

Dunphy Park Improvement Project Phase 2

The scope of these Bid Documents includes.

- Demolition
- Soil preparation and grading
- Planting and irrigation
- Pedestrian paths
- Shoreline protection fencing
- Site furnishings

ABBREVIATIONS

AL	ALIGN	GAL	GALLON	SPD	SEE PLUMBING DRAWINGS
AC	ASPHALTIC CONCRETE	GALV	GALVANIZED	SSD	SEE STRUCTURAL DRAWINGS
AD	AREA DRAIN	GB	GRADE BREAK	SCD	SEE CIVIL DRAWINGS
ADA	AMERICANS WITH DISABILITIES	GC	GALLON CAN	SD	STORM DRAIN
	ACT	GFRC	GLASS FIBER REINFORCED CONCRETE	SDR	STORM / SLOT DRAIN RIM
AGG	AGGREGATE			SHT	SHEET
ALUM	ALUMINUM	GPM	GALLONS PER MINUTE	SJ	SCORE JOINT
APPX	APPROXIMATE	GRD	GRADE	SMD	SEE MECHANICAL DRAWINGS
ARCH	ARCHITECTURE	HB	HOSE BIB	SPCS	SPACES
BLDG	BUILDING	HDPE	HIGH DENSITY POLYETHYLENE	SPEC'D	SPECIFIED
BOS	BOTTOM OF SLOPE	HDR	HEADER	SPECS	SPECIFICATIONS
BR	BOTTOM OF RAMP	HORIZ	HORIZONTAL	SQ	SQUARE
BS	BOTTOM OF STAIRS	HT	HEIGHT	SF	SQUARE FEET
BX	BOX	ID	INSIDE DIAMETER	SS	STAINLESS STEEL
CAL	CALIPER	INV	INVERT ELEVATION	STD	STANDARD
CALDAG	CALIFORNIA DISABLED ACCESSIBILITY GUIDEBOOK	IRR	IRRIGATION	STL	STEEL
	CATCH BASIN	LF	LINEAR FEET	STPA	STORMWATER TREATMENT PLANTING AREA
CB	CALIFORNIA BUILDING CODE	MAWA	MAXIMUM APPLIED WATER ALLOWANCE	SW	SIDEWALK
CBC	CATCH BASIN			TBD	TO BE DETERMINED
CJ	CONTROL JOINT	MAX	MAXIMUM	TC	TOP OF CURB
CL	CENTERLINE	MFG	MANUFACTURER	TOF	TOP OF FOOTING
CLF	CHAIN LINK FENCE	MH	MANHOLE	TOW	TOP OF WALL
CLR	CLEAR	MIN	MINIMUM	TR	TOP OF RAMP
CO	CLEAN OUT	(N)	NEW	TS	TOP OF STAIRS
COL	COLUMN	NIC	NOT IN CONTRACT	TW	TOP OF WALL
CONC	CONCRETE	NO	NUMBER	TYP	TYPICAL
CONST	CONSTRUCTION	NTS	NOT TO SCALE	UBC	UNIFORM BUILDING CODE
CONT	CONTINUOUS	OC	ON CENTER	UON	UNLESS OTHERWISE NOTED
CTR	CENTER	OD	OUTSIDE DIAMETER	VERT	VERTICAL
CY	CUBIC YARD	PA	PLANTING AREA	W	WATER LINE
DG	DECOMPOSED GRANITE	PERF	PERFORATED	WUCOLS	WATER USE CLASSIFICATION OF LANDSCAPE SPECIES
DI	DRAIN INLET	PERP	PERPENDICULAR		WITH
DIA	DIAMETER	PIP	POURED-IN-PLACE	W/	AT
DWGS	DRAWINGS	PL	PROPERTY LINE	@	
EJ	EXPANSION JOINT	POC	POINT OF CONNECTION		
ELE TRANS	ELECTRICAL TRANSFORMER	PROP	PROPOSED		
ELEV	ELEVATION	PSI	POUNDS PER SQUARE INCH		
EQ	EQUAL	PVC	POLYVINYL-CHLORIDE		
EQUIP	EQUIPMENT	QTY	QUANTITY		
ETWU	ESTIMATED TOTAL WATER USE	R	RADIUS		
(E)	EXISTING	RB	ROOTBALL		
FEE	FINISH FLOOR ELEVATION	REBAR	REINFORCING BAR		
FG	FINISH GRADE	REC	RECOMMENDATION		
FL	FLOWLINE	REQ'D	REQUIRED		
FOB	FACE OF BUILDING	RGH	ROUGH		
FOC	FACE OF CURB	RIM	RIM ELEVATION		
FT	FOOT/FEET	RWD	REDWOOD		
FTG	FOOTING	SAD	SEE ARCHITECTURAL DRAWINGS		
GA	GAUGE	SED	SEE ELECTRICAL DRAWINGS		

OWNER:

CITY OF SAUSALITO
420 LITHO ST
SAUSALITO, CA 94965
(T) 415.289.4100

LANDSCAPE:

RHAA
LANDSCAPE ARCHITECTURE
225 MILLER AVENUE
MILL VALLEY, CA 94941
(T) 415.383.7900

SHEET INDEX

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Vicinity Map (NTS)

PROJECT/CLIENT NAME
**Dunphy Park
Improvement Project
Phase 2**

200 Napa Street
Sausalito, CA 94965

Owner:
City of Sausalito
420 Litho St.
Sausalito, CA 94965

RHAA PROJECT NUMBER
16042A

CONSULTANT

SUBMITTAL

Bid Documents

DATE
22 AUGUST 2025

No.	Date	Description
1	09/09/25	ADDENDUM 1
2	09/19/25	ADDENDUM 2

REGISTRATION AND SIGNATURE



Public Works Director:
Date:



SHEET TITLE
COVER SHEET

DRAWN BY: TS / QU CHECKED BY: JM

L0.0



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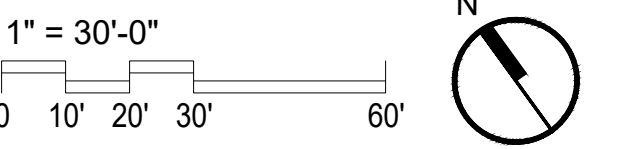
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SHEET TITLE
**ILLUSTRATIVE
SITE PLAN**

DRAWN BY: TS / QU CHECKED BY: JM

L0.1

Date Plotted: 9/18/2025 5:45 PM

GENERAL NOTES

1.

These drawings and specifications describe the quality and character of the materials, shape, configuration and design intent of the completed, installed work. The contractor is responsible for providing complete and operational systems and installations of the described design intent, including all miscellaneous items of work, materials, equipment, etc., necessary to complete the installation whether or not mentioned in the specifications or shown on the drawings. All materials shall be furnished and properly installed by the contractor unless otherwise noted.
2.

The installed work shall conform to the requirements of the governing building authority; requirement of the City of Sausalito, Marin Municipal Water District, and any other permitting agency; all special requirements and conditions of the design review permit and building permit; and all applicable codes, laws, standards, etc.
3.

The contractor shall examine the drawings and specifications and clearly understand the existing conditions under which the work is to be performed prior to bidding. The contractor shall be familiar with the project site, field investigate, verify and be responsible for all conditions, elevations and dimensions of the project, as shown on or referenced on the drawings. The contractor shall notify the owner's representative about any condition requiring modification or clarification prior to bidding. Entering into an agreement with the owner indicates that the contractor has visited the site, familiar with the existing conditions and fully understands the requirements of the contract documents. No allowances of any kind will be made for any extra cost due to the contractor's failure to inform the owner of discrepancies in time to issue corrective addenda prior to bidding.
4.

All general notes, dimensions, and details shall be considered typical and apply to similar conditions unless otherwise noted. Specific notes, details and specifications shall take precedence over general notes and typical details.
5.

The contractor is responsible for the coordination of all work between trades, subcontractors, manufacturers, fabricators, and all other contracted for the completion of the work, including those under separate contracts for concurrent projects.
6.

The contractor is responsible for all testing, inspections and reporting as outlined in the contract document and as required by the permitting authorities to complete the work.
7.

All work shall be in accordance with the recommendations specified in the Geotechnical Study Report prepared by RGH Consultants, dated June 9, 2015, Addendum No. 1, dated August 22, 2017. The recommendations of the report shall supersede the information found within these contract documents (drawings and specifications).
8.

The site plan and proposed grading has been developed based on the Boundary and Topographic Survey by Linda A Carruthers & Associates, dated 12/09/13 and revised 6/15/17.
9.

All underground utilities shown on these plans reflect the available records. Contractor shall use caution in all excavation operations. Contractor shall be aware that they may encounter burn ash type waste. The contractor is responsible to investigate and verify all existing and proposed conditions as shown or referenced in the documents, including location and depth of all utilities. The contractor shall immediate notify the owner's representative of any conflicts and/or discrepancies between existing and proposed conditions which will affect the work, before proceeding with the work.
10.

Contractor shall notify underground service alert (usa 800-642-2444) two working days minimum prior to any excavation.
11.

The contractor shall comply with the requirements of the division of industrial safety pertaining to "confined space". Any manhole, culvert, drop inlet or trench, which could contain air that is not readily ventilated, may be considered a "confined space".
12.

Provide adequate protection for all proposed and existing utilities during the construction of this project.
13.

All existing utility structures (shown or not shown on the drawings) within the area of work shall be adjusted or reconstructed to the finish grades shown and specified.
14.

Utility connections and disconnections necessary to complete the work shall be performed in such a manner as to minimize utility service interruptions. Contractor shall coordinate all "down time" with the owner's representative and the appropriate utility and/or agency.
15.

Refer to civil drawings for information and location of all existing and proposed utilities.
16.

Refer to structural and architectural drawings for information regarding all structural connections, waterproofing, building systems and requirements.
17.

The contractor shall protect existing facilities, trees, landscape and other items to remain from damage. Any damage caused by the contractor shall be repaired or replaced at no additional cost to the owner. The contractor shall provide barricades, signs, lights, etc. for the protection of public, personnel, property, and material and to prevent uncontrolled access to the site at all times. The contractor shall assume sole and complete responsibility for job site conditions during the course of construction of the project, including safety of all persons and property, and not limited to normal working hours.
18.

The contractor shall provide accessible egress and ingress to on-site facilities that are to remain

operational during construction.

19.

Any permanent monuments or points damaged or destroyed by construction activities shall be replaced by a licensed engineer or land surveyor at the contractor's expense.
20.

The contractor shall employ all means necessary to control airborne particulate (dust) at and near the construction site of work and along approach routes to the construction site and in compliance with local air quality standards.
21.

Contractor shall maintain "good housekeeping" practices at the job site. Excess building materials and debris shall be removed promptly from the job site and disposed of at an approved dumpsite. The job site shall be left "broom clean" at the end of each workday. Before acceptance by the owner's representative, the completed construction shall be cleared, any applicable labels removed, and all other touchup work completed. All finish materials shall be protected at all times against subsequent damage until final acceptance by the owner's representative.
22.

The contractor shall contact the owner's representative for designation of the equipment and material storage and staging areas at the job site.
23.

Wastewater generated during construction shall not be discharged to the storm drain system. If necessary, the contractor shall provide an area for on-site washing activities during construction. Materials that could contaminate stormwater runoff shall be stored in areas which are designed to prevent exposure to rainfall and prevent runoff. Grading and drainage features shall be constructed so that water flow does not drain to other properties. Flushing of streets and parking lots to remove dirt and construction debris is prohibited unless proper sediment controls are used.
24.

Refer to civil drawings for the stormwater pollution prevention plan (swppp). If no plan is provided, it is the responsibility of the contractor to provide a swppp to the appropriate agency for approval.
25.

The contractor shall prepare a traffic control plan for review and approval by the appropriate agency prior to any work requiring traffic control. The contractor shall be provide traffic controls in accordance with caltrans "manual of traffic controls for construction and maintenance work zones" (current edition) and any additional city, county, district or other agency requirements. Failure to comply may result in immediate stoppage of work until the proper traffic control is in place.
26.

The contractor is responsible for conforming to all improvements to the adjacent existing conditions with smooth transitions to avoid any abrupt or apparent changes in grades, cross slope, hazardous conditions, etc.
27.

The contractor shall immediately notify the owner's representative of any revisions or additional work required as a result of field conditions or local governing authorities. All revisions shall be in written change order form and approved and authorized by the owner's representative before proceeding with the work. Work performed without written authorization shall be the full responsibility of the contractor and at no additional cost to the owner.
28.

In designated environmentally sensitive areas, 1' maximum excavation depth is permitted.
29.

If any waste is encountered during install and excavation, contact city representative and landscape architect. Landscape elements are not to be installed in waste material. All installations to be in clean cover material.
30.

When soil is removed, documentation should be provided on the quantity of soil/waste removed, any testing, and receipts/invoices/manifests showing where the soil/waste was disposed of.
31.

Record any waste discoveries across the site during construction, including wastes that may extend beyond the MHHW and within the southern shoreline environmentally sensitive areas. Document with photos and GIS coordinates and include all information in the Final Report at the end of the project.
32.

Contractor to create a Health and Safety Plan. Air monitoring of VOCs and methane should be included as well as any hazards related to working with burn ash. For more information regarding potential hazards from burn ash, please see the Protocol for Burn Dump Site Investigation and Characterization dated June 30, 2003 (Protocol For Burn Dump Site Investigation and Characterization, June 30, 2003).
33.

Upon completion of the work, a Final Report should be submitted to the LEA for review and approval that contains, at a minimum, as-built drawings showing the project was implemented per design, information from Notes 30 and 31 above, daily field reports, and photographs.
34.

Contractor to provide staging and access plan in coordination with City of Sausalito.

General References

The contractor shall conform with all applicable 2016 California building, plumbing, electrical, mechanical, energy and green building codes.

The contractor shall comply with all requirements of the City of Sausalito, Marin Municipal Water District requirements, and the state water efficient landscape ordinance.

California Building Code (California Code of Regulations Title 24), current addition

Local air quality maintenance district for airborne particulate

Uniform Building Code (UBC)

Caltrans standards

CAL-OSHA, 'Construction Safety Orders' and division of industrial safety pertaining to "Confined Space", current edition

Current standards of the Americans with Disabilites Act (ADA)

California regional water quality control board requirements.

Latest edition of the uniform plumbing code and the national electric code.

California 1881 model water landscape ordinance or adopted local ordinance.

Quality Control Notes

1.

Contractor to provide mockups of all paving materials, walls, etc. for approval
2.

Contractor to submit shop drawings, product technical data sheets, and material samples for approval.
3.

Contractor to submit soil analysis reports for all planting soils for approval.
4.

All approved submittals, test results, products, systems, shop drawings, materials, and mockups will be considered part of the project specifications.

Accessibility Notes

1.

All site work shall comply with current california building code (california code of regulations title 24), current standards of the americans with disabilities act (ada), and the current fair housing act design manual.
2.

All paving areas shall be accessible per title 24. All paving surfaces are to be stable, firm, and slip resistant with cross slopes not to exceed 2% in any direction, unless otherwise noted. Accessible paths of travel are barrier-free access routes at least 48" clear in width and without any abrupt vertical level changes exceeding 1/2" if beveled at 1:2 max slope, or vertical level changes not exceeding 1/4" max. All accessible pathways shall be sloped less than 5% in the direction of travel, unless otherwise noted.
3.

All accessible paths of travel shall be maintained free of overhanging obstructions below 80" above finish grade. Objects with leading edges located between 27"and 80" above finish grade shall not protrude more than 4" horizontally into the path of travel. exceptions include handrails, door closers, and door stops. guardrails or other barriers shall be provided where object protrusion is beyond the limits allowed.



225 Miller Avenue, Mill Valley, CA 94941
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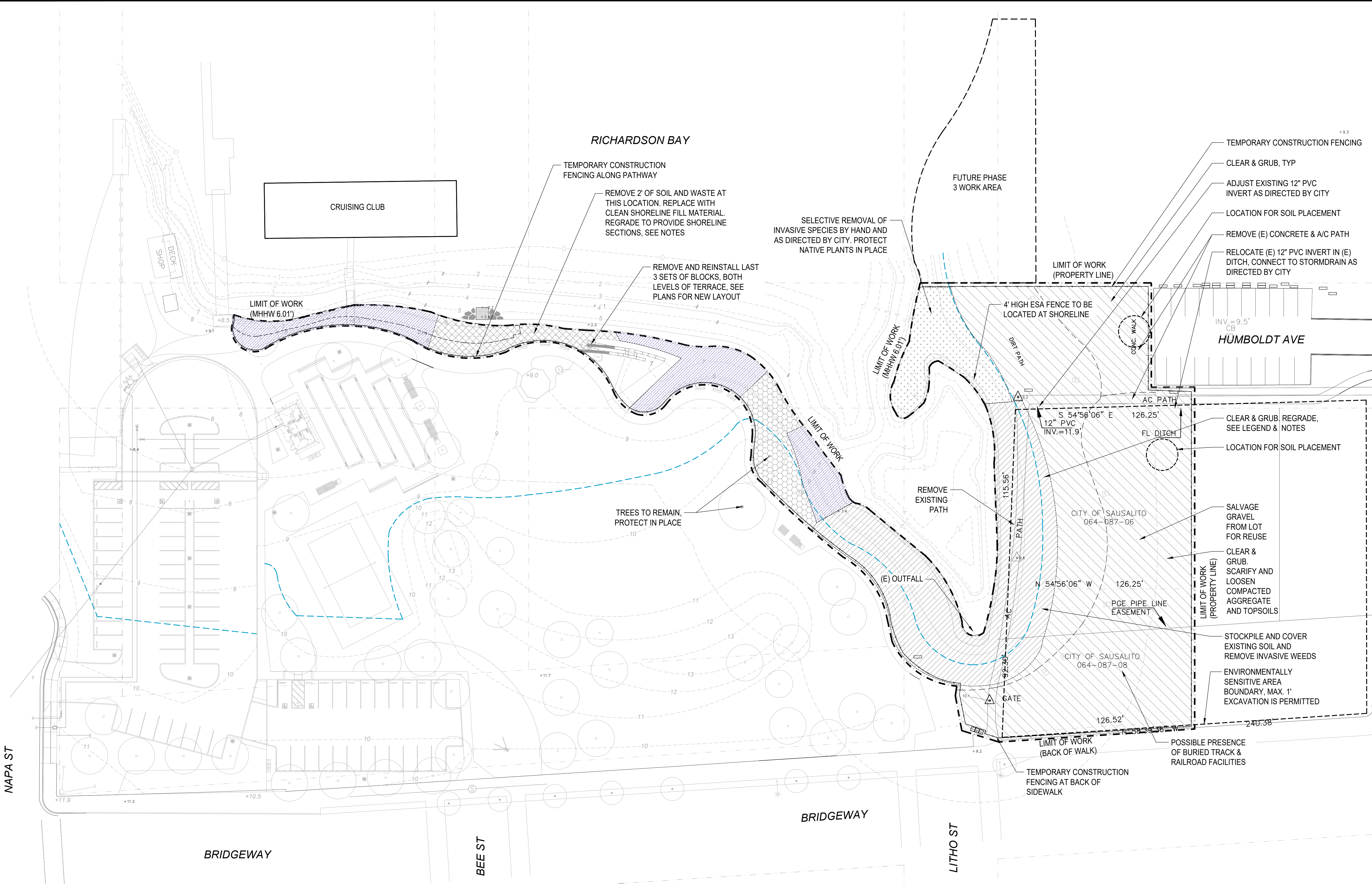
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Date:

SHEET TITLE

GENERAL NOTES

DRAWN BY: TS / QU CHECKED BY: JM

L1.0



LEGEND		
SYMBOL	DESCRIPTION	AREA
	CLEAR & GRUB. REGRADE AS REQUIRED TO PROVIDE SHORELINE SECTIONS. ANY SOIL OR WASTE REMOVAL PER NOTES 30 & 31 ON L1.0 AND 4 ON L1.1.	11,289 SF
	CLEAR & GRUB. SCARIFY AND LOOSEN COMPACTED SOILS. REFER TO SPECIFICATIONS FOR MORE INFORMATION ON SITE & SOIL PREPARATION.	30,422 SF
	SELECTIVE REMOVAL OF INVASIVE SPECIES BY HAND AND AS DIRECTED BY CITY STAFF. ALL NATIVE PLANTS TO BE PROTECTED IN PLACE.	3,083 SF
	SOIL REMEDIATION WAS COMPLETED AT THIS LOCATION AS PART OF PHASE 1 WORK. REMOVE ANY INVASIVE SPECIES PRESENT BY HAND.	5,135 SF

	REMOVE 2' OF SOIL AND WASTE AT THIS LOCATION. REPLACE WITH CLEAN SHORELINE SOIL. REGRADE TO PROVIDE SHORELINE SECTIONS. SEE NOTES 30 & 31 ON L1.0 AND 3 & 4 ON L1.1.	1,750 SF
	SOIL REMEDIATION WAS COMPLETED AT THIS LOCATION AS PART OF PHASE 1 WORK. REMOVE ANY INVASIVE SPECIES PRESENT BY HAND.	2,197 SF
	ENVIRONMENTALLY SENSITIVE AREA BOUNDARY, MAX. 1' EXCAVATION IS PERMITTED	
	PARCEL LINE	
	LIMIT OF WORK LINE	
	100 YEAR XHT 9.53'	
	TEMPORARY CONSTRUCTION FENCING	

DEMOLITION NOTES

- CONTRACTOR TO PROTECT IN PLACE ALL EXISTING PARK PATHWAYS AND IMPROVEMENTS.
- CONTRACTOR TO MITIGATE ANY DAMAGE TO EXISTING IMPROVEMENTS INCLUDING GATES & PATHWAYS.
- IN AREA WITH 2' REMOVAL OF SOIL, DOCUMENTATION SHOULD BE PROVIDED ON THE QUANTITY OF SOIL / WASTE REMOVED, ANY TESTING, AND RECEIPTS / INVOICES / MANIFESTS SHOWING WHERE THE SOIL / WASTE WAS DISPOSED OF.
- IF WASTE IS ENCOUNTERED DURING SITE WORK, REFER TO NOTES 28-33 ON SHEET L1.0 GENERAL NOTES.
- FOR SHORELINE SECTIONS SEE SHEETS L4.2 - L4.4
- REFER TO SOIL PLACEMENT PLAN L3.0 FOR ADDITIONAL INFORMATION ON SOIL TYPES.
- ARCHAEOLOGIST AND NATIVE AMERICAN MONITOR TO BE ON SITE FOR ANY SOIL DISTURBANCE.

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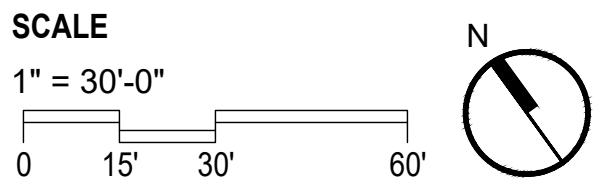
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SHEET TITLE

**DEMOLITION
PLAN**

DRAWN BY: TS / QU CHECKED BY: JM

L1.1

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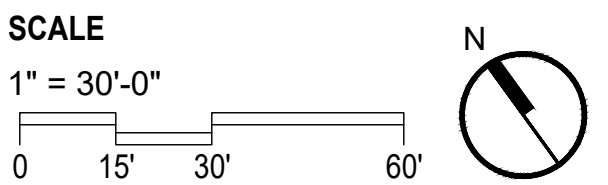
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SHEET TITLE
**LAYOUT PLAN &
GRADING PLAN**

DRAWN BY: TS / QU CHECKED BY: JM

L2.0

PROJECT BENCHMARK IS A 2.5" BRASS DISK SET IN THE CENTER LINE ISLAND ON NAPA STREET AND BRIDGEWAY. THIS BENCHMARK IS PART OF THE CITY OF SAUSALITO HIGH PRECISION NETWORK CONDUCTED IN 2016/2017 AND BASED ON NAVD 1988. BM IS STAMPED HPN 4 HAVING AN ELEVATION OF 13.67' NAVD 1988

RICHARDSON BAY

CRUISING CLUB

FUTURE PHASE
3 WORK AREA

LIMIT OF WORK
(PROPERTY LINE)

HUMBOLDT AVE

LIMIT OF WORK
(MHHW 6.01')

LIMIT OF WORK

LIMIT OF WORK
(PROPERTY LINE)

LIMIT OF WORK
(BACK OF WALK)

BRIDGEWAY

LITHO ST

BEE ST

BRIDGEWAY

NAPA ST

LAYOUT LEGEND	
SYMBOL	DESCRIPTION
	CENTER LINE
	ALIGN
	ARC LENGTH
EQ	EQUAL
(E)	EXISTING
	RADIUS
OC	ON CENTER
	PARCEL LINE
	LIMIT OF WORK

LAYOUT NOTES

- SEE SURVEY FOR BENCHMARK NOTES & DESCRIPTION. SURVEY PERFORMED BY LINDA A. CARRUTHERS & DATED 6/17/17.
- THE CONTRACTOR IS RESPONSIBLE TO LAY OUT ALL IMPROVEMENTS AS SHOWN AND SPECIFIED.
- THE CONTRACTOR SHALL FIELD VERIFY THAT ALL STAKING SET FOR IMPROVEMENTS ARE CONSISTENT WITH THE DESIGN INTENT OF THESE PLANS AND IMMEDIATELY NOTIFY THE OWNER'S REPRESENTATIVE AND LANDSCAPE ARCHITECT OF ANY DISCREPANCY.
- ALL CURVES TO BE CONTINUOUS WITH SMOOTH TRANSITIONS AS SHOWN IN THE DRAWINGS, UNLESS OTHERWISE NOTED.
- HORIZONTAL COORDINATES AND DIMENSIONS ARE SHOWN AT THE PRIMARY GEOMETRIC CONTROL POINTS FOR THE IMPROVEMENTS TO AID THE CONTRACTOR WITH THE ESTABLISHMENT OF THE HORIZONTAL LOCATION OF THE IMPROVEMENTS AND ARE BASED ON THE SURVEY AND COORDINATES PROVIDED BY THE CIVIL ENGINEER.
- THE CONTRACTOR SHALL REFER TO THE ARCHITECTURAL AND ENGINEERING PLANS FOR THE LAYOUT, DIMENSIONS, ANGLES AND ELEVATIONS OF ALL BUILDINGS, STRUCTURES, UTILITIES, CURBS AND GUTTERS.

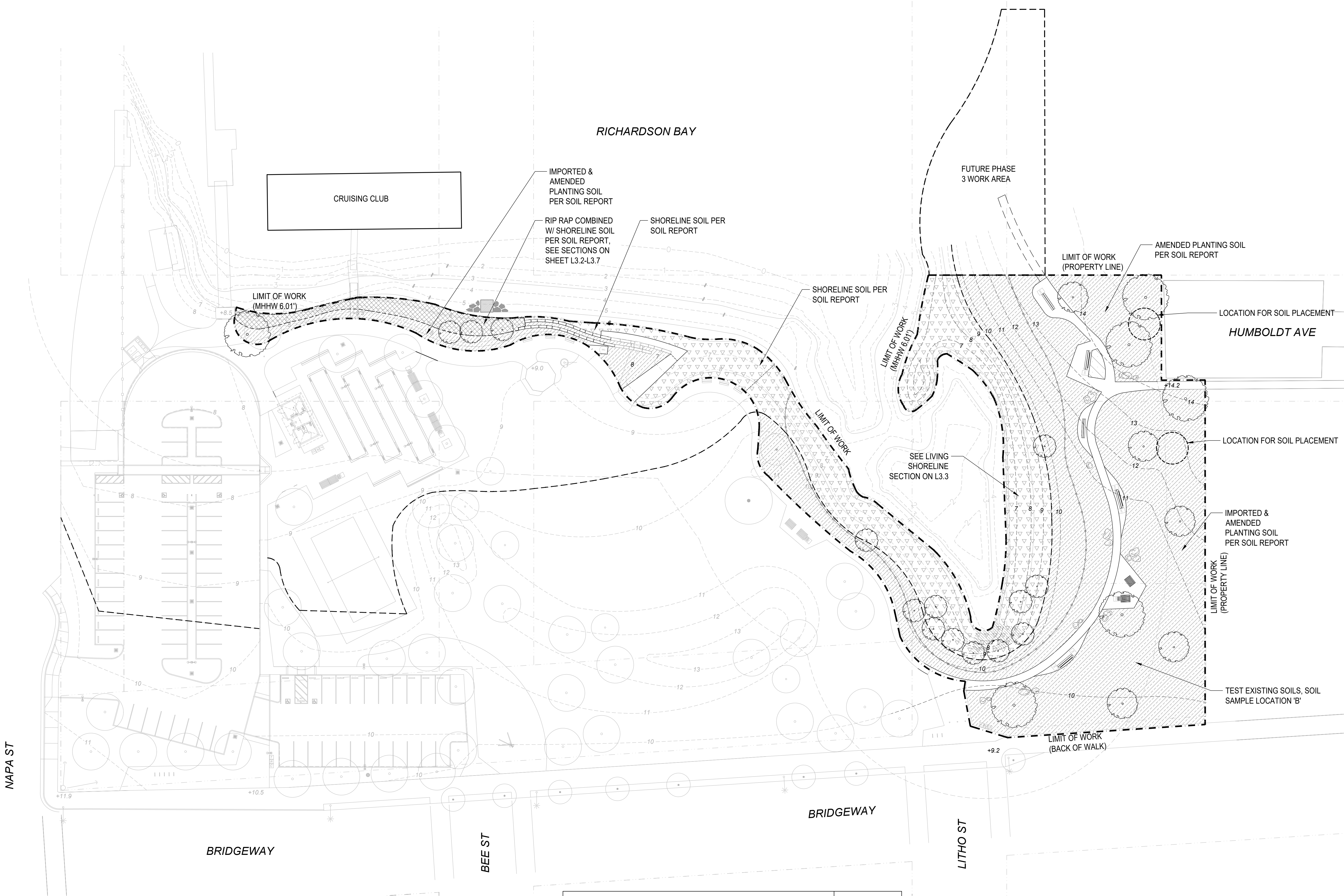
GRADING NOTES

- THE CONTRACTOR IS RESPONSIBLE FOR CONFORMING TO ALL IMPROVEMENTS TO THE ADJACENT EXISTING CONDITIONS WITH SMOOTH TRANSITIONS TO AVOID ANY ABRUPT OR APPARENT CHANGES IN GRADES, CROSS SLOPE, HAZARDOUS CONDITIONS, ETC.
- CONTRACTOR TO NOTIFY THE OWNER'S REPRESENTATIVE OF ANY DISCREPANCIES BETWEEN THE DESIGN INTENT AND EXISTING CONDITIONS AND ANY CONFLICTING INFORMATION REGARDING FINISH GRADES AND ELEVATIONS.
- ALL EXISTING UTILITY STRUCTURES (SHOWN OR NOT SHOWN ON THE DRAWINGS) WITHIN THE AREA OF WORK SHALL BE ADJUSTED OR RECONSTRUCTED TO THE FINISH GRADES SHOWN AND SPECIFIED.
- ALL FINISH GRADES AND CONTOURS IN PLANTING AREAS REFER TO FINISH GRADE OF THE MULCHED LANDSCAPE.

POB FOR COORDINATES,
PROJECT BM HPN 4
ELEV. = 13.67 NAVD 1988

PROJECT BM HPN 4
ELEV. = 13.67 NAVD 1988

Date Plotted: 9/18/2025 5:45 PM



LEGEND		
SYMBOL	DESCRIPTION	AREA
	IMPORTED & AMENDED PLANTING SOIL PER SOIL REPORT	34,157 SF
	RIP RAP W/ SHORELINE SOIL, SEE NOTES	1,760 SF
	SHORELINE SOIL, SEE NOTES	14,997 SF
	PARCEL LINE	
	LIMIT OF WORK LINE	
	100 YEAR XHT 9.53'	

SOIL MANAGEMENT NOTES

- CONTRACTOR TO PROVIDE TESTING AND SOIL REPORT FOR (E) SOIL PRIOR TO STOCKPILING PER SPECIFICATIONS. CONTRACTOR TO AMEND ANY SALVAGED SOIL PER SOIL REPORT RECOMMENDATION.
- REFER TO SPECIFICATIONS FOR DETAILED SOIL AND STOCKPILING INFORMATION.
- TREES WITHIN NEW PLANTING AREAS TO RECIEVE AMENDED PLANTING SOIL AT 2X ROOTBALL DIMENSION. TREES WITHIN EXISTING TURF AREAS TO RECIEVE AMENDED PLANTING SOIL AT 3X ROOTBALL DIMENSION
- SHORELINE SOIL TO BE APPROPRIATE FOR INTERTIDAL PLANT GROWTH, SUCH AS RELOCATED DREGDE MATERIAL OR APPROVED EQUAL, SEE SPECS.
- ARCHAEOLOGIST AND NATIVE AMERICAN MONITOR TO BE ON SITE FOR ANY SOIL DISTURBANCE.

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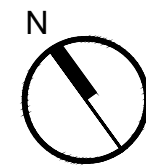
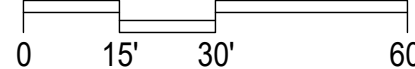
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Public Works Director:
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SCALE

1" = 30'-0"



SHEET TITLE

**SOIL PLACEMENT
PLAN**

DRAWN BY: TS / QU CHECKED BY: JM

L3.0

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Date:

SCALE

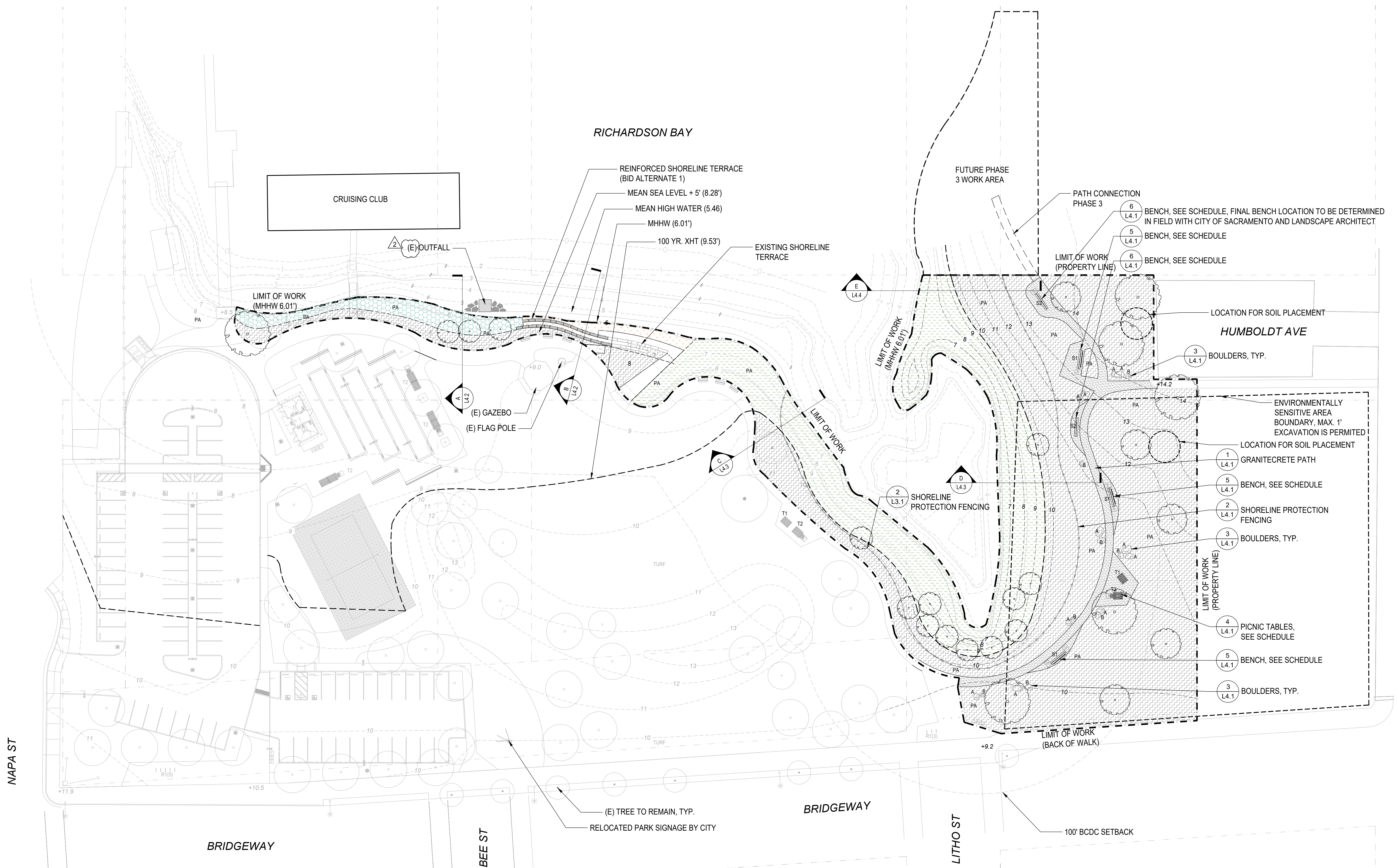
$$1'' = 30'-0''$$

SHEET TITLE

CONSTRUCTION PLAN

DRAWN BY: TS / QU CHECKED BY: JM

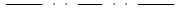
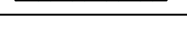
L4.0

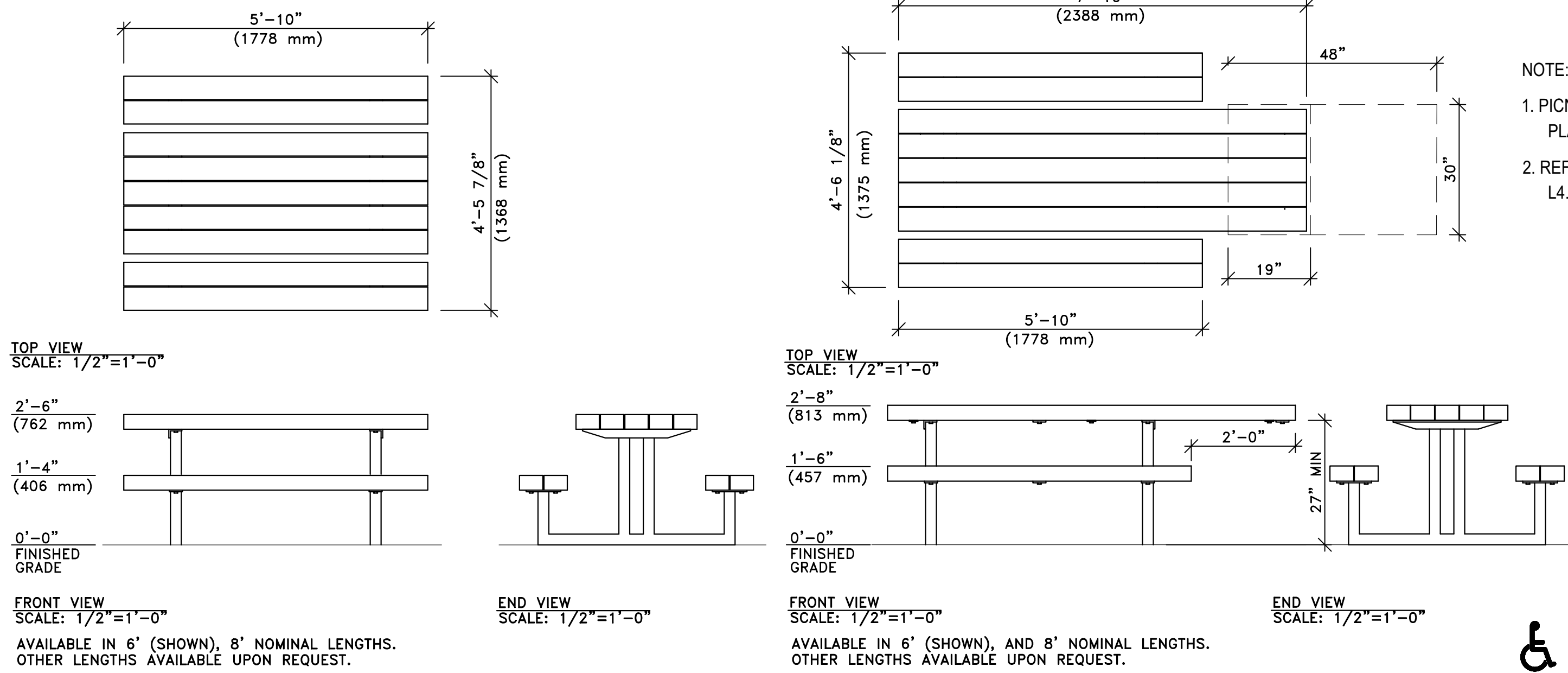


BOULDER SCHEDULE			
	DIMENSIONS	WIDTH AT GRADE	QTY
A	24"-30"	36"	11
B	18"-24"	30"	8

FURNISHING SCHEDULE					
SYMBOL	TYPE/SIZE	MATERIAL	MODEL	MANUFACTURE R	QTY
S1	12'X24"X16"	STEEL-BLACK	GIANT TIMBER SEAT WITH BACK - MODEL # 2219-12-B-ADA	TIMBERFORM	3
S2	12'X24"X16"	STEEL-BLACK	GIANT TIMBER SEAT W/O BACK - MODEL # 2219-12-ADA	TIMBERFORM	2
T1	5'10"X4'5"X2'6"	STEEL-BLACK	GREENWAY PICNIC TABLE (STANDARD) - MODEL # 2164-6	TIMBERFORM	1
T2	7'10"X4'5"X2'6"	STEEL-BLACK	GREENWAY PICNIC TABLE (ACCESSIBLE) - MODEL # 2164-6	TIMBERFORM	1

MATERIALS SCHEDULE			
HATCH	DESCRIPTION	PRODUCT INFORMATION	PRODUCT IMAGE
	GRANITECRETE PATH	MFG & PRODUCT: GRANITECRETE COLOR: NATURAL GOLD, TO MATCH EXISTING, VIF	

LEGEND		
SYMBOL	DESCRIPTION	AREA
	PARCEL LINE	
	LIMIT OF WORK MHHW 6.01'	
	100 YEAR XHT 9.53'	
	REVTMENT SHORELINE	1,760 SF
	EXTENDED TERRACE WALL SHORELINE	537 SF
	LIVING SHORE SHORELINE	14,460 SF
	UPSLOPE PLANTING AREA	34,157 SF



STANDARD PICNIC TABLE

ACCESSIBLE PICNIC TABLE

4 PICNIC TABLES

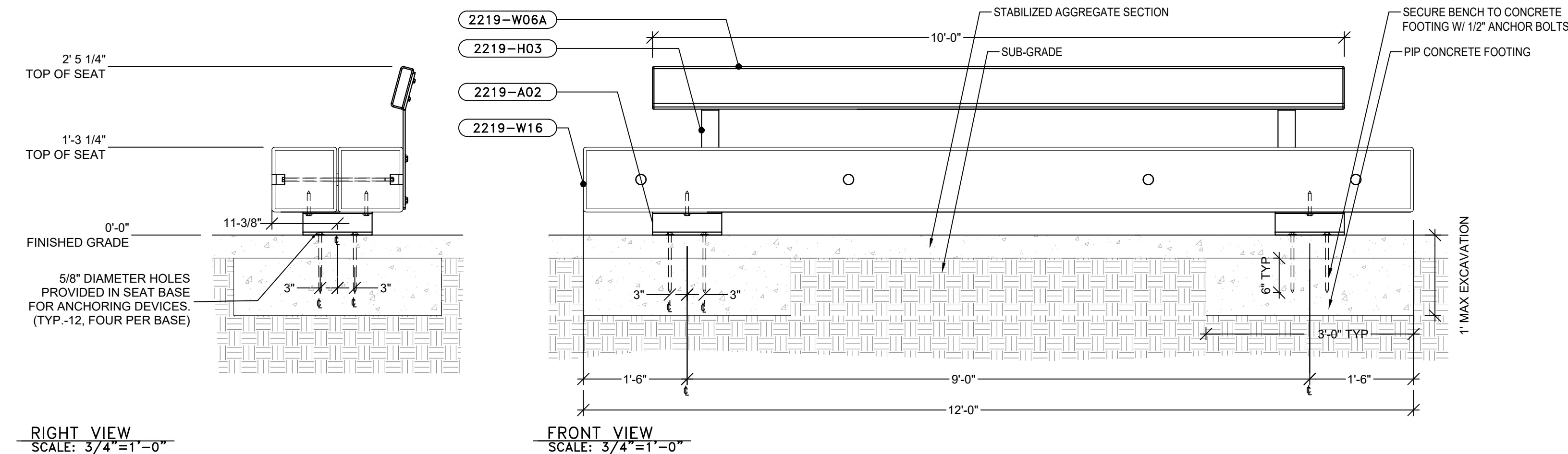
AS NOTED

NOTES:

1. TIMBERFORM GIANT TIMBER SEAT WITH BACK, REFER TO FURNISHING SCHEDULE ON SHEET L4.0 FOR ADDITIONAL PRODUCT INFORMATION.
2. INSTALL PER MANUFACTURER'S INSTRUCTIONS.
3. FOOTING EXCAVATION TO BE LESS THAN 12".

INSTALLATION NOTES:

1. EACH TIMBER MUST BE POSITIONED SO THAT THE BEST FACE IS EXPOSED WHEN ASSEMBLED.
2. FOR MULTIPLE ITEM ORDERS, EXAMINE AND SORT ALL TIMBERS PRIOR TO COMMENCING ASSEMBLY TO ENSURE THE BEST FACES ARE EXPOSED.
3. ASSEMBLE TIMBERS PER DETAIL A/1 IN MANUFACTURER'S INSTRUCTIONS.
4. ATTACH SEAT BASES TO TIMBER ASSEMBLY PER DETAIL A/1 IN MANUFACTURER'S INSTRUCTIONS. USE FULLY ASSEMBLED SEAT TO LOCATE ANCHORING DEVICES, BY OTHERS. THE USE OF SHIMS AND/OR NON-SHRINK GROUT MAY BE REQUIRED FOR LEVEL INSTALLATION, BY OTHERS.
5. SEE IMPORTANT MAINTENANCE INSTRUCTIONS ON DRAWING NO. E-2000-L03.



5 BENCH WITH BACK

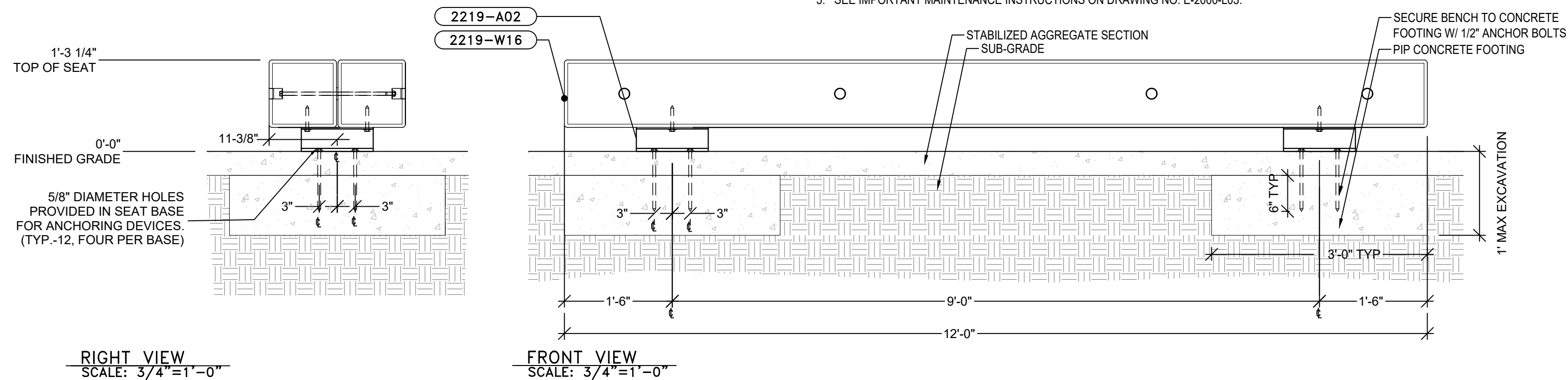
SCALE: 3/4" = 1'-0"

NOTES:

1. TIMBERFORM GIANT TIMBER SEAT WITHOUT BACK, REFER TO FURNISHING SCHEDULE ON SHEET L4.0 FOR ADDITIONAL PRODUCT INFORMATION.
2. INSTALL PER MANUFACTURER'S INSTRUCTIONS.
3. FOOTING EXCAVATION TO BE LESS THAN 12".

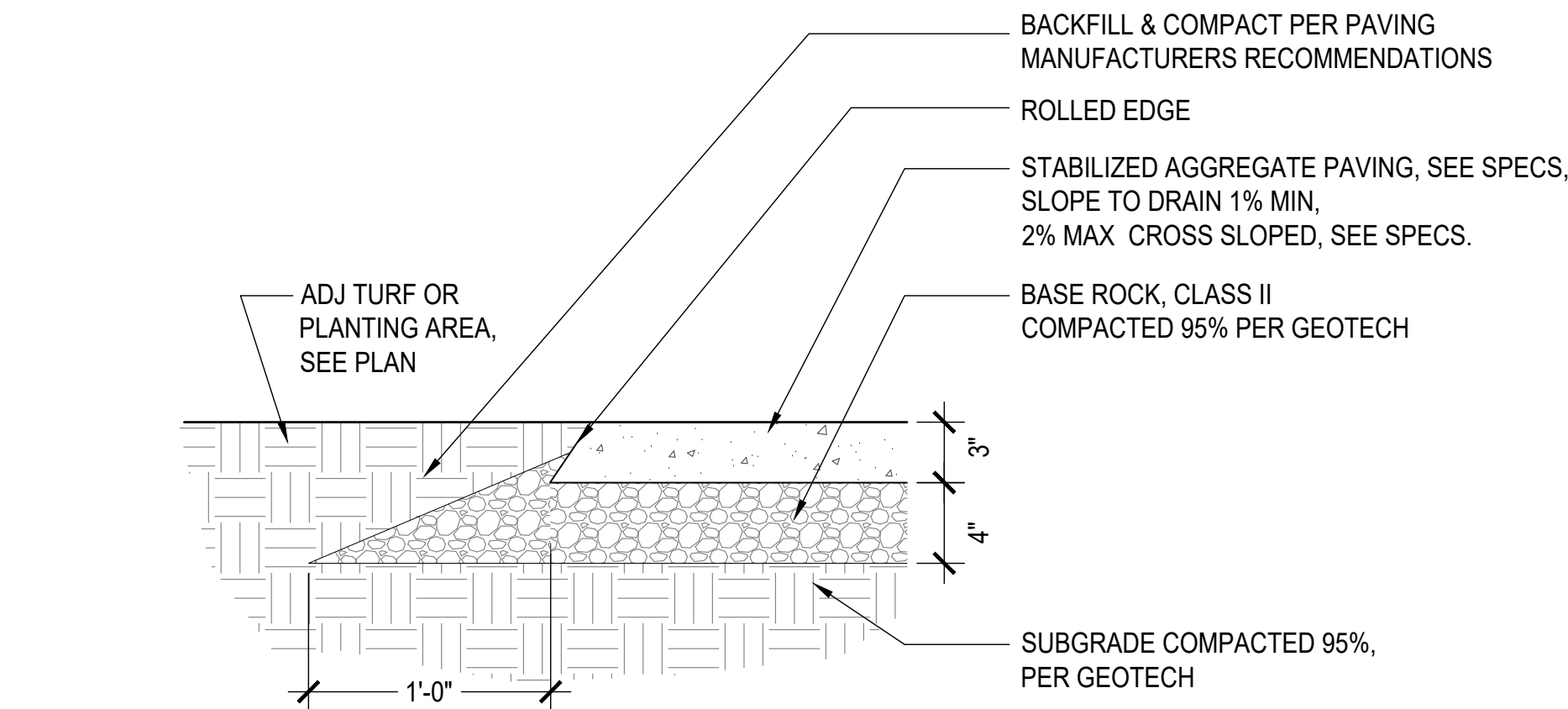
INSTALLATION NOTES:

1. EACH TIMBER MUST BE POSITIONED SO THAT THE BEST FACE IS EXPOSED WHEN ASSEMBLED.
2. FOR MULTIPLE ITEM ORDERS, EXAMINE AND SORT ALL TIMBERS PRIOR TO COMMENCING ASSEMBLY TO ENSURE THE BEST FACES ARE EXPOSED.
3. ASSEMBLE TIMBERS PER DETAIL A/1 IN MANUFACTURER'S INSTRUCTIONS.
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5. SEE IMPORTANT MAINTENANCE INSTRUCTIONS ON DRAWING NO. E-2000-L03.



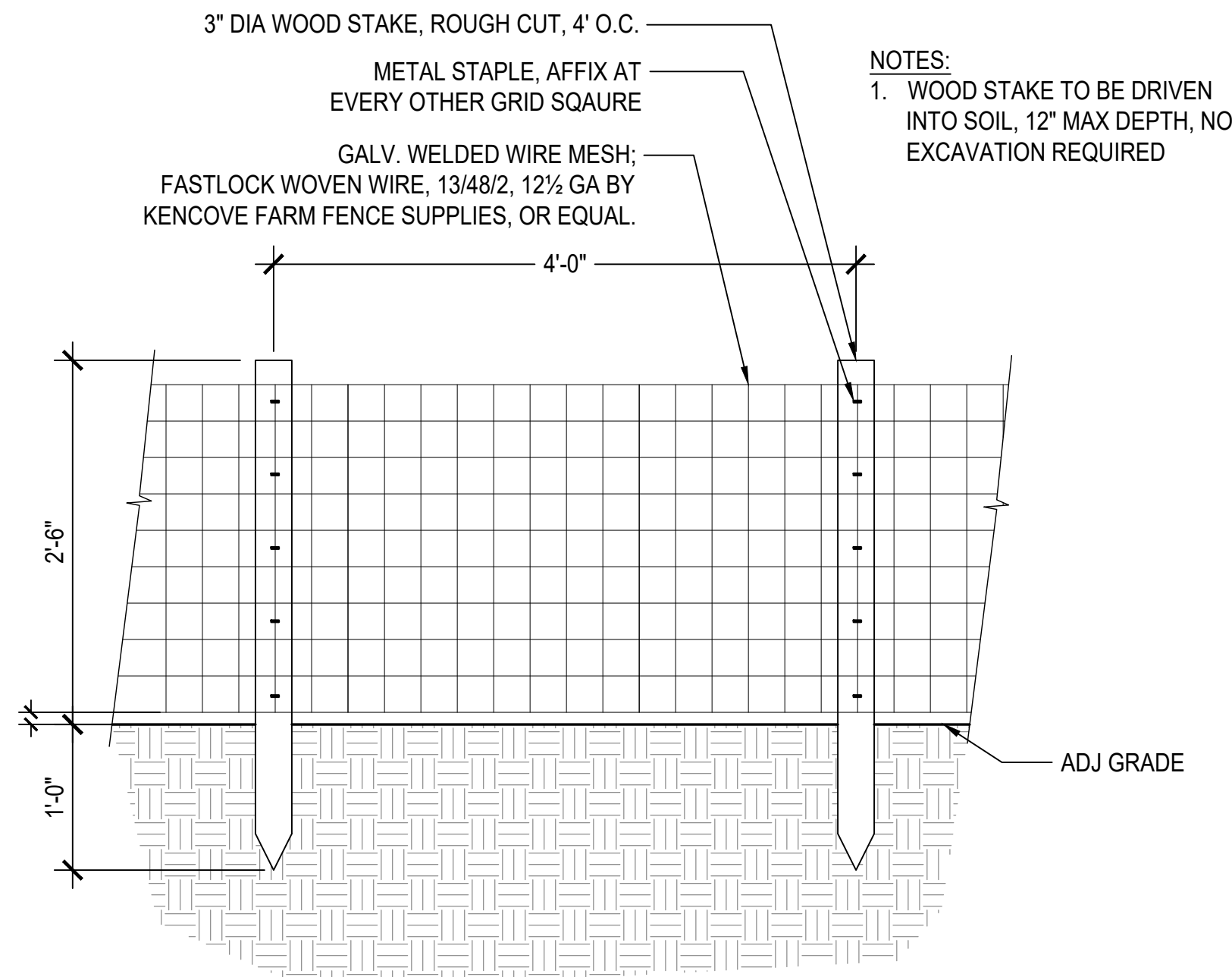
6 BENCH WITHOUT BACK

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



1 GRANITECRETE PATH

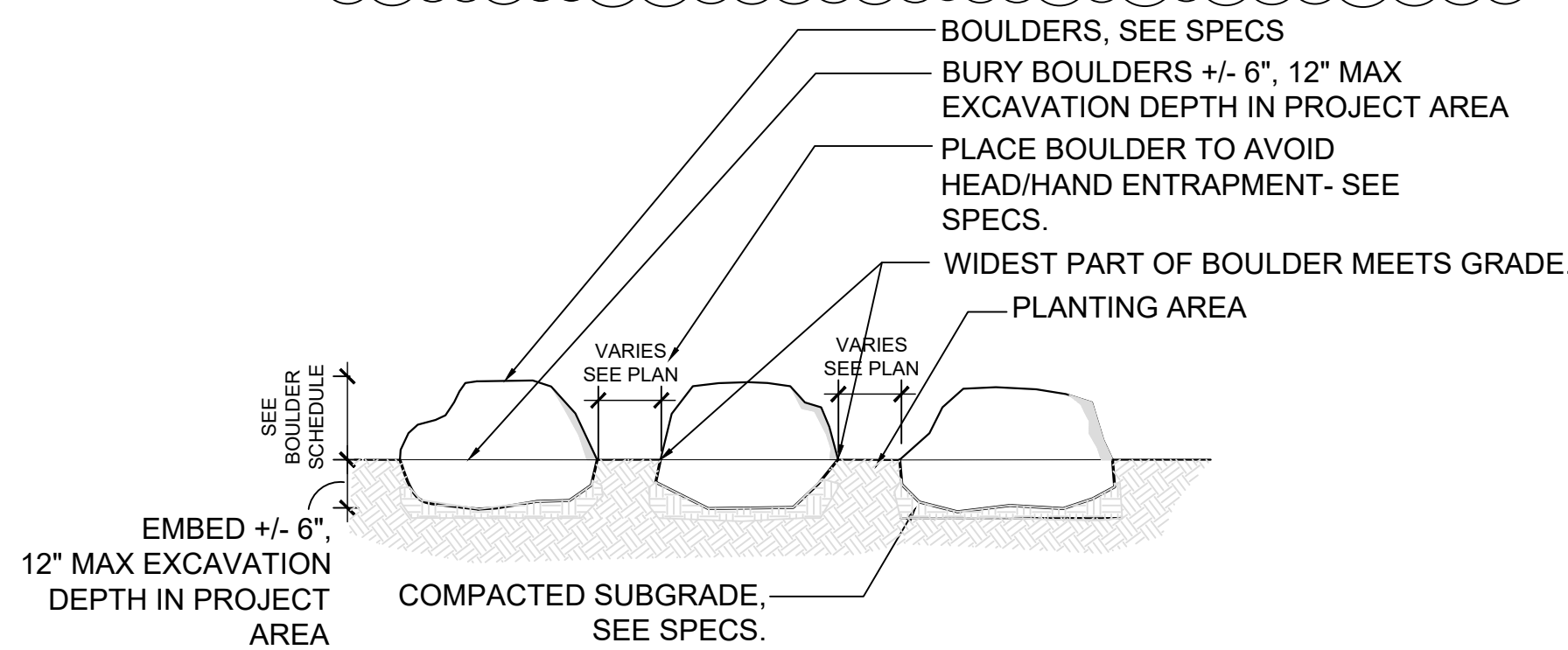
SCALE: 1 1/2" = 1'-0"



2 SHORELINE PROTECTION FENCING

1" = 1'-0"

- NOTES:
1. FINAL BOULDER LOCATION TO BE DETERMINED IN FIELD WITH LANDSCAPE ARCHITECT AND CITY REPRESENTATIVE. DETAIL REPRESENTS TYPICAL LAYOUT.
 2. BOULDER TO BE SONOMA FIELDSTONE TYPE, LOCATED AND SIZED AS SHOWN ON THE DRAWINGS. GENERALLY RECTANGULAR IN SHAPE, NATURALLY WEATHERED, AS AVAILABLE FROM A&S LANDSCAPE MATERIALS OR APPROVED EQUAL. SET AND ARRANGE STONES WITH BEST, UNDAMAGED, AND WEATHERED SIDES EXPOSED, AT HEIGHT AS DESCRIBED IN DRAWINGS OR AS ACCEPTED BY OWNER'S REPRESENTATIVE.



3 BOULDERS

NTS

PROJECT/CLIENT NAME

Dunphy Park Improvement Project Phase 2

200 Napa Street
Sausalito, CA 94965

Owner:
City of Sausalito
420 Litho St.
Sausalito, CA 94965

RHAA PROJECT NUMBER

16042A

CONSULTANT

SUBMITTAL

Bid Documents

DATE

22 AUGUST 2025

REVISIONS

No.	Date	Description
1	09/09/25	ADDENDUM 1
2	09/19/25	ADDENDUM 2

REGISTRATION AND SIGNATURE



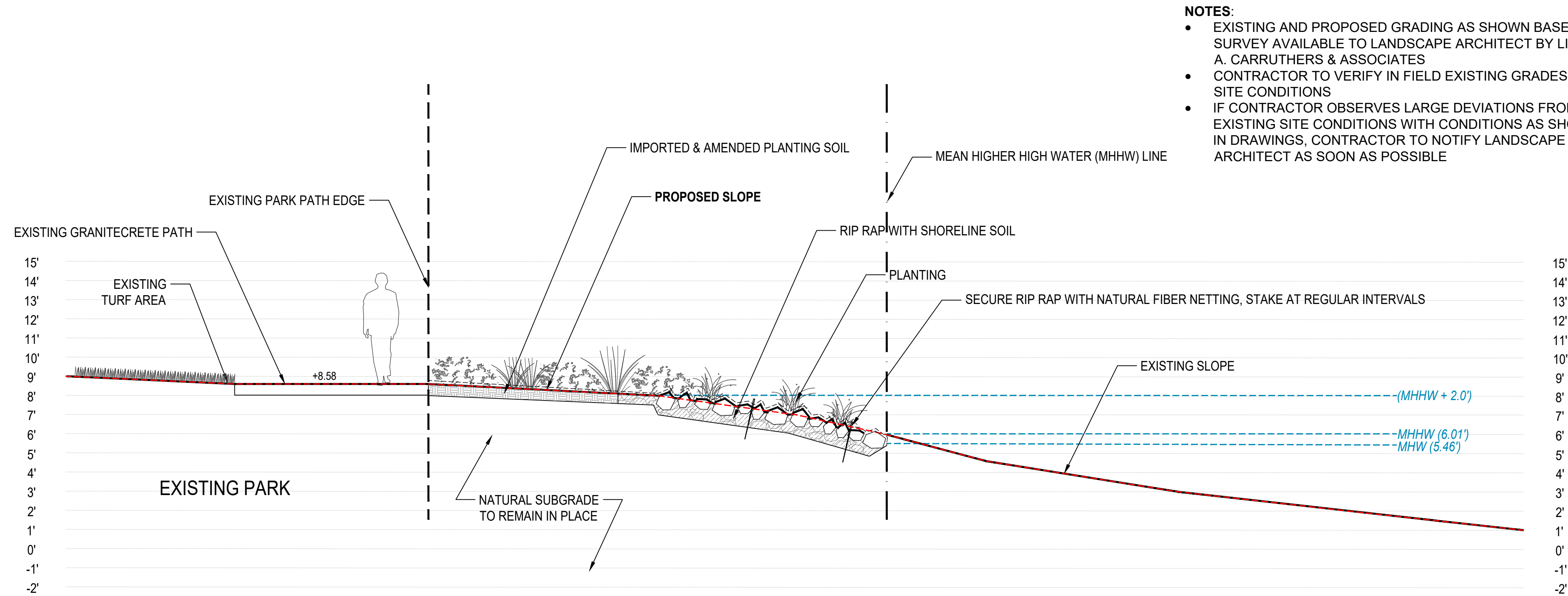
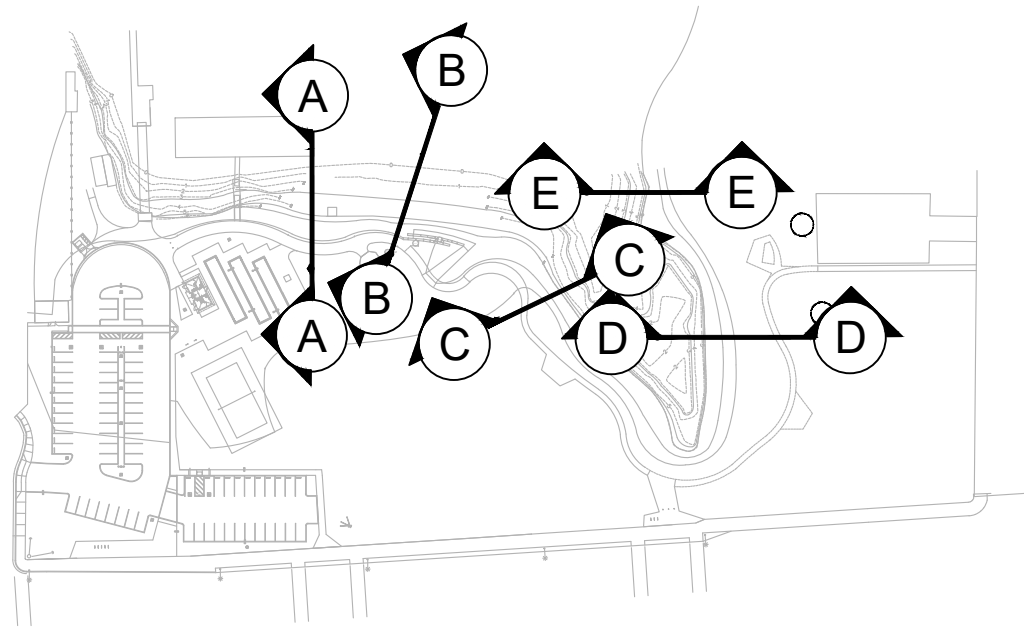
Public Works Director:
Date:

SHEET TITLE

CONSTRUCTION DETAILS

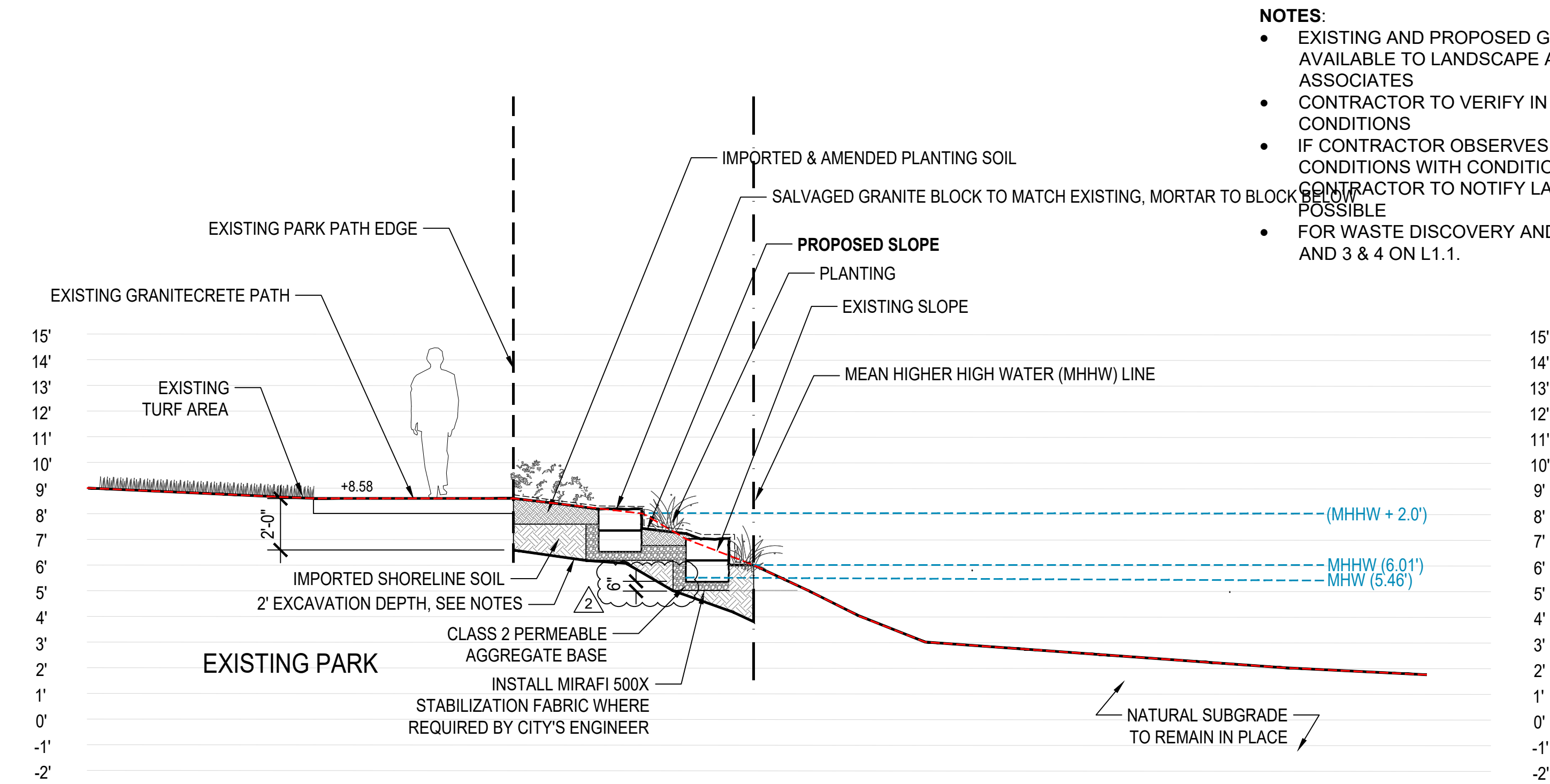
DRAWN BY: TS / QU CHECKED BY: JM

L4.1



- NOTES:
- EXISTING AND PROPOSED GRADING AS SHOWN BASED ON SURVEY AVAILABLE TO LANDSCAPE ARCHITECT BY LINDA A. CARRUTHERS & ASSOCIATES
 - CONTRACTOR TO VERIFY IN FIELD EXISTING GRADES AND SITE CONDITIONS
 - IF CONTRACTOR OBSERVES LARGE DEVIATIONS FROM EXISTING SITE CONDITIONS WITH CONDITIONS AS SHOWN IN DRAWINGS, CONTRACTOR TO NOTIFY LANDSCAPE ARCHITECT AS SOON AS POSSIBLE

A SHORELINE SECTION - PLANTED RIP RAP WITH FIBER NET
1/4" = 1'-0"



- NOTES:
- EXISTING AND PROPOSED GRADING AS SHOWN BASED ON SURVEY AVAILABLE TO LANDSCAPE ARCHITECT BY LINDA A. CARRUTHERS & ASSOCIATES
 - CONTRACTOR TO VERIFY IN FIELD EXISTING GRADES AND SITE CONDITIONS
 - IF CONTRACTOR OBSERVES LARGE DEVIATIONS FROM EXISTING SITE CONDITIONS WITH CONDITIONS AS SHOWN IN DRAWINGS, CONTRACTOR TO NOTIFY LANDSCAPE ARCHITECT AS SOON AS POSSIBLE
 - FOR WASTE DISCOVERY AND REMOVAL SEE NOTES 30 & 31 ON L1.0 AND 3 & 4 ON L1.1.

B SHORELINE SECTION - PLANTED GRANITE BLOCK STEP (BID ALTERNATE 1)
1/4" = 1'-0"

PROJECT/CLIENT NAME
**Dunphy Park
Improvement Project
Phase 2**

200 Napa Street
Sausalito, CA 94965

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City of Sausalito
420 Litho St.
Sausalito, CA 94965

RHAA PROJECT NUMBER
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22 AUGUST 2025

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REGISTRATION AND SIGNATURE

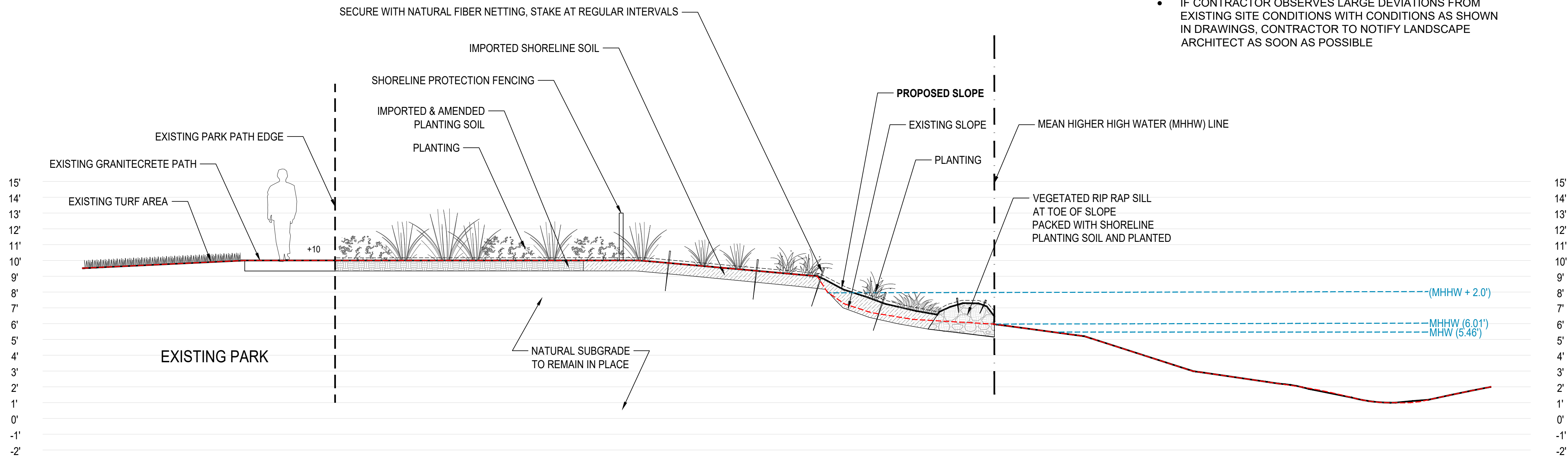
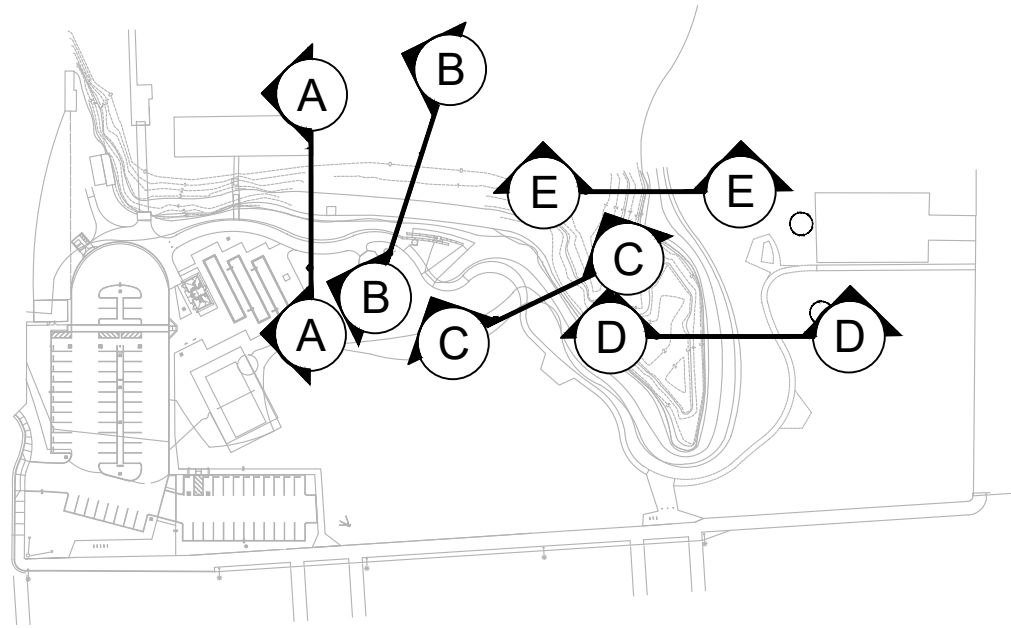


Public Works Director:
Date:

SHEET TITLE
**LANDSCAPE
SECTIONS**

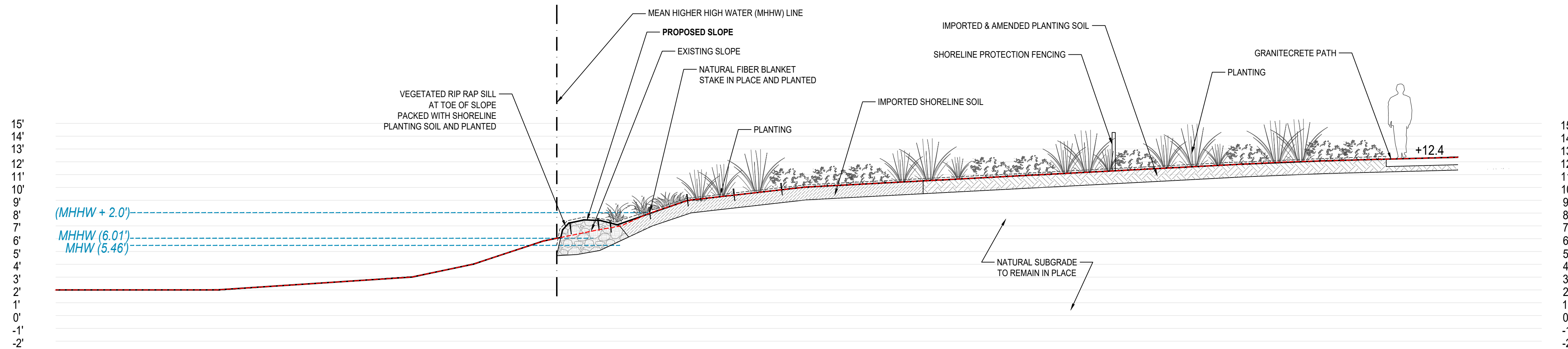
DRAWN BY: TS / QU CHECKED BY: JM

L4.2



C SHORELINE SECTION - REGRADED PLANTED SLOPE W/ EROSION CONTROL
1/4" = 1'-0"

- NOTES:
- EXISTING AND PROPOSED GRADING AS SHOWN BASED ON SURVEY AVAILABLE TO LANDSCAPE ARCHITECT BY LINDA A. CARRUTHERS & ASSOCIATES
 - CONTRACTOR TO VERIFY IN FIELD EXISTING GRADES AND SITE CONDITIONS
 - IF CONTRACTOR OBSERVES LARGE DEVIATIONS FROM EXISTING SITE CONDITIONS WITH CONDITIONS AS SHOWN IN DRAWINGS, CONTRACTOR TO NOTIFY LANDSCAPE ARCHITECT AS SOON AS POSSIBLE



D SHORELINE SECTION - REGRADED PLANTED SLOPE W/ FIBER BLANKET
3/16" = 1'-0"

- NOTES:
- EXISTING AND PROPOSED GRADING AS SHOWN BASED ON SURVEY AVAILABLE TO LANDSCAPE ARCHITECT BY LINDA A. CARRUTHERS & ASSOCIATES
 - CONTRACTOR TO VERIFY IN FIELD EXISTING GRADES AND SITE CONDITIONS
 - IF CONTRACTOR OBSERVES LARGE DEVIATIONS FROM EXISTING SITE CONDITIONS WITH CONDITIONS AS SHOWN IN DRAWINGS, CONTRACTOR TO NOTIFY LANDSCAPE ARCHITECT AS SOON AS POSSIBLE

PROJECT/CLIENT NAME
**Dunphy Park
Improvement Project
Phase 2**

200 Napa Street
Sausalito, CA 94965

Owner:
**City of Sausalito
420 Litho St.
Sausalito, CA 94965**

RHAA PROJECT NUMBER
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CONSULTANT

SUBMITTAL
Bid Documents

DATE
22 AUGUST 2025

REVISIONS		
No.	Date	Description
1	09/09/25	ADDENDUM 1
2	09/19/25	ADDENDUM 2

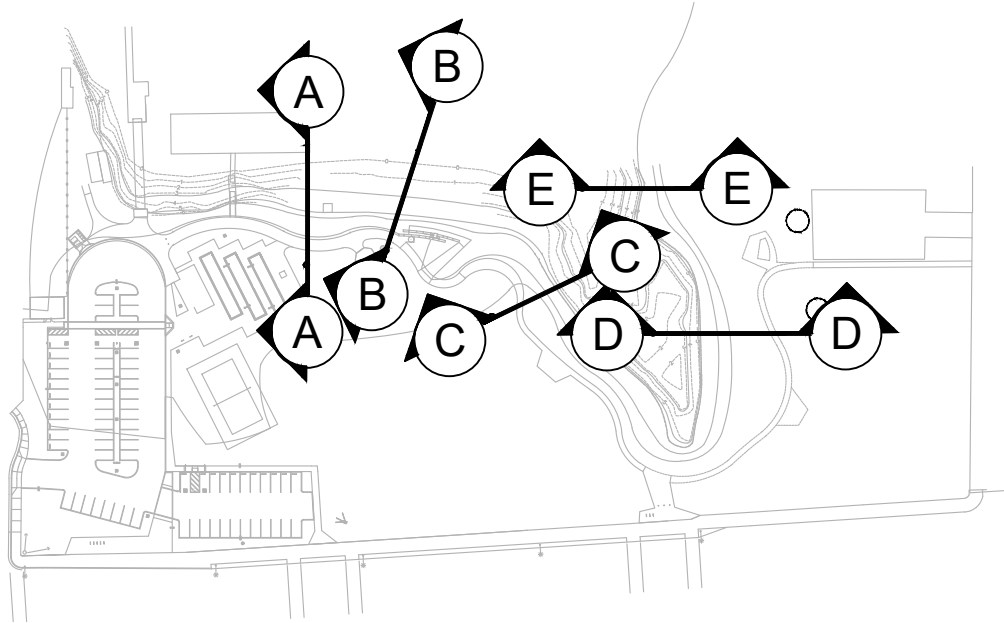
REGISTRATION AND SIGNATURE



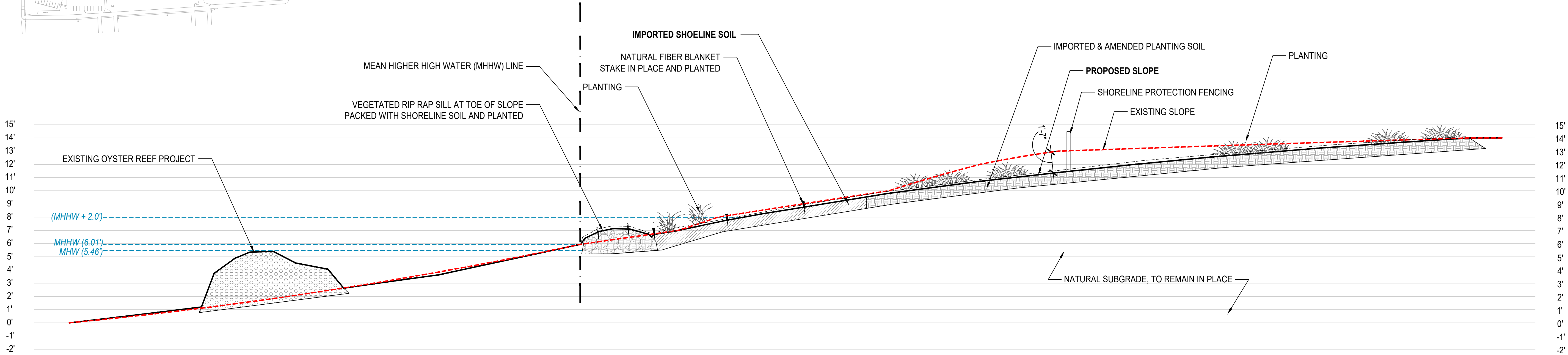
Public Works Director:
Date:

SHEET TITLE
**LANDSCAPE
SECTIONS**

DRAWN BY: TS / QU CHECKED BY: JM



- NOTES:
- EXISTING AND PROPOSED GRADING AS SHOWN BASED ON SURVEY AVAILABLE TO LANDSCAPE ARCHITECT BY LINDA A. CARRUTHERS & ASSOCIATES
 - CONTRACTOR TO VERIFY IN FIELD EXISTING GRADES AND SITE CONDITIONS
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E SHORELINE SECTION - REGRADED PLANTED SLOPE W/ EROSION CONTROL & WAVE ATTENUATION
1/4" = 1'-0"

Date Plotted: 9/18/2025 5:45 PM

225 Miller Avenue, Mill Valley, CA 94941
T 415 383 7900
rhaa.com

PROJECT/CLIENT NAME

**Dunphy Park
Improvement Project
Phase 2**

200 Napa Street
Sausalito, CA 94965

Owner:
City of Sausalito
420 Litho St.
Sausalito, CA 94965

RHAA PROJECT NUMBER

16042A

CONSULTANT

SUBMITTAL

Bid Documents

DATE
22 AUGUST 2025

REVISIONS

No.	Date	Description
1	09/09/25	ADDENDUM 1
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REGISTRATION AND SIGNATURE



Public Works Director:
Date:

SHEET TITLE

**LANDSCAPE
SECTIONS**

DRAWN BY: TS / QU CHECKED BY: JM

L4.4

Irrigation Notes:

1. The irrigation system to be controlled by an existing, centrally located weather-based irrigation controller with a rain shutoff sensor.

2. Shoreline planting to be temporarily irrigated during plant establishment period only. Temporary irrigation to be removed after plants are established.

3. Refer to plans, details and specifications for irrigation system components, installation, maintenance, scheduling, and reporting requirements.

4. The contractor shall comply with local water district procedures & requirements, all city of Sausalito requirements, and the state water efficient landscape ordinance. ordinance criteria has been applied accordingly for the efficient use of water in the irrigation design plan.

5. These irrigation drawings are diagrammatic and indicative of the work to be installed. all piping, valves, and other irrigation components are to be installed within planting areas to the greatest extent possible. Due to the scale of the drawings, it is not possible to indicate all offsets, fittings, sleeves, conduit, and other items which may be required.

6. The contractor is to investigate the existing and proposed finished condition of the work. The contractor shall immediate notify the owner's representative of any conflicts and/or discrepancies between existing and proposed conditions which will affect the work, before proceeding with the work. in the event these notifications are not performed, the contractor assumes full responsibility for required revisions.

7. The contractor shall coordinate all work with other trades, including the installation of all pipe, conduit and sleeves through or under walls, roadways, paving and structures.

8. Prior to trenching and digging, contact usa (800-227-2600) to locate all underground utilities. the contractor shall be responsible for minor changes in the irrigation layout due to obstructions not shown on the irrigation drawings such as underground utilities, vaults, etc. The contractor shall avoid conflicts with underground utilities, new planting, site or architectural elements, and existing trees; any damage to these caused by the installation of the irrigation system shall be repaired and/or replaced at no expense to the owner.

9. Do not trench or install irrigation piping or equipment in lime-treated soil.

10. The irrigation system is designed to operate at 100 gpm, and 120 p.s.i. at the point of connection. The contractor shall verify flow rate and pressure at the point of connection prior to the installation of the irrigation system and notify the owner's representative of test results before construction begins. Notify landscape architect if pressure is greater or less than the static pressure stated on the plans to determine if pressure regulation or a booster pump is required.

11. The contractor shall obtain as-built irrigation drawings of all existing irrigation system(s) from the owner's representative for reference during new and retrofit work.

12. Contractor to field verify condition of all existing irrigation equipment impacted by new construction and repair and replace as necessary.

13. Install all irrigation equipment per manufacturer's recommendations.

14. Install one spare common and control wire from each controller in a continuous loop through each valve box for future use.

15. Where pipe sizes have been omitted or there is a conflict, refer to the lateral pipe sizing chart for sizes. As changes in layout occur during staking and construction, pipe sizes may need to be adjusted accordingly. all lateral end runs shall be 1" size unless otherwise noted.

16. The remote control valves specified on the drawings are pressure reducing types. set the discharge pressure as recommended by manufacturer.

17. Contractor to assume (4) additional control valves to be installed as needed.

18. All irrigation boxes and lids to be black.

19. **Non-potable irrigation note:** This system is being installed for non-potable water use. all pipe, equipment, heads, and fittings shall be color-coded and labeled for non-potable use per all applicable state and local codes.

20. Wherever overhead irrigation is located directly adjacent to hardscape areas, where runoff water flows into the curb and gutter, all spray heads shall be setback a minimum of 24" from hardscape edges.

21. Locate bubblers and emitters on uphill side of plant or tree.

22. Contractor to maintain existing planted areas throughout construction and coordinate operations to keep existing planting areas alive and healthy. Existing and new irrigation systems shall be installed, adjusted and maintained to provide 100% coverage of planting areas and to prevent misting, overspray and runoff onto buildings, walls windows, paved areas, etc.

23. Flush and adjust irrigation emitters, nozzles and outlets for optimum performance and to prevent over spray onto walks, roadways, and/or buildings. Select the best degree of arc and radius to fit the existing site conditions and throttle the flow control at each valve to obtain the optimum operating pressure for each control zone.
24. The intent of this irrigation system is to provide the minimum amount of water required to sustain good plant health. It is the responsibility of the landscape maintenance contractor to program the irrigation controller(s) to provide the minimum amount of water needed to sustain good plant health. This includes making adjustments to the program for seasonal weather changes, plant material, water requirements, mounds and slopes, sun, shade and wind exposure.

25. The contractor shall coordinate valve numbering, controller operations and programming with owner's representative.

26. Station operation times shall not deliver water exceed the soil infiltration rate(s) as determined by the soils report(s).

27. The contractor shall provide the owner's representative with clear as-built plans of the installed of irrigation system.

28. If any waste is encountered during excavation for and installation of irrigation equipment and piping, do not install in waste and contact city representative and landscape architect. Irrigation equipment and piping is to be installed within the thickness of clean cover material.
-
- IRRIGATION LEGEND
- (E) PEDESTAL MOUNTED CONTROLLER
HUNTER HCC-800-SS W/ EZ-DM DECODER (2-WIRE) IN A STAINLESS STEEL
PEDESTAL MOUNTED ENCLOSURE (MODEL ICC-PED-SS) & RAIN SENSOR.

(E) IRRIGATION WATER METER (VIF NUMBER & LOCATION)

(E) 2" REDUCED PRESSURE BACKFLOW PROVENTION DEVICE

(E) MASTER VALVE
HUNTER ICV MASTER VALVE W/ ACCU SYNC AS ADJ, NORMALLY CLOSED

(E) FLOW SENSOR
HUNTER HC FLOW METER, LINE SIZE

MAINLINE: SCH 40 PVC, 2" AND SMALLER

LATERAL LINE: 1" AND LARGER, SCH 40 PVC.

SLEEVE: CLASS 200 PVC

GATE VALVE, BRASS
NIBCO T113-IRR (LINE SIZE), OR EQUAL.

QUICK COUPLING VALVE, LOCKING COVER, 1-PIECE BODY,
RAINBIRD 5-LRC, BRASS, OR EQUAL.

REMOTE CONTROL VALVE WITH PRESSURE REGULATING
SPRAY ZONES: HUNTER ICV W/ ACCU SYNC AS ADJ
DRIP ZONES: HUNTER ICZ WITH FILTER.
- CONTROLLER / STATION NUMBER

FLOW RATE (GPM)

VALVE SIZE (INCHES)
- INLINE DRIP IRRIGATION
RAINBIRD XFS-09-12 SUB-SURFACE DRIP LINE (12" EMITTER SPACING)
W/ RB XFS DRIP SYSTEM OPERATION INDICATOR AT END OF EACH DRIP
ZONE. LINE SPACING TO BE COORDINATED WITH PLANT SPACING (12",
18" & 24" O.C.) *INSTALL LOW FLOW BUBBLERS & IRRIGATION BERMS AT
ROOTBALL OF SHRUBS SPACED GREATER THAN 24" O.C.

TREE WATERING SYSTEM
DRIP RING AT ROOTBALL W/ 2 EMITTERS AT ROOT CROWN, TYP.
DEEP ROOT IRRIGATION TUBE IN PLAZA AREAS

POP-UP STAINLESS STEEL ROTOR W/ ADJUSTABLE ARC & CHECK VALVE
MODEL I-25-04-SS BY HUNTER, OR EQUAL.
SELECT NOZZLE FOR RADIUS SHOWN @ 50PSI

POP-UP SPRAY HEAD WITH ADJUSTABLE ARC, MATCHED PRECIPITATION
RATE, CHECK VALVE & PRESSURE REGULATION.
MODEL PROS-04-PRS40-CV-MP1000/2000/3000 BY HUNTER, OR EQUAL.
SELECT NOZZLE FOR RADIUS SHOWN @40PSI.

TEMPORARY IRRIGATION FOR PLANT ESTABLISHMENT ONLY.
INSTALL (3) SURFACE IN-LINE DRIP LINES AT TOP OF SLOPE. INSTALL
REMOTE CONTROL VALVE & QUICK COUPLERS AS SHOWN ON PLANS.
- | CLASS 200 PVC LATERAL LINE SIZING | | | | TYPICAL VALVE SIZING | |
|-----------------------------------|-------|---------------|------|----------------------|------------|
| 0 - 6 GPM: | 0.75" | 29 - 45 GPM: | 2.0" | 00 - 25 GPM: | 1.0" VALVE |
| 7 - 12 GPM: | 1.0" | 46 - 65 GPM: | 2.5" | 26 - 35 GPM: | 1.25" |
| 13 - 28 GPM: | 1.5" | 66 - 100 GPM: | 3.0" | 36 - 50 GPM: | 1.5" |
| | | | | 51 - 100 GPM: | 2" |
- MARIN WATER
WATER BUDGET & WATER USE CALCULATOR
- | | |
|------------------------|----------------------------|
| Zip Code: | 94965 |
| Date: | 6/24/2024 |
| Project Name: | Dunphy Park |
| Project Address: | 200 Napa Street, Sausalito |
| Project Contact: | Kossen Miller |
| Project Contact Email: | kossen.miller@rhaa.com |
-
- | Maximum Applied Water Allowance (MAWA) | Project Type | ETo | ETAF | Special Landscape Area (SLA) | Total Landscape Area including SLA | MAWA (CCF/yr) |
|--|-----------------|-------|------|------------------------------|------------------------------------|---------------|
| | Non-residential | 26.33 | 0.45 | - | 53,195 | 522 |
- | Estimated Total Water Use (ETWU) | ETo | (SF * PF) / IE | SLA | ETWU (CCF/yr) |
|----------------------------------|------|----------------|-----|---------------|
| | 26.3 | 19,702 | - | 430 |
- Project meets water budget. Difference between MAWA and ETWU 92
- | ETWU Calculation (Regular landscape areas) | Zone # | Description | Irrigation Type | Hydrozone Area (SF) | Plant Water Use Classification | Irrigation Efficiency (IE) | (SF * PF) / IE |
|--|--------|-----------------|-----------------|---------------------|--------------------------------|----------------------------|----------------|
| | 1 | Shrubs | Drip | 3,309 | Low | 0.81 | 1,226 |
| | 2 | Trees | Drip | 2,648 | Low | 0.81 | 981 |
| | 3 | Shrubs | Drip | 2,880 | Low | 0.81 | 1,067 |
| | 4 | Shrubs | Drip | 6,335 | Low | 0.81 | 2,346 |
| | 5 | Temporary Shrub | Drip | 6,640 | Low | 0.81 | 2,459 |
| | 6 | Shrubs | Drip | 3,774 | Low | 0.81 | 1,398 |
| | 7 | Shrubs | Drip | 2,984 | Low | 0.81 | 1,105 |
| | 8 | Trees | Drip | 2,180 | Low | 0.81 | 807 |
| | 9 | Shrubs | Drip | 6,497 | Low | 0.81 | 2,406 |
| | 10 | Shrubs | Drip | 2,450 | Low | 0.81 | 907 |
| | 11 | Trees | Drip | 1,650 | Low | 0.81 | 611 |
| | 12 | Temporary Shrub | Drip | 5,543 | Low | 0.81 | 2,053 |
| | 13 | Shrubs | Drip | 2,784 | Low | 0.81 | 1,031 |
| | 14 | Shrubs | Drip | 2,165 | Low | 0.81 | 802 |
| | 15 | Shrubs | Drip | 1,356 | Low | 0.81 | 502 |
| Landscape area (not including SLA) | | | | 53,195 | | | 19,702 |
- | ETWU Calculation Special Landscape Areas (SLA) | Description | Hydrozone Area (SF) | Plant Factor / Irrigation Efficiency (PF/IE) | (SF * PF) / IE |
|--|--------------------------------------|---------------------|--|----------------|
| | Edible planting area | | 1.0 | - |
| | Multi-use and sports field turf area | | 1.0 | - |
| | Area irrigated with recycled water | | 1.0 | - |
| Total SLA | | 0 | | 0 |
- | | |
|--|--------|
| Total Landscape Area (including SLA) from ETWU Calculation | 53,195 |
|--|--------|
- | Water Use Table | ETWU | Gallons: | 321,662 | Units: | 430 | AF: | 0.99 |
|-----------------|----------------|----------|---------|---------|---------|---------|---------|
| | Billing Period | Jan/Feb | Mar/Apr | May/Jun | Jul/Aug | Sep/Oct | Nov/Dec |
| | Baseline (CCF) | 2 | 47 | 118 | 138 | 99 | 26 |
- 1 CCF (hundred cubic feet) = 748.05 gallons; 1 AF (acre foot) = 435.6 CCF
- MarinWater.org
- Water Budget and Water Use Calculator
Page 1 of 1
- rhaa
Landscape
Architecture
& Planning
- 225 Miller Avenue, Mill Valley, CA 94941
T 415 383 7900
rhaa.com
- PROJECT/CLIENT NAME
- Dunphy Park
Improvement Project
Phase 2
- 200 Napa Street
Sausalito, CA 94965
- Owner:
City of Sausalito
420 Litho St.
Sausalito, CA 94965
- RHAA PROJECT NUMBER
- 16042A
- CONSULTANT
- SUBMITTAL
- Bid Documents
- DATE
- 22 AUGUST 2025
- REVISIONS
- | No. | Date | Description |
|-----|----------|-------------|
| 1 | 09/09/25 | ADDENDUM 1 |
| 2 | 09/19/25 | ADDENDUM 2 |
- REGISTRATION AND SIGNATURE
-
- Public Works Director:
Date:
- SHEET TITLE
- IRRIGATION
NOTES
- DRAWN BY: TS / QU CHECKED BY: JM
- L5.0
- Date Plotted: 9/18/2025 5:46 PM

Date Plotted: 9/18/2025 5:45 PM



PROJECT/CLIENT NAME
**Dunphy Park
Improvement Project
Phase 2**

200 Napa Street
Sausalito, CA 94965

Owner:
City of Sausalito
420 Litho St.
Sausalito, CA 94965

RHAA PROJECT NUMBER
16042A

CONSULTANT

SUBMITTAL
Bid Documents

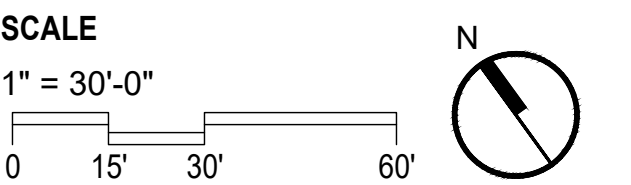
DATE
22 AUGUST 2025

REVISIONS		
No.	Date	Description
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2	09/19/25	ADDENDUM 2

REGISTRATION AND SIGNATURE



Public Works Director:
Date:



SHEET TITLE
IRRIGATION PLAN

DRAWN BY: TS / QU CHECKED BY: JM

L5.1

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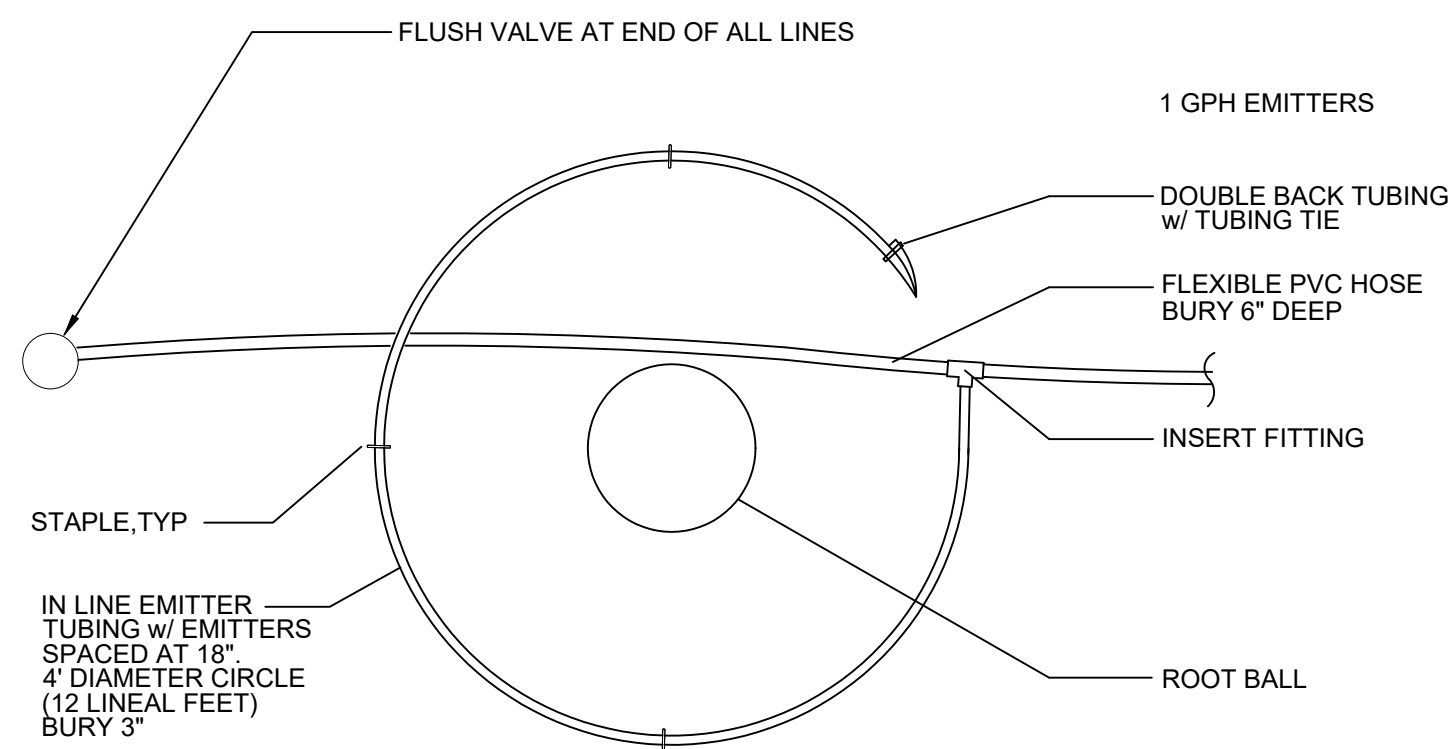


Public Works Director:
Date:

SHEET TITLE
**IRRIGATION
DETAILS**

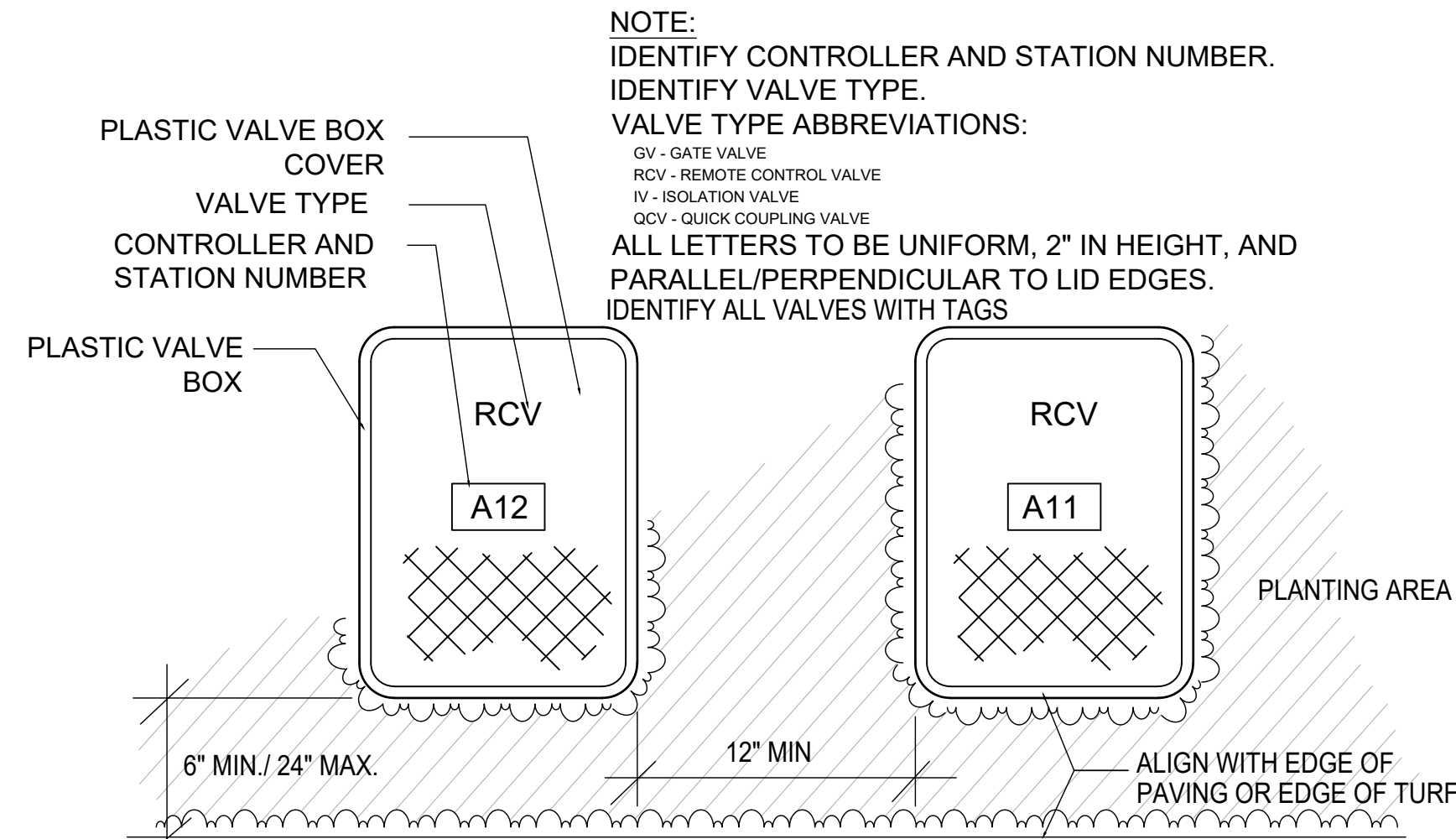
DRAWN BY: TS / QU CHECKED BY: JM

L5.2

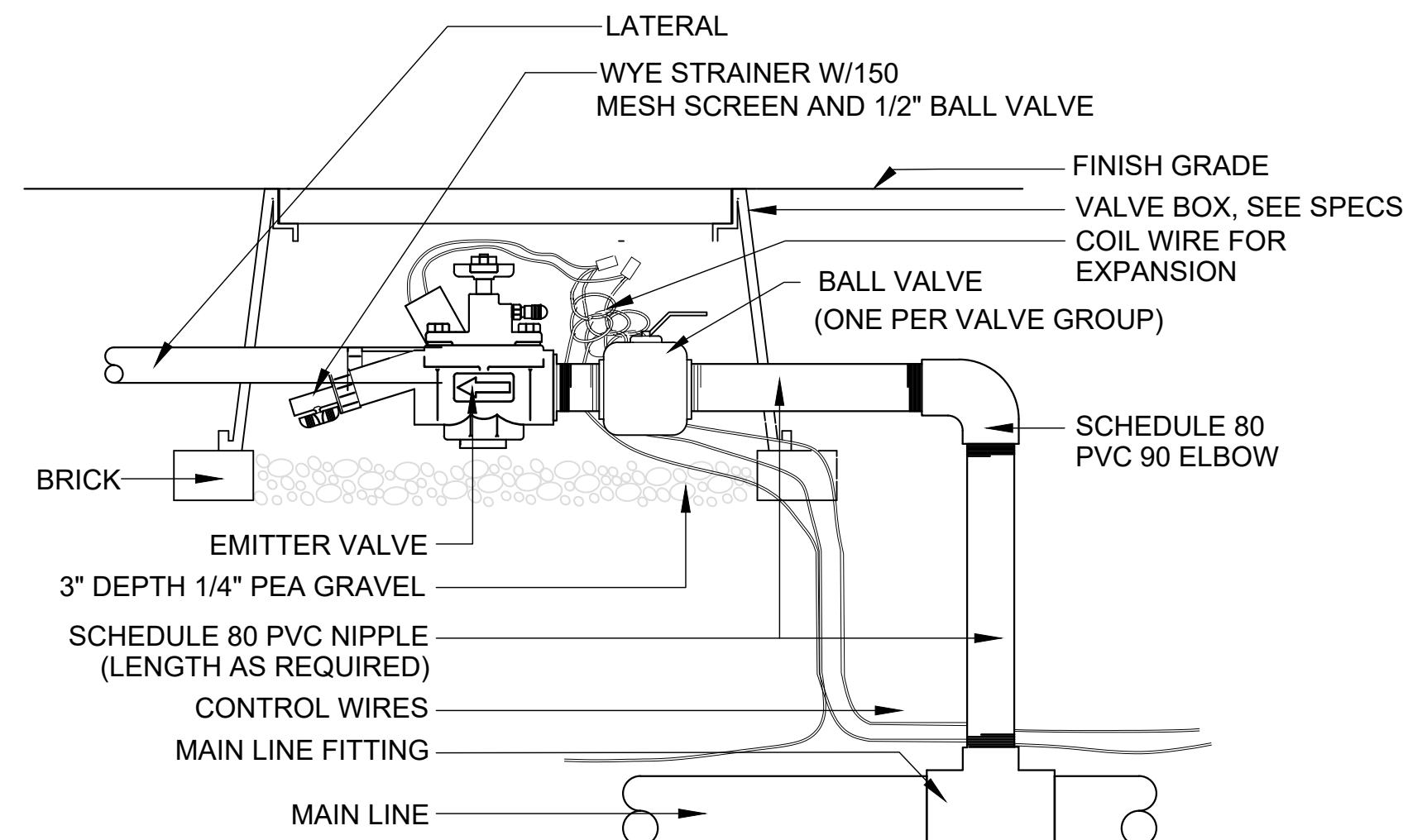


PLAN

7 TREE DRIP RING IRRIGATION
NTS

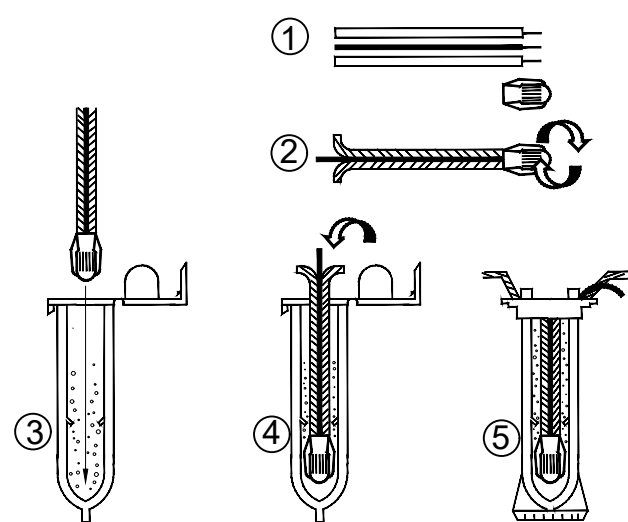


4 REMOTE CONTROL VALVES - LOCATION
NTS



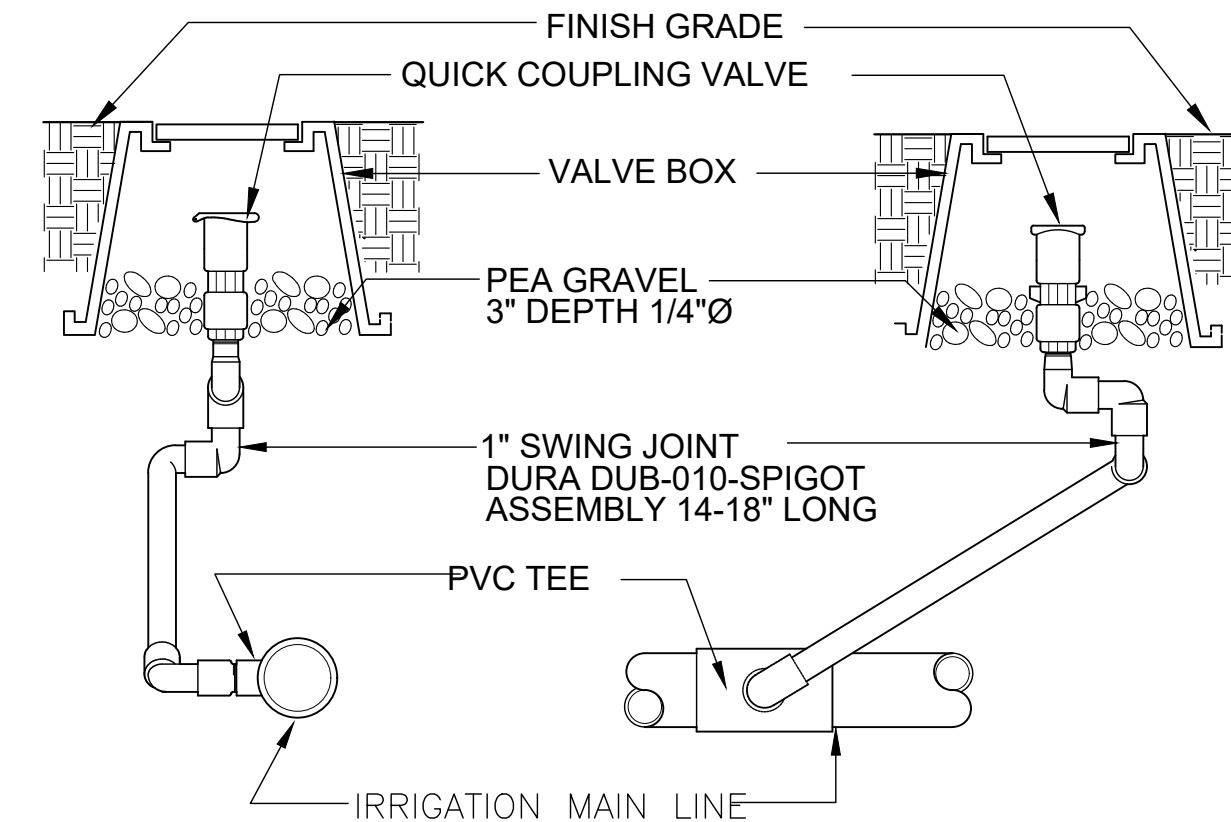
- NOTES:
1. BUNDLE AND TAPE WIRE EVERY 10 FEET
 2. PROVIDE 36" EXPANSION LOOP AT EACH WIRE CONNECTION
 3. LOCATE VALVES MIN. 4" FROM PAVED WALKWAYS.

5 REMOTE CONTROL VALVE - DRIP
NTS

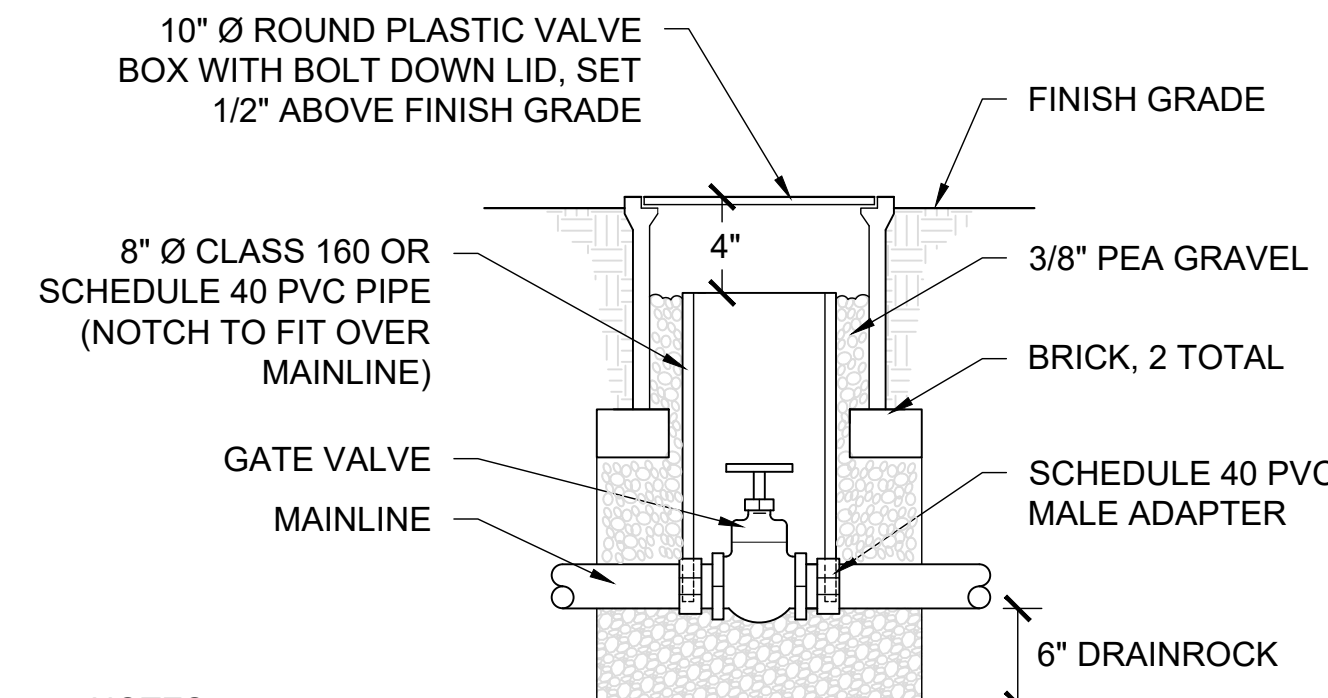


- NOTES:
1. STRIP WIRES APPROXIMATELY 1/2" (12.7 MM) TO EXPOSE WIRE.
 2. TWIST CONNECTOR AROUND WIRES CLOCKWISE UNTIL HAND TIGHT, DO NOT OVERTIGHTEN.
 3. INSERT WIRE ASSEMBLY INTO PLASTIC TUBE UNTIL WIRE CONNECTOR SNAPS PAST LIP IN BOTTOM OF TUBE.
 4. PLACE WIRES WHICH EXIT TUBE IN WIRE EXIT HOLES AND CLOSE CAP UNTIL IT SNAPS.
 5. INSPECT FINAL SPLICE ASSEMBLY TO BE SECURE AND FINISHED.

6 WATERPROOF WIRE CONNECTION
NTS

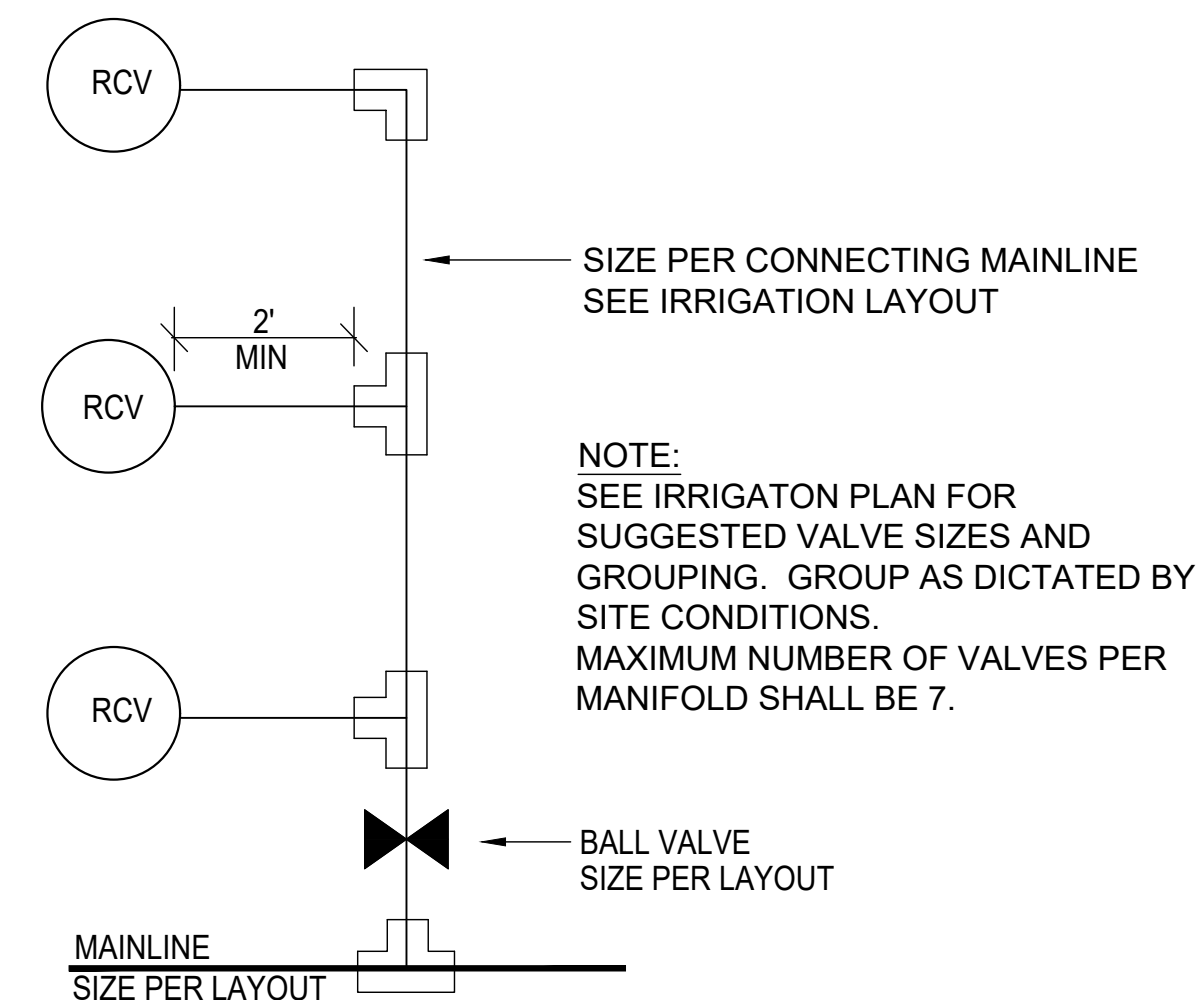


1 QUICK COUPLING VALVE
NTS



- NOTES:
1. HEAT BRAND LID "GV". SEE SPECS FOR BOX COLOR.
 2. GATE VALVE AND FITTINGS SHALL BE LINE SIZE UNLESS NOTED OTHERWISE.
 3. USE TEFLON TAPE ON ALL THREADED FITTINGS.

2 GATE VALVE
NTS



3 REMOTE CONTROL VALVES - CONNECTION
NTS

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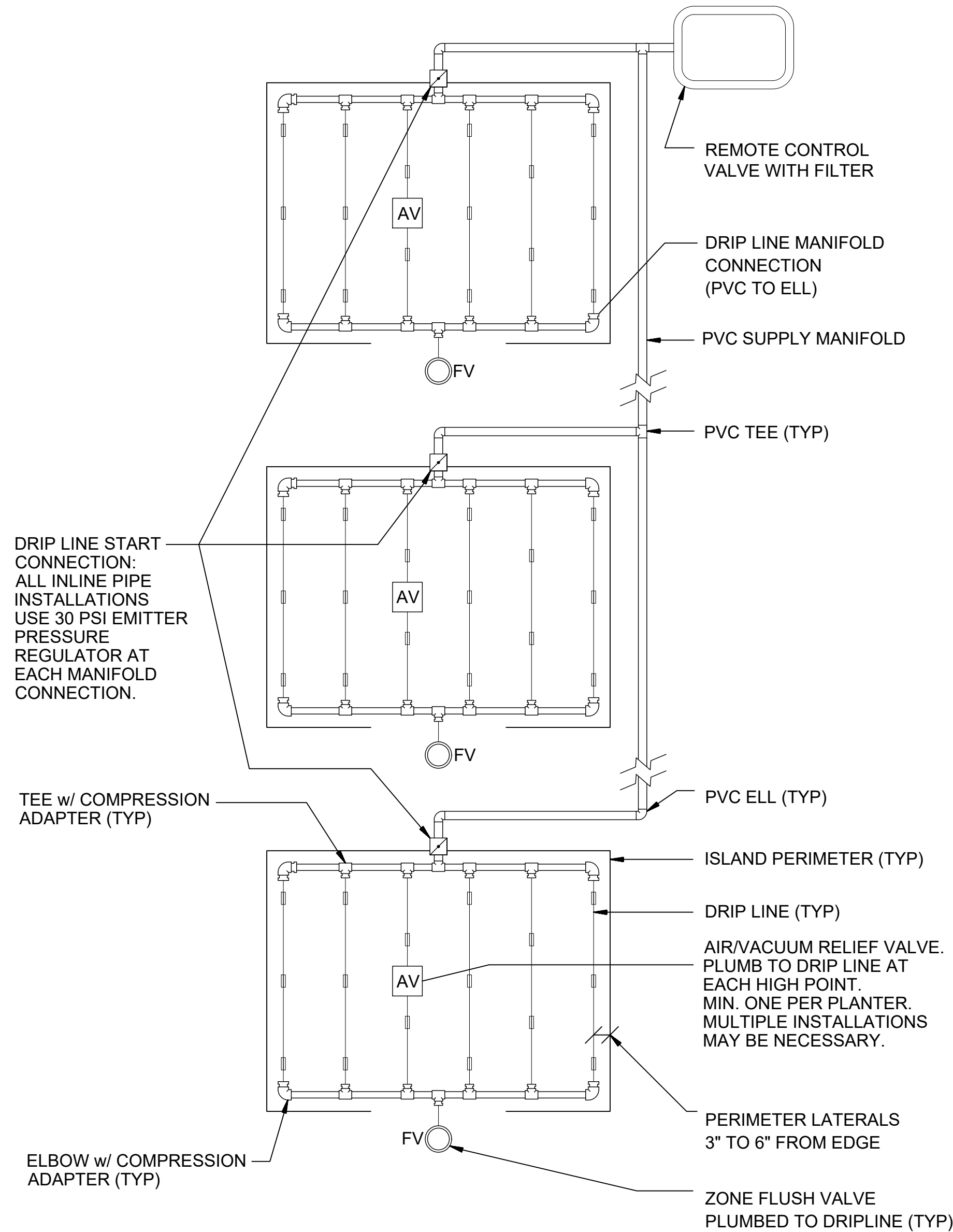


Public Works Director:
Date:

SHEET TITLE
**IRRIGATION
DETAILS**

DRAWN BY: TS / QU CHECKED BY: JM

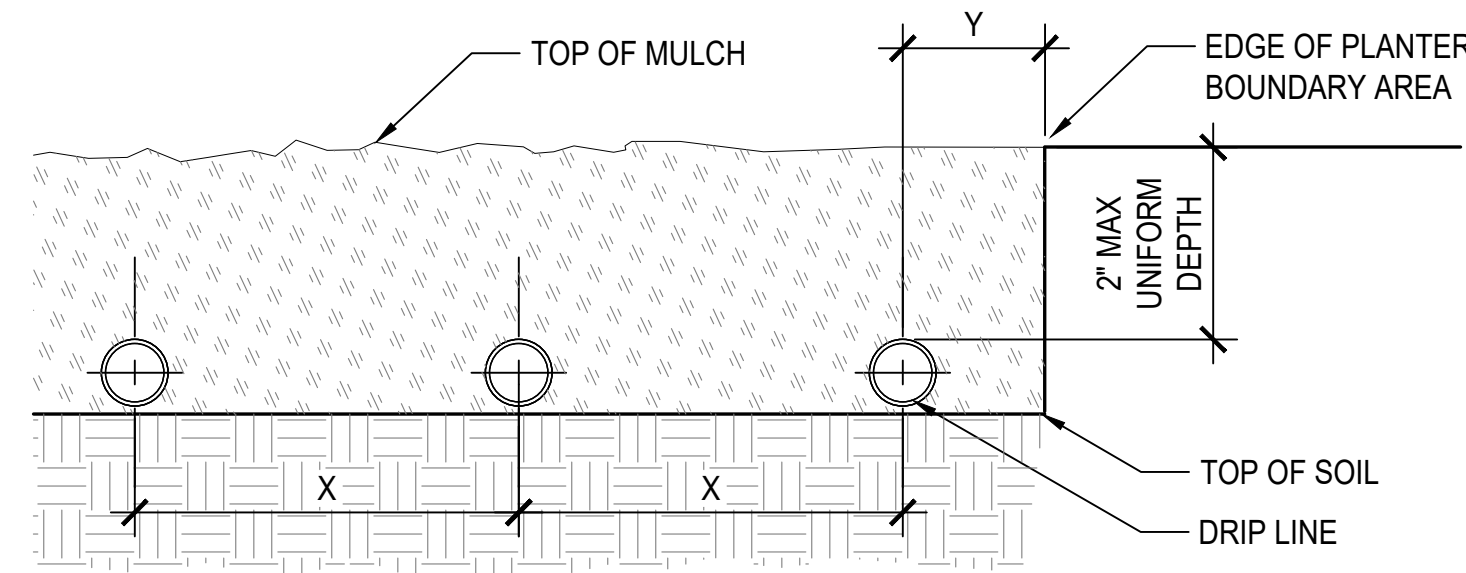
L5.3



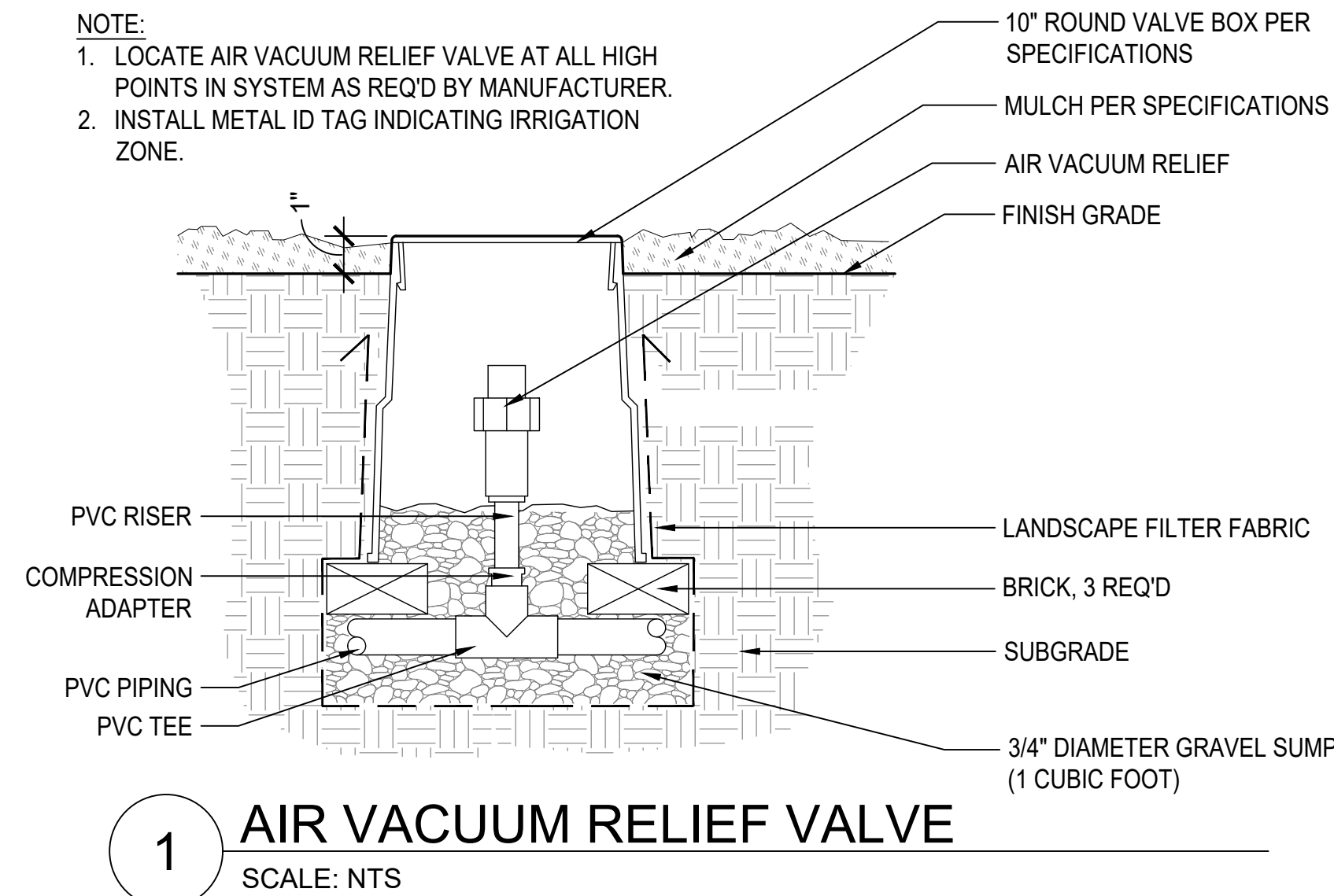
4 **INLINE EMITTER ISLAND LAYOUT**
NTS

X DIMENSION (INCHES)	Y DIMENSION (INCHES)
12	4 OR 6

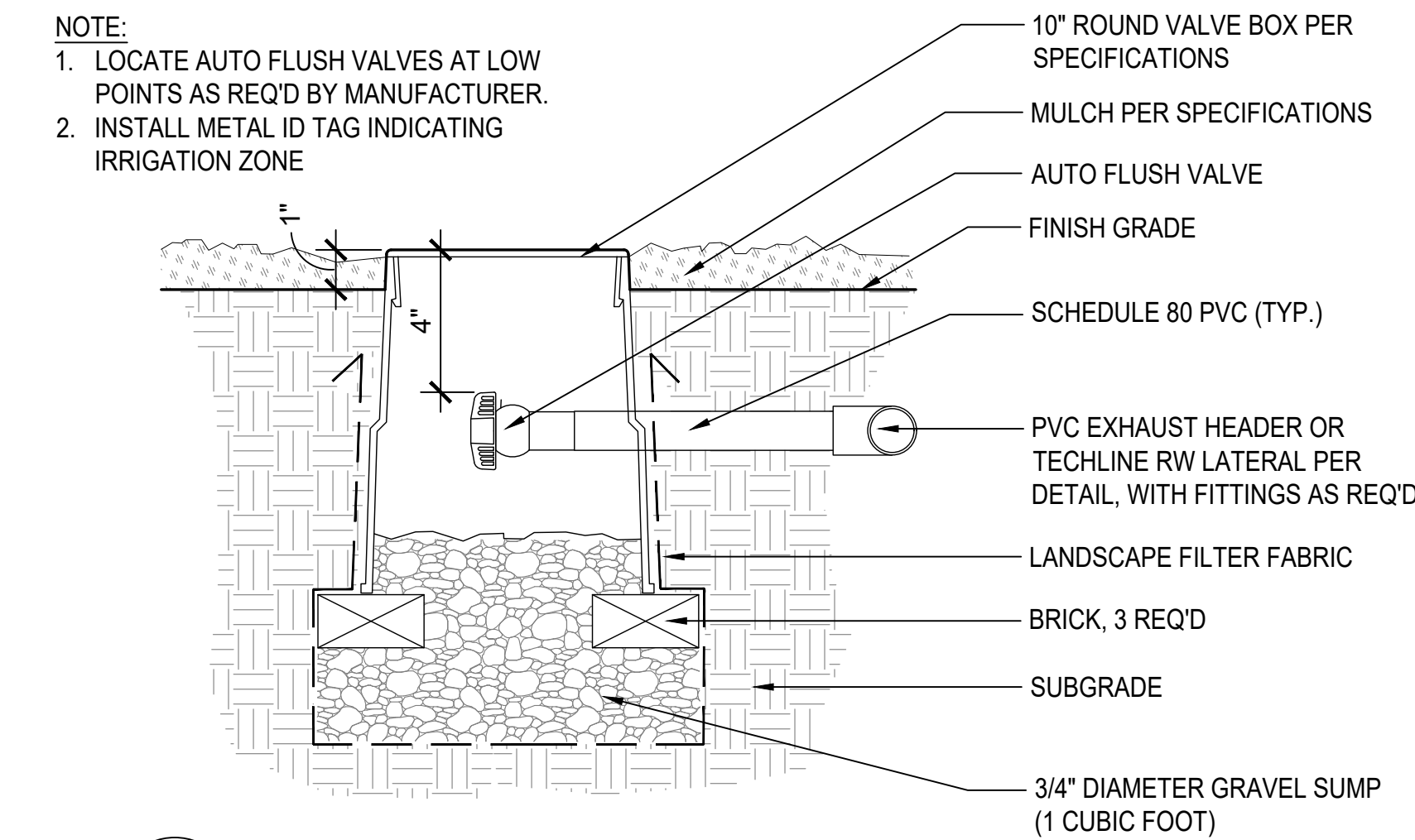
- NOTES:
1. TYPICAL DIMENSIONS FOR DRIP LINE GRID LAYOUT IN PLANTING AREAS.
 2. COORDINATE PLANTING INSTALLATION WITH GRID LAYOUT TO AVOID DAMAGE TO INSTALLED DRIP LINE AND TO PROVIDE UNIFORM IRRIGATION COVERAGE.
 3. INSTALL DRIPLINE PARALLEL TO CONTOUR LINES.



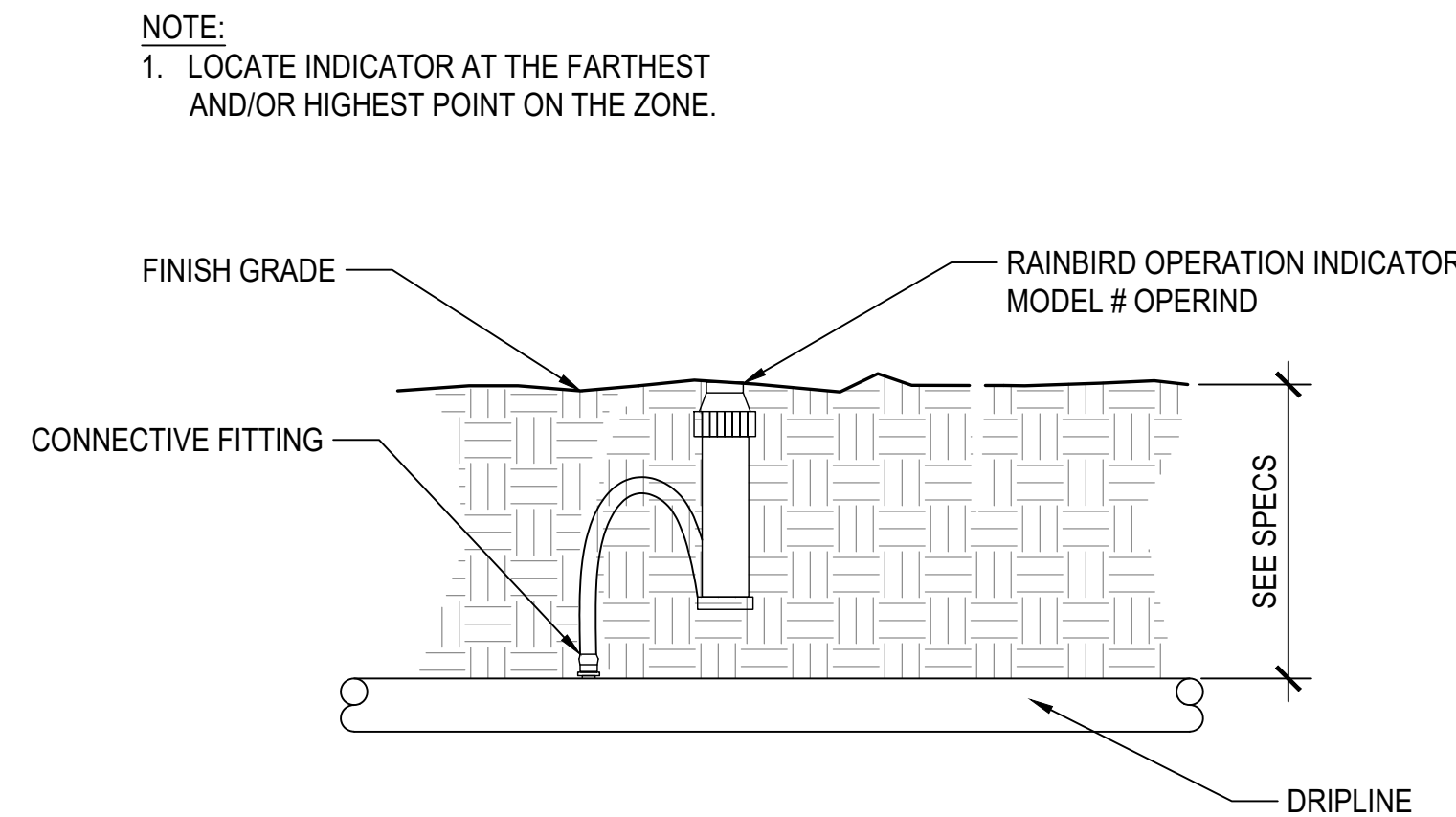
5 **DRIP TUBING ON GRADE INSTALLATION**
SCALE: 6" = 1'-0"



1 **AIR VACUUM RELIEF VALVE**
SCALE: NTS

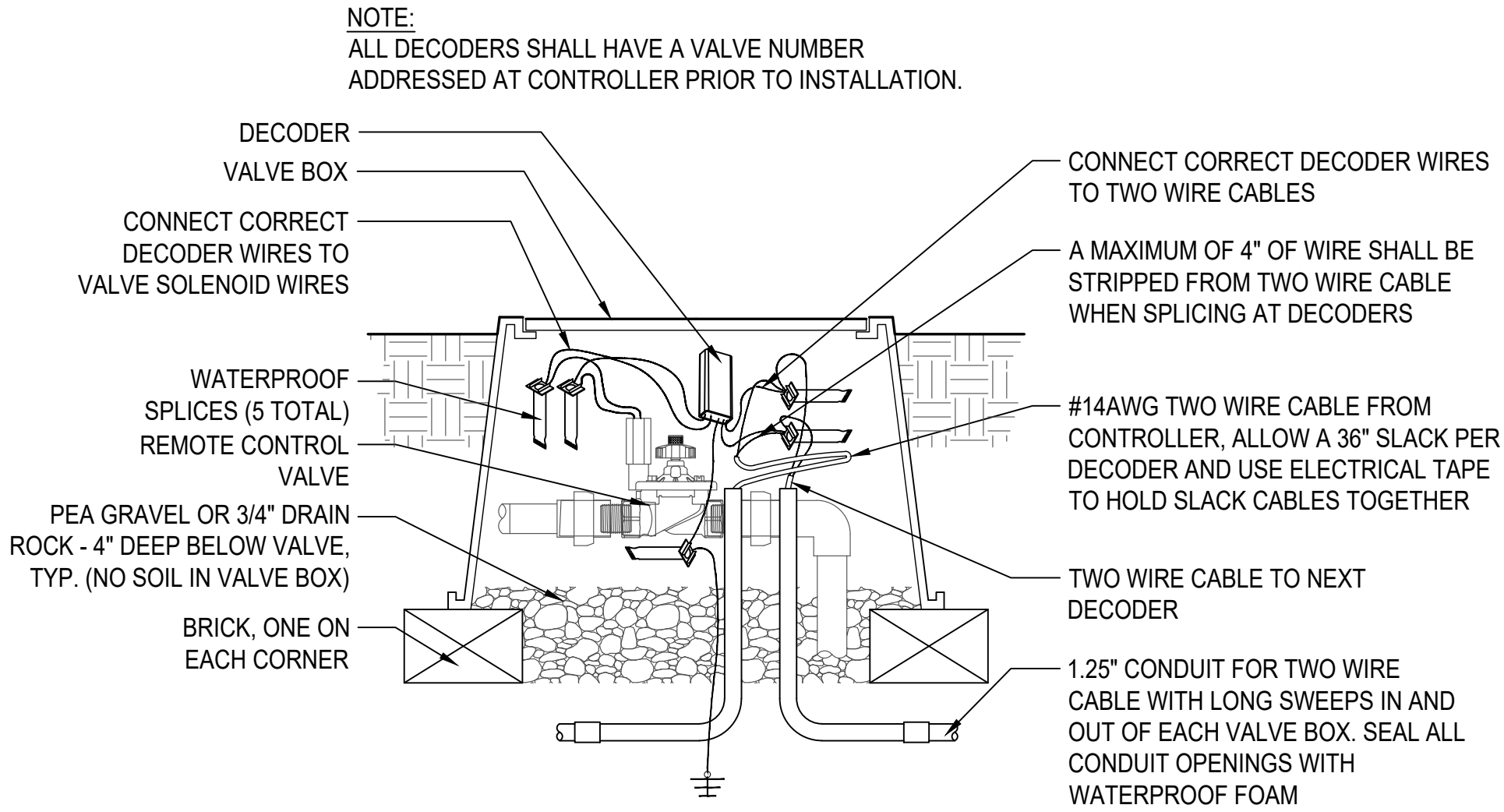


2 **AUTO FLUSH VALVE**
SCALE: 3" = 1'-0"



3 **DRIP OPERATION INDICATOR**
NTS

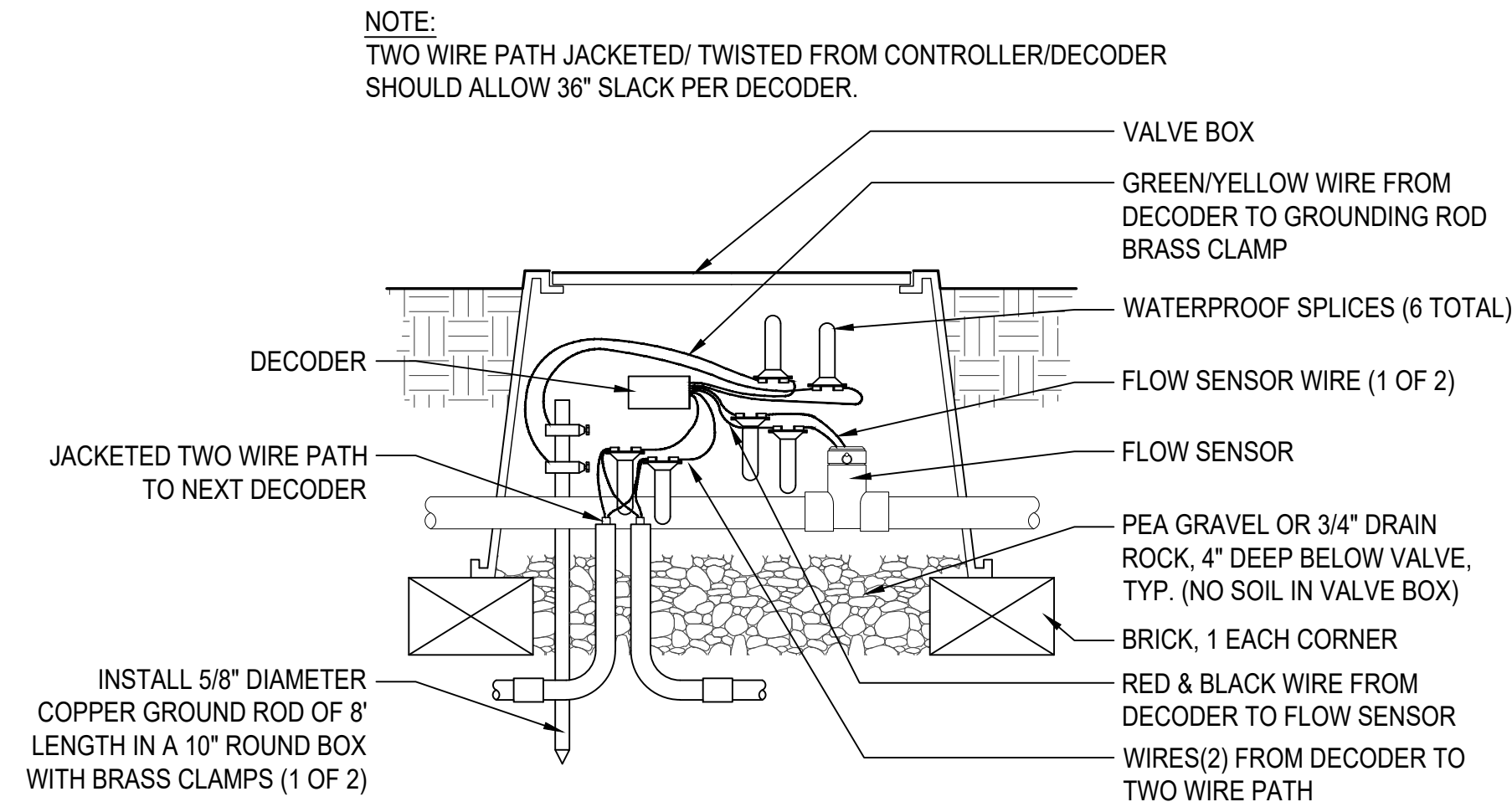
Date Plotted: 9/18/2025 5:46 PM



4

DECODER IN VALVE BOX - TWO WIRE

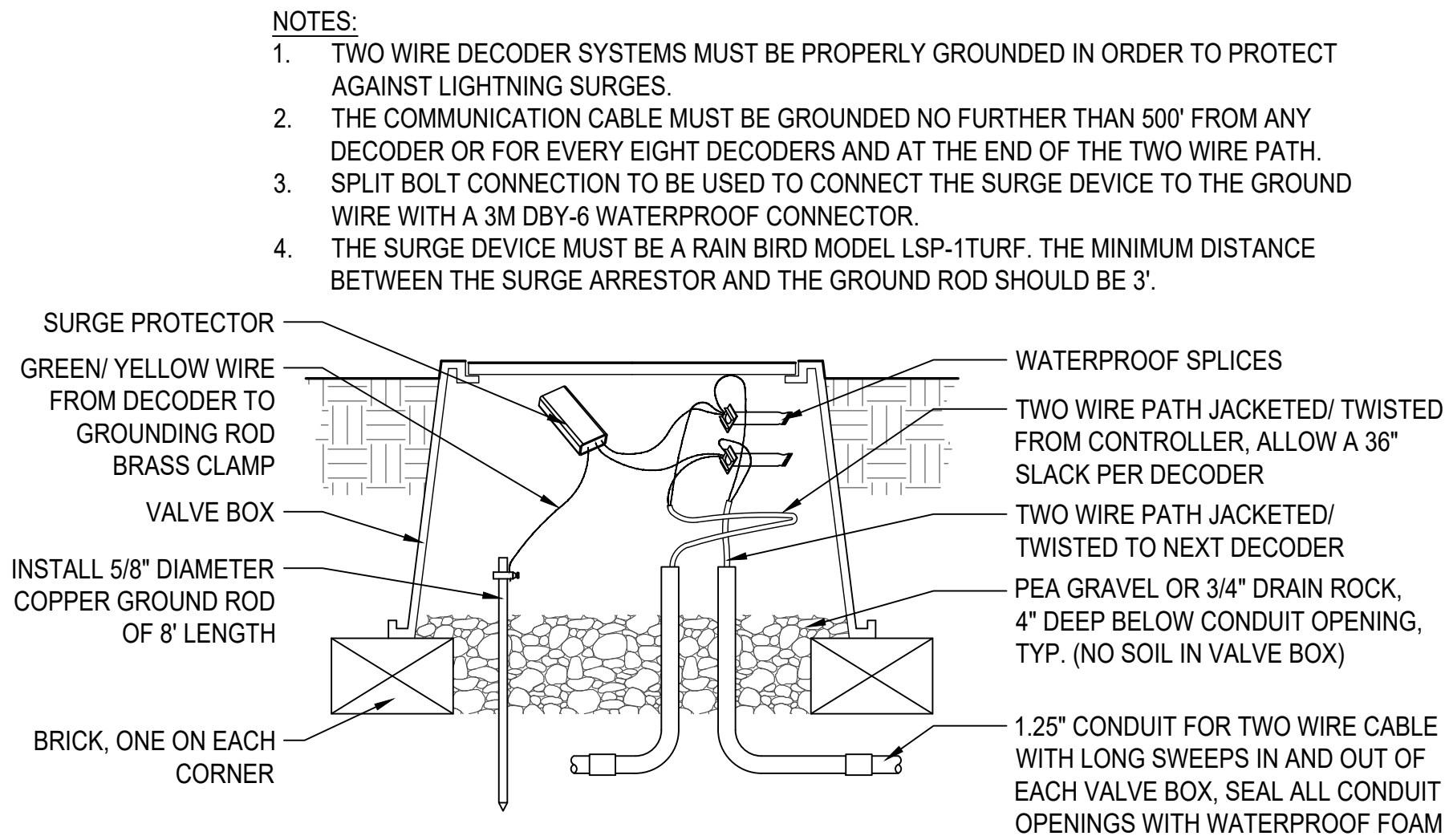
NOT TO SCALE



5

FLOW SENSOR DECODER - TWO WIRE

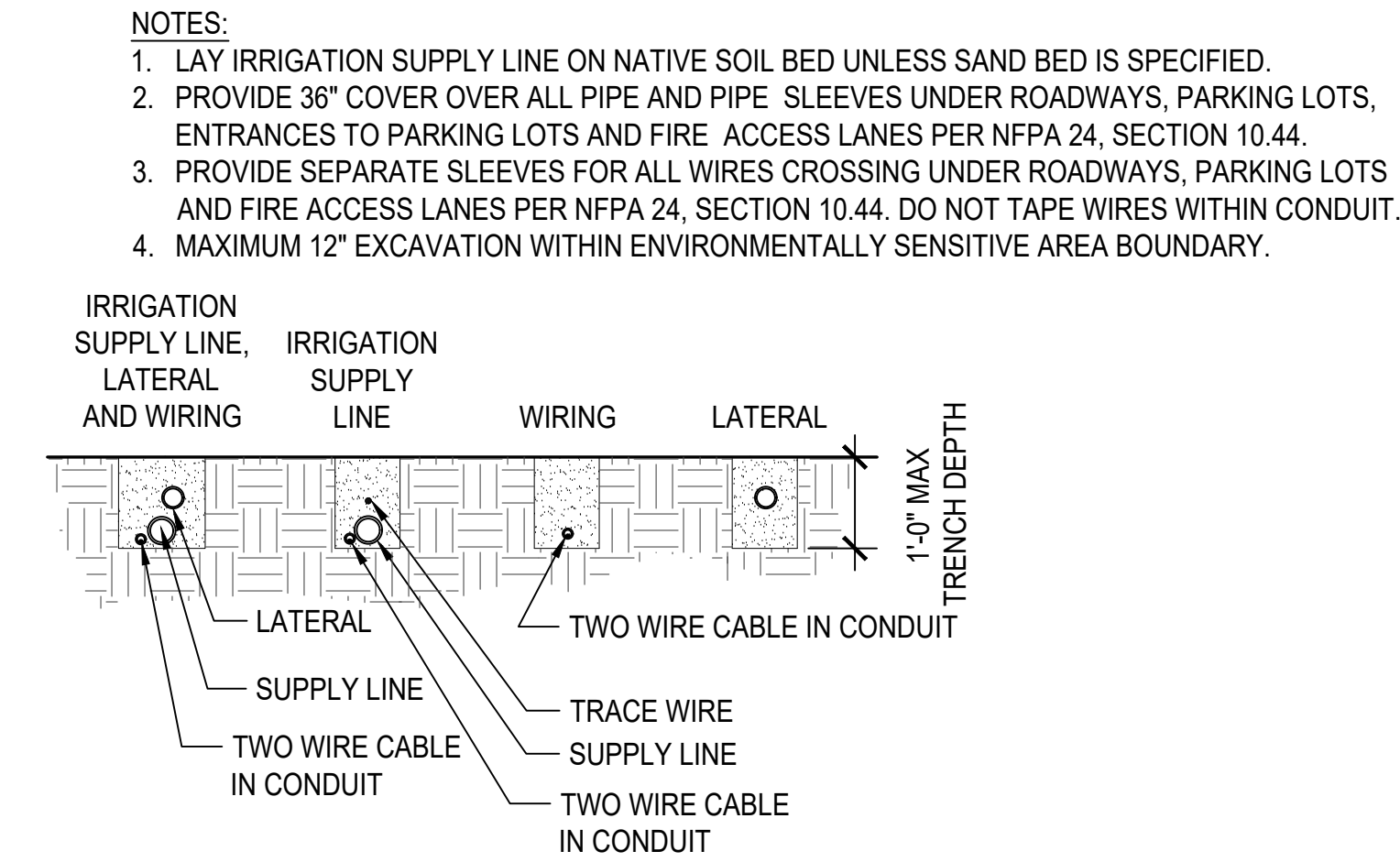
NOT TO SCALE



6

LIGHTNING ARRESTOR - TWO WIRE

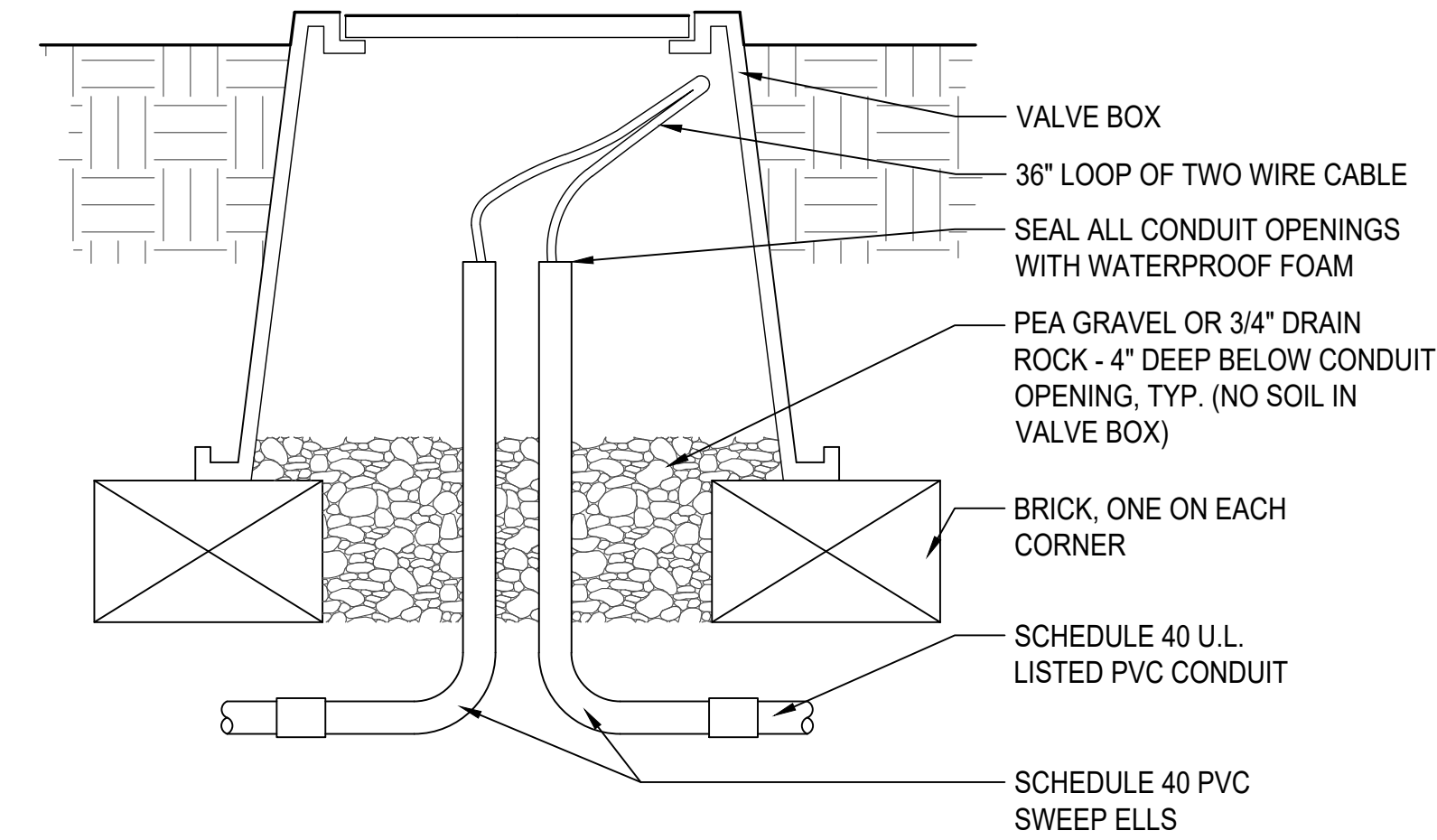
NOT TO SCALE



1

IRRIGATION TRENCHING - TWO WIRE

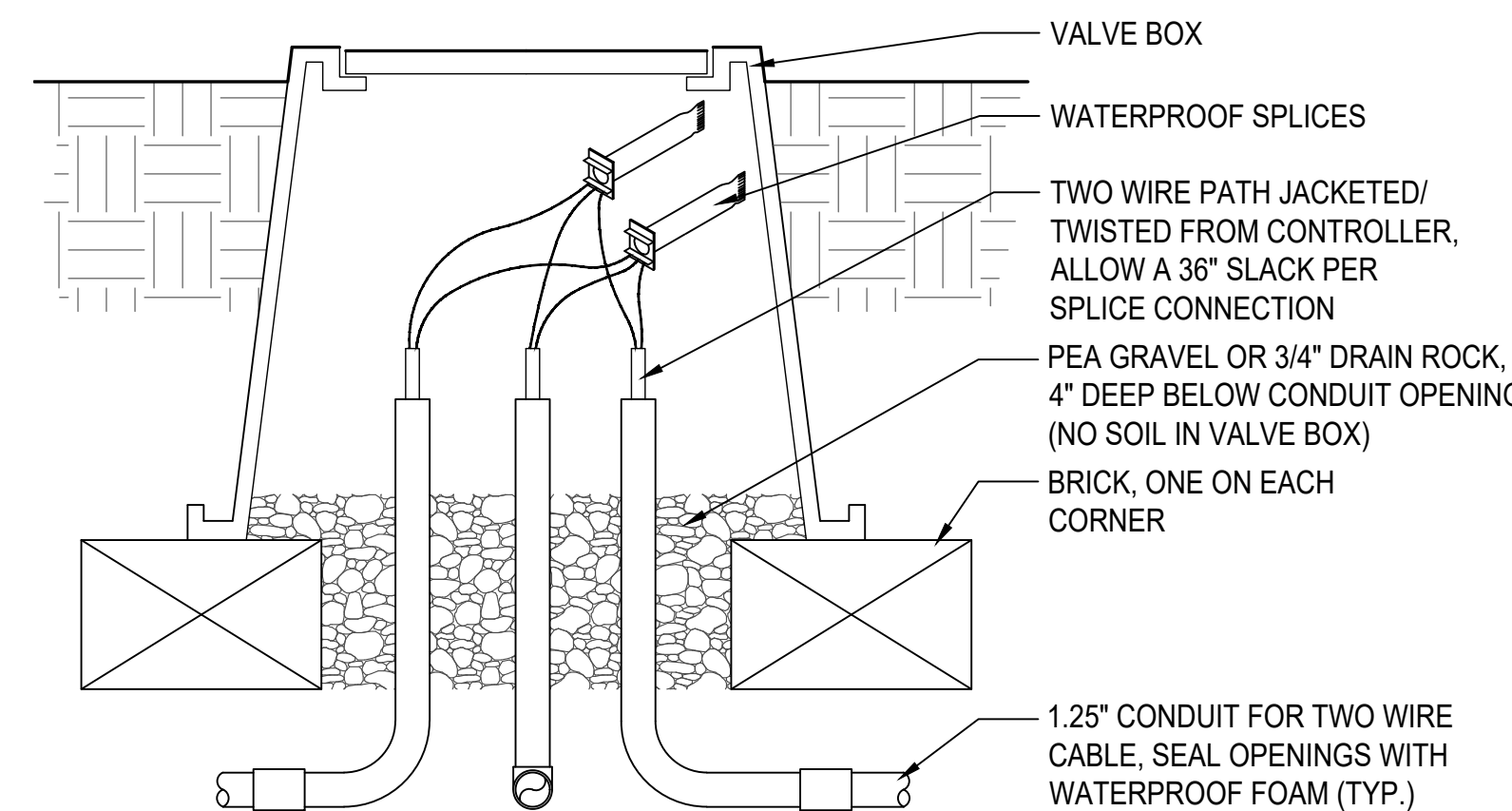
NOT TO SCALE



2

IRRIGATION TWO WIRE PULL BOX

NOT TO SCALE



3

TWO WIRE SPLICE BOX AT MAIN LINE TEE

NOT TO SCALE

PROJECT/CLIENT NAME

Dunphy Park Improvement Project Phase 2

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CONSULTANT

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SHEET TITLE

IRRIGATION DETAILS

DRAWN BY: TS / QU CHECKED BY: JM

L5.4

SHRUBS									
QTY	SYMBOL	ABBREVIATION	SCIENTIFIC NAME	COMMON NAME	SIZE	SPACING	MATURE HEIGHT	MATURE WIDTH	WUCOLS
13		ATR BRE	ATRIPLEX LENTIFORMIS 'BREWERI'	BREWER SALTBU SH	1 GAL	5' O.C.	6'	7'	VL
34		ART CAL	ARTEMISIA CALIFORNICA	CALIFORNIA SAGEBRUSH	1 GAL	4' O.C.	6'	4'	L
29		BAC CON	BACCHARIS PILULARIS 'CONSANGUINEA'	COYOTE BRUSH	1 GAL	4' O.C.	7'	5'	L
11		CEA CON	CEANOTHUS 'CONCHA'	CONCHA CALIFORNIA LILAC	1 GAL	6' O.C.	8'	12'	L
19		EPI CAN	EPILOBIUM CANUM	CALIFORNIA FUSCHIA	1 GAL	3' O.C.	3'	5'	L
10		ERI ARB	ERIOGONUM ARBORESCENS	SANTA CRUZ ISLAND BUCKWHEAT	1 GAL	4' O.C.	5'	6'	VL
17		ERI FAS	ERIGONUM FASCICULATUM VAR. FASCICULATUM	COASTAL CALIFORNIA BUCKWHEAT	1 GAL	4' O.C.	18"	8'	L
10		GAR ELL	GARRYA ELLIPTICA 'EVIE'	SILK TASSEL	1 GAL	5' O.C.	10'	10'	L
16		HET ARB	HETEROMELES ARBUTIFOLIA	TOYON	1 GAL	8' O.C.	8'	8'	L
23		LON INV	LONICERA INVOLUCRATA	BLACK TWINBERRY	1 GAL	4' O.C.	15'	4'	L
46		LUP ALB	LUPINUS ALBIFRONS	SILVER BUSH LUPINE	1 GAL	3' O.C.	3'	4'	L
52		MIM AUR	MIMULUS AURANTIACUS	STICKY MONKEY FLOWER	1 GAL	3' O.C.	3'	3'	L
12		RHA CAL	RHAMNUS CALIFORNICA	COFFEEBERRY	1 GAL	6' O.C.	6'	8'	L
2		ROS CAL	ROSA CALIFORNICA	CALIFORNIA WILDROSE	1 GAL	6' O.C.	8'	10'	L
5		SAL CLE	SALVIA CLEVELANDII	CLEVELAND SAGE	1 GAL	4' O.C.	4'	4'	L
15		SAL LEU	SALVIA LEUCOPHYLLA	PURPLE SAGE	1 GAL	4' O.C.	5'	4'	L
36		SAL MEL	SALVIA MELLIFERA	BLACK SAGE	1 GAL	4' O.C.	6'	8'	L
SMALL SHRUBS & PERENNIALS									
23		ASC SPE	ASCLEPIAS SPECIOSA	SHOWY MILKWEED	1 GAL	3' O.C.	4'	4'	L
32		ERI CON	ERIOPHYLLUM CONFERTIFLORUM	GOLDEN YARROW	1 GAL	18" O.C.	2'	1'-6"	L
13		ERI GLA	ERIGERON GLAUCUS	SEASIDE DAISY	1 GAL	18" O.C.	<1'	2'	L
58		ERI GRA	ERIOGONUM GRANDE VAR. RUBESCENS	RED-FLOWERED BUCKWHEAT	1 GAL	2' O.C.	1'	3'	L
27		ERI LAT	ERIOGONUM LATIFOLIUM	COAST BUCKWHEAT	1 GAL	2' O.C.	<1'	2'	L
20		ERI STA	ERIOPHYLLUM STAECHADIFOLIUM	SEASIDE WOOLLY SUNFLOWER	1 GAL	2' O.C.	5'	5'	L
10		ESC CAL	ESCHSCHOLZIA CALIFORNICA	CALIFORNIA POPPY	1 GAL	1' O.C.	2'	2'	VL
17		PHA CAL	PHACELIA CALIFORNICA	ROCK PHACELIA	1 GAL	18" O.C.	1'-6"	2'	VL
GROUNDCOVER									
62		ART PYC	ARTEMISIA PYCNOCEPHALA	COASTAL SAGEWORT	1 GAL	30" O.C.	2'	3'	L
267		BAC PIG	BACCHARIS PILULARIS 'PIGEON POINT'	PIGEON POINT COYOTE BRUSH	1 GAL	4' O.C.	2'	6'	L
97		CEA ANC	CEANOTHUS GLORIOSUS 'ANCHOR BAY'	POINT REYES CEANOTHUS	1 GAL	4' O.C.	2'	6'	L
10		CIS SUN	CISTUS PULVERLENTUS 'SUNSET'	SUNSET ROCKROSE	1 GAL	5' O.C.	3'	6'	L
4		SAL TER	SALVIA MELLIFERA 'TERRA SECA'	TERRA SECA SAGE	1 GAL	4' O.C.	2'-6"	5'	L
GRASSES									
327		FES CAL	FESTUCA CALIFORNICA	CALIFORNIA FESCUE	D-16	2' O.C.	3'	3'	L
103		LEY CAN	LEYMUS CONDENSATUS 'CANYON PRINCE'	CANYON PRINCE WILD RYE	D-16	42" O.C.	4'	3'	L

VINES									
6		CAL MAC	CALYSTEGIA MACROPHYLLA	CALIFORNIA MORNING GLORY	1 GAL	5' O.C.	4-6'	10'	L
LIVING SHORELINE									
69		BAC DOU	BACCHARIS DOUGLASII (GLUTINOSA)	MARSH BACCHARIS	D-16	36" O.C.	3'	3'	L
35		LIM CAL	LIMONIUM CALIFORNICUM	SEA LAVENDER	D-16	18" O.C.	2'	2'	L
*		DIS SPI	DISTICHLIS SPICATA	SALT GRASS	D-16	15" O.C.	1'	1'	L
39		GRI ANG	GRINDELIA STRICTA VAR. ANGUSTIFOLIA	PACIFIC GUMPLANT	D-16	18" O.C.	3'	4'	L
**		SAR PAC	SARCOCORNIA PACIFICA	PICKLEWEED	D-16	1' O.C.	6"	9"	L

TREES											
QTY	SYMBOL	ABBREVIATION	SCIENTIFIC NAME	COMMON NAME	SIZE	SPACING	HEIGHT	SPREAD	NATIVE	WUCOLS	NOTES
3		PIN CON	PINUS CONTORTA VAR. 'CONTORTA'	SHORE PINE	15 GAL	PER PLAN	25'	25'	YES	L	
9		QUE AGR	QUERCUS AGRIFOLIA	COAST LIVE OAK	15 GAL	PER PLAN	40'	40'	YES	L	
6		SAL LAS	SALIX LASIOLEPIS	ARROYO WILLOW	15 GAL	PER PLAN	20'	20'	YES	L	
1		SAM NIG	SAMBUCUS NIGRA	BLACK ELDERBERRY	15 GAL	PER PLAN	30'	20'	YES	L	
3		SAM RAC	SAMBUCUS RACEMOSA	RED ELDERBERRY	15 GAL	PER PLAN	20'	20'	YES	L	

PLANTING NOTES

- TREES AND PLANTS HAVE BEEN SELECTED FOR THE LOCAL CONDITIONS AND ARE DROUGHT TOLERANT.
- ALL SOIL AND SUBSOIL TO BE TESTED BY AN APPROVED ACCREDITED SOIL TESTING LABORATORY, REFER TO SPECIFICATIONS
- A MINIMUM OF 8 INCHES OF NON-MECHANICALLY COMPACTED SOIL SHALL BE AVAILABLE FOR WATER ABSORPTION AND ROOT GROWTH IN PLANTED AREAS.
- INCORPORATE COMPOST OR NATURAL FERTILIZER INTO THE SOIL TO A MINIMUM DEPTH OF 8 INCHES AT A MINIMUM RATE OF 6 CUBIC YARDS PER 1000 SQUARE FEET OR PER SPECIFIC AMENDMENT RECOMMENDATIONS FROM A SOILS LABORATORY REPORT.
- A MINIMUM 3 INCH LAYER OF MULCH SHALL BE APPLIED ON ALL EXPOSED SOIL SURFACES OF PLANTING AREAS EXCEPT IN TURF AREAS, CREEPING OR ROOTING GROUNDCOVERS, AND DIRECT SEEDING APPLICATIONS.

- 2

* 4,907 DISTICHLIS SPICATA PLANTS LOCATED IN SHORELINE AREA, INSTALL BETWEEN MEAN HIGHER HIGH WATER AND EXTREME HIGH TIDE

** 1,440 SALICORNIA PACIFICA PLANTS, INSTALL PLANTS ALONG LIMIT OF WORK (MEAN HIGHER HIGH WATER, 6.01').

225 Miller Avenue, Mill Valley, CA 94941
T 415 383 7900
rhaa.com

PROJECT/CLIENT NAME

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Improvement Project
Phase 2

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SHEET TITLE

PLANTING
SCHEDULE

DRAWN BY: TS / QU CHECKED BY: JM

L6.0

200 Napa Street
Sausalito, CA 94965

Owner:
City of Sausalito
120 Litho St.
Sausalito, CA 94965

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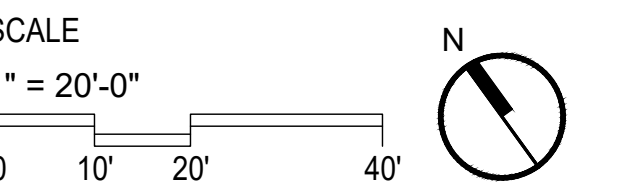
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Public Works Director:
Date:



PLANTING PLAN

DRAWN BY: TS / QU CHECKED BY: JM

L6.1



MATCHLINE

Date Plotted: 9/18/2025 5:45 PM

200 Napa Street
Sausalito, CA 94965

Owner:
City of Sausalito
120 Litho St.
Sausalito, CA 94965

RHAA PROJECT NUMBER
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CONSULTANT

DATE
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Public Works Director:
Date:

SCALE
1" = 20'-0"

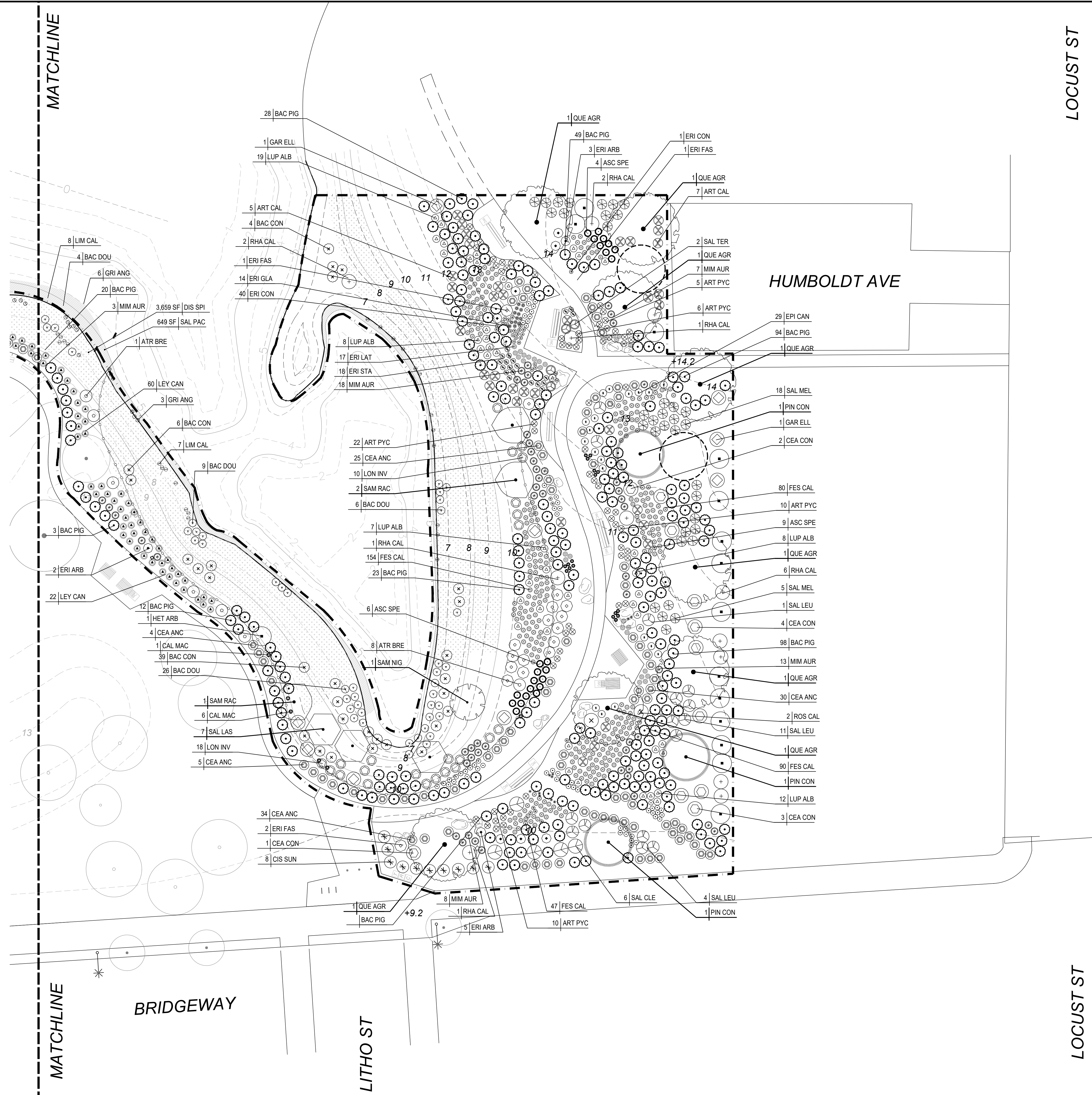
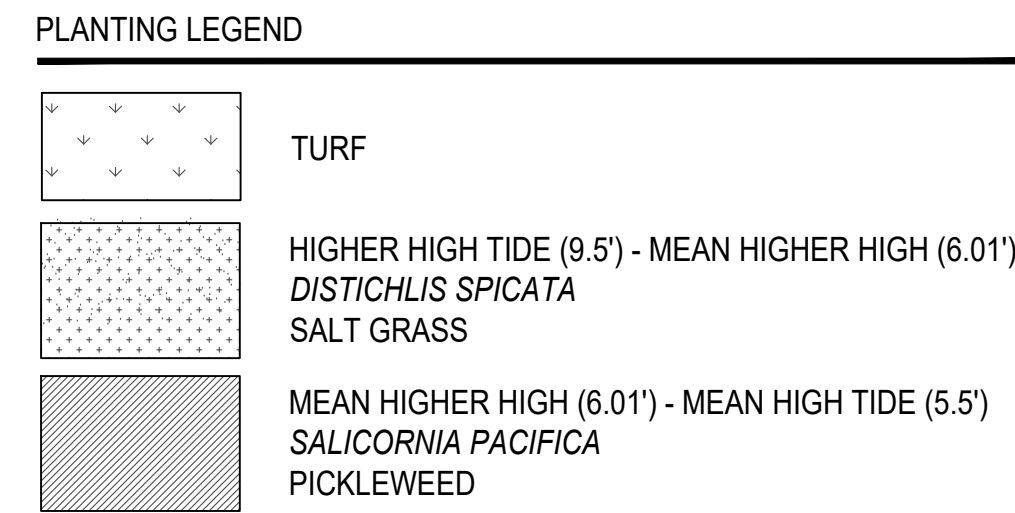
0 10' 20' 40'

N

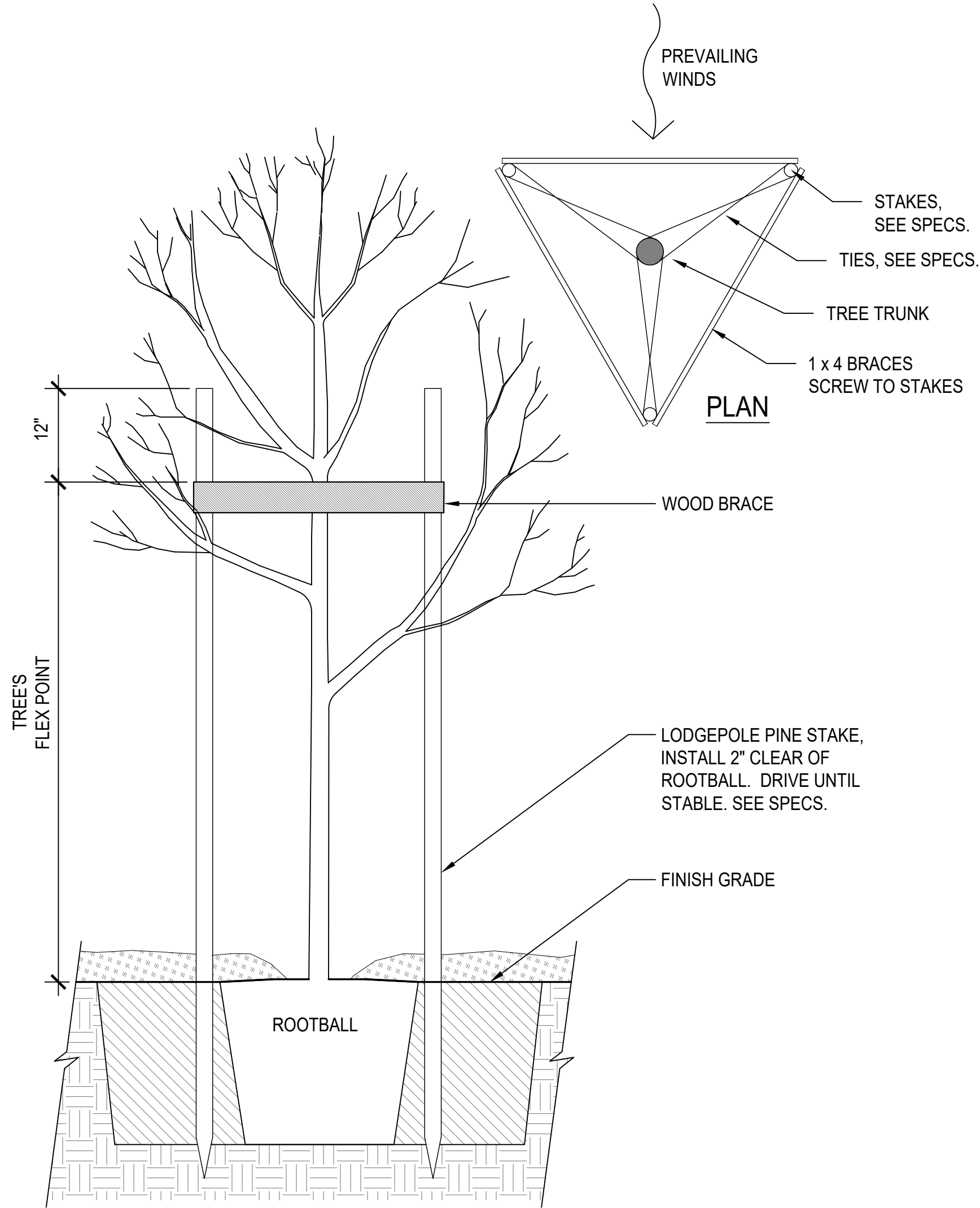
PLANTING PLAN

DRAWN BY: TS / QU CHECKED BY: JM

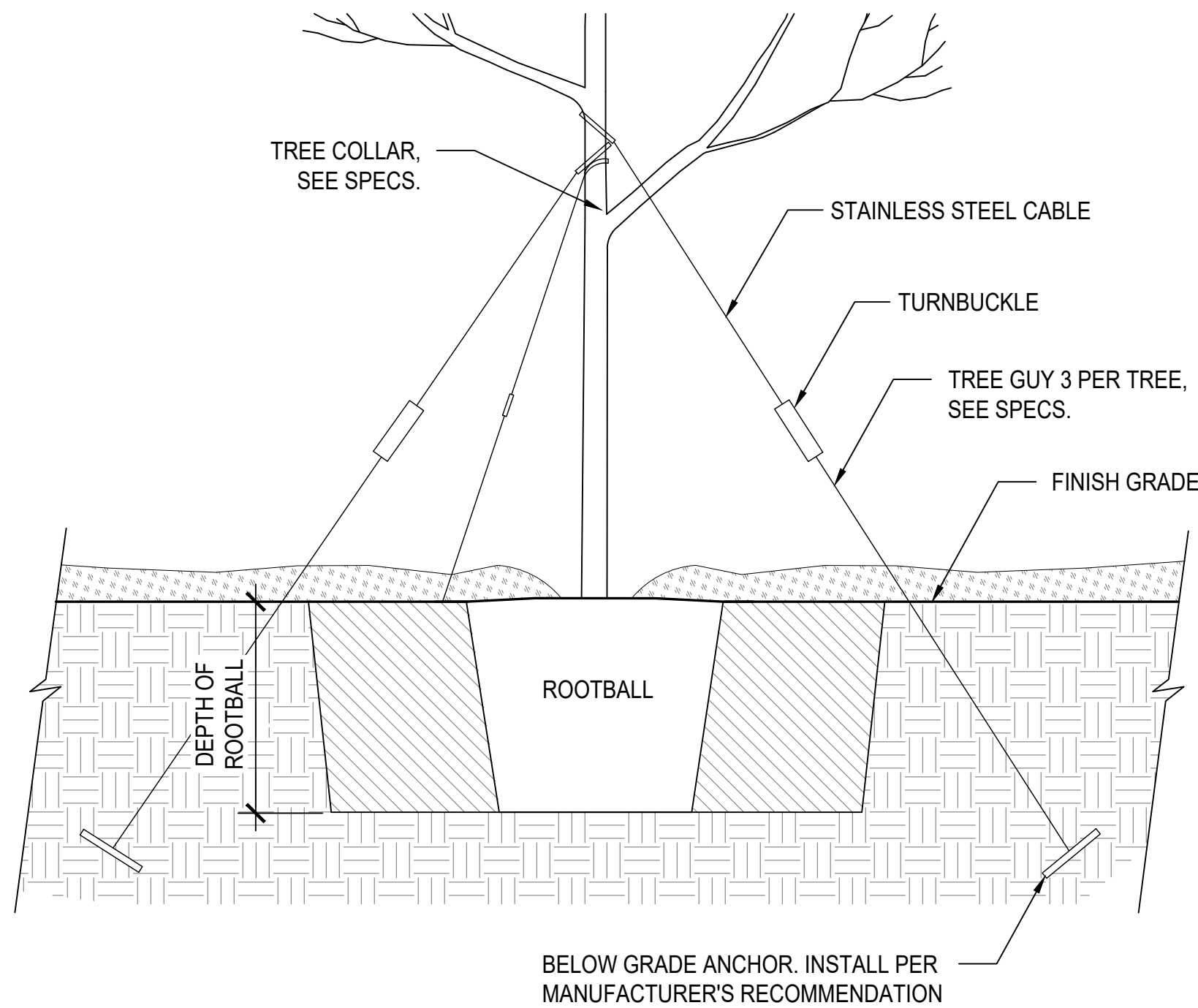
L6.2



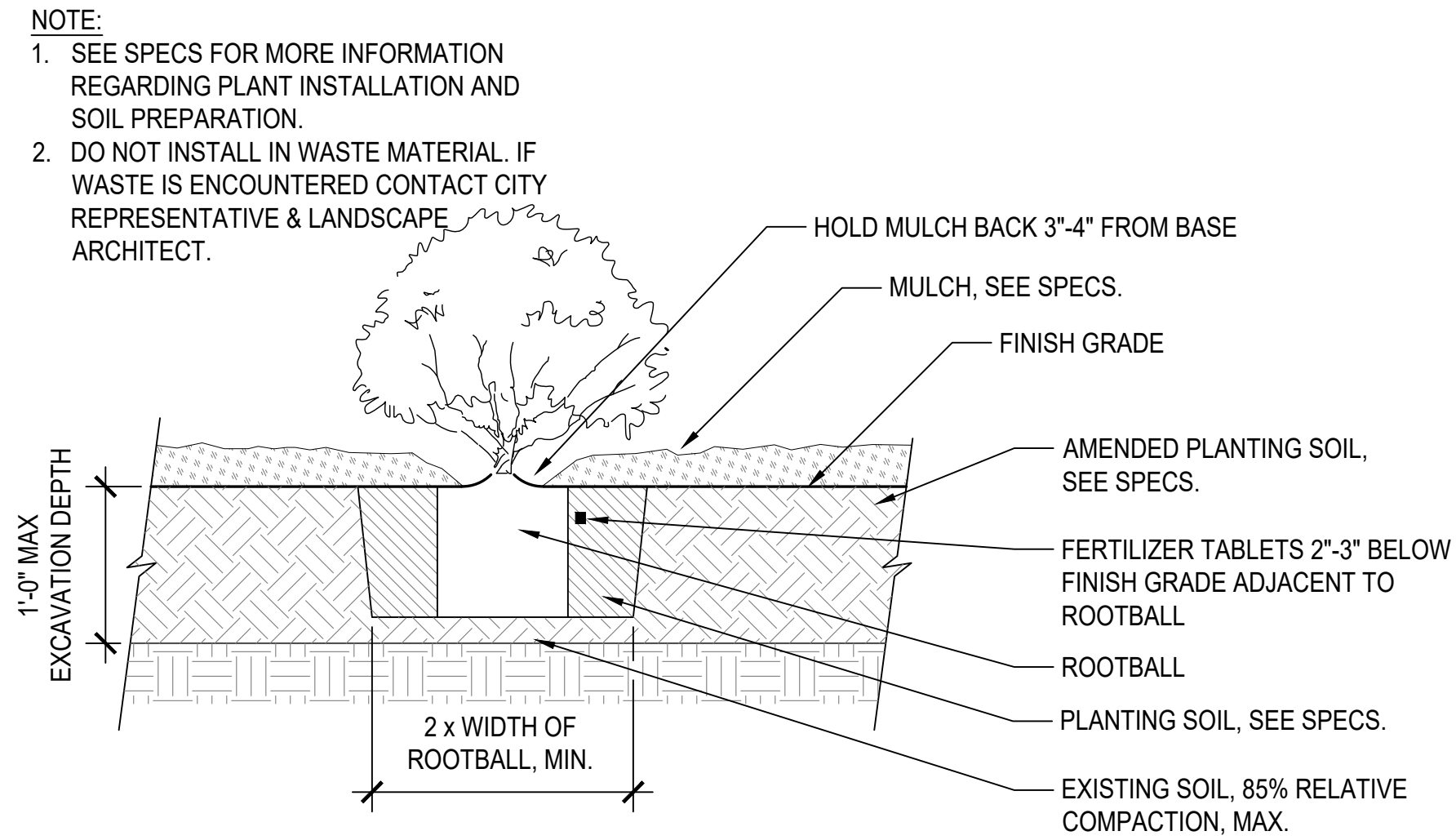
Date Plotted: 9/18/2025 5:45 PM



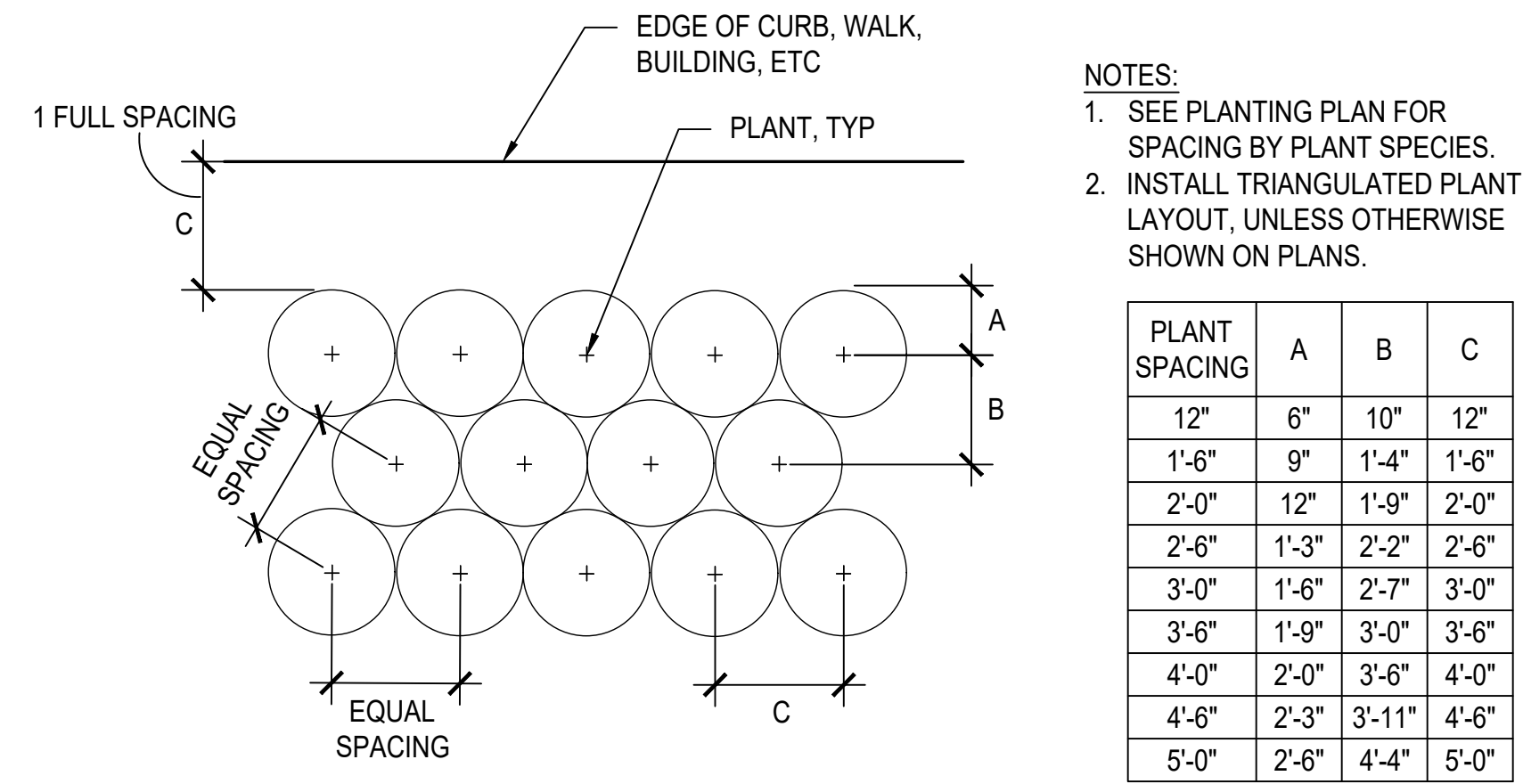
4 TREE STAKING
SCALE: 3/4" = 1'-0"



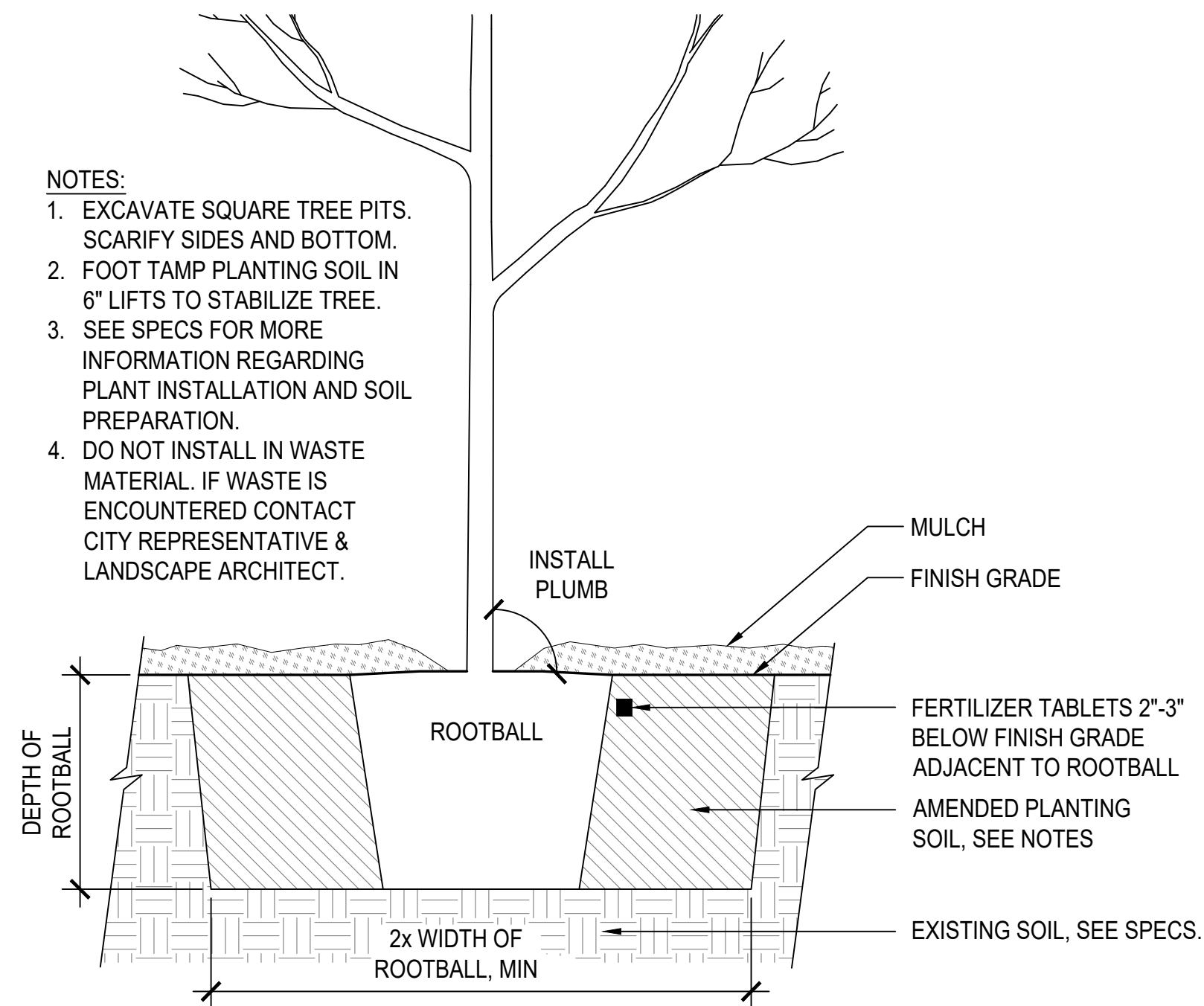
5 TREE GUYING
NTS



1 SHRUB PLANTING
SCALE: 1" = 1'-0"



2 PLANTING LAYOUT
NTS



3 TREE PLANTING
NTS

PROJECT/CLIENT NAME
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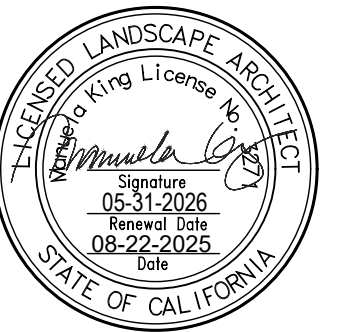
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SHEET TITLE
**PLANTING
DETAILS**

DRAWN BY: TS / QU CHECKED BY: JM

L6.3

01 00 00 – GENERAL REQUIREMENTS

PART 1 -- GENERAL

1.1 DESCRIPTION

A. The Contractor shall provide construction staking and survey to determine the MHHW (Mean Higher High Water) line and marked Limits of Work.

B. The Contractor must comply with all applicable permits and regulations, including, but not limited to, the BCDC permit and OSHA health and safety protocols.

C. Contractors, including all subcontractors brought in for the project, are expected to be experienced, knowledgeable, and capable of managing work in this sensitive shoreline environment and environmentally sensitive sites.

D. Portions of the site may contain closed landfill materials or other environmental sensitivities. Ground disturbances in some areas may be monitored by archaeologists/anthropologists and tribal representatives. The Contractor shall maintain a detailed discovery log including of any waste material or objects throughout the project construction, documenting all discoveries, removal, testing, transport, and disposal, including receipts, invoices, manifests, and other supporting records. Any such work must be approved in writing by the City Engineer.

E. The Contractor shall prepare a Health and Safety Plan addressing air monitoring for VOCs and methane, as well as hazards related to burn ash. Refer to the Protocol for Burn Dump Site Investigation and Characterization (June 30, 2003) for additional guidance. https://dtsc.ca.gov/wp-content/uploads/sites/31/2024/06/SM_POL_Burn-Dump-Protocol_accessible.pdf.

F. The Contractor shall submit full reports including related to all the works mentioned above and the report shall at minimum include:

- As-built drawings confirming implementation of the issues above per design;
- Documentation of waste and other materials discovery and management
- Daily field reports; and
- Photographs of the work.

G. Construction shall maintain public access to waterfront areas through a phased approaches.

H. The contractor must demonstrate experience in coastal, tidally influenced environments, including erosion control and vegetated shoreline construction.

1.2 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

PART 2 -- PRODUCTS (NOT USED)

PART 3 -- EXECUTION

3.1 LAYOUT OF WORK AND QUANTITY SURVEYS

- A. General. The Contractor shall utilize a properly licensed surveyor to perform all layout surveys required for the control and completion of the Work, and all necessary surveys to compute quantities of Work performed.

City and/or the Engineer of Record has established primary control to be used by the Contractor for establishing lines and grades required for the Work.

Primary control consists of benchmarks and horizontal control points in the vicinity of the Work. A listing and identification of the primary control is provided on the Drawings. Before beginning any layout work or construction activity, the Contractor shall check and verify primary control, and shall advise the City Representative of any discrepancies.

- B. Quantity surveys. The Contractor shall perform such surveys and computations as are necessary to determine quantities of Work performed or placed during each progress payment period, and shall perform all surveys necessary for the City Representative to determine final quantities of Work in place. The City Representative will determine final quantities based upon the survey data provided by the Contractor, and the design lines and grades. If requested by the City Representative, the Contractor shall provide an electronic copy of data used for quantity computations.

All surveys performed for measurement of final quantities of Work and material shall be subject to approval of City's Representative. Unless waived by City's Representative in each specific case, quantity surveys made by the Contractor shall be made in the presence of City's Representative.

- C. Surveying

1. Accuracy. Degree of accuracy shall be an order high enough to satisfy tolerances specified for the Work and the following:

- (a) Right-of-way and alignment of tangents and curves shall be within 0.1 foot.
- (b) Structure points shall be set within 0.01 foot, except where operational function of the special features or installation of metalwork and equipment require closer tolerances. When formwork has been placed and is ready for concrete, the Contractor shall check the formwork for conformance with the drawings and to ensure that the forms are sufficiently within the tolerance limits for the completed work.
- (c) Cross-section points shall be located within 0.1 foot, horizontally and vertically.

(d) Aerial Mapping shall meet National Mapping Standards for 2-foot contour intervals.

- D. Records. Survey data shall be recorded in accordance with recognized professional surveying standards. Original field notes, computations, and other surveying data shall be recorded on electronic data collectors or in standard field books and must be of sufficient quality to enable the Contractor to prepare accurate record drawings as required by the Contract Documents.
- E. Cost. Unless otherwise called for by the Contract Documents, the cost of all material, equipment, and labor required for surveys for the layout of work and quantity surveys shall be included in the Schedule of Pay Items for items of work requiring the surveys. No additional compensation shall be made to the Contractor for this Work.

3.2 SCHEDULE

- A. Estimated Schedule. Within 14 Days after the issuance of the Notice to Proceed, Contractor shall prepare a Project schedule and shall submit this to the Engineer for Approval. The receipt or Approval of any schedules by the Engineer or the City shall not in any way relieve the Contractor of its obligations under the Contract Documents. The Contractor is fully responsible to determine and provide for any and all staffing and resources at levels which allow for good quality and timely completion of the Project. Contractor's failure to incorporate all elements of Work required for the performance of the Contract or any inaccuracy in the schedule shall not excuse the Contractor from performing all Work required for a completed Project within the specified Contract time period. If the required schedule is not received by the time the first payment under the Contract is due, Contractor shall not be paid until the schedule is received, reviewed and accepted by the Engineer.
- B. Schedule Contents. The schedule shall indicate the beginning and completion dates of all phases of construction; critical path for all critical, sequential time related activities; and "float time" for all "slack" or "gaps" in the non-critical activities. The schedule shall clearly identify all staffing and other resources which in the Contractor's judgment are needed to complete the Project within the time specified for completion. The overall Project Schedule duration shall be within the Contract time.
- C. Schedule Updates. Contractor shall continuously update its construction schedule. Contractor shall submit an updated and accurate construction schedule to the Engineer monthly when requested to do so by Engineer. Contractor shall also submit schedules showing a three week detailed look-ahead at bi-weekly meetings conducted with the City. The Engineer may withhold progress payments or other amounts due under the Contract Documents if Contractor fails to submit an updated and accurate construction schedule.

3.3 TEMPORARY FIELD OFFICE

- A. Utility Services. Contractor, at its expense, shall arrange for, develop and maintain all utilities, including but not limited to water, electric power, sewage disposal and telephone communications, at the Site to meet the requirements of the Work.

- B. Sanitation. The Contractor shall provide sanitary facilities for all persons working on the project. These facilities shall be kept clean and shall not be unsightly or produce odors.

3.4 PROTECTION OF WORK AND PROPERTY

- A. All traffic detector loops, fences, walls, culverts, property line monuments, or other obstructions (except property line monuments within five (5) feet of the centerline of the mains) which are removed, damaged, or destroyed in the course of the Work, shall be replaced or repaired to the original condition. If Contractor provides the City with reasonable notice of the need for such repair or replacement, it shall be performed by the City. If the Contractor fails to provide the City with reasonable notice, the repair or replacement shall be performed by and at the expense of the Contractor to the satisfaction of the City, whether or not those obstructions have been shown on the Plans, unless otherwise stated herein. It is then the Contractor's responsibility to employ at its expense a Licensed Land Surveyor to restore all property line monuments located more than five (5) feet from the centerline of the mains, which are destroyed or obliterated. Property line monuments located within five (5) feet of the centerline of the mains will be replaced by the City at no expense to the Contractor, provided the City is notified at least 48 hours before the property line monuments are damaged.
- B. Contractor shall provide such heat, covering, and enclosures as are necessary to protect all Work, materials, equipment, appliances, and tools against damage by weather conditions.
- C. Contractor shall take adequate precautions to protect existing sidewalks, curbs, pavements, utilities, and other adjoining property and structures, and to avoid damage thereto, and Contractor shall repair any damage thereto caused by the Work operations. Contractor shall:
1. Enclose the working area with a substantial barricade, and arrange work to cause minimum amount of inconvenience and danger to the public.
 2. Provide substantial barricades around any shrubs or trees indicated to be preserved.
 3. Deliver materials to the Project site over a route designated by the Engineer.
 4. Provide any and all dust control required and follow the Applicable air quality regulations as appropriate. If the Contractor does not comply, the City shall have the immediate authority to provide dust control and deduct the cost from payments to the Contractor.
 5. Confine Contractor's apparatus, the storage of materials, and the operations of its workers to limits required by law, ordinances, permits, or directions of the Engineer. Contractor shall not unreasonably encumber the Project site with its materials.
 6. Take care to prevent disturbing or covering any survey markers, monuments, or other devices marking property boundaries or corners. If such markers are

disturbed by accident, they shall be replaced by a civil engineer or land surveyor acceptable to the City, at no cost to the City.

7. Ensure that existing facilities, fences and other structures are all adequately protected and that, upon completion of all Work, all facilities that may have been damaged are restored to a condition acceptable to the City.
 8. Preserve and protect from injury all buildings, pole lines and all direction, warning and mileage signs that have been placed within the right-of-way.
 9. At the completion of work each day, leave the Project site in a clean, safe condition.
 10. Comply with any stage construction and traffic control plans. Access to residences and businesses shall be maintained at all times, unless otherwise permitted in writing by the City.
- D. These precautionary measures will apply continuously and not be limited to normal working hours. Full compensation for the Work involved in the preservation of life, safety and property as above specified shall be considered as included in the prices paid for the various contract items of Work, and no additional allowance will be made therefore.
- E. Should damage to persons or property occur as a result of the Work, Contractor shall be responsible for proper investigation, documentation, including video or photography, to adequately memorialize and make a record of what transpired. The City shall be entitled to inspect and copy any such documentation, video, or photographs.

3.5 SITE CONDITIONS SURVEYS

A. Work Included.

Contractor shall conduct thorough pre-construction and post-construction site condition surveys of the entire project area. Site Conditions surveys shall include written documentation of the conditions found, as well as photographs and video recordings of the area within at least 80 feet of any construction area and staging area. The written notes, photographs, and video shall be suitable for forensic purposes to resolve any damage claims that may arise as a result of construction.

B. Submittals.

1. Written documentation of site condition survey at pre-construction and post-construction.
2. Photographs as described herein of pre-construction and post-construction conditions.
3. Video recordings as described herein of pre-construction and post-construction conditions.

4. Submittals shall be made within three days of the surveys. All post-construction data shall be submitted prior to the final project inspection.

C. Site Condition Written Documentation.

Written documentation shall include the time, date, and conditions under which the site survey was made. The documentation shall note the condition of structures, pavement, sidewalks, utilities, fences, and etc. within the work areas.

D. Photographs.

1. General – Contractor shall take enough photographs during each site survey to provide a record of conditions existing prior to construction and conditions after construction. Pre-construction photographs shall be taken prior to any construction or mobilization of equipment, but not more than one week prior to actual start of work. The pre-construction photographs may be staged at different times to match the progression of the Work.
2. The photographs shall document existing damage to public and private facilities, both prior to and after construction. Conditions to be documented include, but are not limited to: sidewalk cracks, broken curbs, separated property walls, improvements within public right-of-ways, access roads used, utility covers and markings, signs, pavement striping, pavement, unique or unusual conditions, adjacent driveways, landscaping, survey markers, and any feature directed by the Engineer. Private property that is adjacent to the public right-of-way shall be documented to the extent visible from the public right-of-way.
3. Photographs shall include items to indicate scale, as needed. In particular, scales or other items shall be laid next to close ups of structural cracks and other damaged areas being recorded. Scaling shall also be used to document elevation differences, as needed.
4. One set of color prints shall be submitted. Additional sets shall be available for reviewing in settling any construction disputes. A set of photos shall also be furnished in electronic format. The resolution shall be at least equal to 7 megapixels. All photos shall be documented as to time and date taken, photographer, project number, location, and orientation. Documentation shall include a brief description of objects photographed.

E. Video Recording.

1. Video recordings shall document the conditions of the entire area affected by construction, as well as nearby structures and facilities. The general documentation requirements for videos are the same as for photographs. Video recorders shall accurately and continuously record the time and date.
2. Video recordings shall include an audio portion made simultaneously during the videoing. The audio recording shall describe the location, time, orientation, and objects being recorded. Special commentary shall be provided for unusual conditions or damage noted.

3. Video equipment shall be capable of producing high resolution images and shall have zoom capabilities.
4. Video recordings shall provide an overall picture of the sites and shall provide detailed images of damaged areas. Video shall extend to the maximum height of structures.
5. The Engineer shall have the right to reject any audio video recordings submitted with unintelligible audio, uncontrolled pan or zoom, or of poor quality. Video recordings shall be repeated when rejected.
6. Video recordings shall be submitted with labels indicating the project, date, recorder, and other pertinent information. Recordings shall be submitted on standard DVDs in a standard format.

F. Timing.

Contractor shall provide written notice of the time scheduled for the site conditions survey and the place it is to begin. Contractor shall obtain the Engineer's concurrence prior to beginning the condition survey. The Engineer reserves the right to cancel the survey due to weather conditions or other problems. Videoing shall be done during times of good visibility and no videoing or photography shall be done during periods of visible precipitation or when standing water obscures pavement. Contractor shall provide the Engineer with an opportunity to have a representative present when taking the photos and provide guidance during photographing.

G. Site Surveyor.

The site condition surveyor(s) shall be experienced in construction and potential damage concerns. The site condition surveyor(s) shall be familiar with the photography and video equipment being used.

H. Field Quality Control.

Prior to submitting videos and photographs, the Contractor shall spot check the photos and videos in the field to insure they accurately reflect the actual conditions and to insure they are correctly labeled.

I. Soils Compaction Testing.

1. All soils compaction testing will be done by a licensed geotechnical engineer furnished by the City. Soils compaction testing will be done for all footings and foundations prior to placement of rebar or concrete.
2. For pipeline construction, soil compaction testing will be done at 100-foot intervals at the bottom of the trench prior to placement of pipe bedding; at the top of the pipe bedding above the pipe; every two vertical feet of trench backfill; at the top of the trench backfill, which could be the bottom of the pavement section; and at the top of the aggregate base prior to pavement construction.

3.6 SUBMITTAL REQUIREMENTS FOR MANUALS AND RECORD DRAWINGS

- A. General. The Contractor shall furnish all materials and perform all Work required for furnishing submittals to City in accordance with Contract Documents.
- B. Technical Manuals.
 - 1. The Contractor shall submit technical operation and maintenance information for each item of mechanical, electrical and instrumentation equipment in an organized manner in the Technical Manual. It shall be written so that it can be used and understood by City's operation and maintenance staff.
 - 2. The Technical Manual shall be subdivided first by specification section number; second, by equipment item; and last, by "Category." "Categories" shall conform to the following (as applicable):
 - (a) Category 1 - Equipment Summary:
 - (1) Summary: A summary table shall indicate the equipment name, equipment number, and process area in which the equipment is installed.
 - (b) Category 2 - Operational Procedures:
 - (1) Procedures: Manufacturer-recommended procedures on the following shall be included in Part 2:
 - a. Installation
 - b. Adjustment
 - c. Startup
 - d. Location of controls, special tools, equipment required, or related instrumentation needed for operation
 - e. Operation procedures
 - f. Load changes
 - g. Calibration
 - h. Shutdown
 - i. Troubleshooting
 - j. Disassembly
 - k. Reassembly
 - l. Realignment
 - m. Testing to determine performance efficiency

- n. Tabulation of proper settings for all pressure relief valves, low and high pressure switches, and other protection devices
- o. List of all electrical relay settings including alarm and contact settings

(c) Category 3 - Preventive Maintenance Procedures:

- (1) Procedures: Preventive maintenance procedures shall include all manufacturer-recommended procedures to be performed on a periodic basis, both by removing and replacing the equipment or component, and by leaving the equipment in place.
- (2) Schedules: Recommended frequency of preventive maintenance procedures shall be included. Lubrication schedules, including lubricant SAE grade, type, and temperature ranges, shall be covered.

(d) Category 4 - Parts List:

- (1) Parts List: A complete parts list shall be furnished, including a generic description and manufacturer's identification number for each part. Addresses and telephone numbers of the nearest supplier and parts warehouse shall be included.
- (2) Drawings: Cross-sectional or exploded view drawings shall accompany the parts list.

(e) Category 5 - Wiring Diagrams:

- (1) Diagrams: Part 5 shall include complete internal and connection wiring diagrams for electrical equipment items.

(f) Category 6 - Shop Drawings:

- (1) Drawings: This part shall include approved shop or fabrication drawings, complete with dimensions.

(g) Category 7 - Safety:

- (1) Procedures: This part describes the safety precautions to be taken when operating and maintaining the equipment or working near it.

(h) Category 8 - Documentation:

- (1) All equipment warranties, affidavits, and certifications required by the Technical Specifications shall be placed in this part.

- 3. The Contractor shall furnish to City six (6) identical Technical Manuals. Each set shall consist of one or more volumes, each of which shall be bound in a standard binder.

- C. Spare Parts List - The Contractor shall furnish to City six (6) identical sets of spare parts information for all mechanical, electrical, and instrumentation equipment. The spare parts list shall include the current list price of each spare part. The spare parts list shall include those spare parts which each manufacturer recommends be maintained by City in inventory. Each manufacturer or supplier shall indicate the name, address, and telephone number of its nearest outlet of spare parts to assist City in ordering. The Contractor shall cross-reference all spare parts lists to the equipment numbers designated in the Contract Documents. The spare parts lists shall be bound in standard size, 3-ring binder.
- D. Record Drawings
1. The Contractor shall maintain one record set of Drawings at the Site. On these, it shall mark all Project conditions, locations, configurations, and any other changes or deviations which may vary from the information represented in the original Contract Documents, including buried or concealed construction and utility features which are revealed during the course of construction. Special attention shall be given to recording the horizontal and vertical location of all buried utilities that differ from the locations indicated, or which were not indicated on the Contract Drawings. Said record drawings shall be supplemented by any detailed sketches as necessary or directed to fully indicate the Work as actually constructed. These master record drawings of the as-built conditions, including all revisions made necessary by Addenda and Change Orders shall be maintained up-to-date during the progress of the Project. Red ink shall be used for alterations and notes. Notes shall identify relevant Change Orders by number and date.
 2. For all Projects involving the installation of any pipeline, Contractor shall survey and record the top of the pipe at a minimum of every 100 linear feet, and at each bend, recording both the horizontal and vertical locations.
 3. Record drawings shall be accessible to City's Representative at all times during the construction period. Failure on the Contractor's part to keep record drawings current could result in withholding partial payment.
 4. Upon Completion of the Project and as a condition of final acceptance, the Contractor shall finalize and deliver a complete set of Record Drawings to City's Representative. The information submitted by the Contractor will be assumed to be correct, and the Contractor shall be responsible for, and liable to City, for the accuracy of such information, and for any errors or omissions which may or may not appear on the Record Drawings.
- E. Cost. Unless otherwise called for by the Contract Documents, the cost of all material, equipment, and labor required to complete the Manuals and Record Drawings shall be included in Contractor's bid and distributed in the Schedule of Pay. No additional compensation shall be made to the Contractor for this Work.

3.7 MATERIALS

- A. Materials to be Furnished by the Contractor

1. Inspection of Materials. Materials furnished by the Contractor which will become a part of the Project shall be subject to inspection at any one or more of the following locations, as determined by City's Representative: at the place of production or manufacture, at the shipping point, or at the site of the Work. To allow sufficient time to provide for inspection, the Contractor shall submit to City's Representative, at the time of issuance, copies of purchase orders or other written instrument confirming procurement of the materials, including drawings and other pertinent information, covering materials on which inspection will be made.
2. No later than fourteen (14) Days prior to manufacture of material, Contractor shall inform City's Representative, in writing, the date the material is to be manufactured.
3. Contractors Obligations. The inspection of materials at any of the locations specified above or the waiving of the inspection thereof shall not impact whether the materials and equipment conform to the Contract Documents. Contractor will not be relieved from furnishing materials meeting the requirements of the Contract Documents due to City's inspection or lack of inspection of the equipment or materials. Acceptance of any materials will be made only after materials are installed in the Project.
4. Cost. Unless otherwise called for by the Contract Documents, the cost of all material, equipment, and labor required to accommodate City's testing efforts, including any travel required by Contractor's forces, shall be included in Contractor's bid and distributed in the Schedule of Pay Items related to the materials requiring testing. No additional compensation shall be made to the Contractor for this Work.

3.8 LOCAL CONDITIONS AND REQUIREMENTS

A. Access to Work and Haul Routes

1. General. All work on the rights-of-way necessary for access to the Site shall be performed by the Contractor.
2. Access, Damage, Restoration. The Contractor shall make his own investigation of the condition of available public or private roads and of clearances, restrictions, bridge-load limits, permit or bond requirements, and other limitations that affect or may affect transportation and ingress or egress at the Site. Claims for changes in Contract Price or Contract Times arising out of the unavailability of transportation facilities or limitations thereon shall not be considered by City.
3. The Contractor shall maintain and repair any damage arising out of Contractor's operations to all roads used during construction of the Project, and upon completion of all Work, but prior to final acceptance, the roads shall be restored to their original condition. Prior to using any road for access to the Site, the Contractor shall conduct a photograph and/or video survey of the roadway with a copy submitted to City's Representative.

4. Cost. Unless otherwise called for by the Contract Documents, the cost of all material, equipment, and labor required to complete this Work, shall be included in Contractor's bid and distributed in the Schedule of Pay Items. No additional compensation shall be made to the Contractor for this Work.
- B. Power. Contractor shall provide at its own expense all necessary power required for operations under the contract. The Contractor shall provide and maintain in good order such modern equipment and installations as shall be adequate in the opinion of the Engineer to perform in a safe and satisfactory manner the Work required by the contract.
- C. Construction Water.
1. Construction water shall not be used for purposes other than those required to satisfactorily complete the contract.
 2. All connections to the City's water system used for the purposes of obtaining construction water shall utilize a temporary construction meter and backflow prevention device supplied by the City. The City-furnished backflow prevention device shall be tested immediately after installation and the construction meter and backflow prevention device shall not be placed into service until the backflow prevention device passes such tests. Backflow prevention device testing shall be performed in accordance with applicable standards, and test results shall be provided to the Engineer. If the temporary construction meter and backflow prevention device are moved to alternate location(s) during construction, the backflow prevention device shall again be tested as described above immediately after re-installation.
 3. For each temporary construction meter requested by the Contractor for the performance of work under this contract, an amount equivalent to the deposit requirement for temporary construction meters listed in the current approved version of the City's Policies and Procedures Manual shall be withheld from the final contract payment until the temporary construction meters are returned.
- D. Operation of Existing Water Facilities
1. The Contractor shall not operate any of the existing water systems, including pumps, motors, and hydrants, but shall contact the City two (2) working days in advance with a list and location of the water system facilities that will require operating, opening, stopping, or closure by the City.
 2. At the option of the Engineer, the Contractor may be permitted to operate valves for the purpose of making connections to existing mains. The City will perform all notification to existing customers regarding temporary loss of service.
 3. Contractor shall submit a request on City's standard form for any shut-down of existing water facilities.
- E. Construction at Existing Utilities

1. General. Where the Work to be performed crosses or otherwise interferes with water, sewer, gas, or oil pipelines; buried cable; or other public or private utilities, the Contractor shall perform construction in such a manner so that no damage will result to either public or private utilities. It shall be the responsibility of the Contractor to determine the actual locations of, and make accommodations to maintain, all utilities.
2. Permission, Notice and Liability. Before any utility is taken out of service, permission shall be obtained by the Contractor from the owner. The owner, any impacted resident or business owner and the City Representative will be advised of the nature and duration of the utility outage as well as the Contractor's plan for providing temporary utilities if required by the owner. The Contractor shall be liable for all damage which may result from its failure to maintain utilities during the progress of the Work, and the Contractor shall indemnify City as required by the Contract Documents from all claims arising out of or connected with damage to utilities encountered during construction; damages resulting from disruption of service; and injury to persons or damage to property resulting from the negligent, accidental, or intentional breaching of utilities.
3. Cost. Unless otherwise called for by the Contract Documents, the cost of all material, equipment, and labor required to complete this Work, shall be included in Contractor's bid and distributed in the Schedule of Pay Items. No additional compensation shall be made to the Contractor for this Work.

F. Traffic Control

1. General. Contractor shall abide by traffic control plans approved by the appropriate jurisdiction.
2. Protections. Roads subject to interference by the Work shall be kept open or suitable temporary passages through the Work shall be provided and maintained by the Contractor. The Contractor shall provide, erect, and maintain all necessary barricades, suitable and sufficient flasher lights, flag persons, danger signals, and signs, and shall take all necessary precautions for the protection of the Work and the safety of the public. No construction work along public or private roads may proceed until the Contractor has proper barricades, flasher lights, flag persons, signals, and signs in place at the construction site.
3. Cost. Unless otherwise called for by the Contract Documents, the cost of all material, equipment, and labor required to complete this Work, shall be included in Contractor's bid and distributed in the Schedule of Pay Items. No additional compensation shall be made to the Contractor for this Work.

G. Cleaning Up

1. Contractor at all times shall keep premises free from debris such as waste, rubbish, and excess materials and equipment. Contractor shall not store debris under, in, or about the premises. Contractor shall also clean all asphalt and concrete areas to the degree necessary to remove oil, grease, fuel, or other stains caused by Contractor operations or equipment. The use of water, resulting in mud on streets,

will not be permitted as substitute for sweeping or other methods. Dust control may require having a water truck onsite for the duration of the project, and/or use of temporary hoses and pipelines to convey water.

2. Contractor shall fully clean up the site at the completion of the Work. If the Contractor fails to immediately clean up at the completion of the Work, the City may do so and the cost of such clean up shall be charged back to the Contractor.

3.9 ENVIRONMENTAL QUALITY PROTECTION

A. Environmental Conditions

1. Contractor must comply with all applicable environmental laws, Project conditions, and constraints, including, but not limited to:

BCDC Bay Conservation and Development Commission Permit

OSHA Occupational Safety and Health Administration

2. City has considered these Environmental Conditions when determining the Contract Times and no additional time or compensation will be added to the Contract due to these Conditions.

B. Landscape and Vegetation Preservation

1. General. The Contractor shall exercise care to preserve the natural landscape and vegetation, and shall conduct operations so as to prevent unnecessary destruction, scarring, or defacing of the natural surroundings in the vicinity of the Work.
2. Damage and Restoration. Movement of crews and equipment within the rights-of-way and over routes provided for access to the Work shall be performed in a manner to prevent damage to property. When no longer required, construction roads shall be restored to original contours.
3. Upon completion of the Work, and following removal of construction facilities and required cleanup, land used for construction purposes and not required for the completed installation shall be scarified and regraded, as required, so that all surfaces are left in a condition that will facilitate natural revegetation, provide for proper drainage, and prevent erosion.
4. Cost. Unless otherwise called for by the Contract Documents, the cost of all material, equipment, and labor required to complete this Work, shall be included in Contractor's bid and distributed in the Schedule of Pay Items. No additional compensation shall be made to the Contractor for this Work.

C. Protected Species

1. General. If, in the performance of the Work, evidence of the possible occurrence of any Federally listed threatened or endangered plant or animal is discovered, the Contractor shall notify the City Representative immediately, giving the location

and nature of the findings. Written confirmation of the evidence, location and nature of the findings shall be forwarded to City within 2 Days.

2. Procedures. The Contractor shall immediately cease all construction activities in the immediate area of the discovery to the extent necessary to protect the endangered plant or animal.

If directed by the City Representative, Contractor will refrain from working in the immediate area, suspend the Work in its entirety, or alter its performance to ensure full compliance with all applicable permits, laws and regulations. Any City directed changes to the Work as a result of a siting will be pursuant to the Contract Documents.

3. False Siting. Any costs or delays incurred by City or the Contractor due to unreasonable or false notification of an endangered plant or animal will be borne by the Contractor.
4. Cost. Unless otherwise called for by the Contract Documents, the cost of all material, equipment, and labor required to comply with this paragraph, shall be included in Contractor's bid and distributed in the Schedule of Pay Items. No additional compensation shall be made to the Contractor for this Work.

D. Preservation of Historical and Archeological Resources

1. General. If, in the performance of the Work, Contractor should unearth cultural resources (for example, human remains, animal bones, stone tools, artifacts and/or midden deposits) through excavation, grading, watering or other means, the Contractor notify the Construction/Archeological Monitor and/or the City Representative immediately, giving the location and nature of the findings. Written confirmation of the evidence, location and nature of the findings shall be forwarded to the Construction/Archeological Monitor and/or City within 2 Days.
2. Procedures. The Contractor shall immediately cease all construction activities in the immediate area of the discovery to the extent necessary to protect the cultural resource.

If directed by the City Representative, Contractor will refrain from working in the immediate area, suspend the Work in its entirety, or re-sequence and/or alter its performance to ensure full compliance with all applicable permits, laws and regulations. Should the presence of cultural resources be confirmed, the Contractor will assist the City Representative and the Construction/Archeological Monitor in the preparation and implementation of a data recovery plan. The Contractor shall provide such cooperation and assistance as may be necessary to preserve the cultural resources for removal or other disposition. Any City directed changes to the Work as a result of the cultural resource will be pursuant to the Contract Documents.

3. Contractor's Liability. Should Contractor, without permission, injure, destroy, excavate, appropriate, or remove any cultural resource on or adjacent to the Site, it will be subject to disciplinary action, arrest and penalty under applicable law. The

Contractor shall be principally responsible for all costs of mitigation and/or restoration of cultural resources related to the unauthorized actions identified above. Contractor shall be required to pay for unauthorized damage and mitigation costs to cultural resources (historical and archeological resources) as a result of unauthorized activities that damage cultural resources and shall indemnify City pursuant to the Contract Documents.

4. Cost. Unless otherwise called for by the Contract Documents, the cost of all material, equipment, and labor required to comply with this paragraph, shall be included in Contractor's bid and distributed in the Schedule of Pay Items. No additional compensation shall be made to the Contractor for this Work.

E. Dust and Pollution Control

1. Contractor shall provide all necessary material, equipment and labor to prevent and control the emission of dust and any other potential pollutant on site.
2. Contractor shall not discharge into the atmosphere from any source smoke, dust or other air contaminants in violation of the law, rules, and regulations of the governing agency.
3. Cost. Unless otherwise called for by the Contract Documents, the cost of all material, equipment, and labor required to comply with this paragraph, shall be included in Contractor's bid and distributed in the Schedule of Pay Items. No additional compensation shall be made to the Contractor for this Work.

F. Fugitive Dust

1. In addition to all other environmental and air quality requirements of the Contract Documents, Contractor must also comply with the most recent version of any rules implemented by the Air Quality Management District (AQMD) with jurisdiction over the Project in order to reduce the amount of particulate matter entrained in the ambient air as a result of the Project. All equipment shall be AQMD compliant and permitted, as needed.
2. City has considered these other requirements when determining the Contract Times and no additional time or compensation will be added to the Contract due to these requirements.

G. Management of Storm, Surface and Other Waters

1. Storm water, surface water, groundwater, and nuisance, or other waters may be encountered at various times during construction of the Project. Federal and State laws require the City and its contractors to manage such waters pursuant to the requirements of California State Water Resources Control Board Order Number 2009-0009-DWQ, the Federal Clean Water Act, and the California Porter Cologne Water Quality Control Act. Contractor acknowledges that it has investigated the risk arising from such waters in conjunction with the Project, and assumes any and all risks and liabilities arising therefrom.

2. The Contractor shall perform all construction operations in such a manner as to comply, and ensure all subcontractors to comply, with all applicable Federal, State, and local laws, orders, and regulations concerning the control and abatement of water pollution; and all terms and conditions of any applicable permits issued for the Project. In the event there is a conflict between Federal, State, and local laws, regulations, and requirements, the most stringent shall apply.
3. Contractor violations. If noncompliance should occur, the Contractor shall report this to the City Representative immediately, with the specific information submitted in writing within 2 Days. Consistent violations of applicable Federal, State, or local laws, orders, regulations, or Water Quality Standards may result in City stopping all site activity until compliance is ensured. The Contractor shall not be entitled to any change in Contract Price or Contract Times, claim for damage, or additional compensation by reason of such a work stoppage. Corrective measures required to bring activities into compliance shall be at the Contractor's expense.
4. Compliance with Construction General Storm water Permit. Contractor shall be required to comply with all aspects of the State Water Resources Control Board (State Board) Water Quality Order No. 2009-0009-DWQ, National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Construction Activity (Permit) for all projects that involve construction on or disturbance of one acre or more of land or which are part of a larger common area of development.
 - (a) Contractor shall prepare and implement a Storm Water Pollution Prevention Plan (SWPPP) for the Project site based on the appropriate Risk Level requirements, and draft and coordinate submittal of all Permit related documents with City's Legally Responsible Person and/or Authorized Signatory as those terms are defined in the Permit. The Contractor shall submit the SWPPP to the City Representative for review not less than fifteen (15) Days prior to the start of on- site construction work. City will file the Notice of Intent and pay the filing fee.
 - (b) The SWPPP shall be developed by a Qualified SWPPP Developer and implemented by a Qualified SWPPP Practitioner as those terms are defined in the Permit and shall include industry standard requirements for water quality control including but not be limited to the following:
 - (1) Sediment and erosion control measures to manage sediment and erosion including vegetative practices, structural control, silt fences, straw dikes, sediment controls or operator controls as appropriate. Storm water management measures shall be instituted as required, including velocity dissipaters, and solid waste controls shall address controls for building materials and offsite tracking of sediment.
 - (2) Wastewater and storm water management controls to divert offsite surface flows around the Project site and to divert surface flows within the Project area away from areas of open earth or stockpiles of building and other materials. Wastewater from general construction activities, such as drain water collection, aggregate processing, concrete batching, drilling, grouting, or other construction operations, shall not enter flowing or dry watercourses without having met the authorized non-storm water discharge

requirements listed in State Board Water Quality Order No. 2009-0009-DWQ, Section III.C., including proper notification to the Regional Water Board.

- (3) Pollution prevention measures including methods of dewatering, unwatering, excavating, or stockpiling earth and rock materials which include prevention measures to control silting and erosion, and which will intercept and settle any runoff of sediment-laden waters.
 - (4) Turbidity prevention measures for prevention of excess turbidity including, but are not restricted to, intercepting ditches, settling ponds, gravel filter entrapment dikes, flocculating processes, recirculation, combinations thereof, or other approved methods that are not harmful to aquatic life. All such wastewaters discharged into surface waters, shall contain the least concentration of settleable material possible, and shall meet all conditions of section 402, the National Pollutant Discharge Elimination System (NPDES) permit.
 - (5) Overall construction site management measures to address changes at the Project site as the Project moves through different phases and changes that account for rainy and dry season management practices.
 - (6) Pollution control measures and construction activity methods that will prevent entrance, or accidental spillage, of solid matter, contaminants, debris, or other pollutants or wastes, into streams, flowing or dry watercourses, lakes, wetlands, reservoirs, or underground water sources. Such pollutants and wastes include, but are not restricted to: refuse, garbage, cement, sanitary waste, industrial waste, hazardous materials, radioactive substances, oil and other petroleum products, aggregate processing, tailings, mineral salts, and thermal pollution.
 - (7) Control measures for stockpiled or deposited materials prohibiting the stockpile or deposit of excavated materials, or other construction materials, near or on stream banks, lake shorelines, or other watercourse perimeters where they can be washed away by high water or storm runoff, or can, in any way, encroach upon the watercourse.
 - (8) Develop and implement a Rain Event Action Plan (REAP), if required, that must be designed and implemented to protect all exposed portions of the site 48 hours prior to any likely precipitation event.
 - (9) Monitoring, reporting and record keeping, as necessary to achieve compliance with applicable Permit requirements, including but not limited to annual reports and rain event reports.
- (c) Before any Permit related documents, including the SWPPP, rain event reports, or annual reports may be submitted to the State Board or implemented on the Project site, they must first be reviewed and approved by City.
 - (d) City retains the right to procure and maintain coverage under the Permit for the Project site if the Contractor fails to draft a SWPPP or other Permit related document, or fails to proceed in a manner that is satisfactory to City. City reserves the right to implement its own SWPPP at the Project site, and hire

additional contractors to maintain compliance. Whether Contractor has adequately maintained compliance with the Permit shall be City's sole determination. In the event that Contractor has failed or is unable to maintain compliance with the Permit, any costs or fines incurred by City in implementing a SWPPP, or otherwise maintaining compliance with the Construction General Permit shall be paid by the Contractor.

- (e) Failure to implement the SWPPP or otherwise comply with the Permit is a violation of federal and state law. Contractor hereby agrees to indemnify City as required by the Contract Documents for any noncompliance or alleged noncompliance with the Permit arising out of or in connection with the Project, except for liability resulting from the sole established negligence, willful misconduct or active negligence of City. City may seek damages from Contractor for delay in completing the Contract in accordance with the Contract Documents, caused by Contractor's failure to comply with the Permit.
- 5. In addition to compliance with the Permit, Contractor shall comply with the lawful requirements of any applicable municipality, district, drainage district, flood control district, and other local agencies regarding discharges of storm water, surface water, groundwater or other nuisance waters off of the Project site.
 - 6. Oil storage tanks management.
 - (a) Storage tank placement. All oil or other petroleum product (hereinafter referred to collectively as oil) storage tanks shall be placed at least 20 feet from streams, flowing or dry watercourses, lakes, wetlands, reservoirs, and any other water source.
 - (b) Storage area dikes. Storage areas shall be diked at least 12 inches high or graded and sloped to permit safe containment of leaks and spills equal to the capacity of all tanks and/or containers located within each area, plus a sufficient amount of freeboard to contain the 25-year rainstorm.
 - (c) Diked area barriers. Diked areas shall have an impermeable barrier at least 10 mils thick. Areas used for refueling operations shall have an impermeable liner at least 10 mils thick buried under 2 to 4 inches of soil.
 - (d) Spill Prevention Control and Countermeasure Plan (SPCC). Where the location of a construction site is such that oil from an accidental spillage could reasonably be expected to enter into or upon the navigable waters of the United States or adjoining shorelines, and the aggregate storage of oil at the site is over 1,320 gallons or a single container has a capacity in excess of 660 gallons, the Contractor shall prepare an SPCC Plan. The Contractor shall submit the SPCC Plan to the Engineer at least 30 days prior to delivery or storage of oil at the site. The Plan must have been reviewed and certified by a registered professional engineer in accordance with 40 C.F.R., part 112
 - 7. Underground tank prohibition. The Contractor shall not use underground storage tanks.

8. Construction safety standards. The Contractor shall comply with the sanitation and potable water requirements of Section 7 of United States Bureau of Reclamation's publication "Reclamation Safety And Health Standards."
9. Other Permits.
 - (a) Other permits applicable to the Project are listed in the Special Conditions. The Contractor shall obtain all other necessary licenses and permits.
 - (b) Monitoring. The Contractor is required to conduct monitoring in order to meet the requirements of the permits, which may include sampling, testing and inspections.
 - (c) Recordkeeping. The Contractor shall retain all records and data required by the permits for the time specified in the contract.
10. Cost. Except as specified herein, the cost of complying with this section shall be included in the Schedule of Pay Items for work which necessitate the water pollution prevention measures required by this paragraph.

END OF GENERAL REQUIREMENTS

TECHNICAL SPECIFICATIONS

SECTION 31 10 00
SITE PREPARATION & PLANT PROTECTION

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This Section includes requirements for clearing and grubbing, demolition, removal, salvage, relocation reconstruction, or other disposal and/or reconstruction of existing facilities which interfere with the construction, including removal of items below ground.
- B. Preserve and protect all improvements to remain, including existing trees, shrubs, utilities, pavements, structures and improvements on adjoining properties during removal work, site preparation work and construction.
- C. Provide tree and shrub pruning and removal in accordance with these Specifications if required by the Contract Documents.
- D. Layout and review of utility and irrigation trenches that occur in the Tree Protection Root Zone.
- E. Related requirements specified elsewhere include:
 - 1. Section 32 84 00, IRRIGATION
 - 2. Section 32 90 00 , PLANTING

1.2 QUALITY ASSURANCE

- A. Reference Standards:
 - 1. Ordinances and Regulations: All local, municipal and state laws, codes and regulations governing or relating to all portions of this work are hereby incorporated into and made a part of these Specifications. Anything contained in these Specifications shall not be construed to conflict with any of the above codes, regulations or requirements of the same. However, when these Specifications and Drawings call for or describe materials, workmanship or construction of a better quality, higher standard than is required by the above mentioned codes and regulations, the provisions of these Specifications and Drawings shall take precedence. Furnish without extra charge additional materials and labor required to comply with above rules and regulations.
- B. Pre-installation Conference:
 - 1. Conduct conference at the project site. Contractor shall review and identify with the Owner's Representative the limits of Work and extent of plant materials and other improvements to be protected. Notify Owner's Representative of discrepancies between existing conditions and Drawings before proceeding with Work.
 - 2. Review methods and procedures related to temporary tree and plant protection including, but not limited to, the following:
 - a. Tree-service firm's personnel, and equipment needed
 - b. Arborist's responsibilities.
 - c. Quality-control program.

- d. Coordination of Work and equipment movement with the locations of protection zones.
 - e. Trenching by hand or with air spade within protection zones.
- C. At the Owner's discretion, an Arborist may represent the Owner to review the work of the Contractor in regards to plant protection. Arborist Qualifications: ISA Certified Arborist licensed to work in the State of California.
- D. Tree Service Firm Qualifications: An experienced tree service firm that has successfully completed temporary tree and plant protection work similar to that required for this Project and that will assign an experienced, qualified arborist to Project site during execution of the Work

1.3 PROJECT CONDITIONS

- A. Coordination: Coordinate this work with the work of other Sections to avoid delay and interference with other work.
- B. Nuisances: Keep dirt, dust, noise and other objectionable nuisance to a minimum. Use temporary enclosures, coverings and sprinkling, and combinations thereof, as necessary to limit dust to lowest practicable level, except do not use water to the extent that it causes flooding or contaminated run-off.
- C. Traffic: Conduct work to ensure minimum interference with vehicular and pedestrian traffic, and to permit unencumbered access to site and adjacent properties.
 - 1. Do not close or obstruct streets, sidewalks, alleys or other public passageways without permission from authorities having jurisdiction.
 - 2. If required by governing authorities, provide alternate routes around closed and obstructed traffic ways.
- D. The following practices are prohibited within protection zones:
 - 1. Storage of construction materials, debris, or excavated material.
 - 2. Moving or parking vehicles or equipment.
 - 3. Foot traffic.
 - 4. Erection of sheds or structures.
 - 5. Impoundment of water.
 - 6. Excavation or other digging unless otherwise indicated.
 - 7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.
- E. Do not direct vehicle or equipment exhaust toward protection zones.
- F. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones and organic mulch.

1.4 DEFINITIONS

- A. Diameter breast height (DBH): diameter of a trunk as measured at a height 54 inches above the ground line.

- B. Plant-Protection Zone: Area surrounding individual trees, groups of trees, shrubs, or other vegetation to be protected during construction and indicated on Drawings.
- C. Tree-Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction and as identified on the drawings or otherwise by a certified arborist.
- D. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.
- E. Structural Root Zone: A circular area with the tree trunk at the center and a radius equal to 3 times the diameter of the tree trunk measured at breast height (4.5 feet above ground line). This zone, where most of the structural roots exist, is based upon tree failure research conducted by E.T. Smiley at the Bartlett Tree Research Laboratory. Any structural (buttress) root, which has been severed or is rotten within this zone, can no longer provide adequate support to the tree and must be considered missing.
- F. Dripline: The area of the ground directly beneath the vertical projection (shadow) of the trees foliage canopy.

1.5 SUBMITTALS

- A. Product Data: For each type of product.
- B. Soil Analysis Report:
 - 1. Provide soil analysis report for any top soil to be removed and stockpiled for reuse as planting soil. Soils analysis report to be performed by a certified soil analysis laboratory, and include horticultural suitability analysis and recommendations for amending the soil. Subsoil will not be approved as planting soil.
 - 2. Provide soil analysis for any shoreline soils to be removed from the intertidal zone.
- C. Samples: For each type of the following:
 - 1. Organic Mulch: 1-quart of organic mulch; in sealed plastic bags labeled with composition of materials by percentage of weight and source of mulch.
 - 2. Planting Soil: 1-quart of soil; in sealed plastic bags; for soils to be used within the protection zones.
 - 3. Shoreline Soil: 1-quart of soil; in sealed plastic bags; for soils to be used in the intertidal zone.
- D. Shop Drawings:
 - 1. Include plans and locations of protection-zone fencing and signage, showing relation of equipment-movement routes and material storage locations with protection zones. Indicate extent of trenching by hand or with air spade within protection zones.
 - 2. Protection-Zone Signage
- E. Qualification Data: For arborist and tree service firm.

- F. Certification: From arborist, certifying that trees indicated to remain have been protected during construction according to recognized standards and that trees were promptly and properly treated and repaired when damaged.
- G. Maintenance Recommendations: From arborist, for care and protection of trees affected by construction during and after completing the Work.
- H. Survey of Existing Conditions: Provide to Owner a Survey of Existing Conditions. Record existing conditions, including underground utilities, etc. on As Built Drawings by use of field measurements and preconstruction photographs. Make permanent record of measurements, materials, and construction details required to make exact reproduction.
- I. Tree Pruning Schedule: Written schedule detailing scope and extent of pruning of trees to remain that interfere with or are affected by construction.
 - 1. Species and size of tree.
 - 2. Location on site plan. Include unique identifier for each.
 - 3. Reason for pruning.
 - 4. Description of pruning to be performed.
 - 5. Description of maintenance following pruning.
- J. Record Drawings: Indicate points of disconnection and capping, abandonment and removal of existing utility services; include utility names, sizes and locations, relationship to permanent structures located on site and on adjacent property, and certificates of severance of utility services from respective utility companies or owners.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Backfill Soil: Approved planting soil of suitable moisture content and granular texture for placing around tree; free of stones, roots, plants, sod, clods, clay lumps, pockets of coarse sand, concrete slurry, concrete layers or chunks, cement, plaster, building debris, and other extraneous materials harmful to plant growth.
- B. Shoreline Soil: Shoreline soil to be appropriate for intertidal plant growth, such as relocated dredge material or approved equal. Soil should be greater than 75% fines in order to provide the substrate necessary to support the anticipated project vegetation. Soil to be tested for organic matter and if necessary, amended with compost from intertidal biosolids or with direct nutrient addition. Contractor to receive final soil and amendment approval from geotechnical or soil marine engineer and present approval to landscape architect.
- C. Organic Mulch: Free from deleterious materials and suitable as a top dressing for trees and shrubs, consisting of one of the following:
 - 1. Type: Wood and bark chips
 - 2. Size Range: ½'-2"
 - 3. Color: Natural Brown.

- D. Protection-Zone Fencing: Fencing fixed in position and meeting the following requirements:
1. Chain-Link Protection-Zone Fencing: Galvanized-steel fencing fabricated from minimum 2-inch opening, 0.148-inch- diameter wire chain-link fabric; with pipe posts, minimum 2-3/8-inch- OD line posts, and 2-7/8-inch- OD corner and pull posts; with 1-5/8-inch- OD top and bottom rails; with tie wires, hog ring ties, and other accessories for a complete fence system.
 - a. Height: 72 inches
 2. Gates: Swing access gates matching material and appearance of fencing, to allow for maintenance activities within protection zones.
- E. Shoreline Protection Fencing: Galv. welded wire mesh; fastlock woven wire, 13/48/2, 12½ ga by Kencove farm fence supplies, or equal.; affixed with metal staple to 3" dia wood stake, rough cut, 4' o.c. wood stake to be driven into soil, 12" max depth, no excavation required.
- F. Protection-Zone Temporary Construction Safety Barrier
1. 4 foot high recyclable HDPE or Polypropylene orange mesh construction barrier with minimum 130 pounds breaking strength. Attached to 5.5' steel fence T-posts staked firmly in the ground. Spacing of posts to be determined based on the conditions, assume 6' spacing and 18 inches embedded in the ground.
- G. Protection-Zone Signage: Shop-fabricated, rigid plastic or metal sheet with attachment holes pre-punched and reinforced; legibly printed with nonfading lettering and as follows:
1. Text: "Tree Protection Zone. No Heavy Equipment."
 2. Lettering: 3-inch- high minimum, black characters on white background.
- H. Tree Branch & Trunk Protection: for branches trunks exposed to, or at risk of exposure to impact by construction equipment.
1. 2x lumber
 2. 1/2"-wide steel straps
- I. Natural Fiber Blankets: refer to section 32 90 00 Planting

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas in which work is to be performed. Report in writing to the Owner's Representative all prevailing conditions that will adversely affect the existing plant materials to remain. Do not proceed with work until a solution acceptable to the Owner's Representative has been arrived at
- B. Survey of Existing Conditions: Record existing conditions, including underground utilities, etc. by use of measured drawings and preconstruction photographs.
- C. Starting work constitutes acceptance of the existing conditions and the Contractor shall then, at his expense, be responsible for correcting all unsatisfactory and defective work encountered.

- D. Install and maintain temporary fencing or safety barrier and other required protective devices and exclude construction activities from tree/shrub zones except as supervised by the Arborist / Owner's Representative.
- E. If access to tree/shrub zones cannot be avoided an intact four-inch layer of mulch with minimum 1.25- inch thick, metal strap linked plywood shielding shall be maintained in the tree/shrub zone where heavy equipment will be operated.
- F. Locate and clearly flag trees and vegetation to remain or to be relocated, as diagrammed and noted in the Construction Documents.

3.2 PREPARATION

- A. Locate and clearly identify trees, shrubs, and other vegetation to remain an/or relocated. Tie a 1-inch blue vinyl tape around each tree trunk at 54 inches above the ground.
- B. Protect tree root systems from damage caused by runoff or spillage of noxious materials while mixing, placing, or storing construction materials. Protect root systems from ponding, eroding, or excessive wetting caused by dewatering operations.
- C. Tree-Protection Zones: Mulch areas inside tree-protection zones and other areas indicated. Do not exceed indicated thickness of mulch.
 - 1. Apply 4-inch uniform thickness of organic mulch unless otherwise indicated. Do not place mulch within 6 inches of tree trunks.
- D. Install and maintain temporary fencing and other required protective devices and exclude construction activities from tree/shrub zones except as supervised by the Arborist / Owner's Representative.
- E. If tree/plant protection zones cannot be protected with fencing, a four-inch layer of mulch with minimum 1.25-inch thick, metal strap linked plywood shielding shall be maintained in the tree/shrub zone where heavy equipment will be operated.

3.3 PROTECTION ZONES

- A. Protect trees and shrubs against cutting, breaking, skinning and bruising of bark; permit no traffic or stockpiling within drip line.
- B. Do not change earth surface within drip line of trees and shrubs except as approved in writing by the Owner.
- C. Do not park vehicles or store materials, supplies and construction equipment within Tree Protection Zone.
- D. Verify details of protection-zone fencing before retaining last option in "Protection-Zone Fencing" Paragraph below.
- E. Protection-Zone Fencing: Install protection-zone fencing along edges of protection zones before materials or equipment are brought on the site and construction operations begin in a manner that will prevent people from easily entering protected

areas except by entrance gates. Construct fencing so as not to obstruct safe passage or visibility at vehicle intersections where fencing is located adjacent to pedestrian walkways or in close proximity to street intersections, drives, or other vehicular circulation.

1. Chain-Link Fencing: Install to comply with ASTM F 567 and with manufacturer's written instructions.
 2. Posts: Set or drive posts into ground one-third the total height of the fence without concrete footings. Where a post is located on existing paving or concrete to remain, provide appropriate means of post support acceptable to Architect. Post may be steel driven type, or self-supporting type.
 3. Access Gates: Install where required; adjust 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.
- F. Protection-Zone Signage: Install protection-zone signage in visibly prominent locations in a manner approved by Architect. Install one sign spaced approximately every 20 feet on protection-zone fencing, with signs each facing a different direction.
- G. Where tree branches & trunks are exposed to, or at risk of exposure to impact by construction equipment, secure 2x lumber radially around tree branches and/or trunk to prevent damage. Secure lumber with steel strapping.
- H. Maintain protection zones free of weeds and trash.
- I. Maintain protection-zone fencing and signage in good condition as acceptable to Architect and remove when construction operations are complete and equipment has been removed from the site.
1. Do not remove protection-zone fencing, even temporarily, to allow deliveries or equipment access through the protection zone.
 2. Temporary access is permitted subject to preapproval in writing by arborist if a root buffer effective against soil compaction is constructed as directed by arborist. Maintain root buffer so long as access is permitted.

3.4 CLEARING

- A. Field Verification: Before removing non-designated trees, shrubs, stumps, bushes, vines, rubbish, undergrowth and deadwood as shown on the Drawings and as specified, obtain verification from Owner's Representative.
- B. Remove non-designated trees, shrubs, stumps, bushes, vines, rubbish, undergrowth and deadwood as well as fences and incidental structures that interfere with the construction as shown on the Drawings and as specified. Obtain verification from Owner's Representative prior to removal.

3.5 GRUBBING

- A. Remove all stumps and roots in their entirety, brush, organic materials and debris to bare earth except where otherwise required. Tree trunks shall be removed minimum depth of 2 1/2 feet below existing grade or finish grade, whichever is deeper.

- B. Stump grinding is an acceptable method of removal of roots and stumps of trees and shrubs; however, the chip-contaminated soil shall be replaced with approved clean planting soil in planting areas and with approved clean fill soil in all other areas.
- C. Backfill and compact voids excavated and open pits and holes resulting from removal operations. Comply with Earthwork Specification for backfill materials, compaction and installation methods. Unless required otherwise, in planting areas backfill holes with clean approved planting soil compacted to 90% relative compaction to a minus 12 inches below finish grade and 85% relative compaction for the top 12 inches, except as required elsewhere to a greater degree by Civil or Structural Engineer. In non-planting areas backfill holes with approved fill soil compacted to 95% relative compaction.
- D. When indicated, such materials as topsoil and leaf mold, or other organic materials above the ground surface suitable for use as mulch or topsoil, shall be salvaged and stockpiled.
- E. Remove grasses and weeds. Apply systemic weed killer and confirm weed kill prior to removal.
- F. Remove existing pavement within proposed planting areas in its entirety, including baserock.
- G. Remove existing pavement within proposed pavement areas to a depth sufficient to allow for the construction of the proposed pavement to the grades shown. Existing base material may be left in place and re-compacted as required where not conflicting with the new pavement section.

3.6 UTILITIES

- A. Contact local utility companies 48 hours minimum prior to start of demolition work. Confirm verbal notices and written notices. Verify locations of all utilities entering site and their locations on site.
- B. Cooperate with the Owner's utility companies, adjacent property owners, and other building trades in maintaining, protecting, re-routing or extending utilities passing through work areas which serve structures located on project site and on adjacent properties.
- C. Verify that utilities that are to be removed, capped or abandoned are turned off, or are disconnected, or are re-routed to new locations before starting demolition.

3.7 DEMOLITION/REMOVAL

- A. General:
 - 1. Remove materials in an orderly and careful manner. 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, to minimize disturbance of adjacent surfaces. Temporarily cover and protect openings to remain.

2. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
 3. Repair or replace all removal work performed in excess to that required at no cost to the Owner. Repair or replacement shall match and equal construction, condition and finish existing at time of award of Contract.
 4. Removed and Reinstalled Items:
 - a. Clean and repair items to functional condition adequate for intended reuse. Paint equipment to match new equipment.
 - b. Protect items from damage during transport and storage.
 - c. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.
- B. Remove following from locations to the extent required or directed for new construction. Removal of slabs and other structures shall include their footings and foundations. Removal of pavements shall include base rock and sub-structures.
1. Slabs, equipment pads and sidewalks. Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals, using power-driven saw, then remove concrete between saw cuts.
 2. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, then break up and remove.
 3. Asphalt, concrete paving, curbs, brick and block.
 4. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, then remove masonry between saw cuts.
 5. Fencing, including posts, fabric and footings.
 6. Electric utility poles, wires and down guys, including all underground wires and conduits occurring within removal areas.
 7. Designated utility services occurring within removal areas, including disconnection, capping and complete removal or abandonment.
 8. Buried tanks, complete with piping, footings, leach fields and foundations.
 9. Trees and their roots to a minimum of 30 inches below existing grade.
 10. Miscellaneous structural elements which interfere with the new construction and as directed by the Owner's Representative.
- C. Cutting asphalt, concrete curb and concrete pavement:
1. All lines shall be marked and accepted by Owner's Representative before the cutting operation.
 2. Cut edges of pavement at 90-degree angle to the surface in a true and straight line in accordance with dimensions shown on the Drawings. Make cuts with a concrete saw, to a 1-1/2" minimum depth.
- D. Backfill and compact areas excavated and open pits and holes resulting from removal operations. Comply with requirements specified in Earthwork, Section 02300 for backfill materials, compaction and installation methods.
- E. Rough grade site within removal areas to meet adjacent contours and to provide positive drainage. Leave site in clean condition acceptable for performance of subsequent construction operations.

3.8 EXCAVATION & TRENCHING

- A. General: Excavate at edge of protection zones and for trenches indicated within protection zones according to requirements in Section 312000 "Earth Moving" unless otherwise indicated.
- B. Trenching within Protection Zones: Where utility trenches are required within protection zones, excavate under or around tree roots by hand or with air spade, or tunnel under the roots by drilling, auger boring, or pipe jacking. Do not cut main lateral tree roots or taproots; cut only smaller roots that interfere with installation of utilities. Cut roots as required for root pruning. If excavating by hand, use narrow-tine spading forks to comb soil and expose roots.
- C. Within prehistoric site area, as indicated on demolition plan, maximum 12" excavation depth is required.
- D. Redirect roots in backfill areas where possible. If encountering large, main lateral roots, expose roots beyond excavation limits as required to bend and redirect them without breaking. If encountered immediately adjacent to location of new construction and redirection is not practical, cut roots approximately 3 inches (75 mm) back from new construction and as required for root pruning.
- E. Do not allow exposed roots to dry out before placing permanent backfill. Provide temporary earth cover or pack with peat moss and wrap with burlap. Water and maintain in a moist condition. Temporarily support and protect roots from damage until they are permanently relocated and covered with soil.

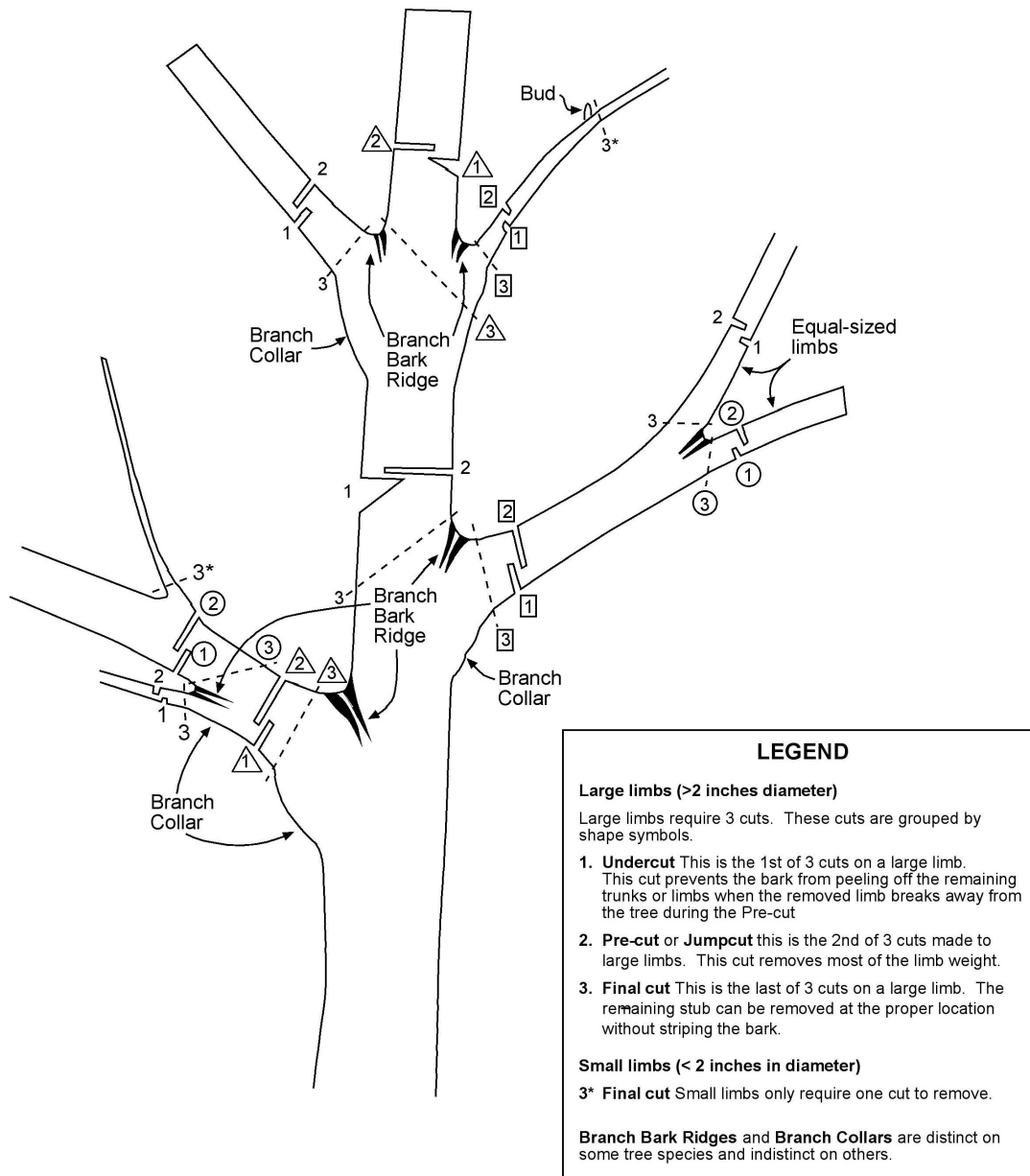
3.9 ROOT PRUNING

- A. Prune tree roots that are affected by temporary and permanent construction. Prune roots as approved by certified arborist.
 - 1. Generally cutting of roots two inches or greater shall be avoided. Roots one inch and greater in diameter that must be cut shall be cut cleanly and obliquely with the cut surface facing down.
 - 2. Exposed and pruned roots shall be covered with light well-drained soil backfill and mulch over. The area shall be kept moist. Retain applicable subparagraphs below.
 - 3. Cut roots manually by digging a trench and cutting exposed roots with sharp pruning instruments; do not break, tear, chop, or slant the cuts. Do not use a backhoe or other equipment that rips, tears, or pulls roots.
 - 4. Cut Ends: Do not paint cut root ends
 - 5. Temporarily support and protect roots from damage until they are permanently redirected and covered with soil.
 - 6. Cover exposed roots with burlap and water regularly.
 - 7. Backfill as soon as possible according to requirements in Section 312000 "Earth Moving."
- B. Root Pruning at Edge of Protection Zone: Prune tree roots 6 inches outside of the protection zone by cleanly cutting all roots to the depth of the required excavation.

- C. Root Pruning within Protection Zone: Clear and excavate by hand or with air spade to the depth of the required excavation to minimize damage to tree root systems. If excavating by hand, use narrow-tine spading forks to comb soil to expose roots. Cleanly cut roots as close to excavation as possible.

3.10 TREE PRUNING

- A. Obtain specific instruction from Arborist / Owner's Representative for pruning of trees, shrubs, roots or disturbance of soil within spread of tree branches. The Contractor shall utilize protection measures as outlined by Arborist / Owner's Representative, which may include directional drilling, or hand clearing to expose the roots.
- B. Provide periodic watering for all planting within Contract limit and any adjacent areas affected by the work. Maintain moisture to a minimum 6" depth, minimum.
- C. Using an approved pruning saw, provide selective tree limb pruning as accepted by the Landscape Architect if branches interfere with new construction. Limb diameter shall be limited to 5-inch diameter and shall be pruned just outside the branch collar in accordance with American National Standards Institute, (ANSI 300) and International Society of Arboriculture, (ISA) standards.
- D. Approved branches to be shortened must be cut just above a fork with another living branch which is plus or minus 1/2 the diameter of the removed branch as shown in the pruning figure herein. Branches to be removed which exceed 2 inches in diameter shall be severed with a 3-step cut to prevent bark peeling. Final cuts must not injure the branch collar or branch bark ridge of the remaining branches and trunk.
- E. Prune branches that are affected by temporary and permanent construction.
 - 1. Prune to remove only injured, broken, dying, or dead branches unless otherwise indicated. Do not prune for shape unless otherwise indicated.
 - 2. Do not remove or reduce living branches to compensate for root loss caused by damaging or cutting root system.
 - 3. Pruning Standards: Prune trees according to ANSI A300 (Part 1)
- F. Unless otherwise directed by arborist and acceptable to Architect, do not cut tree leaders.
- G. Cut branches with sharp pruning instruments; do not break or chop.
- H. Do not paint or apply sealants to wounds.
- I. Provide subsequent maintenance pruning during Contract period as recommended by arborist.
- J. Chip removed branches and stockpile in areas approved by Architect



3.11 REGRADING

- Lowering Grade:** Where new finish grade is indicated below existing grade around trees, slope grade beyond the protection zone. Maintain existing grades within the protection zone.
- Lowering Grade within Protection Zone:** Where new finish grade is indicated below existing grade around trees, slope grade away from trees as recommended by arborist unless otherwise indicated.

1. Root Pruning: Prune tree roots exposed by lowering the grade. Do not cut main lateral roots or taproots; cut only smaller roots. Cut roots as required for root pruning.
- C. Raising Grade: Where new finish grade is indicated above existing grade around trees, slope grade beyond the protection zone. Maintain existing grades within the protection zone.
- D. Minor Fill within Protection Zone: Where existing grade is 6 inches or less below elevation of finish grade, fill with backfill soil. Place backfill soil in a single uncompacted layer and hand grade to required finish elevations.

3.12 FIELD QUALITY CONTROL

- A. Inspections: Engage a qualified arborist to direct plant-protection measures in the vicinity of trees, shrubs, and other vegetation indicated to remain and to prepare inspection reports.

3.13 TREE & PLANT REMOVAL & REPLACEMENT

- A. Field Verification: Before removing non-designated trees, shrubs, stumps, bushes, vines, rubbish, undergrowth and deadwood as shown on the Drawings and as specified, obtain verification from Owner's Representative.
- B. Repair or replace trees, shrubs, and other vegetation indicated to remain or to be relocated 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 according to arborist's written instructions.
 3. Replace trees and other plants that cannot be repaired and restored to full-growth status, as determined by Architect.
- C. Backfill and compact areas excavated and open pits and holes resulting from removal operations. Comply with requirements herein and as specified in Earthwork, Section 02300 for backfill materials, compaction and installation methods.
- D. Remove all stumps and roots in their entirety. Tree trunks shall be removed minimum depth of 2 1/2 feet below existing grade or finish grade, whichever is deeper. Stump grinding is an acceptable method of removal of roots and stumps of trees and shrubs; however, the chip contaminated soil shall be replaced with approved clean planting soil in planting areas and with approved clean fill soil in all other areas.
- E. Backfill and compact voids excavated and open pits and holes resulting from removal operations. Comply with Earthwork Specification for backfill materials, compaction and installation methods. Unless required otherwise, in planting areas backfill holes with clean approved planting soil compacted to 90% relative compaction to a minus 12 inches below finish grade and 85% relative compaction for the top 12 inches, except as required elsewhere to a greater degree by Civil or Structural Engineer. In non-planting areas backfill holes with approved fill soil compacted to 95% relative compaction.

- F. Remove and replace trees indicated to remain that are more than 25% dead or in an unhealthy condition before the end of the corrections period or are damaged during construction operations that Architect determines are incapable of restoring to normal growth pattern.

- A. Plant Replacement: Contractor shall replace trees cut or severely damaged due to the Contractor's work as follows:
 - 1. An ISA Certified Arborist may be retained by the Owner to determine the condition of trees in question as to their ability to survive in a healthy condition and in their original shape, or a pruned aesthetically pleasing shape acceptable to the Owner. Comply with recommendations to rehabilitate as recommended by the Arborist, or to replace in accordance with the requirements below.
 - 2. Trees size shall be determined by Diameter at Breast Height (DBH). Replacement of trees and shrubs shall also include providing acceptable plant installation, automatic irrigation system and a minimum maintenance period of 120 days. If plant(s) is not acceptably maintained and is not healthy and thriving at the end of the 120 day maintenance period, the Contractor shall continue the maintenance work until such time that healthy tree(s) and/or shrub(s) is achieved.
 - 3. Replace any damaged planting in kind using "specimen" plants as follows and at no cost to Owner:
 - a. Trees up to 3" DBH: Replace with 36" box size.
 - b. Trees 3" to 6" DBH: Replace with 72" box size.
 - c. Trees 6" to 12" DBH: Replace with 84" box size.
 - d. Trees 12" DBH and larger: Tree value shall be determined by Arborist using Council of Tree and Landscape Appraisers (CTLA) method. Replace damaged tree with largest available nursery boxed tree and cash difference between value of damaged tree and nursery stock replacement cost.
 - e. Shrubs: Replace with 15-gallon can size.
 - 4. Plant and maintain new trees as specified

- B. Excess Mulch: Rake mulched area within protection zones, being careful not to injure roots. Rake to loosen and remove mulch that exceeds a 3-inch uniform thickness to remain.

- C. Soil Aeration: Where directed by arborist, aerate surface soil compacted during construction. Aerate 10 feet beyond drip line and no closer than 36 inches to tree trunk. Drill 2-inch- diameter holes a minimum of 12 inches (300 mm) deep at 24 inches o.c. Backfill holes with an equal mix of augered soil and sand.\

- 3.14 CLEANUP AND DISPOSAL, per Section 01 70 00.
 - A. General: Except for items or materials indicated to be recycled, reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill.
 - 1. Transport trash, rubbish and debris daily from site.
 - 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
 - 3. Remove and promptly dispose of contaminated, vermin-infested and dangerous materials encountered.
 - 4. Do not burn or bury materials on site.

- B. Clean excess soil may be distributed on site as accepted by Owner's Representative, if it does not adversely affect specified finish grades or percolation of water into planting soil.
- C. 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
- D. Upon completion of work under this Section, remove all tools, equipment and temporary protections, enclosures and structures.
- E. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during site preparation, by methods and with materials so as not to change existing function and warranties.

END OF SECTION

SECTION 32 15 12
STABILIZED AGGREGATE SURFACING

FOR MORE INFORMATION: Contact GraniteCrete Incorporated, www.granitecrete.com or call (800) 670-0849.

PART 1 - GENERAL

1.1 RELATED SECTIONS

- A. Section Includes: Crushed aggregate blended with GraniteCrete admixture surfacing.
- B. Related Work:
 - 1. Section 32 13 12, SITE CONCRETE

1.2 REFERENCES

- A. Geotechnical Study Report by RGH Consultants, dated June 9, 2015.
- B. ASTM C136-Sieve Analysis of Fine and Coarse Aggregates.
- C. ASTM D2419- Sand Equivalent Value of Soils and Fine Aggregates.
- D. "Greenbook" Standard Specifications for Public Works Construction.
- E. RIS-Redwood Inspection Services Grades of California Redwood.

1.3 SEQUENCING

- A. Do not install work specified in this Section prior to acceptance of earth moving. Coordinate work specified in this Section with work specified in other Sections to minimize cutting of and operation of heavy equipment over newly installed surfacing.

1.4 SUBMITTALS

- A. Submit the following for approval:
 - 1. Installer's certification by product manufacturer.
 - 2. Manufacturer's product data sheet and installation instructions indicating that product complies with specifications for:
 - a. Crushed aggregate blended with GraniteCrete admixture surfacing.
 - b. Edging
 - 3. Submit 1 quart sample of crushed aggregate with admixture in color specified.
 - 4. Edging

1.5 QUALITY ASSURANCE / FIELD QUALITY CONTROL

- A. Installer qualifications:
 - 1. Installer Certified by GraniteCrete.
 - 2. Installer to provide evidence to indicate successful installations of 25,000 square feet or more with an additional 6,000 square feet per year in providing decomposed granite surfacing containing GraniteCrete admixture and / or ability to follow installation instructions.

- B. GraniteCrete Certified Installers:
 - 1. McGuire and Hester, Matthew Dale-Landscape Group Manager, (510)632-7676.
 - 2. Ghilotti Bros., Migue Rangel, (415)760-0023.
 - 3. Juan Ontiveros, (831)200-5544.
- C. Materials shall comply with manufactures specifications.
- D. If product is installed by other than a GraniteCrete Certified Installer, contractor shall coordinate to ensure GraniteCrete personnel are onsite to oversee the installation process. Warranty is void otherwise.

1.6 MOCKUP

- A. Prepare 4' x 4' minimum of crushed aggregate blended with GraniteCrete admixture surfacing, including base course and edging, at location approved by Owners Representative. Build mockup 21 days prior to installation. Intent of the mockup is to demonstrate surface finish, texture, color and standard of workmanship
- B. Notify Owners Representative 7 days in advance of mockup construction.
- C. Allow Owners Representative to view and obtain approval of mock-up before proceeding with rest of crushed aggregate blended with GraniteCrete admixture surfacing.
- D. Approved mock-up may remain as first in place construction.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver all GraniteCrete Admixture [bags] [bulk] materials in original, unopened packaging. Protect materials / aggregate from contamination with foreign matter. Store under waterproof cover and protect from dampness.

1.8 FIELD CONDITIONS

- A. Do not install crushed aggregate blended with GraniteCrete admixture surfacing when sub-base is wet at saturated field capacity.
- B. Do not install GraniteCrete materials during rainy conditions or below 40 degrees Fahrenheit.

PART 2 - MATERIALS

2.1 CRUSHED AGGREGATE BLENDED WITH GRANITECRETE ADMIXTURE SURFACING MATERIALS.

- A. Acceptance Manufacturer:
 - 1. Specification is based on products by GraniteCrete, Inc., P.O. Box 1574 Carmel Ca. 93921; phone (800) 670-0849, fax (800) 670-0849, www.granitecrete.com. GraniteCrete admixture is an all-natural product and does not contain oils, polymers, resins, or enzymes.

2. Substitutions: Products by other manufacturers that comply with specifications will be considered. Bidders to provide bid based on specified material only. Substitutions to be considered after bid awarded.

B. Decomposed Granite (DG), crushed aggregate.

1. DG shall have a 3/8" maximum gradation, produced from naturally friable rock /granite with enough fines to produce a smooth walking surface. Materials should be free from clay lumps, organic matter and deleterious material. Blends of coarse sand and rock dust are not acceptable.
2. Use a single supply source for the entire quantity required.
3. Gradation, in accordance with ASTM C136:

<u>Seive Siezes</u>	<u>% Passing</u>
3/8"	100
#4	85-100%
#8	70-80%
#16	50-65%
#30	40-50%
#50	25-35%
#100	15-25%
#200	10-15%

4. Color: Natural Gold by Granitecrete or approved equal. Color to match existing Granitecrete paths on site.
5. Supplier: Enz Vineyard Rock Quarry, Hollister CA.; phone 831.638.3807, or equal.

2.2 BASE COURSE MATERIAL

- A. Class II Permeable Base Rock.

2.3 ACCESSORIES

- A. Water: Free from contaminants that would discolor or be deleterious to crushed aggregate blended with GraniteCrete admixture surfacing.
- B. Steel Edging:
1. Dimensions: [3/8"-thick x 4-inch], with overlapping joints.
 2. Stakes: 3/16" x 1-3/4" wide at top tapering to point at bottom; located 36" o.c. maximum.
 3. Finish: Hot dipped galvanized.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine grading and subsoil conditions. Do not proceed until conditions are acceptable.

3.2 PREPARATION

- A. **Subgrade preparation and compaction to be performed as required by geotechnical engineer and per recommendations outlined in geotechnical report.**
- B. Excavate to depth required so edges of crushed aggregate blended with GraniteCrete admixture surfacing will match adjacent grades and have a maximum cross slope of 1 percent. [Remove excavated soil from site.]
- C. Sub-grade Preparation: Comply with Greenbook Section 301-1 – “Sub-grade Preparation.” and per recommendations outlined in Geotechnical report.
- D. Base Course Installation: Class II permeable base rock at 90% compaction.
- E. [Edging]: Install flush with crushed aggregate blended with GraniteCrete admixture. Provide sufficient stakes to secure in place.]

3.3 INSTALLATION

- A. Prior to installation, dampen surface on which installation is to occur. Install GraniteCrete surfacing as per [specified] [manufacturer's] depth. GraniteCrete must be mixed on site. The use of a portable fiberglass concrete mixer for smaller jobs and the use of a volumetric concrete truck (a virtual portable batching plant) for larger jobs are specified. **Do not allow GraniteCrete blended aggregate to dry during installation. Mist as necessary to maintain optimum moisture content prior to compaction.**
- B. Grade and smooth to required elevation. Smooth out any final irregularities prior to substantial compaction. Smooth by using the straight edge of an asphalt rake or a medium bristle broom over entire paving surface.
- C. Compact: After optimum moisture content is achieved for compaction, thus achieving an 88% to 92% compaction. Hand-tamp around benches, sign posts, corners, boulders, etc. Initially use a vibratory plate and/or a 36" smooth drum roller in static position. Compact with the vibratory plate vertically and then horizontally at half speed. Follow with final compaction using a heavy lawn roller to obtain the final desired dense, smooth, uniform finish.
- D. Take care compacting adjacent to planting and irrigation systems.
- E. Minimum Compacted Thickness: Install to depth shown on Drawings.
- F. Saw cut/trowel/install expansion joints every 5'in narrower paths, every 12' in wider paths, and at every engineered stress areas.
- G. Cover finished surface, when practical, to achieve maximum curing period. See Section 3.5.
- H. Minimum Compacted Thickness (See Section Details):
 - 1. [Residential / Pedestrian Paths] []: [3] inches.
 - 2. [Commercial / Light Vehicular Drives] []: [4] inches.

- I. Surface shall follow overall contours of landscape. Flat areas shall be [sloped] [crowned] for drainage. Slope [2.0%] [] percent minimum to drain away from structures.
- J. Completed, finished surface shall be of consistent quality and free of deleterious materials such as organic materials, nails, stones, and loose material. Surface shall not have depressions or humps greater than [1/4] [] inch in ten feet.
- K. **Cold Joints:** "Between pours", **stop at an area that makes them look intentional.** Snap line just back from loose GraniteCrete into compacted area. With a square nose shovel cut a straight line and then continue with installation. Place newly mixed GraniteCrete into area, **being careful not to overlap existing compacted material.** With a concrete trowel or similar tool, tamp new material at a 45 degree angle 1" above existing grade and compact. If necessary, "feather" in with a medium bristled broom. At end of day's installation, place a 2"X4" or 2"X6" piece of wood and compact. The following day carefully lift the wood and continue, compact and feather.

3.4 CURING PERIOD / PROTECTION

- A. Do not allow traffic on crushed aggregate blended with GraniteCrete admixture surfacing for 5 days after placement or until compacted crushed aggregate blended with GraniteCrete admixture surfacing has fully cured. [Cover for extended curing period].
- B. Protect crushed aggregate blended with GraniteCrete admixture surfacing from damage until project completion. [Repair damaged areas to match specified requirements].

3.5 MAINTENANCE & REPAIRS

- A. Maintenance: Depending on the end users desired finish surface, maintenance may require occasional blowing off or brooming of paved surface. Depending on quality of compaction at time of installation, a thin veneer of loose aggregate material is typical after the full 28 days cure period. If cracking appears in a GraniteCrete surface broom loose aggregate "fines" into cracks and compact with a rubber mallet.
- B. Repair: When repairing GraniteCrete it is important to use the original aggregate/decomposed granite and the original GraniteCrete Admixture color to match previously installed materials. If the paved surface has large areas of raveled material (loose aggregate/decomposed granite) the initial installation may not have been properly compacted or blended materials did not have proper compaction or optimum moisture content during installation. **GraniteCrete cannot be allowed to dry prior to final compaction.** The following are suggestions for repair of raveled materials:
 - 1. For the large loose areas, a minimum of a 3 inch of GraniteCrete can be installed. The repair areas need to be saw-cut at agreed length, removed, and re-installed. A portable concrete mixer or wheelbarrow can be used. Batch proportions are 33 shovelfuls of aggregate/decomposed granite to 3 shovelfuls of GraniteCrete Admixture (11 to 1 ratio). The mixture must be **thoroughly** dry mixed and moistened to specifications.
 - 2. In areas that collapse/fail due to equipment weight, reform and re-install with original materials as per specifications.
 - 3. Cracks: repair by brooming existing surface fines into the cracks of filling with dry, pre-mixed materials, or both. The onsite aggregate/decomposed granite

should be sieved to 1/8" minus material for better application and in-fill of cracks. Materials should be mixed as per ratio described above. Broom or fill the crack, moisten, compact (with rubber mallet or hand compaction plate) and "feather" material into the final finish.

Please refer to the GraniteCrete Installation Instructions for additional installation details.

END OF SECTION

SECTION 32 13 12
SITE CONCRETE

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Provide Portland cement concrete site work complete, including the following principal items:
1. Pavements, including aggregate bases.
 2. Footings and slabs

1.2 QUALITY ASSURANCE

A. Reference and Standards

1. Soils Reports: Subsurface Investigation Dunphy Park Improvements Project City of Sausalito, California by Geo-Logic Associates, dated November 16, 2018
2. Perform work in accordance with all applicable laws, codes and regulations required by City of Sausalito.
3. Reference to "Standard Specifications" shall mean the current Standard Specifications of the State of California, Business and Transportation Agency, Department of Transportation, CALTRANS.
4. The American Concrete Institute (ACI): "Manual of Concrete Practice," Parts 1, 2 and 3.
5. The American Concrete Institute (ACI): "Recommended Practice for Concrete Formwork" (ACI 347R)
6. The American Concrete Institute (ACI): "Hot Weather Concreting", 305R-99
7. The American Concrete Institute (ACI): Guide for Concrete Slab construction, 302.1R-07
8. The American Concrete Institute (ACI): "Standard Specification for Cold Weather Concreting, 306.1-90 (R2002)
9. United States Voluntary Product Standard for Construction & Industrial Plywood (PS 1-95).
10. American Plywood Association's "Guide to Plywood Grades" (APA).
11. West Coast Lumber Inspection Bureau's "Standard Grading Rules No. 17" (WCLIB)
12. Concrete Reinforcing Steel Institute (CRSI): "Manual of Standard Practice" and "Recommended Practice for Placing Reinforcing Bars".
13. American Welding Society: AWS A5.1 and AWS D1.1 and D1.2.
14. Americans with Disabilities Act (ADA), Federal ADA/State of California Title 24 Standards.
15. California Code of Regulations, Title 24, 2010 Edition, also known as California Building Code (CBC).

B. Stipulations

1. Finish Surface Tolerance: 1/4-inch maximum variation in 10 feet.
2. At no point shall paving surface fail to drain.

3. Finish Concrete Surface Slip Resistance: Shall have a minimum slip resistance coefficient of 0.65 on concrete pavement with less than 5% slope and 0.8 on concrete pavement with more than 5% slope.
 4. Contractor shall pour adjacent slabs in a way that does not impact finish quality or construction (expansion) joint dimensional stability.
- C. Testing and Inspection, per Section 01 45 00.
- D. Conform to ACI 306, Section 5.13 during hot weather and cold weather.
- E. Requirements of ACI 318 shall govern work, materials and equipment related to this Section; specifications herein set minimum results required, and references to procedures are intended to establish minimal guides.
- F. The Contractor shall be responsible for quality of concrete in place and shall bear burden of proof that concrete meets minimum requirements. Contractor shall confirm that site soils do not contain elevated levels of sulfate that would require sulfate resistant concrete as outlined in ACI 306. If the site soils contain elevated levels of sulfate, it is the Contractor's responsibility to request mixes that meet the aforementioned requirements.
- G. Placing of concrete by means of pumping will be an acceptable method of placement providing that the Contractor can demonstrate that:
1. Specified concrete strengths will be met.
 2. Equipment has a record of satisfactory performance under similar conditions and using a similar mix.
 3. Trial batches have been successfully made.
- H. Installer Qualifications: Concrete work shall be by firm with 5 years experience with work of similar scope and quality.
- I. Formwork Design Criteria: Formwork shall conform to ACI 347-04 and CBC.
1. Formwork:
 - a. Shall prevent leakage or washing out of cement mortar.
 - b. Shall resist spread, shifting, and settling.
 - c. Shall reproduce accurately required lines, grades and surfaces within tolerances specified.
 2. Safety: The Contractor shall be responsible for adequate strength and safety of all formwork including falsework and shoring.
 3. Formwork allowable tolerances: Formwork shall produce concrete within tolerance limits recommended in ACI 347-04, unless otherwise noted.

1.3 TESTS

- A. The Owner will select a qualified testing laboratory to take samples for testing during the course of the work as considered necessary. Costs for such tests will be paid by the Owner. Contractor shall cooperate in arranging tests and shall be responsible for notifying the designated laboratory in sufficient time to allow taking of samples at time of pour.

- B. Should tests show that concrete is below specified strength, Contractor shall remove all such concrete, as directed by the Owner. Full cost of removal of low strength concrete, its replacement with concrete of proper specified strength and testing, shall be borne by Contractor.

1.4 COORDINATION

- A. Coordinate items of other trades. Contractor shall be responsible for the proper installation of all accessories embedded in the concrete and for the provision of holes, openings, etc., necessary to the execution of the work of the trades.

1.5 SUBMITTALS, per Section 01 33 00.

- A. Samples of all materials under this Division shall be supplied for testing as requested by the Owner.
- B. Material certificates in lieu of material laboratory test reports when permitted by Engineer. Material certificates shall be signed by manufacturer and Contractor certifying that each material item complies with or exceeds requirements. Provide certification from admixture manufacturers that chloride content complies with requirements.
- C. Submit color additive manufacturer's color chart and sample chip(s), indicate color additive number and required dosage rate.
- D. Submit a full-scale mock-up (minimum 4' by 4') sample panels of all concrete finishes and color. The samples shall include curing compound if any is to be used, and include an expansion joint and a score joint, as indicated on the Drawings. Approved samples shall be kept at the job site to serve as a prerequisite for all finishes until acceptance of the Work.
- E. Submit one-pint samples of aggregate for exposed aggregate finished concrete paving in color range as specified.

1.6 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Supply ready mixed concrete throughout. Batch, mix and transport in accordance with ASTM C-94, "Specifications for Ready Mixed Concrete."
- B. Mix and deliver concrete in quantities that will permit immediate use only.
- C. Indiscriminate addition of water for any reason will be cause for rejection of the load.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

- A. Cement and aggregates shall have proven history of successful use with one another. Sources of cement and aggregate shall remain unchanged throughout work.

B. Mixes:

1. Ready-mixed concrete shall meet requirements of ASTM C94.
2. The Contractor shall perform tests or assemble the necessary data indicating conformance with specifications.
3. For each mix, submit data showing that proposed mix will attain the required strength in accordance with requirements of Caltrans Standard Specifications, Section 90.
4. Instruct Laboratory to base mix design on use of materials specified and approved by the Owner's Representative.
5. Mix design shall include compression strength test reports per CBC Section 1905A.6.3.
6. Insure mix designs will produce concrete to strengths specified and of uniform density without segregation.
7. If mix yield exceeds 1-cubic yard, modify mix design to no more than one cubic yard, without changing cement content.
8. Introduction of calcium chloride will not be permitted.
9. Mix design shall be in accordance with CBC Section 1905A.3.

C. Concrete Types (See Drawings for any other miscellaneous items not listed below):

TYPE	28-DAY STRENGTH	AGGREGATE SIZE	FINISH & COLOR	COMMENTS
Slab on grade	3,000	1" X #4	See Drawings	

2.2 FORMWORK MATERIALS

- A. Panel or board forms for Exposed Finish Concrete: Minimum 5/8-inch thick exterior grade plywood with sealed edges, PS 1 grade Plyform Class I and II B-B Exterior.
- B. Form Release Agent: Must not stain or otherwise adversely affect architectural concrete surfaces. "Nox-Crete Form Coating"; Industrial Synthetics Corp.'s "Synthex"; or equal.
- C. Form Ties: Burke "Penta-Tie," or equal, cone and rod type with 1-inch break-back.

2.3 REINFORCING MATERIALS

- A. New, free of rust, Billet steel bars: Current ASTM designation A615.
- B. Bar Reinforcement: ASTM A615.
1. #4 and larger: Grade 60.
 2. Tie wire: #6 minimum, black and annealed.

- C. Bar Reinforcement recycled content shall be a minimum of 75% recycled post-consumer steel.
- D. All reinforcing steel, bolts anchors, sleeves, etc. shall be securely anchored in place before concrete is placed. All reinforcing details, fabrication and installation shall conform to ACI Standard 315, latest edition, except as noted. Stagger all splices where practical and not otherwise detailed. Minimum concrete protection for reinforcement shall be as follows unless otherwise noted:
 - 1. 3" clearance where concrete is placed against the earth.
 - 2. 2" clearance where concrete is exposed to earth or weather but placed in forms.
- E. Accessories: Metal and plaster spacers, supports, ties, etc. as required for spacing, assembling and supporting reinforcing in place. Legs of accessories to be of type that will rest on forms without embedding into forms. Galvanized metal items where exposed to moisture, or use other approved non-corrodible, non-staining supports.

2.4 CONCRETE MATERIALS

- A. Portland Cement: ASTM C150, Type II, except if water or soil is high in sulfates use Type V Portland Cement as described above under Quality Assurance. Use one brand of cement throughout project.
- B. Fly Ash: ASTM C618,08A.
- C. Aggregates: ASTM C33, materials from established sources with proven history of successful use in producing concrete with minimum shrinkage.
- D. Water: Clear and potable, free from deleterious impurities.
- E. Admixtures:
 - 1. Admixtures are optional; however, a water reducer or plasticizing admixture shall be included in the concrete mix and it must be compatible with color pigments where color pigments are required. Any proposed admixture shall comply with ASTM C494.
 - 2. Where more than one admixture is proposed, include statement from admixture manufacturer indicating that admixtures proposed for use are compatible, such that desirable effects of each admixture will be realized.
 - 3. Accelerating admixtures and admixtures containing more than 0.05 percent chloride ions are not permitted. If an accelerator is used, it shall be a non-chloride accelerator.
 - 4. Liquid admixtures shall be considered part of the total water.
 - 5. Refer to Color Additives/Pigments herein for color admixtures.

2.5 CONCRETE MIXES

- A. Concrete mixes shall be approved and shall be in accordance with Caltrans Standard Specifications Section 90. Unless otherwise noted, mix shall contain not less than 590 pounds of cementitious material per cubic yard (Class "2", 3,000 psi,) Type II Portland cement and a maximum aggregate blend of 1" by #4.

- A. Cementitious Material: An intimate blend of type II Portland cement and fly ash. Cementitious material shall include 15% maximum fly ash by weight unless the strength is specified to be achieved on 7 or 14 days.
- B. Matching existing Stabilized Aggregate Paving work: Mixes for matching existing colored paving, [walls], [benches], [and _____] shall be as required to match specified items on site using specified integral color pigments at required rates per 94 pounds of Portland cement. Submit integrally colored sample(s) per Submittals herein.
- C. Lampblack: As supplied by batch plant for plain non-colored concrete work. Concrete for non-colored pavements shall be darkened by the addition of lampblack at the mixer. The proportion of lampblack or other approved colorant shall be that required to properly darken the concrete to reduce glare, and shall be subject to the approval of the Owner's Representative. Provide ¾ pound of lampblack per cubic yard of concrete unless required otherwise.

2.6 ANCILLARY MATERIALS

- A. Aggregate Base: Crushed aggregate, R-78 minimum, 3/4-inch maximum, conforming to Standard Specification 26.1.02A, Class 2.
- B. Expansion Joint Material
 - 1. Fiber Expansion Joint: A non-extruding resilient filler, saturated with high quality bituminous materials having preserving characteristics. Conform to ASTM-D1751-04.
- C. Curing Materials for non-colored Concrete:
 - 1. Waterproof Paper: ASTM C171, Type 1.1.1.1, regular. Same as Sisalkraft Division of St. Regis Paper Co.'s "Orange Label", or equivalent.
 - 2. Impervious sheeting: 4 mil white polyethylene laminated to 10 oz. Burlap, ASTM C171, Type 1.1.3, fungus-resistant.
 - 3. Curing Compound: ASTM C309. Product: Sealtight 1100 Clear-Series by WR Meadows, Burke Azua Resin Cure by Edocol, or equal that will not discolor concrete or affect bonding of other finishes applied thereafter, and which restricts loss of water to not more than 0.500 grams per sq. centimeter of surface when tested per ASTM C156, "Test Method for Water Retention by Concrete Curing Materials."
- D. Curing Compound for Colored Concrete: Water-base acrylic type, free of permanent color, oil or wax, complying with ASTM C309: "W 1000" by Davis Colors, Los Angeles, CA (800) 356-4848; "Cureseal" semi-gloss by L.M. Scofield Co., Los Angeles, CA (800) 800-9900; or equal.
- E. Grout: Premixed high strength non-shrink grout requiring only addition of water at the site. Burke's "Non-Ferrous, Non-Shrink Grout"; Master Builders "Masterflow 928 Grout", or equal.
- F. Patching Mortar: Mix in proportions by volume of one part cement to two parts fine sand. Provide integrally colored patching mortar as required to match color and finish of colored concrete surfaces.

2.7 FILTER FABRIC / PERMEABLE LANDSCAPE FABRIC

- A. Polyester or polypropylene non-woven filter fabric with uniform fiber distribution by "Terra Bond" #1115, "Mirafi, Inc." #140N, or approved equal.

2.8 PERMEABLE DRAIN ROCK

- A. Permeable drain rock used in subsurface drain installations to be Class 2 permeable material in conformance with Section 68 "Subsurface Drains" of the Standard Specifications; gradation to 3/4" maximum size. Submit Sample for approval.

PART 3 - EXECUTION

3.1 GENERAL REQUIREMENTS

- A. Install all concrete work true to line and grade as indicated on the drawings.
- B. Correct irregularities to the satisfaction of the Owner's Representative.
- C. Plain non-colored, exposed concrete shall contain lampblack, approximately 3/4 pound of lampblack per cubic yard, as accepted by Owner's Representative.
- D. The intent of the Grading Drawings is to provide positive drainage and to maintain slopes on walkways as required by the Americans with Disabilities act and California Title 24 throughout the project site. Notify the Owner's Representative immediately of any discrepancies between the Drawings and actual field conditions and/or conflicts between the design and Code requirements.

3.2 PREPARATION

- A. Examine subgrades and installation conditions. Do not start concrete work until unsatisfactory conditions are corrected.
- B. Provide subgrade preparation and the base material installation complete, including clearing, grading, excavation, filling and dewatering. Take every precaution to obtain a subgrade of uniform bearing power compacted to a minimum of 95% relative compaction as determined by the ASTM D1557 laboratory test procedure and in Sections 19 and 20 of the Caltrans Standard Specifications.
- C. Subgrade shall be kept moist and shall not be allowed to dry out before placement of concrete. Place no material on muddy subgrade. Remove un-compactable material and replace with clean fill and compact as required.
- D. Aggregate base, where indicated, shall be placed and compacted in conformance with Caltrans Standard Specifications 26-1.04 and 26-1.05.
- E. Obtain approval of subgrade from Owner's Representative prior to placing steel and concrete.

3.3 FORMS

- A. Forms shall be constructed in accordance with ACI 318, Section 6.1 and shall be of sufficient strength and sufficiently tight to prevent visible distortion or leakage of mortar and fines.
- B. Forms for exposed surfaces shall be constructed to protect intended finish. Deflection of facing material between studs shall not exceed 0.0025 of the span. Facing material and pattern of joints shall be as approved by the Owner's Representative.
- C. Curb and pavement edge forms shall extend full depth of concrete and shall be coordinated with installation of planting root barriers where required. Curves shall be formed with flexible metal or wood made up of thin laminations. Curve forms shall extend one stake space straight beyond tangent point. Where curbs and pavement are adjacent to areas to receive root barriers, provide smooth uniform edges. Remove any excess concrete as required to allow installation of root barriers without gaps between curbs and/or pavement and barriers.
- D. Maintain forms within the following tolerances.
 - 1. Top of Form: Plus or minus 1/8 inch in 10 feet and no abrupt variations; at required elevation to plus 3/8 inch.
 - 2. Face of Form: Plus or minus 1/4 inch in 10 feet longitudinal and no abrupt variations; perpendicular to surface plus or minus 1/8 inch.
- E. Form Ties: Align form ties as accepted by Owner's Representative. Obtain approval of form work from Owner's Representative prior to placing concrete.
- F. Forms may be reused upon cleaning and coating with parting compound to ensure separation from concrete without damage.
- G. After concrete is placed, the following minimum times shall elapse before removal of forms.
 - 1. Walls and benches: 48 hours.
 - 2. Footing sides: 24 hours.

3.4 REINFORCEMENT

- A. All concrete footings, walls, grade-beams shall be steel reinforced unless specifically noted to be "not reinforced." If no reinforcement is shown, reinforce in same manner as that shown in similar places or as accepted by Owner's Representative.
- B. Fabricate and place reinforcement as indicated on the Drawings and in accordance with ACI "Detailing Manual" SP-66. No reinforcement shall be placed prior to distribution of the approved shop drawings.
- C. Secure reinforcement in position by suitable supports and by wiring at intersections with tie wire. Supports shall be of sufficient number and strength to resist crushing or displacement under full load. Metal shall not extend to surface of concrete.

- D. At time of placing concrete, reinforcing shall be free of excessive rust, mill scale, or other bond reducing matter. Immediately before placing concrete, check and adjust position, support and anchorage.

3.5 CLEANING, PATCHING AND DEFECTIVE WORK

- A. Where concrete is under strength, out of line, level or plumb, or shows objectionable cracks, honeycombing, rock pockets, voids, spalling, exposed reinforcement, signs of freezing, mismatched color, or is otherwise defective, and, in the Owner's Representative's judgment, these defects impair proper strength or appearance of the work, the Owner's Representative will require its removal and replacement at the Contractor's expense.
- B. Immediately after stripping and before concrete is thoroughly dry, patch minor defects, form-tie holes, honeycombed areas, etc., with patching mortar colored and textured to match concrete. Remove ledges and bulges.
- C. Rock Pockets:
 - 1. Cut out to full solid surface and form key.
 - 2. Thoroughly wet before casting mortar.
 - 3. Where the Owner's Representative deems rock pocket too large for satisfactory mortar patching as described, cut out defective section to solid surface, and replace.
- D. Cleaning
 - 1. Insure removal of bituminous materials, form release agents, bond breakers, curing compounds, if permitted and other materials employed in work of concreting that would otherwise prevent proper application of sealants, liquid waterproofing, and other delayed finishes and treatments.
 - 2. Where cleaning is required, take care not to damage surrounding surfaces or leave residue from cleaning agents.

3.6 MIXING AND PLACING CONCRETE

- A. Conform to applicable requirements set forth in Caltrans Standard Specifications Section 51-1.09 and Section 90.
- B. Mixes for integrally colored concrete shall have pigment added early enough to ensure complete dispersal and uniform color, but not less than 15 minutes before placing.

3.7 JOINTS AND GROOVES IN FLAT WORK

- A. Plane of joints shall be perpendicular to surface. Where new pavements join existing, joints shall align.
- B. Tooled Joints / Score Joints
 - 1. Form joints in fresh concrete using a jointer to cut the groove so that a smooth, uniform impression is obtained to 1/4 depth of pavement unless shown otherwise.

2. All joints shall be struck before and after brooming. Tool concrete both sides of joint.
3. If joint pattern is not shown, provide joints not exceeding 6 feet in either direction and located to conform to column centerlines, wall corners, etc. as accepted by Owner's Representative.

C. Expansion Joints in Flat Work: Provided at the location and intervals as shown on the drawings, and at all locations where concrete paving abuts buildings, curbs, walls, columns, or other structures, and not more than 16 feet on center. Specified and shown joint material shall be placed with top edge 1/8" below the paved surface and shall be securely held in place to prevent movement. Joint and other edges shall be formed in the fresh concrete using an edging tool to provide a smooth uniform impression. All edges shall be struck before and after brooming.

3.8 FINISHING

A. Flatwork and Curbs

1. Surface Finishes

- a. Float Finish (typical preliminary finishing for slabs to receive other finishes): The surface of the slab shall be screeded and all surface water and laitance removed. Floating shall be started as soon as the screeded surface has stiffened sufficiently. Floating shall be performed by hand using a wood float and shall be the minimum necessary to produce a relatively smooth, level, even-textured surface.
- b. Medium Broom Finish: Obtain by drawing a stiff bristled broom across a floated finish for a nonslip surface. Perform brooming while concrete is still wet enough to receive broom marks to match approved sample. Direction of brooming to be perpendicular to direction of work or as otherwise shown on the drawings.

3.9 CURING

- A. Cure non-colored exposed concrete in accordance with Caltrans Standard Specifications Section 90-7.
- B. When applying Curing Compound, apply after initial set of fresh concrete when bleed water has evaporated from surface using a "Hudson-type" airless sprayer in accordance with manufacturer's specifications.
- C. Only water or curing compounds which impart no permanent color or gloss shall be used for curing concrete.

3.10 CLEANUP: Per Section 01 77 00.

END OF SECTION

SECTION 32 32 53 STONE WALLS

PART 1 - GENERAL

- 1.1 SCOPE: Provide all labor, materials and equipment for preparation and installation of stone work indicated on the drawings and specified.
- 1.2 REFERENCES AND STANDARDS
 - A. Reference to "Standard Specifications" shall mean the Standard Specifications of the State of California, Business and Transportation Agency, Department of Transportation, CALTRANS.
 - B. Perform work in accordance with all applicable laws, codes and regulations required by City of Sausalito
 - C. Concrete Reinforcing Steel Institute (CRSI): "Manual of Standard Practice" and "Recommended Practice for Placing Reinforcing Bars".
 - D. California Code of Regulations, Title 24, 2007 Edition, also known as California Building Code (CBC).
- 1.3 QUALITY ASSURANCE
 - A. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "project Management and Coordination."
 - B. Installer Qualifications: Firm specializing in design and installation of stone masonry walls:
 - 1. With not less than 2 years documented experience.
 - 2. With a minimum of five previously constructed successful projects, similar in size and magnitude, using specified retaining wall system; Provide contact names and numbers.
 - 3. Site supervisor with verifiable qualified experience suitable for this project.
- 1.4 Testing and Inspection, per Section 01 45 00.
- 1.5 SUBMITTALS, per Section 01 33 00.
 - A. Mockups: Build 4' by 4' sample wall mockup over prepared, tested and approved subgrade to verify selections made under sample submittals and to demonstrate functional and aesthetic effects and set quality standards for materials and execution. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion. Do not start masonry work until mock-up has been approved by Owner's Representative.

PART 2 - MATERIALS

- 2.1 PORTLAND CEMENT: ASTM C150, Type I.
- 2.2 SAND: ASTM C144; natural sand containing not more than 2% of silt and clay by weight with specific gravity not less than 2.65.
- 2.3 LIME: ASTM C5, slake; screen through 16 mesh, then store and protect for 10 days.
- 2.4 STONE TYPE, SIZE, AND COLOR: To match existing granite block wall on site & as approved by the City and Landscape Architect.
 - A. Concrete Foundation: Reinforced concrete foundation with compressive strength of 3,000 psi minimum.
- 2.5 MORTAR: Consist of 1 part Portland Cement and 4 parts dry, loose sand. Add not less than 1/4 nor more than 1/2 part lime putty or hydrated lime per volume of cement content. Insure mortar with 28-day strength of at least 1500 psi.
- 2.6 GROUT: Consist of 1 part Portland Cement and 3 parts sand. Add up to 10% lime. When the grout core is 2" or more wide, add 2 parts of pea gravel to the above grout mix. Add water to grout to cause it to flow without segregation into all voids intended to be filled, and to produce a 28-day strength of 2000 psi. Plaster sand may be added to prevent segregation, provided strength is maintained. Color: added to mortar where indicated for use.
- 2.7 REINFORCING MATERIALS
 - A. New, free of rust, Billet steel bars: Current ASTM designation A615.
 - B. Bar Reinforcement: ASTM A615.
 - 1. #3 and smaller: Grade 40.
 - 2. #4 and larger: Grade 60.
 - 3. Tie wire: #6 minimum, black and annealed.
 - C. Bar Reinforcement recycled content shall be a minimum of 75% recycled post consumer steel.

PART 3 - EXECUTION

- 3.1 PREPARATION
 - A. Provide testing and subgrade preparation complete.
 - B. Provide subgrade preparation and the base material installation complete, including clearing, grading, excavation, filling and dewatering. Take every precaution to obtain a subgrade of uniform bearing power compacted to a minimum of 95% relative compaction as determined by the ASTM D1557 laboratory test procedure and in Sections 19 and 20 of the Caltrans Standard Specifications.
 - C. Do any necessary finish grading and compaction in addition to that performed in accordance with earthwork to bring subgrades after final compaction to required

grades and sections as indicated. Place no material on muddy subgrade. Remove uncompactable material and replace with clean fill and compact as required.

- D. Excavate to lines and grades shown on Drawings. Do not disturb embankment or foundation beyond lines. Minimize over-excavation.
- E. After excavation and prior to placement of leveling materials, Contractor's Geotechnical engineer shall examine bearing soil surface to verify strength meets or exceeds design requirement and assumptions and issue report to Owner's Representative for acceptance. Replace any unsuitable bearing soil as directed by Geotechnical Engineer.

3.2 REINFORCEMENT

- A. All concrete footings, walls, grade-beams shall be steel reinforced unless specifically noted to be "not reinforced." If no reinforcement is shown, reinforce in same manner as that shown in similar places or as accepted by Owner's Representative.

3.3 INSTALLATION

- A. Install in accordance with Drawings and applicable codes and regulations.
 - 1. Place first course of units on concrete foundation; check alignment and level. Check for full contact with base and for stability.
 - 2. Place units side by side for full length of wall, aligning back face of straight walls using string line or offset from base line.
 - 3. Do not leave gaps between units.
 - 4. Place succeeding courses by overlapping units below at joints. Insert metal pins between walls as indicated. Check for proper alignment and batter. Place succeeding courses.
- B. Setting Stones:
 - 1. Distribute stones of various color. Select stones roughly squared and pitched to line and place evenly at all wall angles and at all wall ends. Lay flat and stratified rocks in approximate horizontal position, not on edge.
 - 2. Brush free of dust or other foreign matter and thoroughly wet before placing. Set in full mortar beds. Allow joints to vary from 1/2" to 1-1/2".
 - 3. Provide sufficient number of rocks to install complete wall from lines and grades shown on the drawings and details.

3.4 CLEANUP: Per Section 01 74 00

- A. Exercise care that no mortar or grout comes in contact with exposed face of work. Clean immediately.
- B. Use only stiff fiber brushed and wooden scrapers in keeping work clean as it progresses or in cleaning down at completion. Use no metal implements.

END OF SECTION

SECTION 06 20 10 SITE CARPENTRY

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Provide all labor, equipment and materials for the installation of site carpentry, including habitat fencing and as shown on the drawings and specified.

1.2 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - 1. ASTM A123 Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - 2. ASTM D1761 Standard Test Methods for Mechanical Fasteners in Wood.
- B. Federal Specifications (FS):
 - 1. FS FF-S-111D Screws, Wood.
 - 2. FF-S-325 Expansion Shields.
- C. American National Standards Institute (ANSI):
 - 1. ANSI B18.2.1 Square and Hex Bolts and Screws, Inch Series.
- D. California Building Code (CBC)

1.3 QUALITY ASSURANCE

- A. Lumber: Grade stamp to contain symbol of grading agency, mill number or name, grade of lumber, species of species grouping or combination designation, rules under which grades, where applicable, and condition of seasoning at time of manufacture.
 - 1. Inspection and testing agency mark.
- B. Poles and Posts: Shall conform to American National Standards Institute specifications and dimensions for wood poles 05.1-1972, and poles shall be selected for uniformity and appearance with maximum taper of 1-inch per 10 linear feet.
- C. Abbreviations: AD - air dried. KD - kiln dried. VG - vertical grain. FG - flat grain. RWD - redwood. DF - Douglas Fir. PT - pressure-treated. All wood surfaced, four sides, unless otherwise designated "rough".

1.4 PROTECTION

- A. Lumber shall be stored in neat stacks at the site unless it is to be used immediately. All lumber shall be piled so that it may be readily inspected and shall be handled in a manner that will avoid injury or breakage.
- B. Immediately upon delivery to jobsite, place materials in area protected from weather.
- C. Take special care when handling.

- D. Store lumber on a flat surface with skids above ground as necessary to prevent warping.
 - E. When stacking palletted units, start supports at each end and spaced 24" o. c.
 - F. Line up supports vertically.
- 1.5 SUBMITTALS
- 1. Submit manufacturer's certificate to meet or exceed specified requirements.

PART 2 - MATERIALS

2.1 LUMBER

- A. Except where otherwise noted, all lumber shall conform to the allowable characteristics permitted within the applicable grading rule. No splits, checks, holes, decay or other irregularities will be permitted except characteristic of that grade.
- B. Lumber shall be as follows:
 - 1. Unless otherwise indicated on drawings or specified, lumber shall be **Cypress, or approved equal**.

2.2 ACCESSORIES

- A. Hardware: Provide all necessary nails, screws, clips and bolts required for proper installation of wood and wood composite lumber decking. Sizes and quantities as required by code authority having jurisdiction, unless more stringent requirements specified elsewhere.
 - 1. Bolts, Exterior Use:
 - a. Material Standard: Comply with ASTM A307, with standard washers.
 - b. Finish: Galvanized, ASTM A123.
 - c. Size: As shown.
 - 2. Lag Screws:
 - a. Material Standard: Comply with ANSI B18.2.1.
 - b. Finish: Hot dipped galvanized for exterior use.
 - 3. Nails, General:
 - a. Material Standard: Comply with ASTM F1667.
 - b. Type: Common unless otherwise indicated.
 - c. Finish: Hot dipped galvanized for exterior use.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Site Verification of Conditions:
 - 1. Verify that site conditions are acceptable for installation of materials.

3.2 INSTALLATION

- A. Workmanship shall be first class throughout. All lumber shall be accurately cut and framed to a close fit and shall have even bearing over the entire contact surface. All

joints shall be square and tight unless otherwise shown. No shimming will be permitted in making joints. Work shall be free of hammer marks, dents or other disfiguration. Nails and other hardware to be sized per U.C.B. Nailing Schedule and to be seated flush unless otherwise shown. Counter-sink finishing nails 1/16 inch. Holes for bolts shall be bored with a bit 1/16 inch larger than the bolt. Holes for lag screws shall be bored with a bit not larger than the base of the thread (75% of the diameter).

- B. Lumber Selection: Select individual pieces so that knots and obvious minor defects will not interfere with connections.
- C. Fastening:
 - 1. Use such fastenings and connections as required to connect members securely together or to structure.
 - 2. Minimum nailing, not otherwise shown or noted, shall conform to CBC Table 2304.9.1.
 - 3. Penetration of nails or spikes into piece receiving point shall be not less than ½ length of nail or spike, except, that 16 penny nails may be used to connect pieces of 2" thickness.
 - 4. Drive nails and spikes no closer together than 2/3 their depth nor closer to edge of member than ¼ their depth.
 - 5. Place nails, bolts and other connector without splitting wood.
 - 6. Predrill holes whenever nailing tends to split wood. Replace all split members.
 - 7. All nuts and screws shall be tightened when placed and retightened at completion of the job or immediately prior to closing in.
 - 8. Nuts shall be secured against loosening.

3.3 PRESERVATIVES:

- A. Bolts 5/8" and less in diameter shall be fitted with cut washers, and all bolts and lag screws over 5/8" in diameter shall be fitted with cast or malleable iron washers unless otherwise shown on the Drawings. Select bolt length to fit situation. Where bolts project beyond nut, cut off to a point 1/8" from nut and paint same day with heavy coat of Zinc Chromate primer paint and one coat of Aluminum finish paint (to match the galvanized bolt finish, unless otherwise noted). Bolts to be hot dip galvanized.
- B. Stainless steel hardware with stainless steel screws and bolts may be used in lieu of hot dip galvanized. Do not mix stainless steel with galvanized steel hardware.
- C. Exposed nails in exterior work shall be hot-dipped galvanized except where specified otherwise.

3.4 PROTECTION

- A. Protect installed work from damage due to subsequent construction or other activity on the site.

END OF SECTION

SECTION 05 70 05
LANDSCAPE METALWORK

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Provide all labor, materials and equipment as required for complete, finished installation of metalwork as shown on the drawings and specified including the following items:
 - 1. Miscellaneous landscape metal
- B. Metal fabrication includes plates, bars, strips, tubes, pipes made from steel that are not specifically listed herein.

1.2 REFERENCES AND STANDARDS

- A. "Code for Arc and Gas Welding in Building Construction" of American Welding Society, AWS D1.1, latest edition, with current supplements and addenda, is hereby made a part of this Section and miscellaneous metalwork shall conform to the applicable requirements therein, except as otherwise specified herein or shown on the drawings. Nothing contained herein shall be construed as permitting work that is contrary to code requirements or governing rules and regulations.
- B. All work shall conform to the American Institute of Steel Construction Specifications for design, erection and fabrication, and acceptable standards of good practice. Finished members shall be true to line and free from twists and bends.
- C. SSPC "Steel Structures Painting Manual, Volume 2, Systems and Specifications".
- D. National Association of Architectural Metal Manufacturers (NAAMM): Metal Finishes Manual

1.3 SUBMITTALS, per Section 01 33 00

- A. Product Data: Furnish manufacturer's literature including paint, grout and recommendations for cleaning.
- B. Shop Drawings: Shall show dimensions, sizes, thicknesses, gauges, finishes, joining attachments and relationship of work to adjoining construction. Where items must fit and coordinate with finished surfaces and/or constructed spaces, take measurements at site and not from drawings. Where concrete, masonry or other materials must be set to exact locations to receive work, furnish assistance and directions necessary to permit other trades to properly locate their work. Where welded connectors, concrete or masonry inserts are required to receive work, shop drawings shall show exact locations required, and all such drawings shall be furnished to the trades responsible for installing the connectors or inserts. Catalogue work sheets showing illustrated cuts of item to be furnished, scale details and dimensions may be submitted for standard manufactured items.
 - 1. Provide templates for anchorage installations by others.

- C. Certificates: Submit certification signed by California registered civil or structural engineer indicating compliance with Contract Documents and code requirements where required.

1.4 SYSTEM DESCRIPTION

- A. Design Requirements: Drawings indicate metal sizes and shapes; unless otherwise specifically indicated, design components and fabrications of gauges and thicknesses

1.5 QUALITY ASSURANCE

- A. Fabricator Qualifications: Firm with minimum five years successful experience fabricating metal items similar to those required for Project.

PART 2 - MATERIALS

2.1 BASIC MATERIALS AND ACCESSORIES

- A. Miscellaneous steel plates and structural steel shapes conforming to ASTM A36-(latest edition).
- B. Bolts: Structural grade steel, ASTM A307-(latest edition), with suitable hex nuts and washers, all galvanized except where noted otherwise.
- C. Concrete Inserts: Threaded or wedge type; galvanized ferrous castings, either malleable iron ASTM A47 or cast steel ASTM A27. Provide bolts, washers and shims as required, hot-dip galvanized, ASTM A153.
- D. Welding Materials: AWS D1.1, type required for materials being welded.
- E. Screws: Galvanized zinc, electro-plated or brass.
- F. Welding Electrodes: As permitted by AWS A5.
- G. Galvanizing:
 - 1. Galvanize fabricated items as shown and specified after fabrication in accordance with ASTM A123-09.
 - 2. Parts shall be made in suitable sections. First clean in a hot pickling bath to remove scale and then rinse clean with clear water. After pickling and washing, dip parts in liquid zinc tank sufficient length of time to heat parts to zinc temperature, then remove and allow to drip and cool; straighten as required.
- H. Non-Metallic Shrinkage Resistant Grout: Premixed, nonmetallic, non-corrosive, non-staining, shrinkage resistant product containing selected silica sands, Portland cement, shrinkage compensating agents, plasticizing and water-reducing agents, complying with CE-CRD-C621 and ASTM C1107, free of gas-producing or gas-releasing agents, oxidizing catalysts, inorganic accelerators and chlorides. Provide one of the following:
 - 1. "Five Star Grout" (U.S. Grout Corp.).
 - 2. "Masterflow 713" (Master Builders Co.).
 - 3. "Crystex" (L&M Construction Chemicals, Inc.).

- I. Fasteners and Anchorage Devices: Provide fasteners complying with the requirements of Industrial Fasteners Institute standards. Type, grade, class and style best suited for the respective purpose. Use countersunk flat-head Phillips type machine screws for exposed fasteners, except where Allen head screws are required. Use galvanized steel or stainless steel fasteners for exterior construction and for fastening components fabricated of galvanized steel except where specified otherwise. Fasteners exposed in finish surfaces to match finish of adjacent surfaces.
- J. Component Connections: Fabricate component connections to support specified design loads.
- K. Material Selection: Select materials for straightness, free of defects and irregularities.
 - 1. Exposed-to-view surfaces exhibiting pitting, seam marks, roller marks, "oil canning", stains, discolorations, and imperfections on finished units are not acceptable.
- L. Joints: Make exposed joints flush butt type, hairline joints where mechanically fastened; provide concealed connection devices with hidden fasteners.
 - 1. Fabricate continuous items with joints neatly fitted and secured.
 - 2. Ease exposed edges to approximate 1/32" uniform radius.
 - 3. Fabricate joints exposed to weather in manner to exclude water or provide weep holes where water could accumulate.
- M. Welding: Comply with AWS for recommended practices in welding each type of material; provide welds behind finished surfaces without distortion or discoloration on exposed side; dress exposed and contact surfaces.
- N. Exposed Mechanical Fastenings: Flush countersunk fasteners unobtrusively located, consistent with design of structure.
- O. Assemblage: fit and shop assemble in largest practical sections for site delivery.
- P. Dissimilar Materials: Separate dissimilar materials with bituminous paint where concealed, with preformed separators, or similar method to prevent corrosion.
- Q. Exposed Exterior Items:
 - 1. Apply the following cleaning, treatment and painting to exterior work which will be fully exposed or only partially exposed, and to exposed interior work in areas designated as high humidity areas.
 - 2. Clean by "Solvent Cleaning" method specified in SSPC-SP 1, followed by "Power Tool Cleaning" to remove loose mill scale and rust by methods specified in SSPC-SP 3, followed by "Pickling" to remove remaining mill scale and rust by methods specified in SSPC-SP 8. Power tool cleaning and pickling may be omitted from work fabricated from cold-rolled or cold-finished stock, and from castings, provided surfaces are not heavily rusted.
 - 3. Apply pretreatment as recommended by ferrous metal primer manufacturer.
 - 4. Apply prime coat of ferrous metal primer immediately after pretreatment to uniform dry film thickness.
- R. Preparation of Galvanized Non-Ferrous Metal
 - 1. Surface preparation:
 - a. Existing galvanized metal: SSPC-SP1 Solvent Clean to remove visible and soluble surface contaminants.

- b. New galvanized metal shall be prepared per SSPC-SP16 Brush-Off Blast Cleaning of Non-Ferrous Metals to create a dense, uniform and angular surface profile of 1.0 to 1.5 mils. When abrasive blasting is not practical use power tools that create a surface profile (1.0 to 1.5 mils) and do not burnish the surface. The purpose is not to remove zinc but to roughen the surface. If zinc is removed to expose substrate, bare substrate must be primed with a zinc-rich primer such as Tnemec Series 94-H2O | Hydro-Zinc.
2. Surface clean cuts and welds to bright metal.
3. Prime Coat/Tie-Coat: Series 66HS Hi-Build Epoxoline; 2.0 – 3.0 mils DFT
4. Color Finish: Series 1075 Endura-Shield II; 2.0 – 3.0 mils DFT
5. Total DFT: 4.0 – 6.0 mils.

PART 3 - EXECUTION

- 3.1 **CONDITION OF SURFACES:** Inspect all surfaces to receive site metal work and report all defects which would interfere with this installation. Starting work implies acceptance of surfaces as satisfactory.
- 3.2 **FIELD MEASUREMENTS:** Take field measurements prior to preparation of shop drawings and fabrication, where possible; do not delay job progress; allow for trimming and fitting where necessary.
- 3.3 **WORKMANSHIP**
 - A. Verify all measurements at job. Coordinate all metalwork with adjoining work for details of attachments, fittings, etc. Do all cutting, shearing, drilling, punching, threading, tapping, etc., required for site metalwork or for attachment of adjacent work. Drill or punch holes; do not use cutting torch. Shearing and punching shall leave true lines and surfaces. Obtain Owner's Representative's review prior to site cutting or making adjustments which are not part of scheduled work. Perform necessary cutting and altering for installation and coordination with other work.
 - B. Conceal all fastenings where feasible. Thickness of metal and details of assembly and supports shall give ample strength and stiffness. Form joints exposed to weather to exclude water.
 - C. Make all permanent connections in ferrous metal surfaces using welds where at all possible; do not use bolts or screws where they can be avoided.
 - D. Provide all lugs, clips, anchors, miscellaneous fastenings necessary for complete assembly and installation.
 - E. Set all work plumb, true, rigid, neatly trimmed out, accurately fitted and free from distortions or defects detrimental to appearance or performance. Miter corners and angles of exposed moldings and frames unless otherwise noted.
 - F. Where items must be incorporated or built into adjacent work, deliver to trade responsible for such work in sufficient time that progress of work is not delayed. Be responsible for proper location of such items.
 - G. Make provisions for erection stresses by temporary bracing; Keep work in alignment.

- H. Install ornamental metal items in accordance with manufacturer's recommendations, installation instructions, and approved shop drawings.
- I. Install items plumb, true and in correct relation to adjacent work, free from distortion or defects detrimental to appearance and performance.
- J. Prior to securing continuous items, adjust to ensure proper matching at butt joints and correct alignment throughout their length.
- K. Tolerances: Accurately align and locate components to required lines and levels to conform to following tolerances:
 - 1. Plumb: 1/8" in 10'-0"; 1/4" in 40'-0"; non-cumulative.
 - 2. Level: 1/8" in 20'-0"; 1/4" in 40'-0"; non-cumulative.
 - 3. Location: 3/8" maximum deviation from measured theoretical location (any member and location).

3.4 WELDING:

- A. Perform all welding in accordance with AWS Code D1.1. Welds shall be made only by operators experienced in performing the type of work indicated. Welds normally exposed to view in the finished work shall be uniformly made and shall be ground smooth. Where welding is done in proximity to glass or finished surfaces, such surfaces shall be protected from damage due to weld sparks, spatter, or tramp metal.
- B. Field Welding: Comply with AWS Welding Code for procedures related to field welding as related to appearance and quality of welds made and for methods used in correcting welding work. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals. Obtain fusion without undercut or overlap. Remove welding flux immediately. At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing and contour of welded surface matches those adjacent.

3.5 BOLTED, SCREWED AND RIVETED CONNECTIONS

- A. In general, use bolts for field connections only and then only as detailed. Provide washers under all heads and nuts bearing on wood. Draw all nuts tight and nick threads of permanent connections to prevent loosening. Use beveled washers where bearing is on sloped surfaces.
- B. Where screws must be used for permanent connections in ferrous metal, use flat-head-type, countersunk, with screw slots filled and finished smooth and flush.
- C. Where rivets are used, they shall be machine-driven, tight, heads centered, countersunk, and finished flush and smooth.

3.6 SURFACE TREATMENT AND PROTECTIVE COATINGS

- A. Cleaning: Thoroughly clean all mill scale, rust, dirt, grease and other foreign matter from ferrous metal prior to any galvanizing, hot phosphate treatment or painting. Conditions which are too severe to be removed by hand cleaning methods shall be cleaned per SSPC "Surface Preparation Specifications," "Solvent Cleaning, SSPC-SP-1"; "Power Tool Cleaning, SSPC-SP-3"; or "Brush-Off Blast Cleaning, SSPC-SP 7"; as required.

3.7 GALVANIZING

- A. Galvanize fabricated items after fabrication in accordance with ASTM A123-66.
- B. Parts shall be made in suitable sections. First clean in a hot pickling bath to remove all scale and then rinse clean with clear water. After pickling and washing, dip parts in liquid zinc tank sufficient length of time to heat parts to zinc temperature, then remove and allow to drip and cool; straighten as required.

3.8 INSTALLATION

- A. Coordinate and furnish anchorages, setting drawings, diagrams, templates, instructions and directions for installation of anchorages, including concrete inserts, sleeves, anchor bolts and other miscellaneous items having integral anchors that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to the project site. Deliver items which are to be built into the work of other Sections in time so as not to delay the progress of the Work.
- B. Protect finished surfaces against damage during construction and remove protection at time of substantial completion.
- C. Immediately after erection, clean field welds, bolted connections, marred and abraded surfaces. Paint and touch-up paint with the specified paint system. Touch up galvanized surfaces in accordance with ASTM A780.
- D. Replace items damaged in course of construction.

3.9 PROTECTION AND CLEANING, per Section **01 74 00**

- A. Remove all soil and foreign matter from finished surface and apply such protective measures as may be required to prevent damage or discoloration of any kind until acceptance of project.

END OF SECTION

**SECTION 32 33 00
SITE FURNISHINGS**

PART 1 - GENERAL

1.1 1.1 DESCRIPTION

- A. Furnish and install all site furnishings shown on drawings and specified in accordance with the manufacturer's instructions and as shown on the drawings and as specified.
- B. Related requirement specifications elsewhere:
 - 1. Section 32 13 12, SITE CONCRETE
 - 2. Section 32 15 12, STABILIZED AGGREGATE SURFACING

1.2 REFERENCES

- A. Perform work in accordance with all applicable laws, codes and regulations required by the City and the State of California.
- B. Manufacturer's Instructions:
 - 1. Where required in the Specifications that materials, products, processes, equipment or the like to be installed or applied in accordance with manufacturer's instructions, directions or specifications, or words to this effect, it shall be constructed to mean that said application or installation shall be in strict accordance with printed instructions furnished by the manufacturer of the material for use under conditions similar to those at the job site.
 - 2. All site furnishings shall be anchored or otherwise secured to prevent movement, unless stated otherwise. Provide concrete footings, corrosion resistant clips, etc. as accepted by the Owner's Representative.
- C. Reference Standards:
 - 1. Manufacturers' specifications and recommendations.

1.3 COORDINATION

- A. Coordinate items of other trades. Contractor shall be responsible for the proper installation of all accessories embedded in concrete and for the provision of connections, holes, openings, etc., necessary to the execution of the work of the trades.

1.4 SUBMITTALS: Section 01 33 00

- A. Submit product data sheets for all specified site furnishing shown in drawings and herein.

PART 2 - MATERIALS

2.1 PICNIC TABLES

- A. Timberform Greenway Tables by Columbia Cascade Company
 - 1. Standard Picnic Table; Model # 2164-6, Color: Black, Qty: 1

2. Accessible Picnic Table: Model # 2164-6, Color: Black, Qty: 1

2.2 BENCHES

- A. Timberform Giant Timber Seat
 1. ADA model with back, Model # 2219-12-B-ADA by Columbia Cascade Company, including required leveling spacers. Color: Black, Qty: 3
 2. ADA model without back, Model # 2219-12-B-ADA by Columbia Cascade Company, including required leveling spacers. Color: Black, Qty: 2

PART 3 - EXECUTION

3.1 GENERAL INSTALLATION

- A. Install manufactured items in accordance with the manufacturer's instruction and as shown in the drawings and as specified herein.
- B. Perform all work in accordance with all applicable laws, codes and regulations required by State of California and the City of Sausalito.
- C. Set all work true and square, plumb and level. Remove and replace any wood that splits during or after erection until acceptance. Keep nailing neatly lined up.
- D. Fabricate wood in as long pieces as practical unless otherwise indicated. End joints shall occur at supports. Keep all work clean, accurately cut, closely fitted and set to the required lines and levels. Blunt exposed edges by sanding or with plane.
- E. Place washer under the head and nut of bolts where same bear on wood, except head of carriage bolt. Drill bolt holes same diameter as bolt.
- F. Size bolts to fit flush with nuts. Countersink nuts and bolts as detailed.
- G. Hammers with scored faces shall not be used in nailing.
- H. Supply all miscellaneous metal units and install as specified herein under the Sections entitled "Miscellaneous Metalwork" and "Galvanizing." Hot-dip galvanize all metal fastenings, angles, etc., after complete fabrication.
- I. Galvanized metal that is cut, damaged or modified after fabrication shall be immediately painted with Zinc-rich paint to prevent rusting.
- J. Touch up paint any damaged surfaces to match original finish as accepted by Owner's Representative.
- K. Set site furniture, level. Provide spacers under furniture to level as specified herein and acceptable to Owner's Representative
- L. Transport, store and handle precast units and manufactured items in a manner to avoid hairline cracks, staining or other damage. Store units free of the ground and protected from mud or rain splashes. Cover units, secure covers firmly, and protect the units from dust, dirt or other staining material.

3.2 CLEANUP, per Section 01 77 00.

END OF SECTION

SECTION 32 84 00 IRRIGATION

PART 1 - GENERAL

1.1 DESCRIPTION

- A. The work in this section consists of furnishing, layout and installing an irrigation system complete, including certification of irrigation system installation as required by the State of California Model Water Ordinance described herein.
- B. Related work specified elsewhere includes:
 - 1. Section 31 10 00, SITE PREPARATION & PLANT PROTECTION
 - 2. Section 32 90 00, PLANTING

1.2 CALIFORNIA MODEL WATER EFFICIENT LANDSCAPE ORDINANCE REQUIREMENTS

- A. Contractor shall be familiar with and follow the State of California Model Water Ordinance, California Code of Regulations, Title 23 Waters, Division 2, Department of Water Resources, Chapter 2.7. Also, the Contractor is responsible to follow all local water ordinances.
- B. Pursuant to the requirements of the California Model Water Efficient Landscape Ordinance, the Contractor shall submit a Certification of Installation to the Local Jurisdiction /water purveyor as described in the construction documents and these specifications. Certification shall at a minimum include the following documents:

PART 1. Project Information Sheet
PART 2. Certification of Installation according to the landscape documentation package.
PART 3. Irrigation Scheduling and Controller Programming
PART 4. Schedule of Landscape and Irrigation
PART 5. Landscape Irrigation Audit Report
PART 6. Soil Management/Analysis Report with verifying implementation, see Planting Specification for analysis requirements.

1.3 QUALITY ASSURANCE

- A. Manufacturer's Specifications: Follow manufacturer's current printed specifications and drawings in all cases where the manufacturers of articles used in the Contract furnish directions covering points not specified or shown in the drawings.
- B. Ordinances and Regulations: All local, municipal and state laws, codes and regulations governing or relating to all portions of this work are hereby incorporated into and made a part of these Specifications. Anything contained in these Specifications shall not be construed to conflict with any of the above codes, regulations, or requirements of the same. However, when these Specifications and Drawings call for or describe materials, workmanship or construction of a better quality, higher standard, or larger size than is required by the above codes and regulations, the provisions of these Specifications and Drawings shall take precedence. Furnish

without extra charge additional materials and labor required to comply with above rules and regulations.

C. References, Codes and Standards:

1. State of California Model Water Efficient Landscape Ordinance
2. California Environmental Quality Act (CEQA)
3. Water Use Classification of Landscape Species (WUCOLS IV).
4. American Society of Irrigation Consultants (ASIC) Design Guidelines.
5. California Landscape Standards, California Landscape Contractors Association, (CLCA) Sacramento, California.
6. CAL-OSHA, Title 8, Subchapter 4-Construction Safety Orders and Subchapter 7-General Industry Safety Orders.
7. California Electric Code.
8. California Plumbing Code (UPC) published by the Association of Western Plumbing Officials.
9. NFPA 24, Section 10.4, Depth of Cover.
10. Underwriters Laboratories (UL): Electrical wiring, controls, motors and devices, UL listed and so labeled.
11. American Society of Testing Materials (ASTM).

D. Furnish without extra charge any additional material and labor when required by the compliance with all above mentioned codes and regulations, though the work be not mentioned in these specifications or shown on the drawings.

E. Experience: Assign a full-time employee to the job as supervisor for the duration of the Contract with a certified landscape technician, irrigation certification through CLCA or minimum of four (4) years experience in landscape irrigation installation.

F. Labor Force: Provide a landscape installation and maintenance force thoroughly familiar with, and trained in, the work to be accomplished to perform the task in a competent, efficient manner acceptable to the Owner's Representative.

G. Explanation of Drawings:

1. Due to the scale of the Drawings, it is not possible to indicate all piping offsets, fittings, sleeves, etc., which may be required. Carefully investigate the conditions affected all of the work and plan accordingly, and furnish all required fittings. Install system in such a manner to avoid conflicts with planting, utilities and architectural features.
2. Do not install the irrigation system as shown on the Drawings when it is obvious in the field that obstructions, grade differences or discrepancies in arc dimensions exist that might not have been considered in engineering. Bring such obstruction or differences to the attention of the Owner's Representative. Notify and coordinate irrigation Work with applicable contractors for location and installation of piping and sleeves through or under walls, pavement and structures. In the event this notification is not given, the Contractor shall assume full responsibility for any revision necessary.

H. Trench Interference with Tree Root Systems:

1. Prior to trenching, layout main and lateral line locations within Drip Line of trees and review locations with Owner's Representative. Relocate any lines that may interfere with existing root systems to avoid or reduce damage to root systems as accepted by Owner's Representative.

2. Mechanical Trenching is not allowed within dripline of existing trees to be protected except as approved by Landscape Architect
- I. Coordinate plant locations with emitter locations.
 1. Adjust plant locations in relation to the subsurface emitter s as required to ensure that the plant roots receive the proper amount of water in order for it to thrive.
 2. Coordinate planting and irrigation and provide hand watering of emitter irrigated and drip irrigated areas as required to maintain moist root zones until end of plant

1.4 PROTECTION OF EXISTING STRUCTURES AND UTILITIES

- A. The Drawings show, if applicable, existing above and below grade structures and utilities that are known to the Owner. Locate known existing installations before proceeding with construction operations that may cause damage to such installations. Existing installations shall be kept in service where possible and damage to them shall be repaired with no adjustment of Contract Sum. Verify with Owner if As Built drawings are available.
- B. If other structures or utilities are encountered, request Owner's Representative to provide direction on how to proceed with the Work. If a structure or utility is damaged, take appropriate action to ensure the safety of persons and property.
- C. Verify location of existing irrigation systems to be removed and/or replaced. Maintain any existing systems as required by the Drawings and Specifications, including temporary retention of systems necessary to maintain existing on site and adjacent planting.

1.5 SUBMITTALS, in accordance with Section 01 33 00.

- A. Materials List:
 1. Submit required copies of the cut sheets and a complete list of materials proposed for installation, along with any proposed substitutions clearly identified and obtain the Owner Representative's written approval thereof before proceeding. Use only accepted materials and items of equipment.
 2. List all materials by manufacturer's name and model number.
 3. Submit to Local Water Purveyor with copy to the Owner Certification of Installation as required by the State of California Model Water Ordinance.
- B. Substitutions:
 1. If the Contractor desires to substitute a product, he shall list each item and note it as a "substitution" and provide the following information:
 - a. Descriptive information describing its similarities to the specified product.
 2. If the product is approved and, in the opinion of the Owner's Representative, the substituted product does not perform as well as the specified product, the Contractor shall replace it with the specified product at no additional cost to the Owner.
- C. Operations and Maintenance Manuals:

1. Prior to the final acceptance of the irrigation system, furnish three (3) individually bound Operation and Maintenance Manuals to the Owner's Representative for use by the Owner. The manuals shall contain complete enlarged drawings, diagrams and spare parts lists of all equipment installed showing manufacturer's name and address. In addition, each Service Manual shall contain the following:
 - a. Index sheet indicating the Contractor's name, address and phone number.
 - b. Copy of the Landscape Irrigation Audit
 - c. Copy of the 12-month irrigation schedule and estimate of annual water consumption
 - d. Copies of equipment warranties and certificates.
 - e. List of equipment with names, addresses and telephone numbers of all local manufacturer representatives.
 - f. Complete operating and maintenance instructions in sufficient detail to permit operating personnel to understand, operate and maintain all equipment.
 - g. Parts list of all equipment such as controllers, valves, solenoids and heads.
- D. As-Built Drawings:
1. Dimension the location of the following items from two (2) permanent points of reference such as building corners, sidewalks, road intersections, etc.:
 - a. Connection to existing water lines/meter.
 - b. Connection to electrical power.
 - c. Gate valves.
 - d. Routing of sprinkler pressure lines (a dimension at least every 100 feet and as required to identify all changes in direction and location).
 - e. Remote control valves.
 - f. Routing of control valves.
 - g. Quick coupling valves.
 - h. All sleeve locations.
 - i. Routing of all control wiring.
 - j. Include all invert elevations below 12".
 2. Deliver a reproducible As-Built Drawing to the Landscape Architect or Owner's Representative within seven (7) working days before the date of final review. Delivery of the record drawings shall not relieve the Contractor of the responsibility of furnishing required information in the future.
- E. Controller Plan:
1. Provide one Irrigation Diagram plan in each controller housing. The plan shall show the area controlled by each valve in different colors and for orientation, any major permanent structure such as buildings and roads.
 2. Charts to be waterproof and hermetically sealed between two pieces of transparent 10 mil thick plastic and installed in each controller on the door as accepted by the Owner's Representative no later than the time of the coverage test of the irrigation system.
- F. Maintenance Material - supply the following tools to the Owner:
1. Three (3) sets of specialized tools required for removing, disassembling and adjusting each type of sprinkler, valve or other equipment supplied on this project.
 2. Two (2) keys for each type of equipment enclosure.
 3. Two (2) keys for each type of automatic controller.

4. Two (2) keys for each type of valve (including square type key for valves larger than 2")
5. Two (2) quick-coupler keys and matching hose swivels for each type of quick-coupling valve installed.
6. All lock keys shall be keyed alike.

1.6 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Furnish and deliver materials in manufacturer's packaging, bearing original legible labeling.
- B. The Contractor is cautioned to exercise care in handling, loading, unloading, and storing PVC pipe and fittings. All PVC pipe shall be transported in a vehicle which allows the length of the pipe to lie flat so as not to subject it to undue bending or concentrated external load at any point. Any section of pipe that has been dented, cracked, or otherwise damaged shall be discarded and, if installed, shall be replaced with new piping.

1.7 SEQUENCING AND SCHEDULING

- A. Acceptance: Do not install main line trenching prior to acceptance by Owner's Representative of rough grades completed under another Section.
- B. Coordination: Coordinate with the work of other sections to insure the following sequence of events:
 1. Sleeves and Conduits: Installation of all sleeves and conduits to be located under paving and through walls prior to placement of those materials.
 2. Bubbler Heads: Install after placement of tree, but prior to backfill with planter soil mix.
 3. On-Structure Equipment: Install piping and risers after waterproofing is accepted.
 4. Sprinkler Head in Pots: Install riser and seal the penetration of the pot prior to backfill of pot with drainage materials and planter soil mix.
 5. Coordinate work schedule with Owner to avoid disruption of landscape maintenance of existing landscaping.
 6. Install piping prior to soil preparation (planting soil amendment installation).

1.8 WARRANTY, per Section 01 78 36.

- A. In addition to manufacturer's guarantees and warranties, work shall be warranted for one (1) year from date of final acceptance against defects in material, equipment and workmanship. Warranty shall also cover repair of damage to any part of the premises resulting from leaks or other defects in materials, equipment and workmanship to the satisfaction of the Owner.
- B. Include a copy of the warranty form in the Operation and Maintenance Manual.

1.9 OPERATION

- A. Routine: Inspect and adjust all spray heads and control valves including raising or lowering of spray head heights to accommodate plant growth and weather conditions.
- B. Controller: Inspect regularly for power interruption and reset clock as required. Adjust station timing to accommodate changes in plant growth and weather conditions.
- C. System Failure: Perform all repairs within one (1) operating period. Replacements to match removed products and materials in all respects. Report promptly all damage not resulting from Contractor's operations. Repair all damage caused by Contractor at no expense to Owner.
- D. Climate Change: Set and program automatic controllers in response to seasonal requirements and requirements of newly planted materials.

PART 2 - PRODUCTS

2.1 PIPE

- A. Pressure Main Line Pipe and Fittings: All PVC fittings shall bear the manufacturer's trademark name, material designation, size, applicable I.P.S. schedule and NSF seal of approval.
- B. All main line pipe shall be solvent welded and shall be schedule 40 unless shown otherwise on the Drawings.
 - 1. PVC Pressure Rated Pipe: ASTM D2241 NSF approved Type I, Grade I, solvent welded PVC with an appropriate standard dimension ratio (S.D.R.).
 - 2. PVC Scheduled Pipe: ASTM D1785 NSF approved, Type I,
 - 3. Grade I, solvent welded PVC.
 - 4. PVC Solvent-weld Fittings: ASTM D2466 Schedule 40, 1-2, II-I NSF approved.
 - 5. Solvent Cement and Primer for PVC solvent-weld pipe and fittings: Type and installation methods prescribed by the manufacturer.
 - 6. Connections between Main Lines and RCVs: Schedule 80 PVC (threaded both ends) nipples and fittings unless required otherwise by local jurisdiction.
 - 7. Valves 2-inch and larger shall be flanged only.
 - 8. Copper pipe shall be Type K or Red Brass where threaded joints are required and Type L otherwise.
- C. All lateral line pipe shall be solvent welded and shall be schedule 40 unless shown otherwise on the Drawings.

2.2 CONDUITS & SLEEVES

- A. Sleeving shall be Schedule 40 PVC pipe sleeves and a minimum of two times the aggregate diameter of all pipes contained within the sleeve. Provide vertical sweep for all electrical conduit on each side of hardscape and terminate ends at 12" minimum depth and 12" from hardscape surface.

2.3 ISOLATION VALVE:

- A. Valves 3 inches and smaller: 125 lb. WSP bronze gate valve with screw-in bonnet, non-rising stem and solid wedge disc, NIBCO T-113 K, or approved equal. Valves shall be line size.
- B. Valves larger than 2": shall have square nut stem and o-ring connections for key operation.

2.4 QUICK COUPLER VALVES:

- A. Quick coupler valves shall be as listed on the Drawings with 10" diameter black box and black lid similar to isolation valve box described below.

2.5 BOX FOR ISOLATION & QUICK COUPLER VALVES

- A. 10" diameter black plastic, Ametek, Brooks, Christy, Rain Bird with bolt down black lid marked "irrigation," or accepted equal. Avoid locating valve in paved areas. Provide H/20 Loading concrete box with bolt-down concrete lid if valve is located in paved area. Obtain location approval by Owner's Representative.

2.6 REMOTE CONTROL VALVE: As shown on Drawings and with the following minimum requirements:

- A. Remote control valves shall be those normally manufactured for irrigation systems and shall have a slow, consistent speed of closure through entire closing operation, including last portion. To ensure this, the effective diaphragm working area/valve seating opening ratio must be a minimum 3 to 1.
- B. Shall be mechanically self-cleaning to help prevent diaphragm or solenoid port plugging. To ensure this, the flush rod should be tapered to vary the size of the port opening as the diaphragm raises and lowers, thus allowing trapped material to escape. Rod is to be finished with a serrated surface to help scrub trapped material out. Screens not acceptable.
- C. Shall have removable valve seat so valve can be repaired without removal from irrigation line.
- D. Shall have ability to operate manually without the use of wrenches or special keys.
- E. Shall have one-piece solenoid that attaches directly to valve without shunts or clips that can be lost.
- F. Shall have cross top handle to adjust maximum travel of diaphragm to allow "tuning" of valve and closure.

2.7 BOX FOR REMOTE CONTROL VALVE

- A. Rectangular black plastic valve box - Ametek, Carson, Christy, Rain Bird or accepted equal with non-hinged bolt down black colored lid marked "irrigation". Box body shall have knock outs. Do not saw cut body. The minimum size box is as shown on Drawings. Increase box size as required to fit. Valve box lids are to indicate the controller letter and station number of valve as accepted by Owner's Representative. Also refer herein to required polyurethane tag at valve solenoid control wire under Control Wires. Locate the identification in center of the lid. Provide separate box for each valve. Provide H/20 Loading concrete boxes with bolt-down concrete lids for all valves that occur in paved areas.

2.8 CONTROL WIRES

- A. Connections between automatic controllers and the solenoid-operated electric control valves shall be made with direct burial copper wire 14- AWG-UF 600 volt (minimum size). Pilot wires shall be a color other than white, and shall be a different color for each automatic controller with wires sharing a common trench. Common wires shall be white in color, with a different color stripe for each controller with wiring sharing the same common trench. No stripe is required if multiple controller wiring is not present.
- B. Size of wire shall conform to the remote control valve manufacturer's specification for control wire sizes, but in no case shall the control wire be smaller than #14. Runs over 2,000 lineal feet shall be #12- AWG-UF 600 volt copper wire.
- C. All wire splices are to be made within a valve box, with a copper crimp-type connector, and a "3-M" #DBY splice kit or Rain Bird "DBTWC25".
- D. Use continuous control wiring between controllers and remote control valves (no splices).
- E. Provide polyurethane tag at valve solenoid control wire that shows the controller number and station number. Also refer to valve box lid identification.
- F. Provide a spare control wire in each RCV box for future.

2.9 SPRAY HEADS

- A. Pop-up as shown on drawings and with the following minimum requirements:.
- B. Shall have approximately 30 psi water pressure coming out of nozzle to prevent "fogging" or misting. Shall have pressure-compensating devices.
- C. Shall have ability to prevent low head drainage. Use heads with integral check valves.
- D. EXAMPLE – Rain Bird 1800 Spray Body with SAM -PRS Series
- E. Shall not have spray blocked by turf or shrubbery; use minimum 4" pop-ups in turf areas.

2.10 ROTOR HEADS

- A. As shown on drawings and with the following minimum requirements:
- B. Heads shall have exact matched precipitation rates. Radius and precipitation rates must be the same.
- C. EXAMPLE – Rain Bird 5000/5000 Plus Series with MPR, PRS and SAM

2.11 SWING JOINTS

- A. Sprinklers and Bubblers: Use Dura, Lasco, Rain Bird or equal pre-assembled swing joints with O-rings.

2.12 Quick Coupling Valve: Dura 1-inch 1-A2-1-11-18 pre-assembled swing joint with O-rings and Dura quick lock to receive stabilizing rod.

2.13 SHRUB & TREE BUBBLERS

- A. As shown on drawings

2.14 DRIP EMMITTER IRRIGATION

- A. Drip Manifold:
 - 1. Pressure Regulator: Preset at 30 psi outlet pressure, $\frac{3}{4}$ " female threaded inlet and outlet, by RainBird, Torro or equal.
 - 2. Emitters: Xeri-Bug (XB Series) by RainBird, Toro EZ Drip Series, or equal.
 - 3. Flexible PVC: ASTM D2287 algae-resistant flexible PVC as recommended by manufacturer of Drip Emitters.
 - 4. Drip tubing: Conform to A. S. A. E. standards for minimum inside diameter and wall thickness, Minimum 2% carbon black, Salco $\frac{3}{4}$ " AR Drip PVC flexible drip hose, or equal.
 - 5. $\frac{3}{4}$ " Y-filter, 200 mesh.
 - 6. Toro DL 2000 Air/Vacuum Relief Valves and In-line Spring Check Valves.
 - 7. $\frac{3}{4}$ " manual PVC ball valve with extra 3' of hose coiled in valve box.
 - 8. Drip system in accordance with "RainBird Xerigation Low-Volume Landscape Irrigation Design Manual" and as shown on the drawings as required for a complete working system.

2.15 IN-LINE DRIP IRRIGATION

- A. As specified herein and as shown on the drawings and in accordance with manufacturer's recommendations. Provide all miscellaneous valves, filters fittings etc. required for a complete, operable system including the following:

1. Rain Bird XFCV with "Copper Shield" technology. Drip system in accordance with "RainBird Xerigation Low-Volume Landscape Irrigation Design Manual" and as shown on the drawings as required for a complete working system.
 2. Pop-up operation indicator
 3. Air/vacuum relief valves
 4. Flush valves
- B. Drip Valve Assembly: Size valve box large enough and deep enough to contain assembly and allow convenient access and easy removal of filter screen. Position filter pointed down, approximately 45 degrees.
- C. Pressure regulator: Size regulator in accordance with flow rate. Do not over size. Use factory pre-set regulator at 30 PSI.
- 2.16 RCV IDENTIFICATION TAGS:
- A. Plastic or brass tags with valve number, approximately 2" by 2" with number imprinted, as accepted by Owner.
- 2.17 MISCELLANEOUS INSTALLATION MATERIALS
- A. Solvent Cement and Primers for Solvent-weld Joints: Make and type approved by manufacturer(s) of pipe and fittings. Maintain cement proper consistency throughout use.
- B. Pipe and Joint Compound: Permatex: Do not use on sprinkler inlet port.
- 2.18 MISCELLANEOUS EQUIPMENT/ACCESSORIES
- A. Concrete for equipment pads (and thrust blocks if Bell-Type Pipe with O-Rings is required): Poured-in-place Class A concrete per Section 20-2 of the Caltrans Standard Specifications.
- B. Sleeves and Conduits: See Drawings.
- C. Key(s) for Quick-Coupling Valves:
1. Type: Same manufacturer as Quick-Coupling Valve.
- 2.26 OTHER EQUIPMENT: As shown on Drawings and required for a fully functional irrigation system.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Sleeves and Conduits: Verify that all installed sleeving and conduits are undisturbed and are free of defects or errors introduced by the work of other sections.

- B. Water Meter/Water Pressure: Test and verify that existing water pressure is the minimum pressure at maximum system g.p.m. to operate the irrigation system as indicated on the drawings.
- C. Stub-outs: Verify that all stub-outs to be provided under another contract are correctly sized, located and installed as noted on Drawings.
- D. Notification: Submit written notification to Owner's Representative within ten (10) working days of above inspections describing all acceptable and non-acceptable site conditions.

3.2 CONNECTIONS TO SERVICES

- A. Provide and coordinate connection to water meter.
- B. Provide and coordinate connection of irrigation controller to electrical power source.

3.3 INSTALLATION

- A. Install irrigation system components in accordance with this Section, with the Drawings, with the manufacturer's recommendations, and with established industry standards. The Contractor shall do nothing that may jeopardize any manufacturer warranty.
- B. Existing Automatic Controller:
 - 1. Connection to Valves: Connect remote control valves to controller in clockwise sequence to correspond with station setting beginning with Stations 1, 2, 3, etc.
 - 2. Labeling: Affix controller letter (i.e., "A") on inside of controller cabinet door with minimum of one-inch (1") high permanent letter.
 - 3. Irrigation Diagram: Affix a non-fading, waterproof copy of irrigation diagram to cabinet door below controller name. Irrigation diagram to be sealed between two plastic sheets, 20 mil. minimum thickness. Use a legible reduced copy of the Record Drawing for the irrigation diagram clearly showing all valves operated by the controller, station, number, valve size, and type of planting irrigated. Color code area operated by each valve.
- C. Control Wiring:
 - 1. General: Install control wires in common trenches with sprinkler mains and laterals wherever possible. Lay to the bottom side of pipe line. Provide looped slack at valves. Snake wires in trench to allow for contraction of wires. Tie wires in bundles at 10 ft. intervals.
 - 2. Extra Length: Provide 30 inches (30") extra control wire at each remote control valve splice to facilitate the removal of the remote control bonnet to finish grade without cutting wires.
 - 3. Spare: Install one unconnected spare control wire running from the controller through each intermediate control valve box.
 - 4. Size: Minimum size of wire is to be determined strictly by the manufacturer's current printed specifications for remote control valves, but not smaller than #14.
 - 5. Detection Wire: Install a bare #12 copper wire or greater on top of the PVC supply line for the purpose of possible future mine detection search. Install the

control wires on the bottom of the PVC supply line with electrical tape every ten feet (10').

6. Splicing: Crimp control wire splices at remote control valves. Seal with specified splicing materials. In-line splices will be allowed only on runs exceeding 2500 feet and only in junction boxes.

D. Excavating and Trenching:

1. Prior to trenching, layout main and lateral line locations within Drip Line of trees and review locations with Owner's Representative. Relocate any lines that may interfere with existing root systems to avoid or reduce damage to root systems as accepted by Owner's Representative.
2. Dig trenches wide enough to allow a minimum of three inches (3") between parallel pipe lines. Provide a minimum cover from finish grade as follows:
 - a. 24-inches Deep: Over pipe on pressure side of irrigation control valve, control wires and quick-coupling valves.
 - b. 36-inches Deep: Over all pipe and pipe sleeves under roadways, parking lots, entrance to parking lots and Fire-Access Lanes per NFPA 24, Section 10.4.4.
 - c. 18-inches Deep: Over pipe on non-pressure side of irrigation control valve.
 - d. Direct Burial PVC Piping Under Pavement: Provide a minimum of 4 inches of sand backfill on all sides and 24 inches cover to bottom of paving.
 - e. As indicated on demolition plan, Prehistoric Site Area requires maximum 12" excavation depth.

E. Conduits and Sleeves:

1. Coordination: Provide conduits and sleeves and coordinate installation with other trades.
2. Extent: Install conduits and sleeves where control wires and pipes pass under paving or through walls as shown on Drawings. Extend twelve inches (12") beyond edges of paving and walls and cap ends until ready for use.

F. Pipeline Assembly:

1. Install pipe and fittings in accordance with manufacturer's current printed Specifications.
2. Clean all pipes and fittings of dirt, scale and moisture before assembly.
3. Solvent-welded Joints for PVC Pipes:
 - a. Solvents: Use solvents and methods specified by pipe manufacturer.
 - b. Curing Period: Minimum of one (1) hour before applying any external stress on the piping and at least 24 hours before placing the joint under water pressure.
4. Threaded Joints for Plastic Pipes:
 - a. Use Permatex on all threaded PVC fittings except sprinkler heads and quick coupler valve ACME threads.
 - b. Joining: Use strap-type friction wrench only. Do not use metal-jawed wrench. Assemble finger tight plus one or two turns.
5. Laying of Pipe:
 - a. Bedding On-grade: Remove from trench all rocks or clods. Bed pipe in at least 2 inches of soil excavated from trench. Backfill on all sides of piping to provide a uniform bearing.

- b. Snaking: Snake pipe from side to side of trench bottom to allow for expansion and contraction. Minimum allowance for snaking is one (1) additional foot per 100 ft. of pipe.
 - c. Moisture Restrictions: Do not lay PVC pipe when there is water in the trench. Do not assemble PVC pipe unless the pipe is dry.
- G. Closing of Pipe and Flushing of Lines:
 - 1. Capping: Cap or plug all openings as soon as lines have been installed to prevent entrance of materials that would obstruct the pipe. Leave in place until removal is necessary for completion of installation.
- H. Detection Wire and Warning Tape:
 - a. Install a bare # 12 copper wire or greater on top of the PVC supply line for the purpose of possible future mine detection search.
- I. Control Valves:
 - 1. Install in valve boxes where shown on Drawings and group together where practical. Install box flush with finish grade, not necessarily level. If valve occurs in drainage swale, relocate out of drainage swale as approved by Owner's Representative.
 - 2. Where two or more valves are installed adjacent to each other, provide at least six inches (6") separation. Align boxes in a row, perpendicular with pavement edge.
 - 3. Permanently mark valve box lid with 2" black valve number and controller letter or with numbered metal tag inside box as approved by Owner's Representative.
 - 4. Refer to control wiring for required spare wire in each valve box.
- J. RCV Identification Tags:
 - 1. Install in remote control valve box as recommended by manufacturer and as accepted by Owner's Representative.
- K. Pop-up Spray Heads and Rotors:
 - 1. Place all sprinkler heads in planting areas with top of heads set to finish grade or top of mulch as required.
 - 2. Place part-circle pop-up sprinkler heads two inches (2") from edge of and flush with top of adjacent walks, header boards, curbs and mowing bands or paved areas and 12 inches (12") from building foundations at time of installation.
 - 3. Set all sprinkler heads in turf to allow for settlement. Adjust as required after settlement. Hold heads two inches (2") clear of pavement edge.
- L. Bubblers:
 - a. Coordinate installation with planting contractor to insure timely and proper placement of heads at new planting.
- M. In-Line Drip Irrigation
 - 1. Coordinate plant locations with emitter locations. Refer to QUALITY ASSURANCE herein.
 - 2. Coordinate hand watering of emitter irrigated and drip irrigated areas. Refer to QUALITY ASSURANCE herein.

3. Coordinate emitter spacing with planting types and plant spacing as accepted by Landscape Architect. Install emitters at uniform **18 inches** on center maximum and 2 to 4 inches deep, except where emitter spacing and depth is shown otherwise.
4. Adjust spacing on slopes to prevent over watering at base of slopes. Install system in accordance with manufacturer's recommendations and as shown on the Drawings as required for a complete working system.
5. Provide air/vacuum relief valves at all high points on systems.
6. Provide filter as shown and as recommended by emitter manufacturer.
7. Tape pipe ends during installation and do not allow dirt or debris to enter pipe.
8. Use emitter line with the specified emitter flow rate and emitter spacing. Assemble dripper line to allow water to flow continuously and directly, with no dead ends or dead end loops between control valve and flush valve.
9. Use fittings at sharp bends and do not allow dripper line to kink.
10. Install emitter line around perimeter of planter not more than 3 inches off edge for ground cover and turf, 18 inches maximum for shrub planting.
11. Adjust alternate rows so emitters are spaced in a triangular pattern.
12. Collect water from multiple dripper lines and convey the water to automatic line flush valve.
13. Install flush valve at end(s) of collector laterals so that entire system will flush and be free of dirt and debris.
14. Flush valves shall be open when water is turned on for the first time and after a break in the main or lateral lines. Extend collector lateral as required and locate flush valve at convenient accessible location.
15. Flush the systems weekly through the first month of the maintenance period.
16. Thoroughly saturate soil prior to planting. Provide additional surface watering as required to keep plant root systems moist during planting establishment period.

N. Drip Emitter Irrigation:

1. Install system in accordance with "RainBird Landscape Irrigation Design and Specifications Xerigation Products and Details" or equal and as shown on the Drawings as required for a complete working system.
2. Install Toro DL 2000 Air/Vacuum Relief Valves at high points in system.
3. Install manual PVC ball valve with extra 3' of hose coiled in valve box at end(s) of collector laterals so that entire system will flush and be free of dirt and debris.
4. Install a continuous PVC irrigation mainline warning tape 12" above the supply line.

3.4 MISCELLANEOUS EQUIPMENT

- A. Install miscellaneous equipment with concrete footings, brackets, etc., as required and as recommended by manufacturer.

3.5 FIELD QUALITY CONTROL

A. Testing of Irrigation System:

1. Make hydrostatic tests with risers capped when welded PVC joints have cured at least 24 hours. Center load piping with backfill to prevent pipe from moving under pressure. Keep all couplings and fittings exposed.

2. Install two (2) pressure gauges at opposite ends of main line system. Pump system up to a minimum of 125 psi the day preceding the scheduled test and verify that pressure is holding. Inspect system early following day and immediately notify Owner's Representative if the test confirmation must be postponed.
 3. Apply continuous static water pressure of 125 psi in accordance with Caltrans Standard Specifications Section 20-2, except after a drop in pressure (5 psi maximum), then the pressure must stabilize and remain stable for a one (1) hour minimum period before acceptance of the test.
 4. Leaks detected during tests shall be repaired and test repeated until system passes tests at no additional cost to Owner.
- B. Irrigation Audit Report with Certificate of Completion
1. Per the requirements of the California Model Water Efficient Landscape Ordinance, the Contractor shall perform an irrigation audit and provide a report with certificate of completion to the local agency that may include, but is not limited to: inspection, system tune-up, system test with distribution uniformity, reporting overspray or run off that causes overland flow, and preparation of an irrigation schedule. Irrigation audits shall be conducted by a CLIA Certified landscape Irrigation Auditor by the Irrigation Association. Operation of the irrigation system outside the normal watering window is allowed for auditing and system maintenance.
- C. Adjustment of the System:
1. Flush and adjust all sprinkler heads for optimum performance and to prevent overspray onto walks, roadways and buildings. Adjust the arc and radius as applicable.
 2. Include as a part of the work any nozzle changes or arc adjustments necessary due to daytime windy conditions during grass establishment period. After grass has been established and watering can be performed during calm early morning or evening hours, make any required adjustments to nozzles and arcs.
 3. Set all sprinkler heads perpendicular to finished grades unless otherwise noted on the drawings.
 4. When the landscape sprinkler system is completed and before planting, perform a coverage test in the presence of the Owner's Representative to determine if the water coverage for planting areas is adequate.
 5. Test controllers individually in the presence of the Owner's Representative and the Landscape Architect. Demonstrate that all control valves operate electronically. Provide vehicles and radio equipment as necessary to expedite this process.
 6. Demonstrate to Owner's Representative that irrigation scheduling programmed into controller is adequate for plant requirements without causing runoff, and that scheduling capacities of controller are utilized.

3.6 IRRIGATION SCHEDULING AND CONTROLLER PROGRAMMING

- A. Per the requirements of the California Model Water Efficient Landscape Ordinance All irrigation schedules and programs shall be developed, managed and evaluated to utilize the minimum amount of water required to maintain plant health.

- B. Irrigation controller Scheduling and Programming Parameters to be conducted by a CLCA Certified Irrigation manager and submitted to the local agency as part of the Certificate of Completion.
- C. Parameters used to set the automatic controller shall be developed for each of the following:
 - 1. Plant establishment period
 - 2. Established landscape period
 - 3. Temporary irrigated area (if applicable)
- D. Each irrigation schedule shall consider for each station all of the following that apply:
 - 1. Irrigation interval (days between irrigation)
 - 2. Irrigation run times (hours or minutes per irrigation event to avoid runoff)
 - 3. Number of cycle starts required for each irrigation event to avoid runoff
 - 4. Amount of applied water scheduled to be applied on a monthly basis
 - 5. Application rate setting
 - 6. Root depth setting
 - 7. Plant type setting
 - 8. Soil type
 - 9. Slope factor setting
 - 10. Shade factor setting
 - 11. Irrigation uniformity or efficiency setting
- E. Total annual applied water shall be less than or equal to Maximum Applied Water Allowance (MAWA). Actual irrigation schedules shall be regulated by automatic irrigation controllers using current reference evapotranspiration data (CIMIS or soil moisture sensor data).

3.7 BACKFILL AND COMPACTING

- A. General: After system is operating and required tests and reviews have been made, backfill excavations and trenches with clean soil, free of debris.
- B. Backfill for All Trenches: Regardless of the type of pipe covered, compact to minimum 95% density under pavements and 85% under planted areas.
- C. Finishing: Dress off areas to finish grades. Re-dress any areas which subsequently settle.
- D. Owner's testing agency will test backfill compaction in areas under paving.

3.8 MAINTENANCE

- A. The entire sprinkler irrigation system shall be under full automatic operation for a period of 2 days prior to any planting.
- B. The Owner's Representative reserves the right to waive or shorten the operation period.
- C. Maintain/repair system for full duration of plant maintenance period.

3.9 REVIEWS PRIOR TO ACCEPTANCE

- A. Notify the Owner's Representative in advance for the following reviews, according to the time indicated:
 - 1. Supply line pressure test and control wire installation - 72 hours.
 - 2. Coverage and controller test - 72 hours.
 - 3. Final review - 7 days.
- B. No reviews will commence without record drawings, without completing previously noted corrections, or without preparing the system for review.

3.10 FINAL REVIEW AND CLEANUP, per Section 01 77 00.

- A. Operate each system in its entirety for the Owner's Representative at time of final review. Any items deemed not acceptable by the Owner's Representative shall be reworked to the complete satisfaction of the Owner's Representative.
- B. Provide evidence to the Owner's Representative that the Owner has received all accessories and equipment as required before final review can occur.
- C. Final acceptance and start of warranty period will occur no earlier than the end of the plant maintenance period.
- D. For time of final review, Contractor shall arrange a meeting with the Owner's maintenance personnel to demonstrate the operation of the irrigation systems automatically in order to verify acceptance and to familiarize the maintenance personnel with the system and recommended programming.

END OF SECTION

**SECTION 32 90 00
PLANTING**

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Provide planting work and planting maintenance complete as shown on the drawings and as specified including staking and layout of the landscaping, including soil sampling as required by the State of California Model Water Ordinance.
- B. Related work specified elsewhere includes:
 - 1. Section 31 10 00, SITE PREP & PLANT PROTECTION
 - 2. Section 32 84 00, IRRIGATION

1.2 QUALITY ASSURANCE

- A. Reference Standards:
 - 1. All local, municipal and state laws, codes and regulations relating to all portions of this work are to be incorporated as part of these Specifications. These specifications shall not be construed to conflict with any of the above codes, regulations or requirements. The Specifications and Drawings shall take precedence when they call for materials, workmanship or construction of a better quality or higher standard than required by the above mentioned codes and regulations. Furnish without extra charge additional materials and labor required to comply with above rules and regulations.
 - 2. State of California Model Water Ordinance
 - 3. Public utility agency having jurisdiction over the project work.
 - 4. "American Standards for Nursery Stock," American Association of Nurseryman, 230 Southern Building, Washington, D.C. 20005.
 - 5. International Society of Arboriculture, Guide for Plant Appraisal, latest version.
 - 6. US Composting Council Compost Analysis Program (CAP)
 - 7. US Composting Council (USCC) Seal of Testing Assurance (STA) program.
 - 8. Test Methods for the Evaluation of Composting and Compost (TMECC)
 - 9. Manufacturer's recommendations.
- B. Qualifications:
 - 1. Experience: Assign a full-time employee to the job as foreperson for the duration of the Contract who is certified landscape technician, certification through CLCA or minimum of five (5) years experience in landscape installation and maintenance supervision, with experience or training in turf management, entomology, pest control, soils, fertilizers and plant identification
 - 2. Labor Force: Provide a landscape installation and maintenance force thoroughly familiar with, and trained in, the work necessary to complete the tasks described herein in a competent, efficient manner acceptable to the Owner.
- C. Requirement
 - 1. Site Visit: At beginning of work, visit and walk the site with the Owner's Representative to clarify scope of work and understand existing project/site conditions.

2. Supervision: The foreperson shall directly supervise the work force at all times and be present during the entire installation. Notify Owner's Representative of all changes in supervision.
3. Identification: Provide proper identification at all times for landscape maintenance firm's vehicles and a labor force uniformly dressed in a manner satisfactory to Owner's Representative.
4. Protect all existing and new plants from construction activities, deer & rodents: Contractor shall be responsible for protection of all planting per Part 3.

D. Plant Material Standards:

1. Quality and Size of Plants: Conform to the State of California Grading Code of Nursery Stock, No. 1 grade. Use only nursery-grown stock which is free from insect pests and diseases.
2. Comply with federal and state laws requiring inspection for plant diseases and infestations, including Phytophthora. Submit inspection certificates required by law with each shipment of plants, and deliver certificates to the Owner. Obtain clearance from the County Agricultural Commissioner as required by law, before planting plants delivered from outside the County in which planted.

E. Soils & Amendment Testing

1. All soils & amendments to be tested for suitability by one of the following accredited soil testing laboratories (or approved equal). Components of the test shall include all major nutrients, pH, salinity, boron, sodium, micronutrients, copper, zinc, manganese and iron, adsorption rate, organic content and texture. The laboratory report shall include recommendations for adjusting fertilizer and amendment quantities.

Lucchesi Plant & Soil Consulting
Los Gatos, CA (408) 337-2575

Waypoint Analytical, Inc.
4741 E. Hunter Ave, Suite A, Anaheim, CA 92807; (717) 282-8777

Wallace Laboratories, LLC
365 Coral Circle, El Segundo, CA 02345; (310) 615-0016

2. Upon approval of the laboratory's report by the Landscape Architect, the recommendations in the report shall become a part of the Specifications and the soil preparation procedures, quantities of soil amendment, fertilizer and other additives shall be adjusted to conform with the report at no additional cost to the owner. Note that there is a minimum quantity of organic amendment specified elsewhere in this specification section.
3. Significant issues with soil quality will require soil to be retested in the locations identified on Soil Analysis Plan, prior to proceeding with plant installation, to ensure that the recommendations in the report have been followed and the In-Situ Topsoil is horticulturally suitable as described in Part 2.

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. Subsoil is defined as either existing site soil located below the topsoil prior to construction activities, or select fill used for rough grading during construction. Subsoil cannot be considered for use as planting soil.

- 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. 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 (50 mm) in diameter; and free of weeds, roots, toxic materials, or other non-soil materials.
- D. Planting Soil: Approved existing topsoil or imported planting soil, meeting the requirements herein. Subsoil cannot be considered for use as planting soil.

1.4 SUBMITTALS, per Section 01 33 00.

- A. The following shall be submitted to the landscape architect for approval prior to the installation of landscape materials and products.
 - 1. Manufacturer's Technical data sheets for fertilizers, turf, and all other products and materials listed herein.
 - 2. Manufacturer's technical data sheets for amendments. Reports to be dated no more than 3 months prior to soil preparation.
 - 3. 1-pint samples of imported soils, organic amendments/compost, mulches, and cobbles.
- B. Submit planting soil and organic amendment laboratory reports a minimum of [3] weeks prior to beginning soil prep. See below for required soil analysis reports.
- C. Required Soil Analysis Reports. Reports to be dated no more than [3] months prior to soil preparation.
 - 1. Soil Analysis Plan: Contractor to submit annotated plan showing confirmed locations of all required soil tests. Each location is to be identified with a unique label.
 - 2. Existing Planting Soil Analysis: After approval of the Soil Analysis Plan, rough grading, and topsoil placement, contractor to obtain 3 representative samples of in situ topsoil taken from approved site locations at depth of 4" to 6" below finish grade and submit to an accredited soils testing laboratory for "horticultural suitability" analysis, including particle size, infiltration rate, and evaluation of physical and chemical properties of soil and recommendations for adding amendments and fertilizers to the soil.
 - 3. Imported Planting Soil Analysis: Contractor to submit an "horticultural suitability" analysis report from an accredited soils testing laboratory, including particle size, infiltration rate, and evaluation of physical and chemical properties of soil and recommendations for adding amendments and fertilizers to the soil. Soil to conform to requirements in Part 2.
 - 4. Amended Planting Soil Analysis: Significant issues with soil quality will require soil to be retested in the locations identified on Soil Analysis Plan, prior to proceeding with plant installation, to ensure that the recommendations in the report have been followed and the final Planting Soil is horticulturally suitable as described in Part 2.

- D. The Contractor is responsible to follow all local water ordinances and make available to the local agency the soil analysis report and verification of its implementation as required.
- E. Delivery Receipts upon request by Owner, provide delivery receipts for quantities of soil & amendments delivered to the site.
- F. Representative photos of trees with measuring pole and plant species (unless trees or plants previously tagged at nursery by landscape architect). Identified and dated photos of trees and plants to be the trees and plants delivered to site and not a stock photograph.
- G. Entire plant quantity delivered to the site. Plants to be reviewed prior to installation during a single site visit.

1.5 WARRANTY AND REPLACEMENT

- A. Maintenance Period: See Part 3.
- B. Warrant all plants to be in a healthy, thriving condition until the end of the maintenance period, and deciduous trees, shrubs and vines beyond that time until active growth is evident.
- C. Replace all dead and damaged plants and plants not in a vigorous condition immediately upon discovery and as directed by the Owner's Representative and at no cost to the owner. Install replacement plants before the final acceptance of the maintenance period in the size specified.
- D. Warrant all products, prepared soils and plant material installed and maintained by contractor against defects for a period of one year after final acceptance of the maintenance period.

PART 2 - PRODUCTS

2.1 EXISTING PLANTING SOIL:

- A. Existing Planting Soil is defined as on-site topsoil that is either to be removed and stockpiled for reuse or to remain in place during construction. Satisfactory planting soil shall be free of subsoil, clay, lumps, stones, and other objects over 4" in diameter, and without weeds, roots, and other objectionable material. The soil shall be fertile, friable, natural, productive soil containing a normal amount of humus, and shall be capable of sustaining healthy plant life. Soil shall not be infested with nematodes or with other noxious animal life or toxic substances. Soil shall be obtained from well-drained, arable land, and shall be of an even texture. Soil shall not be taken from areas on which are growing any noxious weeds such as morning glory, equisetum, or Bermuda grass, etc.
- B. If herbicide contamination is suspected then a radish/ryegrass growth trial must be performed. Consult with Landscape Architect prior to decision to test or not.
- C. Amended Planting Soils are to conform with the following target levels. Elements are expressed as mg/kg dry soil or mg/l for saturation extract.

pH value	6.5-7.9,	iron	4-15 mg/kg
lime	none present	manganese	0.6-3.0 mg/kg
salinity (ECe)	0.5-3 milli-mho/cm	zinc	1-3 mg/kg
chloride	<150 ppm	copper	0.2-3.0 mg/kg
nitrate	20-30 ppm	boron	0.2-0.5 mg/kg
SAR	<3	magnesium	25-100 mg/kg
phosphorus	8-20 mg/kg	sodium	<200 mg/kg
potassium	60-180 mg/kg	sulfur	25-100 mg/kg

- D. Sufficient on-site surface topsoil is not available. Contractor is to provide imported planting soil as specified below. Placement of dissimilar soils shall be coordinated with irrigation zones by the contractor to maintain separate valves for dissimilar soils.
- E. Submit soil analysis report from an approved soils laboratory for approval by the Landscape Architect. Refer to Part 1 for soil testing requirements.

2.2 IMPORTED PLANTING SOIL:

- A. Imported planting soil shall be screened and shall be free of subsoil, heavy or stiff clay, rocks, gravel, brush, roots, weeds, noxious seeds, sticks, trash, and other deleterious substances.
- B. Imported Planting Soils are to conform with the following target levels. Elements are expressed as mg/kg dry soil or mg/l for saturation extract.

pH value	6.5-7.9,	iron	4-15 mg/kg
lime	none present	manganese	0.6-3.0 mg/kg
salinity (ECe)	0.5-3 milli-mho/cm	zinc	1-3 mg/kg
chloride	<150 ppm	copper	0.2-3.0 mg/kg
nitrate	20-30 ppm	boron	0.2-0.5 mg/kg
SAR	<3	magnesium	25-100 mg/kg
phosphorus	8-20 mg/kg	sodium	<200 mg/kg
potassium	60-180 mg/kg	sulfur	25-100 mg/kg

- C. The silt and clay content of Imported Planting Soil shall not exceed that of the existing soil it is to be placed over. Except where otherwise required, it shall be a "Sandy Loam" as classified in accordance with USDA Standards with a combined total of between 25% to 40% Clay and Silt.
- D. Submit soil analysis report from an approved soils laboratory for approval by the Landscape Architect. Refer to Part 1 for soil testing requirements.
- E. Following approval of the sample, provide a one-half cubic yard sample, which shall be stored at the site of work for comparison with sample and subsequent loads of soil. The comparison sample shall be protected by a cover until the installation of all soil has been completed and accepted.

2.3 IMPORTED SHORELINE SOIL:

- A. Shoreline soil to be appropriate for intertidal plant growth, such as relocated dredge material or approved equal. Soil should be greater than 75% fines in order to provide the substrate necessary to support the anticipated project vegetation. Soil to be tested for organic matter and if necessary, amended with compost from intertidal biosolids or with direct nutrient addition. Contractor to receive final soil and amendment approval from geotechnical or soil marine engineer and present approval to landscape architect.

2.4 ORGANIC AMENDMENT FOR PLANTING SOILS:

- A. Ground Redwood or Ground Fir Bark with the following properties:

<u>Percent Passing</u>	<u>Sieve Designation</u>	
100	9.51 mm	3/8"
50-60	6.35 mm	1/4"
20-40	4.76 mm	No. 4
0-20	2.38 mm	No. 8 8 mesh

Redwood Sawdust

Dry bulk density, lbs. per cu. yd.	260-280
Nitrogen stabilized - dry weight basis	0.4% minimum
Salinity (ECe):	4.0 maximum
Organic Content:	90% minimum
Reaction (pH):	4.0 minimum

Ground Fir and/or Pine Bark

Dry bulk density, lbs. per cu. yd.	350 minimum
Nitrogen stabilized - dry weight basis,	0.5% minimum
Salinity (ECe):	4.0 maximum
Organic Content:	90% minimum
Reaction (pH):	4.0 minimum

- B. Submit sample, product's technical data sheet, and analysis report from an approved soils laboratory for approval by the Landscape Architect. The analysis report should include compliance to the specifications above and directions for product use.
- C. Contractor may use Composted Yard Waste Amendment in lieu of the above specified Organic Amendment pending approval of product' technical data sheet.

2.5 COMPOSTED YARD WASTE AMENDMENT FOR PLANTING SOILS:

- A. The above ORGANIC AMENDMENT FOR PLANTING SOILS is the specified organic amendment material. Acceptance of Composted Yard Waste Amendment in lieu of the above specified amendment material will be considered if the in situ planting soil salinity and soil structure is favorable for the inclusion of recycled yard waste organic matter, as approved by the Landscape Architect.
- B. The composted yard waste amendment shall be a mixture of feedstock materials including green material consisting of chipped, shredded, or ground vegetation and mixed food waste, or clean processed recycled wood products. Single source, biosolids (sewage waste) compost will not be acceptable.

- C. The addition of the compost shall result in a final ECe of the amended soil of less than 4.0 dS/m @ 25 degrees C. as determined in a saturation extract. Use the following table to determine the maximum allowable ECe (dS/m of saturation extract) of compost at desired use rate and allowable ECe increase.

DESIRED USE RATE		MAXIMUM ALLOWABLE ECe INCREASE FROM AMENDMENT		
Cu. Yds. Amendment Per 1000 Sq. Ft. for Incorporation to 6" depth	Volume percentage of amendment	1 dS/m	2 dS/m	3 dS/m
		Maximum ECe of Compost		
1	5	14	28	42
2	11	7	14	21
3	16	5	9.5	14
4	22	3.5	7	10.5
5	27	3	5.5	8.5
6	32	2.5	4.5	7

Example: Specification calls for 6 cu. Yrds. Compost per 1000 sq. ft. for incorporation to 6" depth, and site soil has an ECe of 2.0. In order to avoid exceeding ECe of 4 in final blend, compost ECe shall be less than 4.5 dS/m.

- D. Composted Yard Waste Soil Amendment properties to conform to the following:
- Gradation:

% Passing by weight		Sieve Designation
90		1/2"
85-100	9.51 mm	3/8"
50-80	2.38 mm	No. 8
0-40	500 micron	No. 35
 - Organic Content: Minimum 50% based on dry weight and determined by ash method. Minimum 250 lbs. organic matter per cubic yard of compost.
 - Carbon to nitrogen ratio: Maximum 35:1 if material is claimed to be nitrogen stabilized.
 - pH: 5.5 – 8.0 as determined in saturated paste.
 - Soluble Salts: See D. above.
 - Moisture Content: 35-60%.
 - Contaminants: The compost shall be free of contaminants such as glass, metal and visible plastic. Heavy metals, fecal coliform and Salmonella shall not exceed levels outlined as acceptable in the California integrated waste management regulations.
 - Maturity: Physical characteristics suggestive of maturity include:
 - Color: Dark brown to black.
 - Acceptable Odor: None, soil-like, or musty.
 - Unacceptable Odor: Sour, ammonia or putrid.
 - Particle Characterization: Identifiable wood pieces are acceptable, but the balance of the material shall be soil-like without recognizable grass or leaves.
- E. Submit sample, product's technical data sheet, and analysis report from an approved soils laboratory for approval by the Landscape Architect. The analysis report should include compliance to the specifications above, directions for product use, and a list of

ingredients. It is the Contractor's responsibility to secure test of the proposed composted yard waste amendment (2 quart sample) and submit to a Soils Laboratory for evaluation and recommendations. The composted yard waste amendment sample shall be a grab sample from the currently available material that has been tested within the last 30 days and shall include the composter's Compost Technical Data Sheet that includes lab analytical test results and directions for product use along with list of ingredients. Refer to Part 1 for soil testing requirements.

- F. Based on the Soils Laboratory evaluation, the addition of composted yard waste amendment shall not be acceptable if it creates a leaching requirement.

2.6 PLANTS

- A. Plant the variety, quantity and size indicated on drawings. The total quantities indicated on the drawings are considered approximate and furnished for convenience only. Contractor shall perform plant quantity calculations and provide all plants shown on the drawings.
- B. Measure trees and shrubs with branches in normal position. Height and spread dimensions indicated refer to the main body of the plant, and not from branch tip to tip.
- C. Take precautions to ensure that the plants will arrive at the site in proper condition for successful growth. Protect plants in transit from windburn and sunburn. Protect and maintain plants on site by proper storage and watering.
- D. Install healthy, shapely and well rooted plants with no evidence of having been root-bound, restricted or deformed.
- E. Tag plants of the type or name indicated and in accordance with the standard practice recommended by the American Association of Nurserymen.
- F. Substitutions will not be permitted, except as follows:
 - 1. If proof is submitted to the Landscape Architect that any plant specified is not obtainable, a proposal will be considered for use of nearest equivalent size or variety with an equitable adjustment of contract price.
 - 2. Substantiate and submit proof of plant availability in writing to the Landscape Architect within 10 days after the effective date of Notice to Proceed.
- G. Tree Form
 - 1. Trees shall have a symmetrical form as typical for the species/cultivar and growth form.
 - 2. Central Leader for Single Trunk Trees: Trees shall have a single, relatively straight central leader and tapered trunk, free of co-dominant stems and vigorous, upright branches that compete with the central leader. Preferably, the central leader should not have been headed; however, in cases where the original leader has been removed, an upright branch at least $\frac{1}{2}$ the diameter of the original leader just below the pruning point shall be present.
 - 3. Potential Main Branches: Branches shall be evenly distributed radially around and appropriately spaced vertically along the trunk, forming a generally symmetrical crown typical for the species.
 - 4. Headed temporary branches should be distributed around and along the trunk as noted above and shall be no greater than $\frac{3}{8}$ " diameter, and no greater than $\frac{1}{2}$ diameter of the trunk at point of attachment.

H. Tree Trunk

1. Trunk diameter and taper shall be sufficient so that the tree will remain vertical without the support of a nursery stake.
2. Trunk shall be free of wounds (except properly-made pruning cuts), sunburned areas, conks (fungal fruiting-bodies), wood cracks, bleeding areas, signs of boring insects, galls, cankers and/or lesions.
3. Tree trunk diameter at 6" above the soil surface shall be within the diameter range shown for each container size below, except where shown otherwise:

Container	Trunk Diameter	Soil level from Container Top
5 gallon	0.5" to 0.75"	1.25 to 2"
15 gallon	0.75" to 1.0"	1.75 to 2.75"
24" Box	1.5" to 2.5"	2.25 to 3"
36" Box	>2.5"	2.25 to 3"

4. Tree trunks shall be undamaged and uncut with all old abrasions and cuts completely callused over. Do not prune plants prior to delivery.

I. Tree Roots

1. Trunk root collar (root crown) and large roots shall be free of circling and/or kinked roots. Contractor may be required to remove soil near the root collar in order to verify that circling and/or kinked roots are not present.
2. The tree shall be well rooted in the container. When the trunk is lifted the trunk and root system shall move as one and the rootball shall remain intact.
3. The top-most roots or root collar shall be within 1" above or below the soil surface. The soil level in the container shall be within the limits shown in above table.
4. The rootball periphery shall be free of large circling and bottom-matted roots.
5. On grafted or budded trees, there shall be no suckers from the root stock.

2.7 FERTILIZERS

A. General Landscape Fertilizers

Commercial fertilizer, pelleted or granular form, conform to the requirements of Chapter 7, Article 2, of the Agricultural Code of the State of California for fertilizing materials as follows:

Type A:

6% Nitrogen, 20% Phosphorus Acid and 20% Potash, (6-20-20)

Type B:

21 gram planting tablets 20% Nitrogen, 10% Phosphoric Acid and 5% Potash (20-10-5) available from Agriform or 10gm BestPacks packets 20% Nitrogen, 10% Phosphoric Acid and 5% Potash (20-10-5) available from Best Fertilizer Co.

Type C (Maintenance Fertilizer)

Complete fertilizer 21% Nitrogen, 7% Phosphoric Acid and 14% Potash (21-7-14).

If commercial fertilizer having the above analysis is not obtainable, other similar commercial fertilizer may be used providing it meets the approval of the Landscape Architect.

2.8 IRON OR FERROUS SULFATE: Dry form.

- A. Essential 20% Ferrous (Iron) Sulfate. A soluble product that can be broadcast or incorporated. Analysis of 20% Iron, 18% Sulfur.

2.9 EROSION CONTROL NETTING

- A. New, with a uniform, open plain-weave, flame-retardant mesh. The mesh shall be [natural brown-tan] and made from unbleached single jute yarn. The yarn shall be of loosely twisted construction and shall not vary in thickness by more than one-half its normal diameter. Furnish jute mesh in rolled strips to meet the following requirements:
 - Width: 48 inches, with a tolerance of one-inch wider or narrower.
 - Not less than 78 warp ends per width.
 - Not less than 41 weft ends per yard.

2.10 PERFORATED DRAIN PIPE

- A. Polyvinyl Chloride (PVC) pipe and pipe fittings shall meet extra strength minimum of SDR-35 of the requirements of ASTM Specification D3034.
- B. Perforated and non-perforated corrugated polyethylene pipe, 3- to 10-inch diameter, shall meet the requirements of ASTM D883 and ASTM F412, and shall conform to Section 68 of the Standard Specifications.
- C. Corrugated polyethylene pipe fittings shall comply with all requirements of AASHTO M-252-85I for 3- to 10-inch diameter pipe. Couplings shall be split or snap-on type for perforated pipe and split couplings with gaskets for non-perforated pipe. Cutting pipe with integral couplings will not be allowed.
- D. Corrugated polyethylene pipe and fittings manufactured by Advanced Drainage Systems, Inc., shall be considered the standard to determine compliance to this specification.
- E. Inspection Tube Cap: Paint cap one coat chocolate-brown color using Flat, exterior grade latex paint as accepted by Owner's Representative.

2.11 FILTER FABRIC / PERMEABLE LANDSCAPE FABRIC

- A. Polyester or polypropylene non-woven filter fabric with uniform fiber distribution by "Terra Bond" #1115, "Mirafi, Inc." #140N, or approved equal.

2.12 PERMEABLE DRAIN ROCK

- A. Permeable drain rock used in subsurface drain installations to be Class 2 permeable material in conformance with Section 4-68 "Subsurface Drains" of the Caltrans Construction Manual; gradation to 3/4" maximum size. Submit Sample for approval.

2.13 TREE STAKES

- A. Unless otherwise shown on drawings, provide two-inch (2") diameter by eight feet (8') long for trees less than 8' high and 1" caliper.

- B. Unless otherwise shown on drawings, provide three-inch (3") diameter by eight to ten feet (8' - 10') long for trees greater than 8' high and 1" caliper.

2.14 TREE TIES

- A. Unless otherwise shown on drawings, provide rubber strap, 24-inch minimum length without sharp edges adjacent to trunk, V.I.T. cinch-tie, Dublin, CA, (818)882-9530, or approved equal.

2.15 TREE GUYING SYSTEM:

- A. For trees larger than 3" caliper, 3/16" galvanized steel cable, with rubber tree collar, 12" minimum long, and secured with cable clamp, and attached to anchor for below-grade location, Duckbill Model 40 DTS, or approved equal.
- B. Rootball guying system with three dead man anchors per tree as shown on drawings.

2.16 MULCH

- A. Organic Mulch:
 - 1. Forest floor bark mulch by American Soil and Stone
- B. Submit samples of mulch for approval by Landscape Architect until acceptable to Owner, at no extra cost.

PART 3 - EXECUTION

3.1 PLANT PROTECTION AND REPLACEMENT

- A. Inspect and protect all existing and new plants and trees against damage from construction activities, erosion, trespass, insects, rodents, deer, disease, etc. and provide proper safeguards, including trapping of rodent and applying protective sprays and fencing to discourage deer browsing. Maintain and keep all temporary barriers erected to prevent trespass.
- B. Repair all damaged planted areas. Replace plants and re-seed or re-sod turf immediately upon discovery of damage or loss.

3.2 TOPSOIL STRIPPING AND STOCKPILING

- A. Strip existing planting soil to whatever depths encountered in areas that may be compacted due to construction activities and in a manner to prevent intermingling with the underlying subsoil or other objectionable material. Topsoil stripping is limited to area outside "Drip Line" of existing trees to remain and areas indicated on drawings and as approved by the Owner's Representative.
- B. Remove heavy growths of grass from areas before stripping.
- C. Stockpile existing planting soil in storage piles in areas shown, or where designated by Owner. Construct storage piles to freely drain surface water. Cover storage piles if required to prevent windblown dust.

- D. If herbicide contamination is suspected then a radish/ryegrass growth trial must be performed. Consult with Landscape Architect prior to decision to test or not.

3.3 GENERAL PREPARATION OF PLANTING SOIL

- A. Submit soil analysis report of amended soils from an approved soils laboratory for approval by the Landscape Architect. Refer to Part 1 for soil testing requirements.
- B. All planting soils to be amended as specified in soil laboratory analysis report(s).
- C. Provide a minimum of [12"] depth of amended planting soil in all planting areas, or more where shown or specified otherwise. Install soil in maximum [12"] lifts. Compact each lift prior to installing subsequent lifts.
- D. Thoroughly wet down the planting areas to settle the soil and confirm irrigation coverage and operation. Allow soil to dry so as to be workable as described herein.
- E. After the rototill work, float areas to a smooth, uniform grade as indicated on the drawings. Slope all planting areas to drain. Roll, scarify, rake and level as necessary to obtain true, even planting surfaces. Remove rocks, sticks and debris 1 inch and larger in size in turf areas and 2 inches or larger in shrub and ground cover areas. Secure approval of the grade by the Landscape Architect before any planting.
- F. Prior to planting, soil shall be loose and friable to a minimum depth of [12"] with a relative maximum compaction of 85%. Rip and scarify any overly compacted and re-compacted planting areas (in two directions full depth of compacted soil) prior to planting.
- G. Water settling, puddling, and jetting of soil and backfill materials as a compaction method is not acceptable.
- H. Prior to planting, soil shall be moist, but not so moist that it sticks to a hand shovel. Do not work planting soil in a wet or muddy condition or dump or spread in areas where subgrade is not in proper condition.
- I. Provide planting soil as a final lift in all planting areas within and adjacent to paved areas and other construction where native site soil has been covered by engineered fill and/or base rock. Unless otherwise shown or specified, finish grade in planting islands shall be crowned with a minimum 2% pitch to drain.
- J. Finish Grade: Hold finish grade and/or mulch surface in planting areas 1/2-inch below adjacent pavement surfaces, tops of curbs, manholes, etc. The subgrade of the mulch in mulched planting areas shall be a minus 2 inches at a distance of 12 to 18 inch from the edge of pavement. Drag finish grade to a smooth, even surface. Grade to form all swales and berms. Pitch grade with uniform slope to catch basins, streets, curb, etc., to ensure uniform surface drainage. Areas requiring grading include adjacent transition areas that shall be uniformly sloped between finish elevations. Slope surface away from walls so water will not stand against walls or buildings. Control surface water to avoid damage to adjoining properties or to finished work on the site. Take required remedial measures to prevent erosion of freshly graded areas.

- K. Planting operations shall be performed only during periods when beneficial results can be obtained. When excessive moisture or other unsatisfactory conditions prevail, the work shall be stopped until conditions are satisfactory.

3.4 PREPARATION OF IN-SITU PLANTING SOIL

- A. In-Situ Planting Soil is defined as top soil left in its original place and undisturbed during construction activities which is to receive new planting
- B. Except within tree driplines, rip all planting areas in two directions full depth to a maximum of 12" into undisturbed native subsoil prior to amending. Scarification of any planting area which cannot be accomplished with a tractor shall be accomplished by an alternative method approved by the Owner's Representative to the specified depth to ensure proper percolation/drainage.
- C. Inspect planting areas and remove all base rock and other foreign material. Verify placement of planting soil within dripline of trees with Owner's Representative.
- D. Test depth of loose soil with hand shovel in presence of Owner's Representative in several locations as directed.
- E. After acceptance of the planting condition, uniformly mix and amend soil with required fertilizers, nutrients, etc. per specifications herein and recommendations given in soils reports.
- F. In the case of a contradiction between the quantity of organic amendment required by the soils laboratory analysis and the specified quantity below, the greater of the two quantities shall take precedence. Spread organic amendment, iron and Type A fertilizer evenly over installed and rough graded on-site topsoil in all planting areas including turf, ground cover and shrub areas at the following rates:
 - 1. Organic Amendment: 6 cubic yards per 1,000 square feet
 - 2. Fertilizer: Type A (6-20-20) at 20 lbs. per 1,000 square feet.
 - 3. Iron Sulfate: 10 lbs. per 1,000 square feet
- G. Rototill above additives into soil **[8-12"]** inches deep. Keep iron sulfate off pavement and other surfaces to prevent rust staining. Correct all rust damage to work.
- H. Final planting soil shall have a pH range of 6.5 to 7.5.

3.5 PREPARATION OF IMPORTED PLANTING SOIL (ON-GRADE)

- A. Uniformly distribute and spread Subsoil or select fill in planting areas to achieve rough grading and compact to a maximum of 85% relative compaction.
- B. Except within tree driplines, rip all planting areas in two directions full depth to a maximum 12" into undisturbed native subsoil prior to backfilling. Scarification of any planting area which cannot be accomplished with a tractor shall be accomplished by an alternative method approved by the Owner's Representative to the specified depth to ensure proper percolation/drainage.
- C. Thoroughly water-settle subsoil to required subgrade prior to installing Top Soil.

- D. Prior to placing planting soil secure the Owner's Representatives acceptance of the planting areas subgrade condition. Test depth of loose soil with hand shovel in presence of Owner's Representative in several locations as directed.
- E. After acceptance of the planting areas subgrade condition, uniformly distribute and spread planting soil backfill over scarified subgrade in planting areas as specified.
- F. Mix and amend soil with required fertilizers, nutrients, etc. per specifications herein and recommendations given in soils reports.

3.6 WEED GERMINATION

- A. Work shall be done under the supervision of a person licensed by the State of California as a pest control applicator and holding a qualified applicator license or a Qualified Applicator Certificate.
- B. Following soil preparation and fine grading of planting areas, irrigate the planting areas to germinate any weed seeds for a minimum period of 21 days. Maintain the soil in a damp condition for a minimum depth of 4 inches.

3.7 EROSION CONTROL NETTING

- A. Verify finished grades and provide Jute Mesh and single grind Redwood bark mulch on all slopes 3:1 and steeper as accepted by the Owner's Representative. Install jute mesh loosely up and down the slope in accordance with manufacturer's specifications and as follows. Fit the soil surface contour and hold in place with 12-inch long, 11-gauge (minimum) steel wire staples driven vertically into the soil at 18- to 24-inch spacing. Jute mesh strips shall overlap along all edges at least 6 inches. Ends of side strips shall be buried into the soil at least 6 inches. Drive staples along edges to securely anchor mesh to ground.

3.8 NATURAL FIBER BLANKETS

- A. Burlap or coir erosion control blankets placed over shoreline soil where indicated on plan. Install in accordance to manufacturer's specifications. Use biodegradable stakes. Product to be approved by geotechnical or soil marine engineer and landscape architect.

3.9 TREE AND SHRUB PLANTING

- A. Mark tree and shrub locations on site using stakes, gypsum or similar approved means and secure location approval by the Landscape Architect before plant holes are dug. Adjust location as required prior to planting.
- B. Review location of plants in relationship to irrigation heads and adjust location(s) that interfere with the function of the spray heads. Adjust locations as required to ensure that the plant roots receive the proper amount of water in order for the plants to thrive.
- A. Square Tree Pits
 - 1. Drilled tree pits shall be modified to a square pattern with pit walls scarified to promote root penetration.
- B. Excavate tree, shrub and vine pits as follows:

	<u>Width</u>	<u>Depth</u>
Boxed Trees	Box + 24"	Box depth
Canned Trees (15 gc)	Can + 18"	Can depth
Canned Shrubs/Vines (1- 5 gc)	Can + 12"	Can depth

- C. Test drainage of plant beds and tree pits by filling with water (minimum 6"). The retention of water in planting beds and plant pits for more than two (2) hours shall be brought to the attention of the Landscape Architect. If rock, underground construction work, tree roots, poor drainage, or other obstructions are encountered in the excavation of plant pits, alternate locations may be selected by Landscape Architect.
- D. Break and loosen the sides and bottom of tree pits to ensure root penetration and water test hole for drainage as required above.
- E. Excavate plant hole or tree pit keeping excavated planting soil layer on the surface when backfilling around the plant. Carefully set plants as detailed without damaging the rootball. Superficially cut edge roots vertically on three sides. Remove bottom of plant boxes before planting. Remove sides of boxes after positioning the plant and partially backfilling.
- F. Set plants in backfill with top of the rootball 1 inch above finished grade of adjacent soil. Backfill remainder of hole and soak thoroughly by jetting with a hose and pipe section. Water backfill until saturated the full depth of the hole.
- G. Backfill plant holes with mix as specified, free from rocks, clods or lumpy material. Backfill native soil free of soil amendments under rootball and foot tamp to prevent settlement. Backfill remainder of the hole with soil mix and place plant tablets or packets (Type B fertilizer) 3 inches below finish grade and 1/2-inch from roots at the following rates:

1 gallon can plant	-	1 tablet or packet
5 gallon can plant	-	3 tablets or packet
15 gallon can plant	-	6 tablets or packet
24-inch box plant	-	6 tablets or packet
36-inch box plant	-	8 tablets or packet

- H. Except for acid loving plants (Azaleas, Rhododendrons, Ferns, Camellias, etc.), use a soil mix of 2 parts soil from the hole, and 1 part amendment with iron added at the following rates:

1 gallon can plants	-	iron, 1/4 cup
5 gallon can plants	-	iron, 1/3 cup
15 gallon can plants	-	iron, 1/2 cup
24" box and larger	-	iron, 1 cup

For acid loving plants (Azaleas, Rhododendrons, Ferns, Camellias, etc.), mix 1 part soil from the hole and 1 part amendment to use a backfill around the plants.

Mix the iron, amendment and soil thoroughly for use in the top 8 inches of backfill around plants. For acid loving plants, mixture to be 1/2 soil from the hole and 1/2 amendment.

- I. Remove any soil from top of plant rootballs and secure Landscape Architect's approval of rootball height prior to mulching.
- J. After approval of rootball height, install mulch as required below.
- K. Stake and/or guy trees as detailed. Drive stake(s) until solid (at least 12" beyond bottom of rootball) and remove excess stake protruding above top tree tie to prevent rubbing against branches. Avoid driving stakes through rootball. If subgrade does not accept stakes to a stable degree, delete stakes and guy the trees as specified herein and as detailed. Locate tree ties to avoid contact with tree branches. Locate top tie at tree flex point.
- L. Build watering basin berms around trees and shrubs to drain through rootball. Basins are not required around trees in turf areas. Water backfill until saturated the full depth of the hole.

3.10 GROUND COVER PLANTING

- A. Plant in neat, straight, parallel and staggered rows as indicated on plan. Plant first row one-half required ground cover spacing behind adjacent curbs, structures, or other plant bed limits. Plant ground cover to edge of water basins of adjacent trees and shrubs.

3.11 MULCH

- A. Except where rock mulch is required, mulch all tree, shrub and ground cover areas with organic mulch to a 3-inch depth, except mulch to 2-inch depth where planting with ground cover plants from flats.
- B. Hold bark mulch away from base (trunk) of plant 4" or as directed by the Landscape Architect.
- C. Individual trees and/or shrubs planted in non-irrigated areas shall, at minimum, receive bark mulch over their watering basin and berm. No mulch is required around trees in turf areas.

3.12 WATERING

- A. Water all trees, shrubs and ground cover immediately after planting. Apply water to all plants as often and in sufficient amount as conditions may require to keep the plants in a healthy vigorous growing condition until completion of the Contract. Provide supplemental hand watering of trees and shrubs, as required, to maintain a moist root zones throughout plant establishment period.

3.13 PRE-MAINTENANCE PERIOD REVIEW AND APPROVAL OF PLANTING

- A. Maintain plants from time of delivery to site until final acceptance of landscape installation.
- B. Receive approval of the installed planting prior to commencement of planting establishment maintenance period. Notify the Landscape Architect or Owner's Representative a minimum of seven (7) days prior to requested review. Before the review, complete the following:
 - 1. Complete all construction work.

2. Present all planted areas neat and clean with all weeds removed and all plants installed and appearing healthy.
3. Plumb all trees and tree and shrub supports.
4. No partial approvals will be given.

3.14 PLANTING ESTABLISHMENT MAINTENANCE

A. General Requirements

1. **Maintenance Period:** The planting establishment maintenance period required shall be **120 calendar days** after all planting and irrigation is complete, turf is installed/seeded, and as approved by Owner's representative. A longer period may be required if the turf is not thick, vigorous and even and has been mowed a minimum of 4 times, or if the plant material is not acceptably maintained during the maintenance period. The start of the maintenance period to be confirmed by Owner's representative. Contractor to notify landscape architect of start and end dates of maintenance period. The maintenance period may be suspended at any time upon written notice to the Contractor that the landscaping is not being acceptably maintained, and the day count suspended until the landscape is brought up to acceptable standards as determined by the Owner Representative.
2. Planting establishment maintenance immediately follows, coincides with, and is continuous with the planting operations, and continues through turf installation, and after all planting is complete and accepted; or longer where necessary to establish acceptable stands of thriving plants.
3. Protect all areas against damage, including erosion, trespass, insects, rodents, disease, etc. and provide proper safeguards. Maintain and keep all temporary barriers erected to prevent trespass.
4. Keep all walks and paved areas clean. Keep the site clear of debris resulting from construction or maintenance activities.
5. Repair all damaged planted areas, and replace plants and resod turf immediately upon discovery of damage or loss.
6. Check sprinkler systems at each watering; adjust coverage and clean heads immediately. Adjust timing of sprinkler controller to prevent flooding.
7. Maintain adequate moisture depth in soil to ensure vigorous growth. Check rootball of trees and shrubs independent of surrounding soils and hand water as required.
8. Keep contract areas free from weeds by cultivating, hoeing or hand pulling. Use of chemical weed killers will not relieve the Contractor of the responsibility of keeping areas free of weeds at all times.

B. Tree and Plant Maintenance

1. Maintain during the entire establishment period by regular watering, cultivating, weeding, repair of stakes and ties, and spraying for insect pests. Prune when requested by the Landscape Architect.
2. Keep watering basins in good condition and weed-free at all times.
3. Replace all damaged, unhealthy or dead trees, shrubs, grasses, vines and ground covers with new stock immediately; size as indicated on the drawings.

C. Fertilizing:

1. Upon approval and after submitting fertilizer delivery tags, maintenance fertilization shall begin 30 days after planting is complete. Fertilize all turf and ground cover areas by broad-casting Type C (21-7-14) fertilizer at the rate of 5 lbs. per 1,000 square feet evenly throughout. Reapply every forty-five (45) days until acceptable.

2. During the winter, for quick turf greening effect, calcium nitrate (15.5-0-0) may be applied at the rate of 6 lbs. per 1,000 square feet.
3. Early spring and fall substitute a complete fertilizer such as 15-15-15 applied at the rate of 6 lbs. per 1,000 square feet, to help insure continuing adequate phosphorus and potassium.
4. Apply ammonium sulfate fertilizer as necessary to maintain vigorous, green grass between fertilizations mentioned above.
5. Observe plant's color, and if a soil pH imbalance is suspected, take soil samples and obtain laboratory analysis for confirmation. Take necessary action recommended in laboratory analysis such as top dressing with soil sulfur, leaching soil, etc.

3.15 FINAL PLANTING REVIEW AND ACCEPTANCE

- A. At the conclusion of the Maintenance Period, schedule a final review with the Owner, the Owner's maintenance person, and/or the Landscape Architect. On such date, all project improvements and all corrective work shall have been completed. If all project improvements and corrective work are not completed, continue the planting establishment maintenance period at no additional cost to the Owner until all work has been completed. This condition will be waived by the Owner under such circumstances wherein the Owner has granted an extension of time to permit the completion of a particular portion of the work beyond the time of completion set forth in the Agreement.
- B. Submit written notice requesting review at least 10 days before the anticipated review.
- C. Prior to review, weed and restore all planted areas, mow and edge turf, plumb trees and tree supports, clear the site of all debris and present in a neat, orderly manner.

END OF SECTION