Tokay High School
Classroom and Gym Building Project
Sewer Lift Station Documentation

Prepared by LPA
March 9, 2023

Section 1: Weil 2515 Series Pump Information

WEIL 3-Inch Submersible Wastewater Pump 2515

Heavy duty pump for commercial and industrial applications.
Pump clear water, gray water, effluent and wastewater with solids up to 2 1/4-inch diameter.

Disch. Size	3 Inch
Disch. Type	ANSI
Solids Max.	2 1/4 Inch
Mounting Style	2613 Removal

Pump
Case - Cast Iron
Impeller - Cast Iron
Stainless Steel Hardware

Motor
Double Seal - Tandem
- Upper - Carbon against Ceramic
- Lower - Silicon Carbide against Silicon Carbide

Air-Filled Hermetically Sealed
Shaft - Stainless Steel Series 300
Motor Shell - Cast Iron
Insulation - Class F
Ball Bearings - 2 - Double Sealed
Power Cable Length - 25 ft
Three-phase motor
- 1150 and 1750 RPM
- 60 Hz, 208-230 or 460 volts

Single-phase capacitor start motor
- 1150 and 1750 RPM
- 60 Hz, 115 or 208-230 volts
- Automatic reset thermal and overload protection

Options
Bronze Impeller
316SS Impeller
CUL/UL Explosion Proof Motor
575 Volt 60hz 3 Phase Motor
Moisture Sensor and Temperature Limiter
Additional Power Cable Lengths
Stainless Steel Lifting Cable

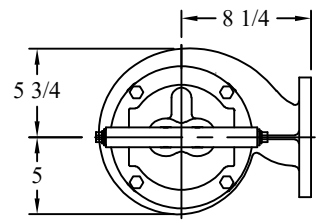
Flow - To prevent solids from settling out

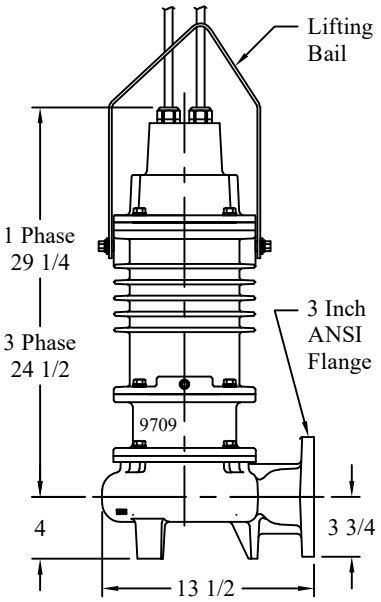
Discharge Pipe Size Dia Inches	Minimum Flow GPM
2	25
3	50
4	90

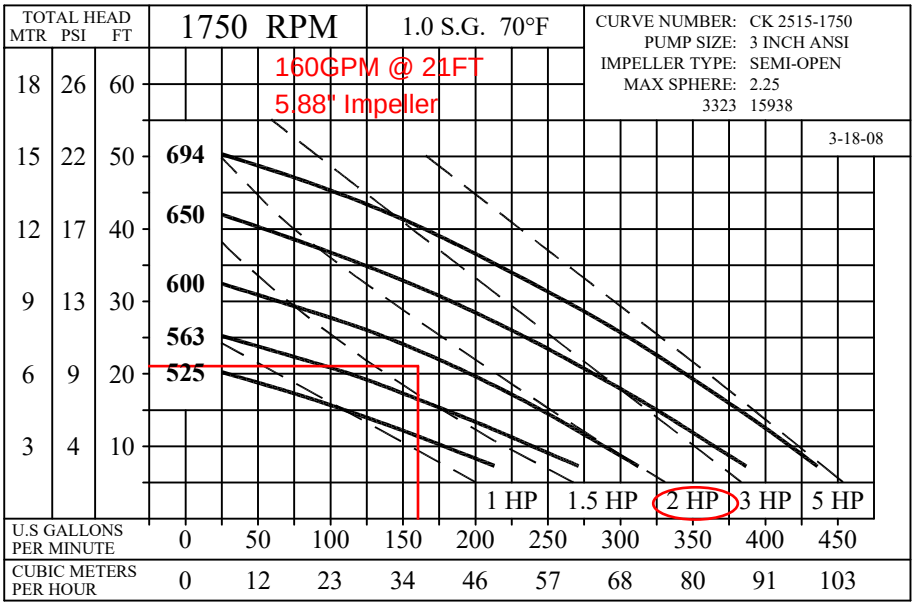
Capacities - Wet Wells

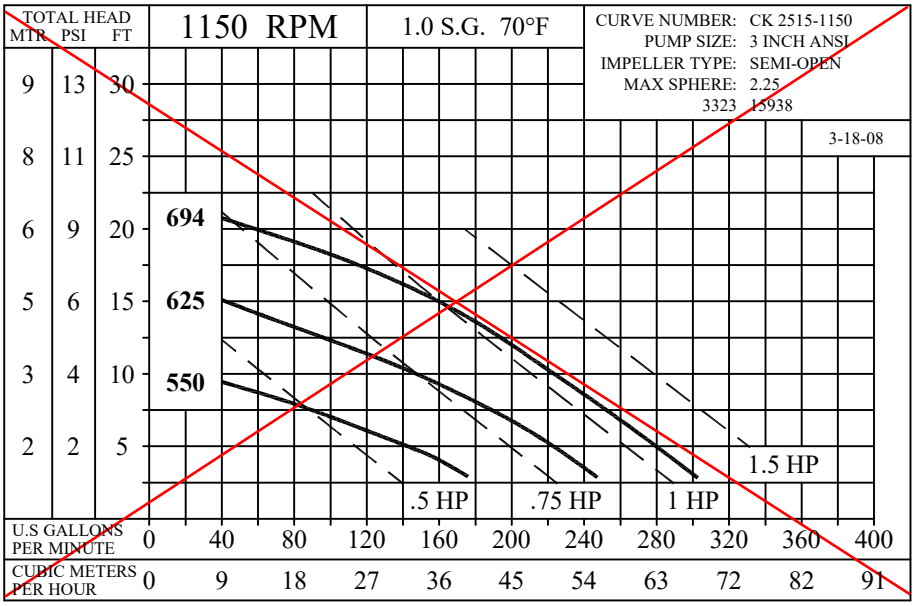
Dia or Side Inches	Gallons per Foot of Depth	
	Round	Square
30	37	47
36	53	67
48	94	120
60	147	187
72	212	269

Good wet well design
Maximum 10 starts per hour.
Minimum run time - 1 1/2 minutes.









Section 2: Weil 2515 Pump Installation, Operation, and Maintenance Documentation

WEIL

INSTALLATION
OPERATION
MAINTENANCE

Submersible Wastewater Pump

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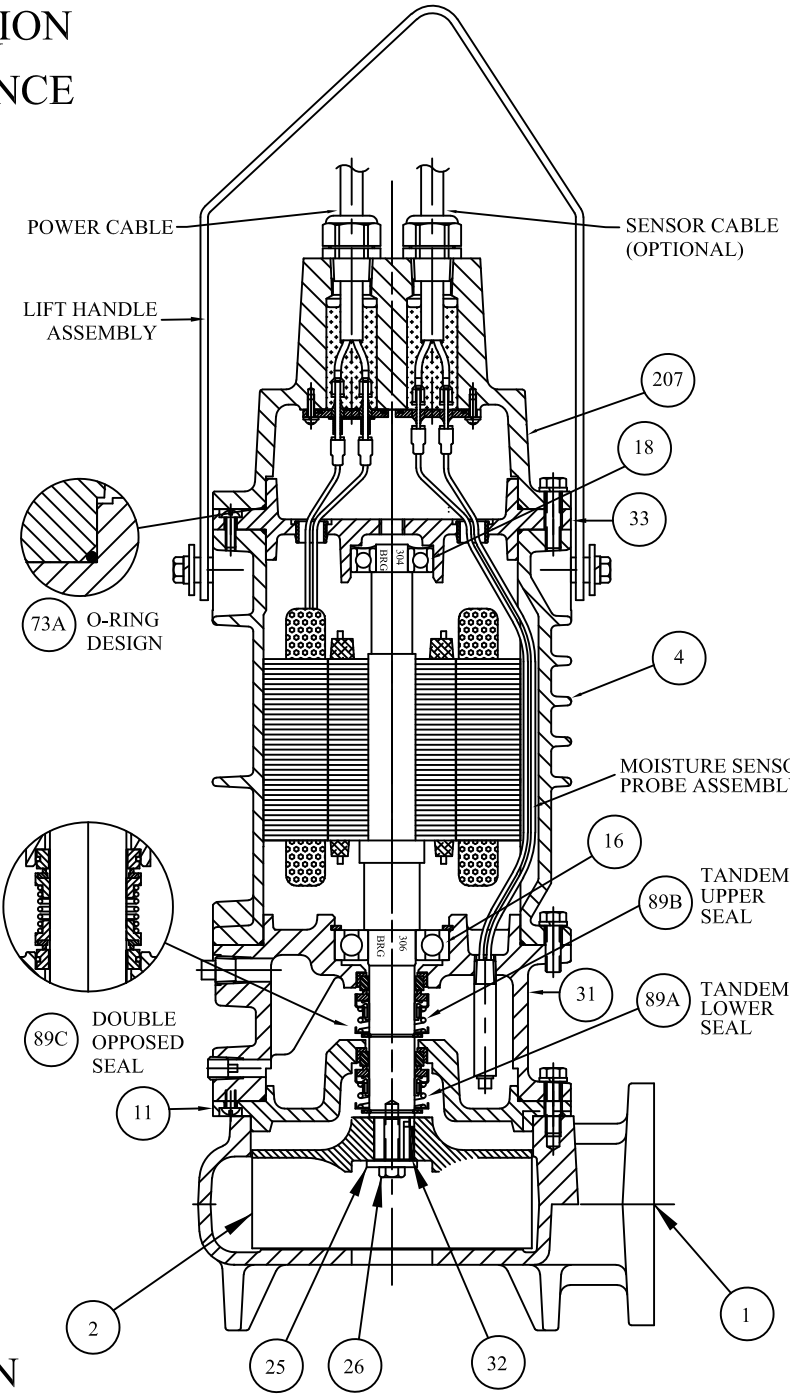
2515 2557
2517 2564
2521 2572
2523 2573
2554 2574
2515S



PARTS BREAKDOWN

KEY NO.		DESCRIPTION
1		Case
2		Impeller
4		Motor
11		End Plate
16	●	Ball Bearing, Lower
18	●	Ball Bearing, Upper
25	●	Washer
26	●	Impeller Retaining Screw
31		Seal Chamber
32	●	Impeller Key
33		Bearing Support
73A	●	Gasket, (O-Ring) - (4)
89A	●	Seal, Lower
89B	●	Seal, Upper
89C		Seal, Double Opposed (Optional)
207		Motor Cover Assembly
		Strainer (1607 Only)
		Lift Handle Assembly
		Moisture Sensor Probe Assembly (Optional)
		Temperature Limiter (Optional)

Items marked with (●) are included in repair kit 201.585.101 for pumps with motors W-9701, W-9709 and W-9710.

EM-1607-2

XA KA

SAFETY PRECAUTIONS

1. Disconnect and lock out the electrical supply to the motor before working on the unit.
2. Lift the pump from the pit with a steel cable or chain attached to the lifting handle at the top of the pump. DO NOT USE THE POWER OR SENSOR CABLE TO LIFT PUMP.

LUBRICATION

Double sealed prelubricated ball bearings require no further lubrication.

CLEANING OR REPLACEMENT OF IMPELLER

1. With the pump standing vertically, remove the screws holding the seal chamber (31) to the case (1).
2. Carefully lift the motor assembly out of the case.
3. Lay the unit on its side in V-Blocks with the impeller (2) overhanging.
4. Remove the impeller retaining screw (26) and washer (25).
5. Tap the impeller with a soft hammer to loosen. Remove impeller from shaft using opposed pry bars. Remove impeller key (32).
6. Scrape off any deposits on the impeller and inspect it for breaks, cracks, or wear.
7. To reassemble the impeller on the shaft, insert the impeller key in the shaft keyway.
8. Coat exposed area of shaft with anti-seize compound. Align the impeller keyway with the impeller key and carefully push the impeller on to the shaft, tapping gently with a soft hammer.
9. When the impeller is seated on the shaft, place washer over impeller retaining screw and install and tighten the screw. Rotate the impeller by hand to ensure that it turn freely.
10. Set the motor assembly into the case and install and tighten the screws removed in step 1.

REPLACEMENT OF MECHANICAL SEALS

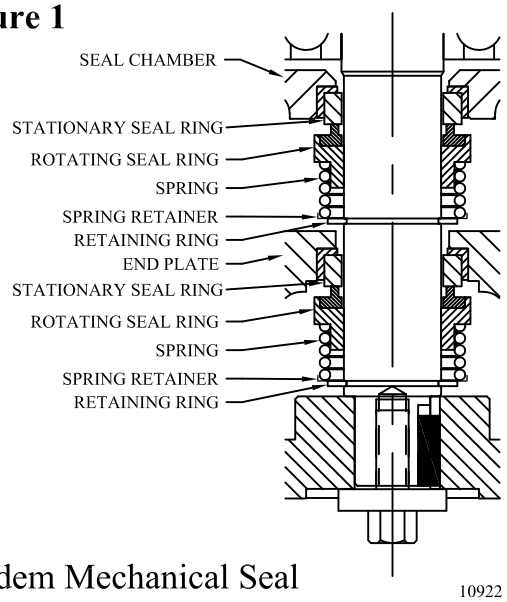
Disassemble case and remove impeller as described in "CLEANING OR REPLACEMENT OF IMPELLER." Drain oil from seal chamber by removing the two pipe plugs and placing unit on its side with drain holes facing down.

DISASSEMBLY - TANDEM SEAL

(Refer to Figure 1)

1. Remove the retaining ring from the shaft and remove the spring retainer and spring.
2. Slide the rotating seal ring off the shaft. TAKE CARE NOT TO SCORE THE SHAFT.
3. Remove the round head machine screws holding the end plate (11) to the seal chamber.

Figure 1



Tandem Mechanical Seal Assembly

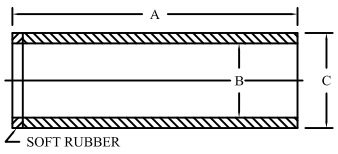
10922

4. Press the stationary seal ring out of the end plate.
5. Remove the retaining ring from the shaft and remove the spring retainer and spring.
6. Slide the rotating seal ring off the shaft. TAKE CARE NOT TO SCORE THE SHAFT.
7. Remove the upper stationary seal ring by pulling with hooked picks behind the outside of the seal ring. If this method fails, break the seal ring with a small chisel and remove the pieces.
8. The mounting seats of both end plate and seal chamber stationary seal rings and the shaft must be cleaned of any adhering particles or deposits before a replacement seal can be installed.

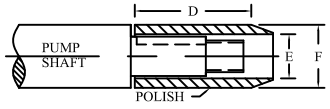
ASSEMBLY - TANDEM SEAL

(Refer to Figure 1)

1. Check the replacement seal to ensure that it is the same type, shaft size and length as the original seal. UPPER SEAL COMPONENTS AND LOWER SEAL COMPONENTS MUST NOT BE INTERCHANGED.
2. Apply a thin coating of lubricating oil or glycerin to the outside surface of the rubber cup of the stationary seal ring. TAKE CARE NOT TO MAR OR DAMAGE THE SEAL FACES.
3. Position seal ring with its face toward the threaded end of the shaft. Gently press the seal ring into its seat using tool 1 shown in Figure 2. APPLY EVEN PRESSURE TO SEAL FACE. The seal is seated to its full depth when the rubber seating cup is flush with the surface of the seal chamber.



TOOL 1 - TO INSTALL STATIONARY SEAL RING



TOOL 2 - TO INSTALL ROTARY SEAL RING

SEAL SIZE	TOOL 1			TOOL 2		
	A	B	C	D	E	F
1 1/8	6	1 5/32	1 3/4	1 5/8	7/8	1 1/8
1 1/2	6	1 9/16	2	3	1 5/16	1 1/2

NOMINAL SEAL SIZE EQUALS SHAFT O.D.

Figure 2

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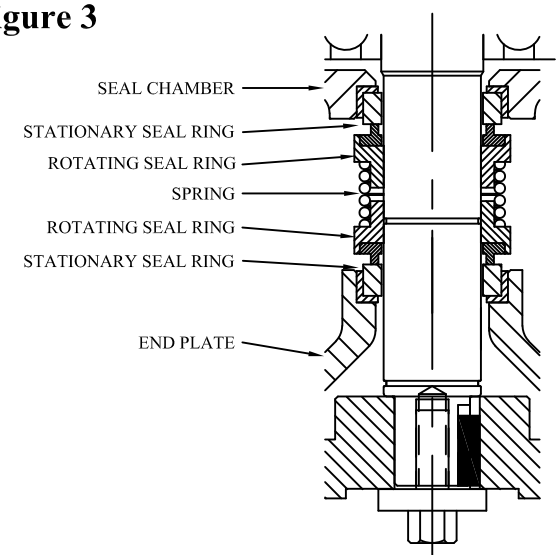
Figure 3



Double Opposed Mechanical Seal Assembly

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4. Apply lubricating oil or glycerin to the inside surface of the bellows and slide the rotating seal ring onto the shaft using tool 2 shown in Figure 2 until the rotating ring seal face contacts the stationary ring seal face.
5. Install the spring, spring retainer and retaining ring.
6. Position the end plate over the shaft and install and tighten the round head machine screws.
7. Apply a thin coat of lubricating oil or glycerin to the outside surfaces of the rubber cup of the stationary seal ring.
8. Position the seal ring with its face toward the threaded end of the shaft. Gently press the seal ring into its seat using tool 1. APPLY EVEN PRESSURE TO SEAL FACE. The seal is seated to its full depth when the rubber seating cup is flush with the face of the end plate.
9. Lubricate inside surface of the rubber bellows of the rotating seal ring and slide it into position so that the seal faces touch.
10. Install the spring, spring holder and retaining ring on the shaft.
11. Refill seal chamber with oil (Mobil EAL 224H or equivalent) up to plug opening and reinstall the two pipe plugs.
12. Remove tool 2 from the shaft and assemble the impeller and case as described under "CLEANING OR REPLACEMENT OF IMPELLER."

DISASSEMBLY - DOUBLE OPPOSED SEAL

(Refer to Figure 3)

1. Remove the round head machine screws holding the end plate to the seal chamber.
2. Press lower stationary seal ring out of end plate and remove the lower and upper rotating seal ring from the motor shaft. TAKE CARE NOT TO SCORE SHAFT.
3. Remove the upper stationary seal ring by pulling with hooked picks behind the outside of the seal ring. If this method fails, break the seal ring with a small chisel and remove the pieces.
4. The mounting seats of both end plate and seal chamber stationary seal rings and the shaft must be cleaned of any adhering particles or deposits before a replacement seal can be installed.

ASSEMBLY-DOUBLE OPPOSED SEAL

(Refer to Figure 3)

1. Check the replacement seal to ensure that it is the same type, shaft size and length as the original seal. UPPER SEAL COMPONENTS AND LOWER SEAL COMPONENTS MUST NOT BE INTERCHANGED**.**
2. Apply a thin coating of lubricating oil or glycerin to the outside surfaces of the rubber cup of the upper stationary sealring. TAKE CARE NOT TO MAR OR DAMAGE THE SEAL FACE.
3. Position upper stationary seal ring with its face toward the threaded end of the shaft. Gently press the seal ring into its seat using tool 1 shown in Figure 2. APPLY EVEN PRESSURE TO SEAL FACE. The seal is seated to its full depth when the rubber seating cup is flush with the surface of the seal chamber.

4. Slip tool 2 shown in Figure 2 over the end of the shaft, lubricate the rubber bellows inside the upper rotating seal ring and install over tool 2 with seal face away from threaded end of shaft until seal faces touch.
5. Install spring.
6. Lubricate the lower rotating seal ring and slide on to the shaft so that the seal ring face is facing the threaded end of the shaft. DO NOT DAMAGE THE SEAL FACE.
7. Lubricate the outside surfaces of the rubber cup on the lower stationary seal ring.
8. Using tool 1 press the seal ring into the mounting seat in the end plate with the seal face away from the end plate.
9. Carefully place the end plate over the shaft and slide it gently into contact with the seal chamber.
10. Install and tighten the round head machine screws and remove tool 2.
11. Refill seal chamber with oil (Mobil EAL 224H or equivalent) up to plug opening and reinstall the two pipe plugs.
12. Assemble the impeller and case as described under "CLEANING OR REPLACEMENT OF IMPELLER."

DISASSEMBLY - BALL BEARINGS

(Refer to Parts View)

1. Disassemble the case and the impeller as described in "REPLACEMENT OF IMPELLER."
2. Drain the oil from the seal chamber and remove the mechanical seals as described in "REPLACEMENT OF MECHANICAL SEALS." Use great care when removing the mechanical seals if they are to be reused. The stationary seals should not be removed from their seats in the end plate and the seal chamber. The shaft should be wiped clean and lightly lubricated with lubricating oil or glycerin before the rotating seal rings are removed from the shaft. Tool 2 should be used to cover the end of the shaft while the rotating seals and the end plate (with stationary seal ring seated) are removed.
3. If the unit is equipped with moisture sensors, remove the cap screws holding the motor cover (207) to the motor. Slightly raise the motor cover and disconnect the moisture probe leads from the leads of the sensor cable. DO NOT DISCONNECT THE POWER CABLE LEADS TO THE STATOR. Replace the screws finger-tight to prevent movement of the motor cover.
4. Remove the screws holding the motor to the seal chamber.
5. Separate the seal chamber from the motor (the rotor with bearings will remain attached to the seal chamber) and remove the upper bearing wave spring.
6. Using internal retaining ring pliers, remove the retaining ring from the groove in the seal chamber and carefully slide the shaft with ring spacer and bearing out of the seal chamber.
7. Remove tool 2 from the shaft.
8. Using external retaining ring pliers, remove the retaining ring from the shaft. Remove the bearings from the shaft using a three-jaw bearing puller.

ASSEMBLY - BALL BEARING

(Refer to Parts View)

1. Check the replacement bearings to ensure that they are the same size and type as the originals.
2. Use a hand press to assemble bearings to shaft. Assemble the upper bearing (18) to shaft. Place internal ring and ring spacer over shaft before assembling lower bearing (16) to shaft. APPLY NO FORCE TO THE OUTER RACE OF EITHER BEARING. PRESS ONLY ON THE INNER RACE.
3. Insert the shaft with bearing and ring spacer into the bearing bore into the seal chamber.
4. Replace the upper bearing wave spring and hold in place with a dab of grease.
5. Make sure that all mating flanges are clean and that the O-ring is properly positioned. Carefully lower the motor shell over the rotor assembly so that the upper bearing slides into the bore of the upper bearing support and the flanges contact.
6. If the unit is equipped with moisture sensors, remove the motor cover cap screws and prop up the motor cover (207) to "fish" the moisture sensor wires through the channel in the motor shell.
7. Reconnect the moisture sensor leads to the moisture sensor cable leads.
8. Place the O-ring or in position. Install and tighten the screws holding the motor cover to the motor and upper bearing support.
9. Install and tighten the screws securing the motor to the seal chamber.
10. Assemble the mechanical seals, impeller, case and suction cover as previously described.
11. Rotate shaft several times by hand to ensure that it turns smoothly.

NOTE

See separate Submersible Sump Pump sheet for general Installation Operation and Maintenance instructions.

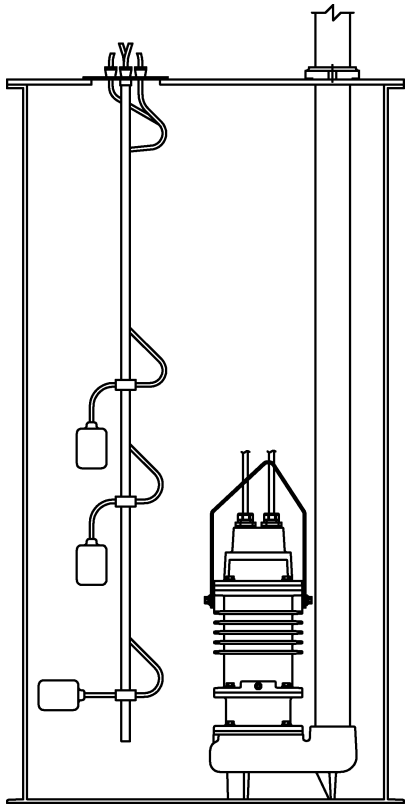
WEIL

SUBMERSIBLE WASTEWATER PUMP
INSTALLATION OPERATION MAINTENANCE

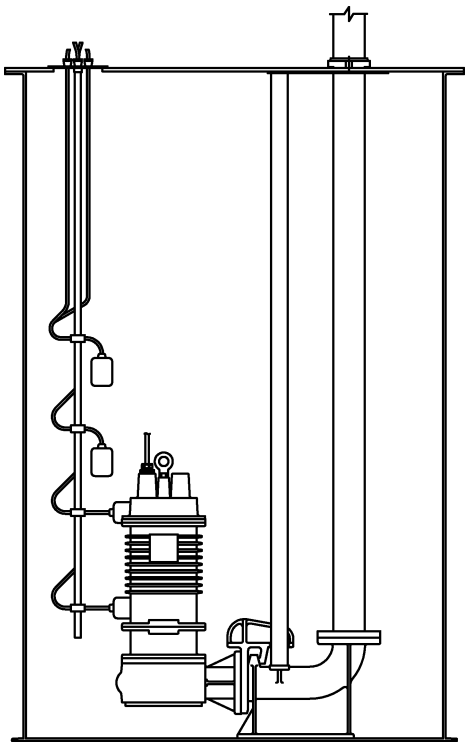
1600
2500

OWNERS INFORMATION

Manufacturer's Number	Date Code



Manufacturer's Number	Date Code



WEIL SUBMERSIBLE WASTEWATER PUMP
INSTALLATION OPERATION MAINTENANCE

INTRODUCTION

This manual contains instruction for installation, operation and maintenance of your pump equipment. Read and study this manual before using the equipment. The pump is a well designed and sturdily constructed machine. When properly installed and given reasonable care and maintenance, it will give many years of service.

SAFETY PRECAUTIONS

Always disconnect the electrical power supply to the motor before working on the unit. **Failure to do so can cause severe electrical shock or death.** If the basement floor is wet or flooded, do not walk on floor until the electrical power has been disconnect the power. Exercise caution when working in the exposed areas of rotating parts.

RECEIVING

Immediately upon arrival, the equipment should be checked for any shortages and/or damage. Any shortages or damage should be noted on the bill of lading and freight bill, and promptly reported to the Transportation Company. Claims for shortages or damage must be made in writing to Weil Pump Company Inc., Cedarburg, Wisconsin within 14 days of receipt of equipment.

STORAGE

Pumping equipment should be installed and put into operation as soon as possible. If it is necessary to store the equipment for extended periods, precautions should be taken to prevent corrosion or oxidation. It is recommended that the equipment be stored indoors. The storage area should be dry and have a relatively constant temperature. Exposed machined surfaces should be coated with a rust preventative. The entire unit should be sealed in heavy plastic bag. A desiccant should be placed in the bag before it is sealed. Before sealing the bag, arrange the power cable, and moisture/temperature sensor cable, (if so equipped) in gently curved loops to prevent cables from taking a permanent set.

During storage, the plastic bag should be opened at least once a month, and the rotating assembly of the pump turned several times by hand. This helps prevent point of contact corrosion and maintains rotational integrity. Add desiccant before the bag is resealed. For additional information regarding rust prevention, refer to the American Society for Metals Handbook, under **"Rust Prevention Compounds."**

INSTALLATION

Clean wet well thoroughly before installing pump. Sand, mud, cinders, etc. are abrasives which will damage the mechanical seals.

The pump is ready for installation as shipped. Except as noted above, no lubrication or adjustment is required before initial operation.

Raise and lower the unit by means of a chain or steel cable fastened to the lifting handle provided. **Do not raise, lower, or support the unit by means of the electrical power cable or the moisture sensor cable.** When moving the pump, avoid putting strain on the electrical cables. Set the pump in its final location before connecting the cable(s). Provide adequate headroom above the wet well for future maintenance of the equipment. Install the associated level controls so that the pump is properly immersed. for **intermittent service**, the minimum liquid level must be at least 1" above the pump case.

POWER CABLE

The electrical characteristics shown on the pump nameplate describes the power supply required to operate the pump motor. The user is responsible for providing appropriate branch circuit, motor starter, and overload protection in accordance with local code requirements.

Electrical connections made in the pit, even though above the highest water level, must be sealed to prevent moisture penetration into power or sensor cables through junction boxes or other. Wiring diagrams for the pump motor are provided. It is important to make connections according to the diagram provided. Incorrect electrical connections will void the warranty.

PIPING

(Refer to Figure 1)

1. Piping should be as short as possible using a minimum number of fittings to avoid excessive friction loss.
2. Pipes should line up "naturally" with the pump discharge and should never be forced together.
3. Discharge piping must be supported by appropriate supports.
4. In a duplex installation, each pump must have its own check valve.

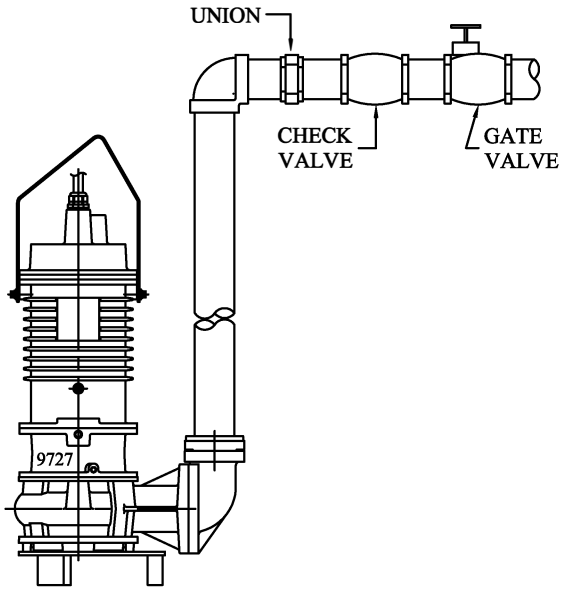


Figure 1

ES-1096

SENSOR OPTION - MOISTURE SENSOR AND TEMPERATURE LIMITER

(Refer to Figure 2)

The pump is equipped with the moisture sensor and temperature limiter when this option is ordered. Connect the moisture sensor to the Weil Alarm-Test Panel as shown in Figure 2. Power supplied to the Alarm-Test Panel must be 115 volts, regardless of the voltage supplied to the pump motor.

Connect the temperature limiter into the pump motor starter control circuit in series with the liquid level control and the starter holding the coil, as shown in Figure 2.

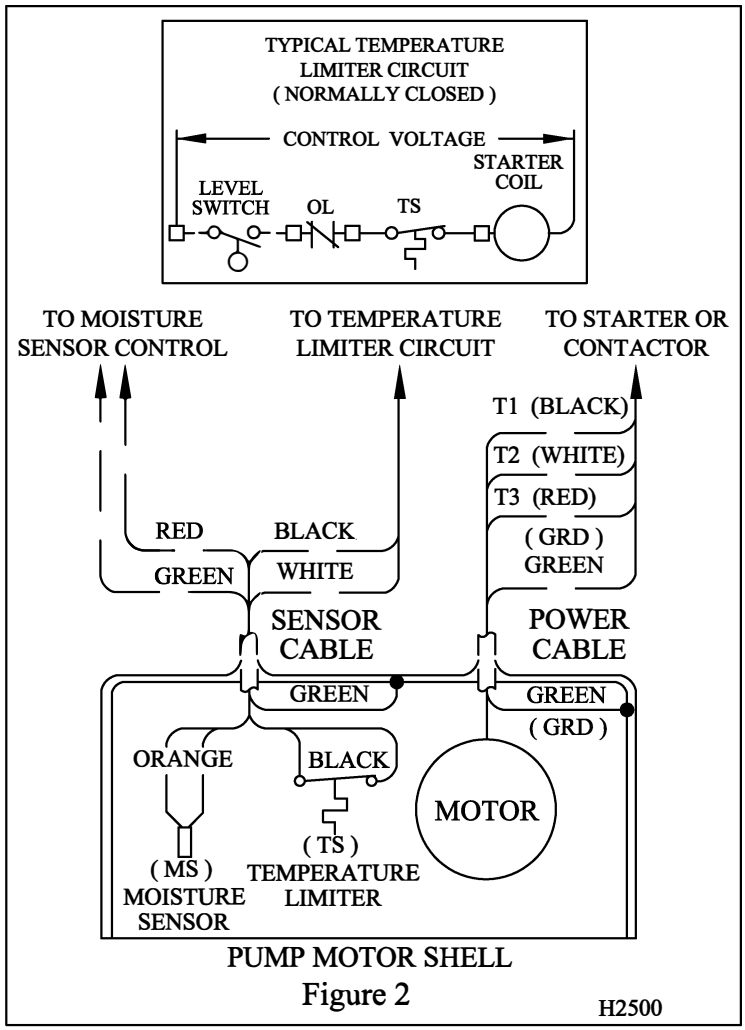


Figure 2

H2500

START-UP PROCEDURE

Before placing pump into general operation, check the following items to insure that no damage will occur to pump motor.

1. Turn shaft manually to ensure it is turning freely.
2. Check voltage, phase, and frequency of the motor, making sure that the same is supplied to unit.
3. Make sure there is proper motor circuit protection.
4. Review piping installation, per "Piping" instructions.
5. Recheck basin to make sure it is free of debris.
6. With pump laying down on its side, apply momentary power to confirm proper impeller rotation.
7. Verify proper operation in a "wet" test startup: check GPM, Pressure, amps, volts, audible noise and vibration.
8. Check measured parameters to design conditions.

SAFETY PRECAUTIONS

1. Disconnect and lockout the electrical supply to the motor before working on the unit, or if maintenance is to be performed on the pump in a flooded area.
2. Exercise caution when working in the exposed areas of the rotating parts.
3. In case of severe vibration or unusual noise, shut off pump at once and determine the cause.
4. If frequent tripping of the overload protection occurs, troubleshoot the pump to correct the problem.

TROUBLESHOOTING PUMP

Problem	Probable Cause
Insufficient or No Water Flow	1. Blown fuses or open circuit breakers 2. Poor switch contact 3. Discharge head too high 4. Clogged or damaged impeller 5. Binding shaft 6. Check or gate valve closed 7. Water level below casing
Insufficient Pressure	1. Low voltage 2. Clogged or damaged impeller 3. Motor incorrectly wired 4. Pump may be air-bound
Noisy or Vibrating Pump	1. Misaligned or bent shaft 2. Worn bearings 3. Lack of lubrication 4. Water level below casing 5. Impeller rubbing or damaged 6. Clogged impeller

NOTE

Submersible motors have an air relief slot on the lower mounting flange area. This slot is to prevent air lock. Under normal operation water will spray out of the air relief slot. The normal water level should be above the slot at shut off.

PERIODIC INSPECTION

Periodic inspection of the pump should be performed at six month intervals. The pump should be cleaned of accumulated abrasive particles and debris. The wet well should also be cleaned of accumulated abrasive particles.

Check the motor housing and the seal chamber for moisture in the following manner:

1. Place the pump in a horizontal position in a V-block chamber with the seal chamber plugs facing downward.
2. Remove the plugs and drain the content of the seal chamber in a transparent container and allow the draied liquid to settle.
3. If no water settles to the bottom of the container, the chamber can be refilled with clean oil and the plugs replaced.
4. If water settles in the container, the source of the liquid must be determined and worn and/or damaged seals, O-rings, etc. must be replaced.
5. Turn the pump over, remove the motor shell plug, drain the motor houseing into a transparent container.
6. If no liquid is present, replace the plug.
7. If oil or oil and water are present, the upper seal must be inspected.
8. If only water is present the leakage source is most likly in the motor housing and the condition of the O-rings and/or the cable seal should be checked.

REPLACEMENT PUMPS

Single phase units have starting modules built into the motor. When replaceing exsiting pumps, check for any exsiting external modules, control panel mounted or seperatly mounted. These must be removed or bypassed for proper operation of the pumping unit.

IMPORTANT NOTICE

For warranty consideration contact your local Weil representative before disassembly or repair.

NOTE

See separate instructions for pump assembly and disassembly.

WEIL PUMP COMPANY INC

Section 3: Electrical Wiring Information

NOTE: Contractor to verify that the minimum circuit ampacity and maximum overcurrent protection requirements for the replacement pumps match the values of the pumps being removed.

Submersible Wastewater Pumps

Explosion-Proof U/L Submersible Pump Motor
Class 1 Div 1 Groups C&D
Wiring Diagrams

Owner's Information

Manufacturer's Number	Date Code

Introduction

This manual contains wiring diagrams for the installation of your explosion proof motor pump equipment.

The pump is a well designed and sturdily constructed machine. When properly installed and given reasonable care and maintenance, it will give many years of service.

There are six wiring diagrams. They are for 1150 rpm, 1750 rpm, and 3450 rpm explosion proof motors.

Fig. A - 1 phase 115 volt without run capacitor
Fig. B - 1 phase 115 volt with run capacitor
Fig. C - 1 phase 208-230 volt without run capacitor
Fig. D - 1 phase 208-230 volt with run capacitor
Fig. E - 3 phase 208-230 volt
Fig. F - 3 phase 460 volt

Safety Precautions

Always disconnect the electrical power supply to the motor before working on the unit. **Failure to do so can cause severe electrical shock or death.**

Do not walk on wet or flooded floor until the electrical power has been disconnected. Exercise caution when working near equipment with rotating parts.

Receiving

Immediately upon arrival, the equipment should be checked for any shortages and/or damage. Any shortages or damage should be noted on the bill of lading and freight bill, and promptly reported to the Transportation Company. Claims for shortages or damage must be made in writing to Weil Pump Company, Inc., Cedarburg, Wisconsin within 14 days of being received.

Submersible Wastewater Pumps

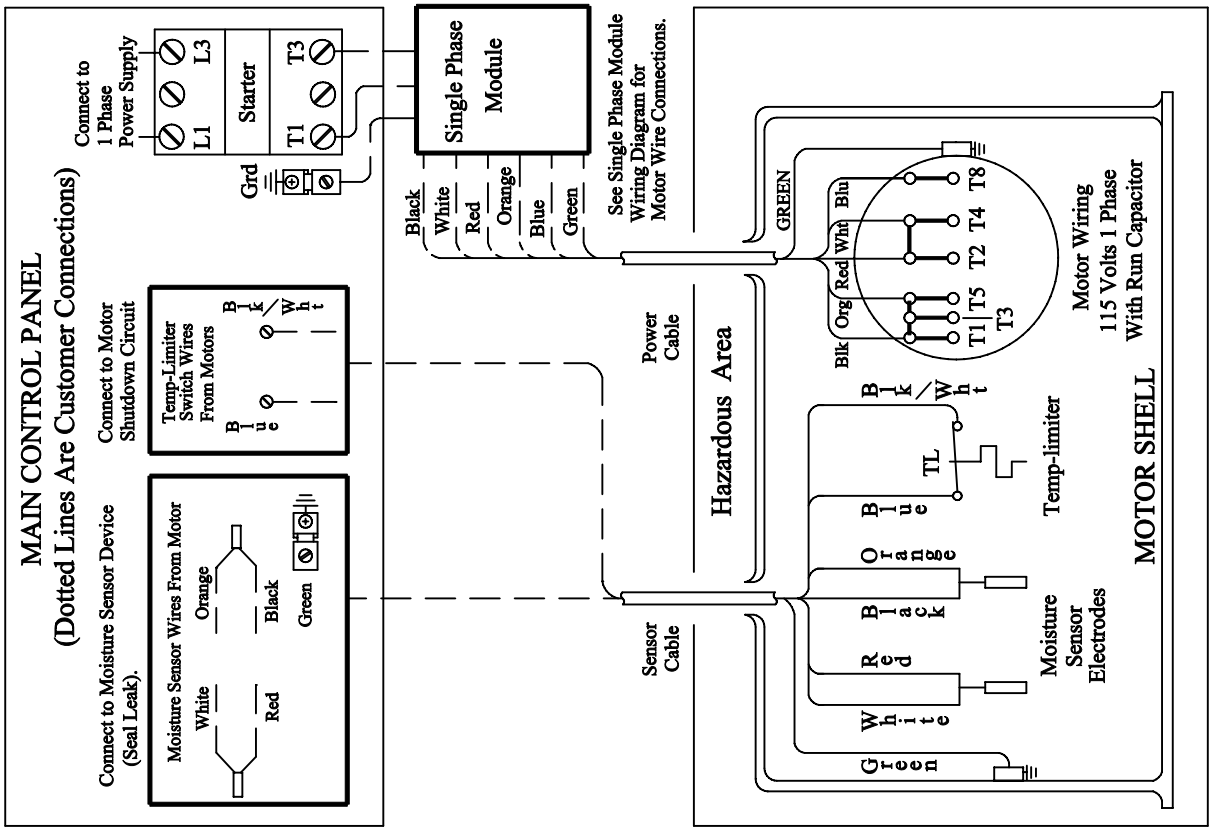
Explosion Proof Pump Motor Model 9701

1 Phase 115 Volt Wiring Diagram

Explosion Proof Pump Motor Model 9701

1 phase 115 volt with run capacitor

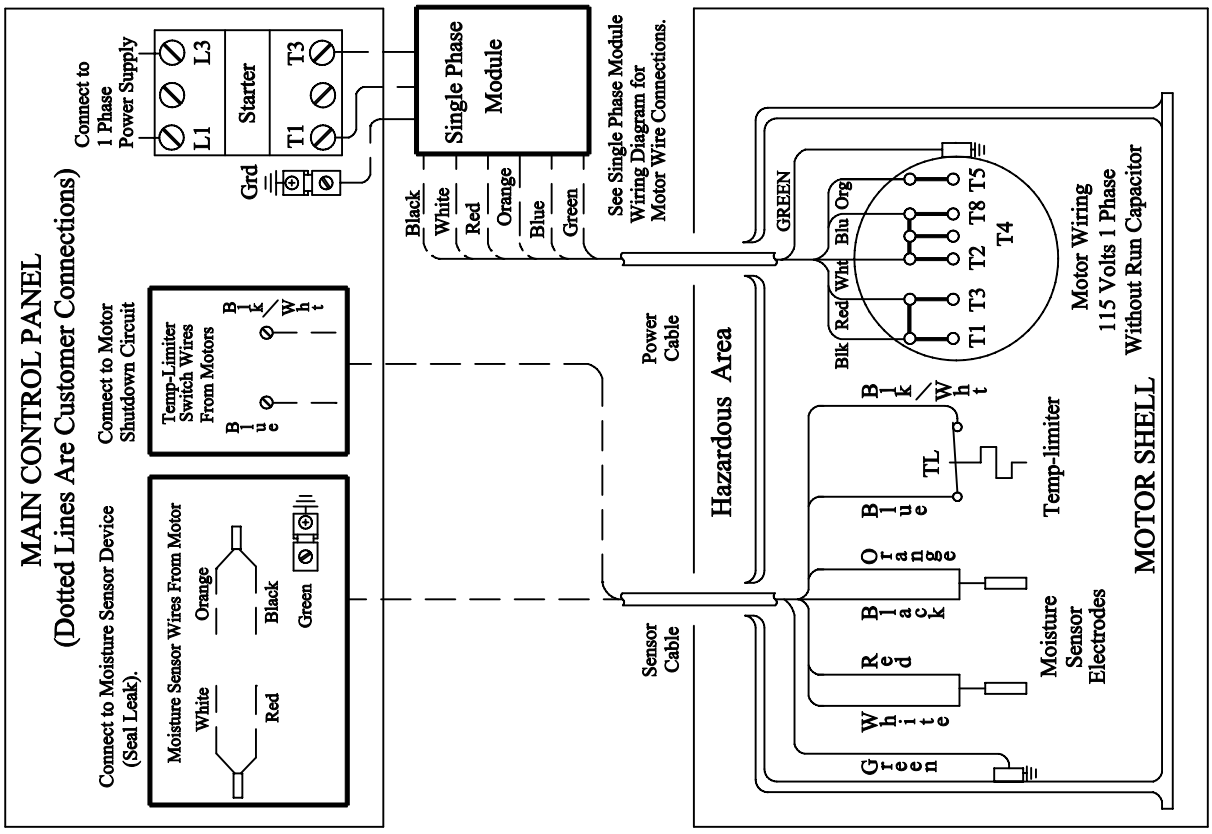
Fig. B



Explosion Proof Pump Motor Model 9701

1 phase 115 volt without run capacitor

Fig. A



WEIL

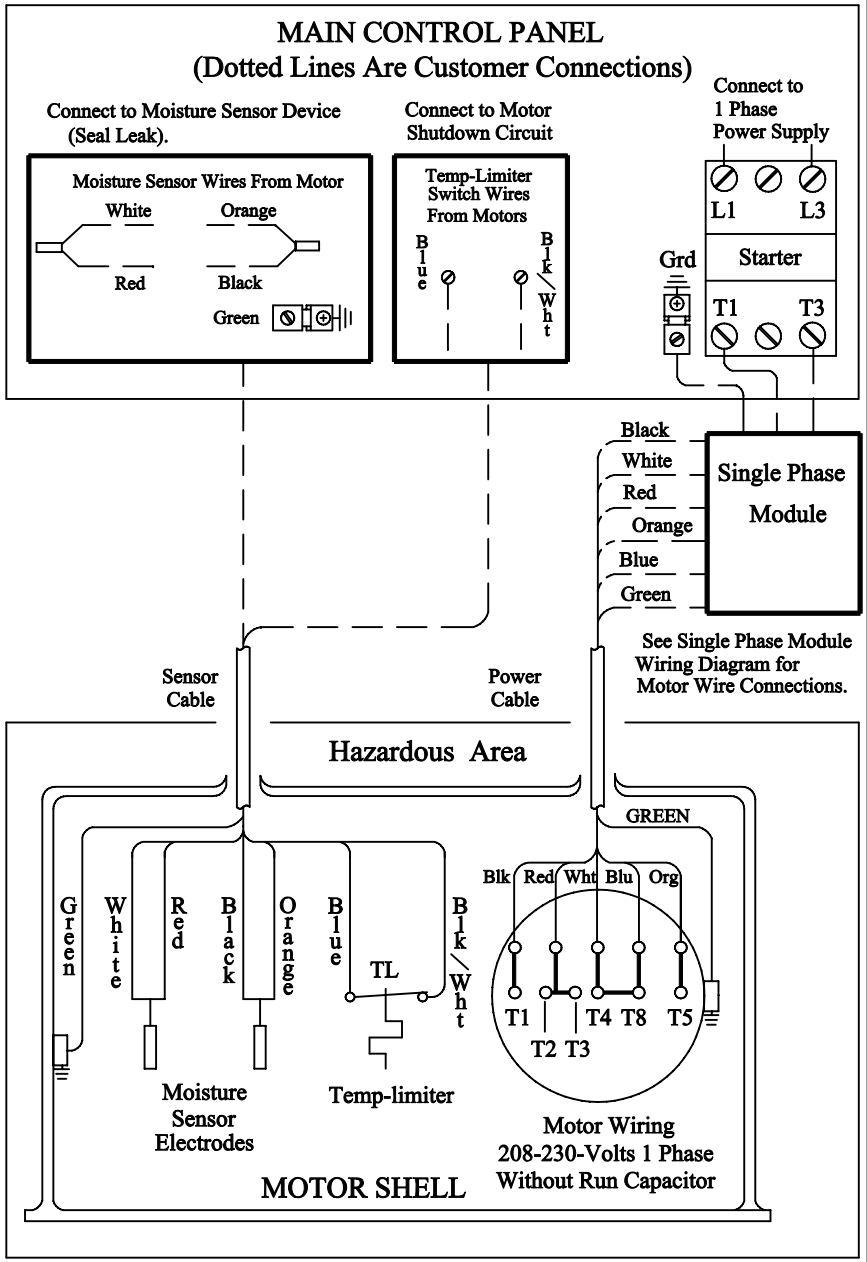
Submersible Wastewater Pumps

Explosion Proof Pump Motor Model 9701
1 Phase 208-230 Volt Wiring Diagram

1600
2500

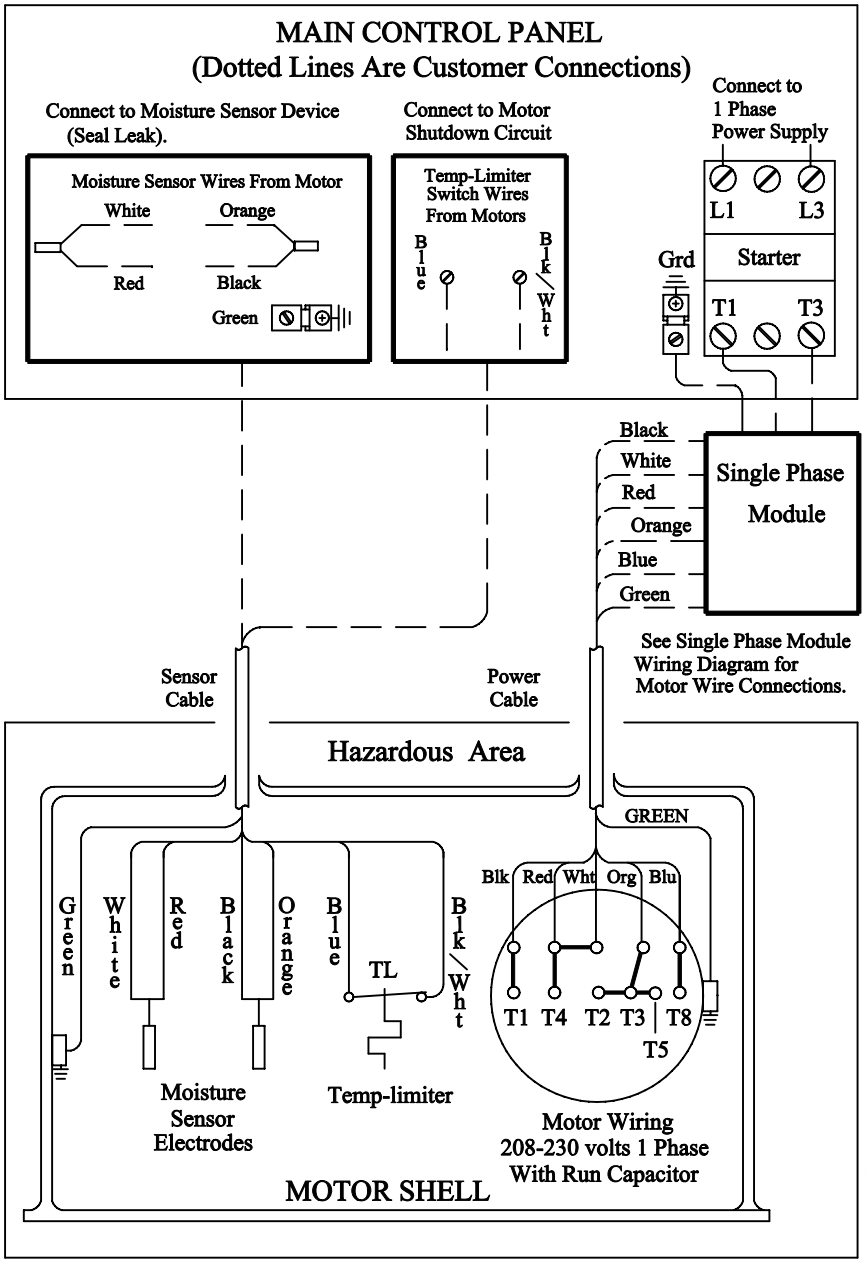
Explosion Proof Pump Motor Model 9701
1 phase 208-230 volt without run capacitor

Fig. C



Explosion Proof Pump Motor Model 9701
1 phase 208-230 volt with run capacitor

Fig. D



1600
2500

WEIL

Submersible Wastewater Pumps

Explosion Proof Pump Motor Model 9701 & 9702

3 Phase Wiring Diagrams

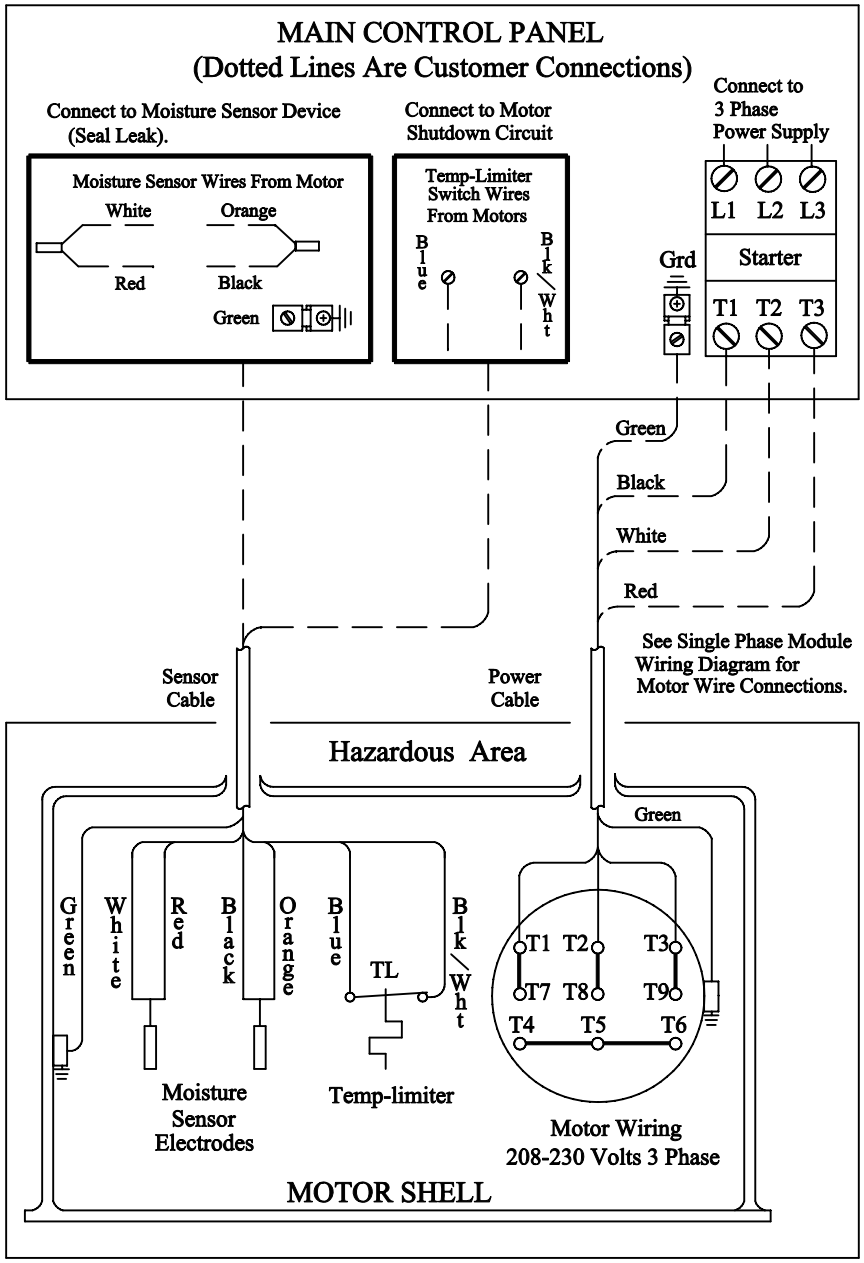
1600

2500

Explosion Proof Pump Motor Model 9701 & 9702

3 phase 208-230 volt

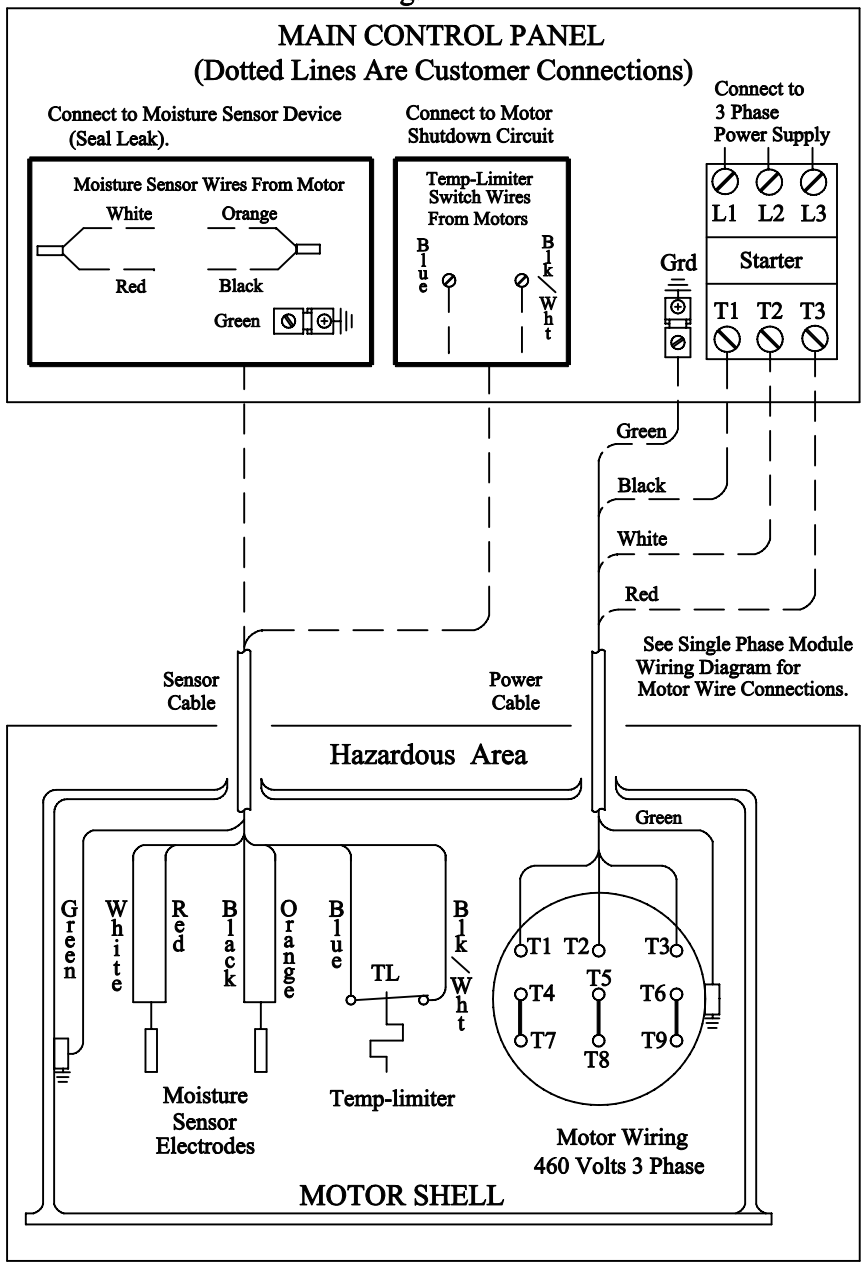
Fig. E



Explosion Proof Pump Motor Model 9701 & 9702

3 phase 460 volt

Fig. F



Section 4: Sewer Lift Station Vent Drawings

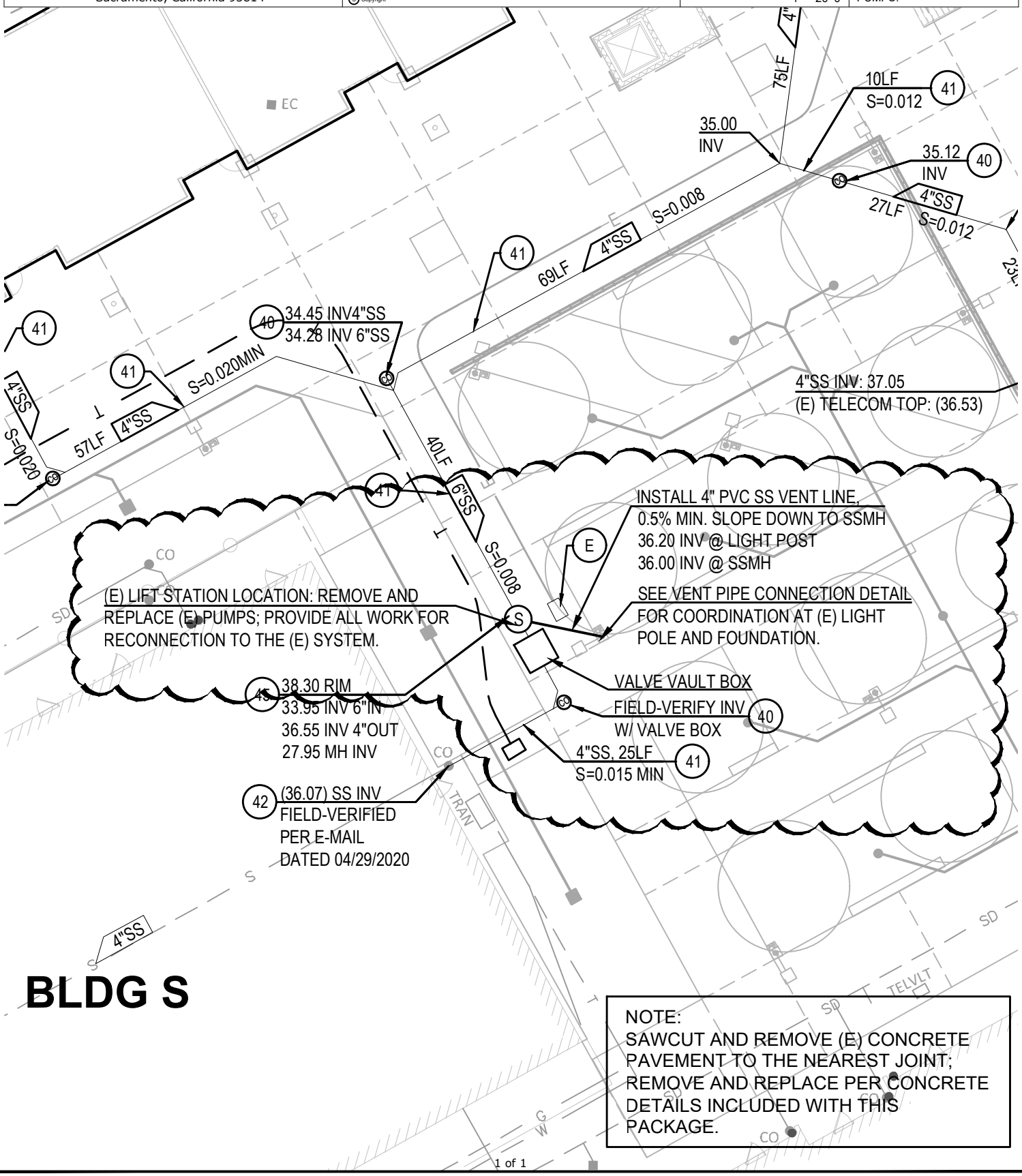
DSA #: 02-117806 FILE#: 39-H4

LPA
ARCHITECTURE ENGINEERING INTERIORS
LANDSCAPE ARCHITECTURE PLANNING
916-287-2400 Office
LPADesignStudios.com
431 I Street, Suite 107
Sacramento, California 95814

TOKAY HIGH SCHOOL NEW GYM AND CLASSROOM BUILDING

TOKAY HIGH SCHOOL, LODI, CA.

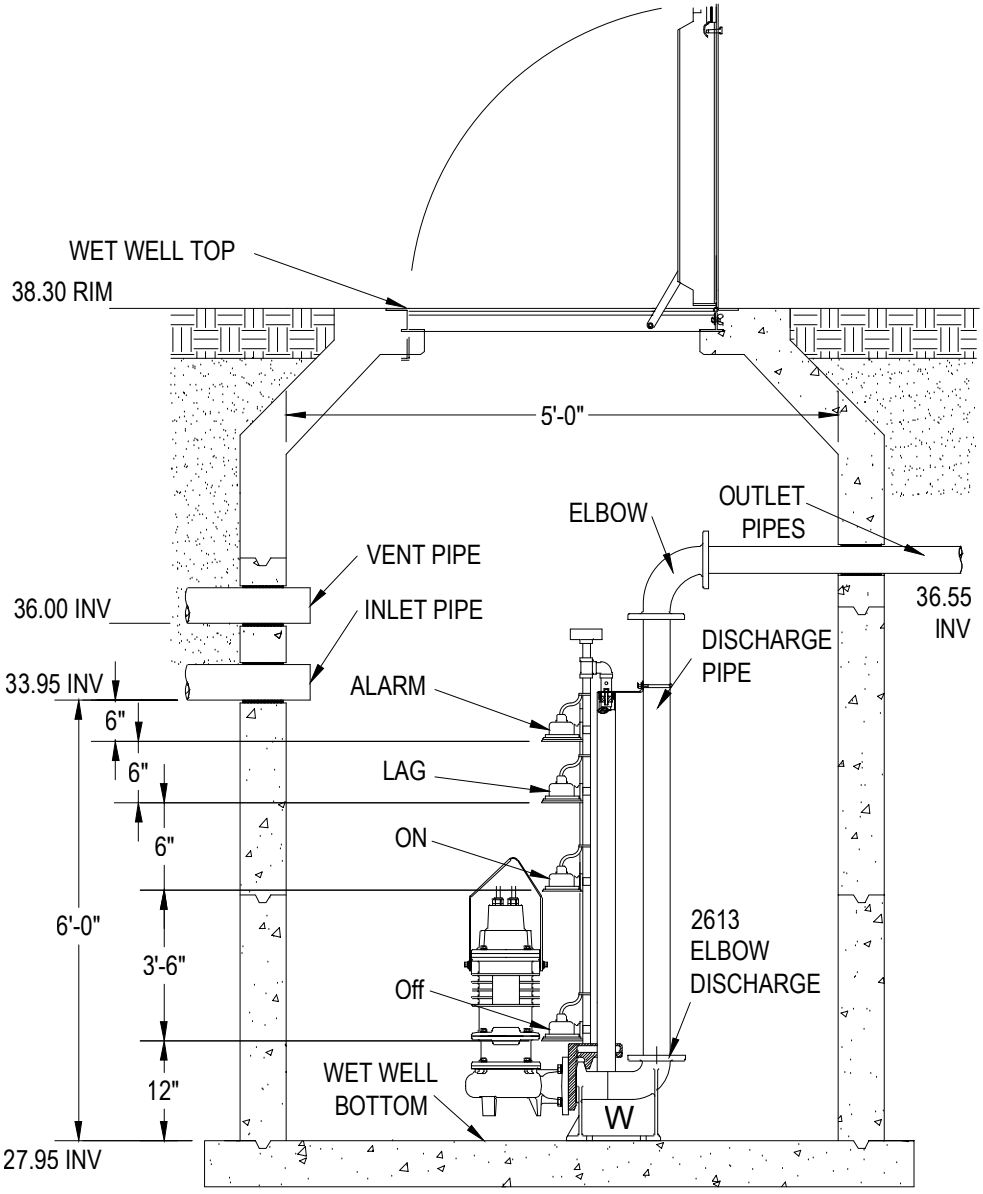
SKETCH: CSK-02	REVISION: -
PROJECT NO: 18180.10	DESCRIPTION: INSTALL 4" DIA. PVC SEWER VENT FROM (E) LIFT STATION MANHOLE TO ADJACENT LIGHT POST AS NOTED; REMOVE AND REPLACE (E) LIFT STATION PUMPS.
REFERENCE: C4.02	
DATE: 02/08/2023	
SCALE: 1" = 20'-0"	



BLDG S

NOTE:
SAWCUT AND REMOVE (E) CONCRETE PAVEMENT TO THE NEAREST JOINT; REMOVE AND REPLACE PER CONCRETE DETAILS INCLUDED WITH THIS PACKAGE.

NOTE:
(1) CONTRACTOR TO FIELD-VERIFY SWITCH POSITIONS (OFF, ON, LAG, ALARM) AND CONFIRM HEIGHTS FROM WET WELL BOTTOM TO MATCH POSITIONS SHOWN. RESET SWITCH POSITIONS TO MATCH DIMENSIONS SHOWN, IF REQUIRED.
(2) ELEVATIONS ARE PER DESIGN DRAWINGS; CONTRACTOR TO VERIFY AS-BUILT FIELD CONDITIONS AND NOTIFY ARCHITECT IF CONDITIONS VARY FROM WHAT IS SHOWN.



Wet Well

LPA

CLASSROOM LIFT STATION SWITCH LOCATIONS

NTS

DSA #: 02-117806 FILE#: 39-H4

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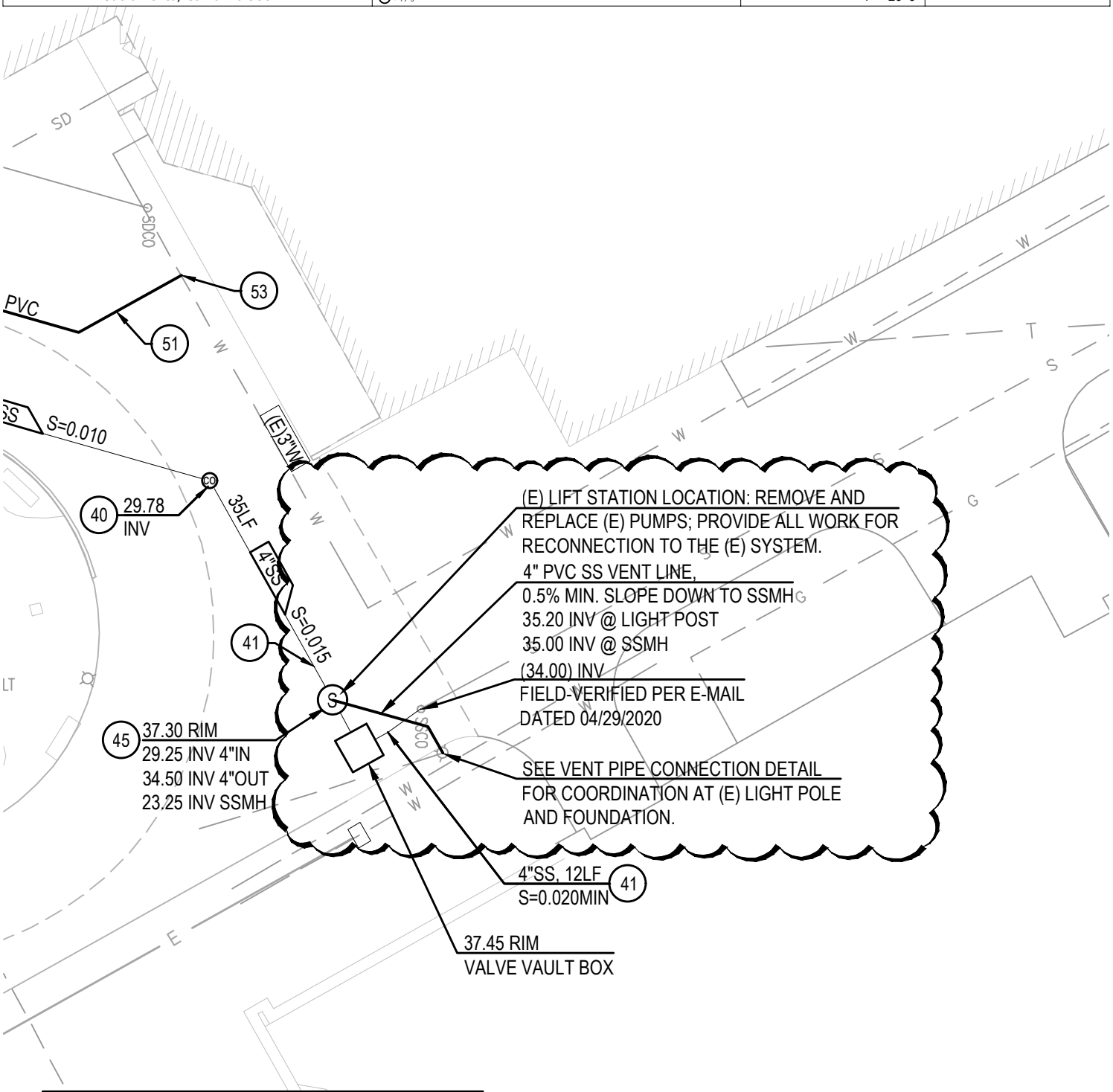
LPADesignStudios.com
431 I Street, Suite 107
Sacramento, California 95814

TOKAY HIGH SCHOOL NEW GYM AND CLASSROOM BUILDING

TOKAY HIGH SCHOOL, LODI, CA.

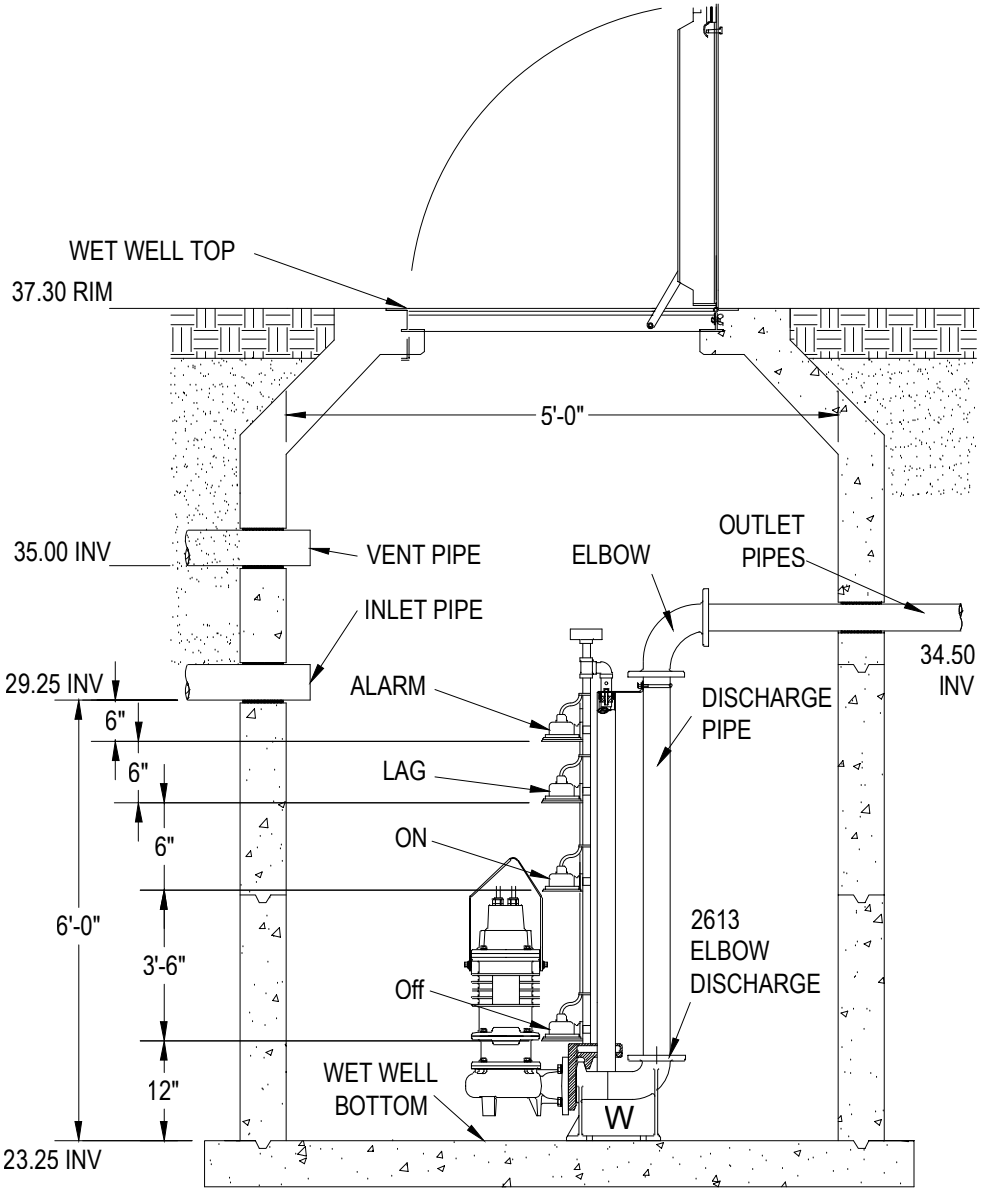
SKETCH: CSK-01	REVISION: -
PROJECT NO: 18180.10	DESCRIPTION: INSTALL 4" DIA. PVC SEWER VENT FROM (E) LIFT STATION MANHOLE TO ADJACENT LIGHT POST AS NOTED; REMOVE AND REPLACE (E) LIFT STATION PUMPS.
REFERENCE: C4.01	
DATE: 02/08/2023	
SCALE: 1" = 20'-0"	



NOTE:
SAWCUT AND REMOVE (E) CONCRETE PAVEMENT TO THE NEAREST JOINT; REMOVE AND REPLACE PER CONCRETE DETAILS INCLUDED WITH THIS PACKAGE.

BLDG K

NOTE:
(1) CONTRACTOR TO FIELD-VERIFY SWITCH POSITIONS (OFF, ON, LAG, ALARM) AND CONFIRM HEIGHTS FROM WET WELL BOTTOM TO MATCH POSITIONS SHOWN. RESET SWITCH POSITIONS TO MATCH DIMENSIONS SHOWN, IF REQUIRED.
(2) ELEVATIONS ARE PER DESIGN DRAWINGS; CONTRACTOR TO VERIFY AS-BUILT FIELD CONDITIONS AND NOTIFY ARCHITECT IF CONDITIONS VARY FROM WHAT IS SHOWN.

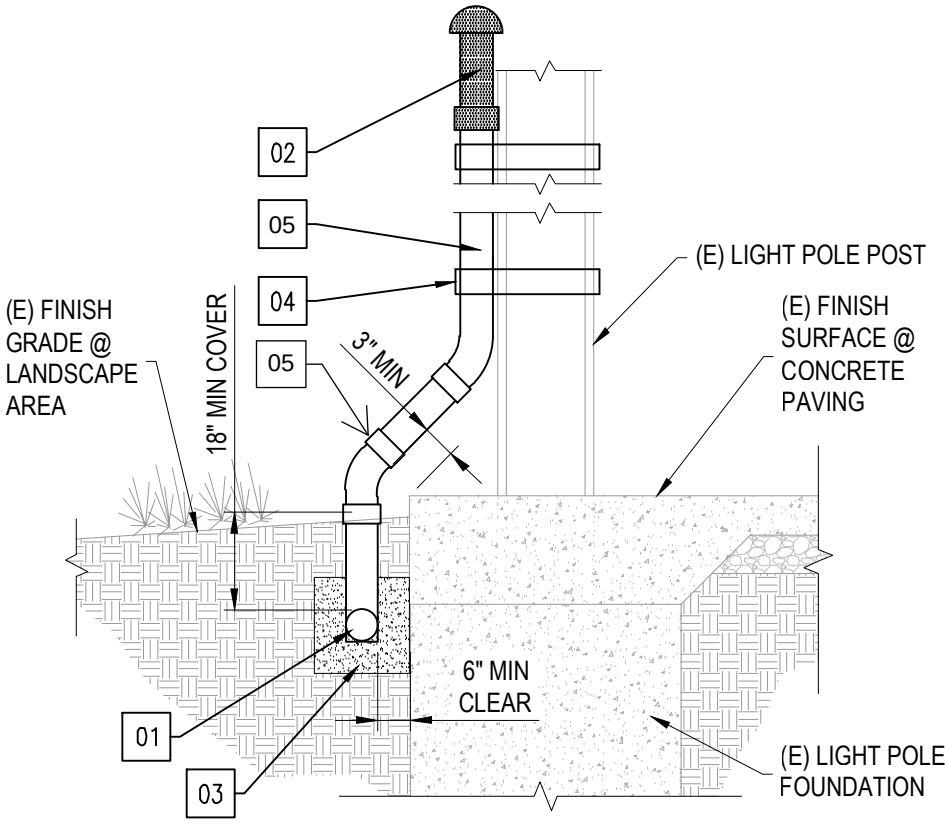


Wet Well

LPA

GYM LIFT STATION SWITCH LOCATIONS

NTS



01 4" PVC PIPE FOR SEWER VENT. INSTALL TEES, BENDS, ETC. AS REQUIRED FOR CONNECTION. EXTEND PIPE 10'-0" MIN ABOVE FINISHED GRADE. REFER TO UTILITY PLANS FOR CONTINUATION OF PIPE CONNECTING TO LIFT STATION.

02 AT TOP OF VENT PIPE, INSTALL ODOR HOG ODOR GUARD, CLAMP-ON STYLE, OR APPROVED EQUAL.

03 6" (MIN) COMPACTED SAND WHERE PIPE IS ADJACENT TO FOUNDATION. EXTEND COMPACTED SAND PLACEMENT FOR MIN. 12" ALONG PIPE PAST FOUNDATION.

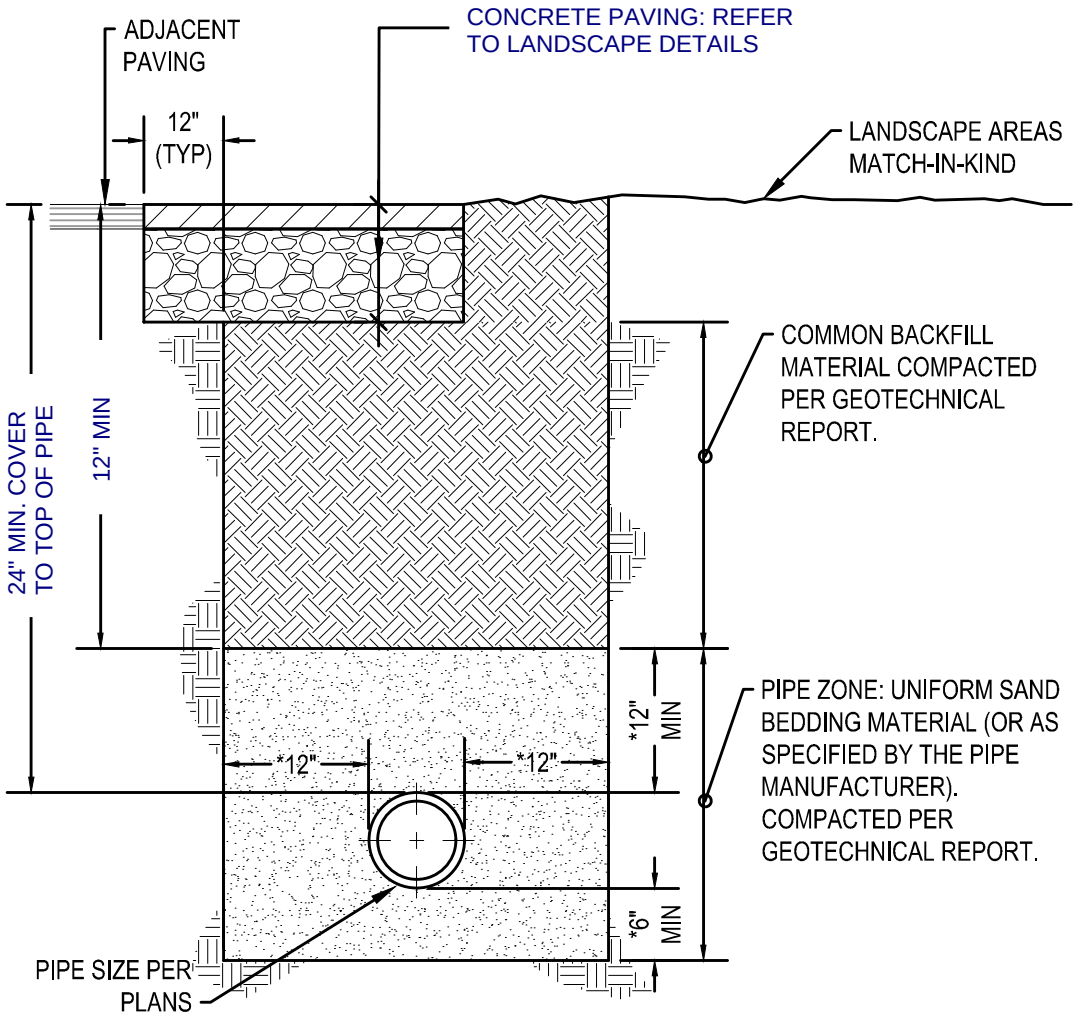
04 SECURE VENT PIPE TO POST WITH FLUSH-MOUNTED STRAPS SECURED TIGHTLY TO THE POST AT 24" MAX. VERTICAL SPACING.

05 SCHEDULE 40 GAVANIZED STEEL VENT PIPE. SLEAVE AND SEAL OVER PVC PIPE. PAINT FINISH, COLOR TO MATCH LIGHT POLE

LPA

VENT PIPE CONNECTION @ (E) LIGHT POLE

NTS



WATER & SEWER PIPE TRENCH

NTS

04

Section 5: Sewer Vent Pipe and Odor Guard Cut Sheet Information

SEWER VENT PIPE:

1. PVC VENT PIPE:
   RUNS FROM LIFT CHAMBER TO GROUND LEVEL TERMINATION AND IS SLEAVED BY THE GALVANISED IRON PIPE.

2. SCHEDULE 40 GALVANISED STEEL VENT PIPE:
   SEAL AND SLEAVE OVER PVC PIPE WHEN EXITING AT GROUND LEVEL. PRIME PIPE WITH GALVANISED IRON PRIMER AND FINISH WITH 2# COATS OF EXTERIOR LATEX PAINT SEMI GLOSS FINISH COLOR MATCH TO ADJACENT LIGHT POLE.

North American Pipe Corporation™

ASTM D3034: *Gasketed Gravity Sewer Pipe*

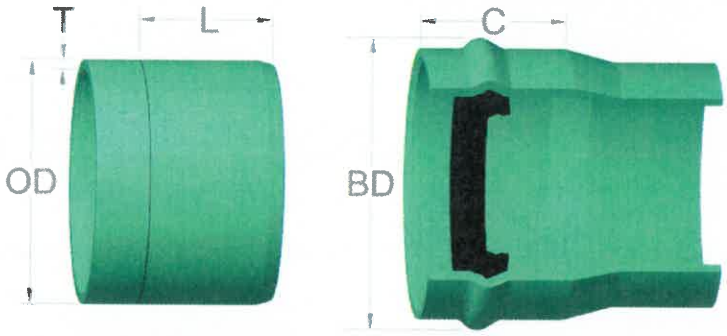
North American Pipe's ASTM D3034 Gravity Sewer PVC product line is manufactured to meet the needs of modern municipal waste water systems, residential waste water control and other non-pressure applications. With top quality raw materials and modern processing technology, North American Pipe's ASTM D3034 Gravity Sewer pipe meets all industry standards; in addition to our own rigorous quality control standards. Our ASTM D3034 Gravity Sewer pipe utilizes Reiber style gaskets throughout the entire product offering. Whether specifying or installing our pipe, you can be assured that North American Pipe will provide the pipe "Right, On Time, All the Time".

Short Form Specification
ASTM D3034 Gasketed Gravity Sewer Pipe

Pipe Standard:	ASTM D3034
Pipe Compound:	ASTM D1784 Cell Class 12454 or 12364
Gasket:	ASTM F477
Integral Bell Joint:	ASTM D3212
Wall Thickness:	ASTM D3034 SDR 35 (46 PS) or SDR 26 (115 PS)
Applications:	Wastewater & Storm Drainage
Color:	Green
Lay Length:	14' or 20'
Installation:	North American Pipe's Installation Guide for PVC Solid Wall Sewer Pipe

North American Pipe Corporation™

ASTM D3034: *Gasketed Gravity Sewer Pipe*



PIPE SIZE	OUTSIDE DIA. – NOM. (OD)	*APPROX. BELL DIA. (BD)	**APPROX. BELL DEPTH (C)	INSERT MARK (L)
4"	4.22	5.13	3.75	3.13
6"	6.28	7.50	4.63	4.00
8"	8.40	9.75	5.25	4.13
10"	10.50	12.25	5.88	5.13
12"	12.50	14.50	6.50	5.38
15"	15.30	17.50	7.75	7.38

MINIMUM WALL THICKNESS (T)	PS 46 SDR 35 (T)	PS 115 SDR 26 (T)
4"	.120	.162
6"	.180	.241
8"	.240	.323
10"	.300	.404
12"	.360	.481
15"	.437	.588

Note: These dimensions are for estimating purposes only * Dimension given for Approx. Bell Diameter (BD) is for highest pressure class ** Nominal depth, depth will vary by pressure class

VINYLTECH SEWER PIPE

TECHNICAL DATA SUBMITTAL

VINYLTECH VT PVC • PIPE

CONFORMANCE

These specifications designate the requirements for manufacturing and installing Vinyltech PVC sewer pipe.

ASTM D3034 - Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings

ASTM F679 - Standard Specification for Poly (Vinyl Chloride) (PVC) Large-Diameter Plastic Gravity Sewer Pipe and Fittings

ASTM D3212 - Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals

ASTM F477 - Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe

ASTM D1784 - Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds

ASTM D2152 - Standard Test Method for Extruded Poly (Vinyl Chloride) (PVC) Pipe and Molded Fittings by Acetone Immersion

ASTM D2444 - Standard Test Method for Determination of the Impact Resistance of Thermoplastic Pipe and Fittings by Means of Tup (Falling Weight)

ASTM D2321 - Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and other Gravity-Flow Applications

ASTM D2412 - Standard Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading

IAPMO (File No. 2128) - Uniform Plumbing Code (UPC) - Vinyltech sewer pipe is IAPMO listed for ASTM D3034 SDR 35 4-15 inch and SDR 26 4-12 inch.

PIPE COMPOUND

The pipe shall be extruded from compounds meeting the requirements of Cell Classification 12454, as defined in ASTM D1784, Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds.

PIPE

Vinyltech pipe shall be manufactured in accordance with ASTM D3034 and ASTM F679.

GASKET JOINT

The gasket shall be reinforced with a steel ring and meet the requirements of ASTM F477. Vinyltech pipe shall have an integral bell end with a locked-in factory installed gasket and shall meet the requirements of ASTM D3212.

MARKING

The pipe shall be marked in accordance with ASTM D3034 and F679.

QUALITY CONTROL

Requirements for manufacturing and testing are conducted in strict accordance with ASTM specifications and are outlined in ASTM D3034 and F679.

INSTALLATION

Recommended installation procedures of Vinyltech Corporation are outlined in ASTM D2321, Underground Installation of Flexible Thermoplastic Sewer Pipe.

ASSEMBLING THE PIPE

Assembling of PVC Sewer Pipe is easily accomplished by hand or by using a bar and block. A depth of entry mark serves as a visual check for rapid, accurate joint inspection. **Do not over insert.**

1) Remove any mud, sand, or other foreign matter from the belled and spigot ends of the pipe. Carefully clean the gasket area.
2) With a clean applicator (a brush or hand) lubricate the entire surface of the pipe from the spigot end to the depth of entry mark and the contact surface of the gasket with **Vinyltech Brand Lubricant.**
3) Brace the bell to avoid disturbing the already installed joints. Align the pipe, insert the spigot into the bell and push.
4) **Do not insert past the entry mark line.**

ASTM INTERNATIONAL

IAPMO

SEWER PIPE

VINYLTECH VT PVC • PIPE
201 S. 61st Avenue • Phoenix, AZ 85043
602 233-0071 • 602 272-4847 Fax • www.vtpipe.com

AN OTTERTAIL COMPANY

Effective 03/14

VINYLTECH VT PVC • PIPE

GRAVITY SEWER MAIN

TECHNICAL DATA SUBMITTAL

SEWER PIPE

ASTM D3034 SDR 35/PS 46 PVC SEWER PIPE					
NOMINAL SIZE (IN)	(mm)	OUTER DIAMETER (IN)	MINIMUM WALL	14' LENGTH WEIGHT (LB/100')	20' LENGTH WEIGHT (LB/100')
4	(100)	4.215	0.120	105.7	104.2
6	(150)	6.275	0.180	232.6	229.0
8	(200)	8.400	0.240	417.8	410.3
10	(250)	10.500	0.300	657.4	643.9
12	(300)	12.500	0.360	944.1	922.7
15	(375)	15.300	0.437	1390.0	1361.0

ASTM D3034 SDR 26/PS 115 PVC SEWER PIPE				
NOMINAL SIZE (IN)	(mm)	OUTER DIAMETER (IN)	MINIMUM WALL	14' LENGTH WEIGHT (LB/100')
4	(100)	4.215	0.162	150.0
6	(150)	6.275	0.241	320.0
8	(200)	8.400	0.323	580.0
10	(250)	10.500	0.404	900.0
12	(300)	12.500	0.481	1300.0
15	(375)	15.300	0.588	2000.0

ASTM F679 PS 46 PVC SEWER PIPE				
NOMINAL SIZE (IN)	(mm)	OUTER DIAMETER (IN)	MINIMUM WALL	14' LENGTH LB/100'
18	(475)	18.701	0.499	2115.0
* 21	(560)	22.047	0.588	2962.0
* 24	(630)	24.803	0.661	3740.0

ASTM F679 PS 115 PVC SEWER PIPE				
NOMINAL SIZE (IN)	(mm)	OUTER DIAMETER (IN)	MINIMUM WALL	14' LENGTH LB/100'
18	(475)	18.701	0.671	2790.0
* 21	(560)	22.047	0.791	3940.0
* 24	(630)	24.803	0.889	4980.0

* Northern Pipe Products

VINYLTECH VT PVC • PIPE

201 S. 61st Avenue • Phoenix, AZ 85043
602 233-0071 • 602 272-4847 Fax • www.vtpipe.com

AN OTTERTAIL COMPANY

Sani-21™: PVC Sewer Pipe
SPECIFICATION DATA

Sani 21™
SANITARY SEWER PIPE FOR THE 21st CENTURY

D3034 & F679
SEWER SPECIFICATION DATA

Diamond gravity sewer pipe 4 inches through 60 inches shall be made of compounds conforming to material requirements of ASTM D3034 and ASTM F679 in accordance with ASTM D1784. Diamond PVC Sewer Pipe meets all the dimensional, chemical, and physical requirements as outlined in ASTM D3034 and ASTM F679. A listing to CSA B182.2 is available for most of these sizes. A complete listing by manufacturing plant is available upon request.

The pipe sizes 4 inches through 60 inches are made with an integral bell "water-tight" joint that meets the requirements of ASTM D3212 and that utilizes a Rieber gasket system for sealing that meets the requirements of ASTM F477.

Each male end shall be beveled to facilitate joining and referencing marked for proper insertion depth. Diamond furnished lubricant is to be used in the joining process.

Physical Properties of ASTM D3034 & F679

Pipe Materials:
Pipe shall be made of PVC plastic having a minimum cell classification of 12454 or 12364 as defined in Specification D1784.

Property	**ASTM Test**	**Minimum** 12454/12364
Specific Gravity	D792	1.40/1.40
Tensile Strength, psi	D638	7,000/6,000
Tensile Modulus, psi	D638	400,000/500,000
IZOD Impact Strength,	D256	.65ft., lb./in.

SHORT FORM **Specification for Diamond PVC Solid-Wall Sewer Pipe SDR 26 or SDR 35 or PS 46 or PS 115**
All PVC Solid-Wall Sewer PIpe shall be made of compounds conforming to ASTM D1784 manufactured in accordance with the material requirements of ASTM D3034 or ASTM F679. All PVC Sewer Pipe must meet dimensional, chemical, and physical requirements as outlined in ASTM D3034 orASTM F679. Joints shall meet the requirements of ASTM D3212 and shall be formed using Rieber Technology.
PVC Sewer Pipe shall be installed according to the requirements of ASTM D2321, Uni-Bell's Uni-Pub 6 and the manufacturer's recommendations.

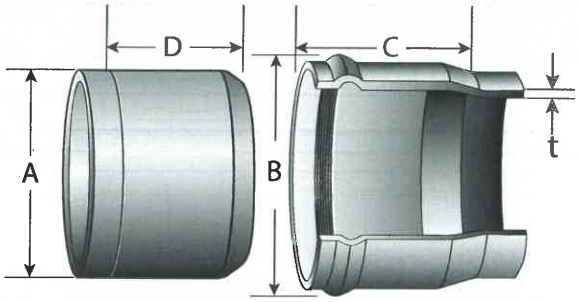
DIAMOND PLASTICS® CORPORATION

Corporate Headquarters • 1212 Johnstown Road • P.O. Box 1608 • Grand Island, NE 68802-1608

Sani-21™: PVC Sewer Pipe
SPECIFICATION DATA

Sani-21 SANITARY SEWER PIPE FOR THE 21st CENTURY

Rieber Joint Illustration



Sani-21 is supplied in 14 foot and 22 foot laying lengths.

Sani-21™ D3034 & F679 SEWER SPECIFICATION DATA

Nominal Pipe Size in. (mm)	Outside Diameter A Inches	Bell Socket Diameter B Inches	Socket Depth C Inches	Insert Mark D Inches #	Wall Thickness SDR26/PS115 (t) Inches	Wall Thickness SDR35/PS46 (t) Inches
D-3034 Pipe Dimensions						
4" (100)	4.215	5-1/4	4-5/8"	4"	0.162	0.120
6" (150)	6.275	7-1/2	4-3/4"	4-1/8"	0.241	0.180
8" (200)	8.400	9-7/8	6-1/8"	4-7/8"	0.323	0.240
10" (250)	10.500	12-3/8	6-3/4"	5-1/4"	0.404	0.300
12" (300)	12.500	14-5/8	7-1/4"	5-1/2"	0.481	0.360
15" (375)	15.300	18	7-1/4"	4-5/8"	0.588	0.437
F-679 Pipe Dimensions						
18" (450)	18.701	21-3/4"	9-1/2"	7-3/4"	0.671	0.499
21" (525)	22.047	25-1/2"	10"	8-1/2"	0.791	0.588
24" (600)	24.803	28-3/4"	11"	10"	0.889	0.661
27" (675)	27.953	32-1/2"	13-1/4"	11-1/8"	1.002	0.745
30" ciod (750)	32.000	37-1/4"	14"	13-5/8"	1.148	0.853
36" ciod (900)	38.300	43-1/4"	15"	13-7/8"	1.373	1.021
42" ciod (1050)	44.500	53"	18"	16-3/4"	1.596	1.187
48" ciod (1200)	50.800	60"	18"	16-7/8"		1.355
54" ciod (1350)	57.560	67"	*	*	2.227	1.641
60" ciod (1500)	61.610	72"	*	*	2.384	1.756

*Contact manufacturer for specific information.

"Possession of this page does not constitute an offer of sale"

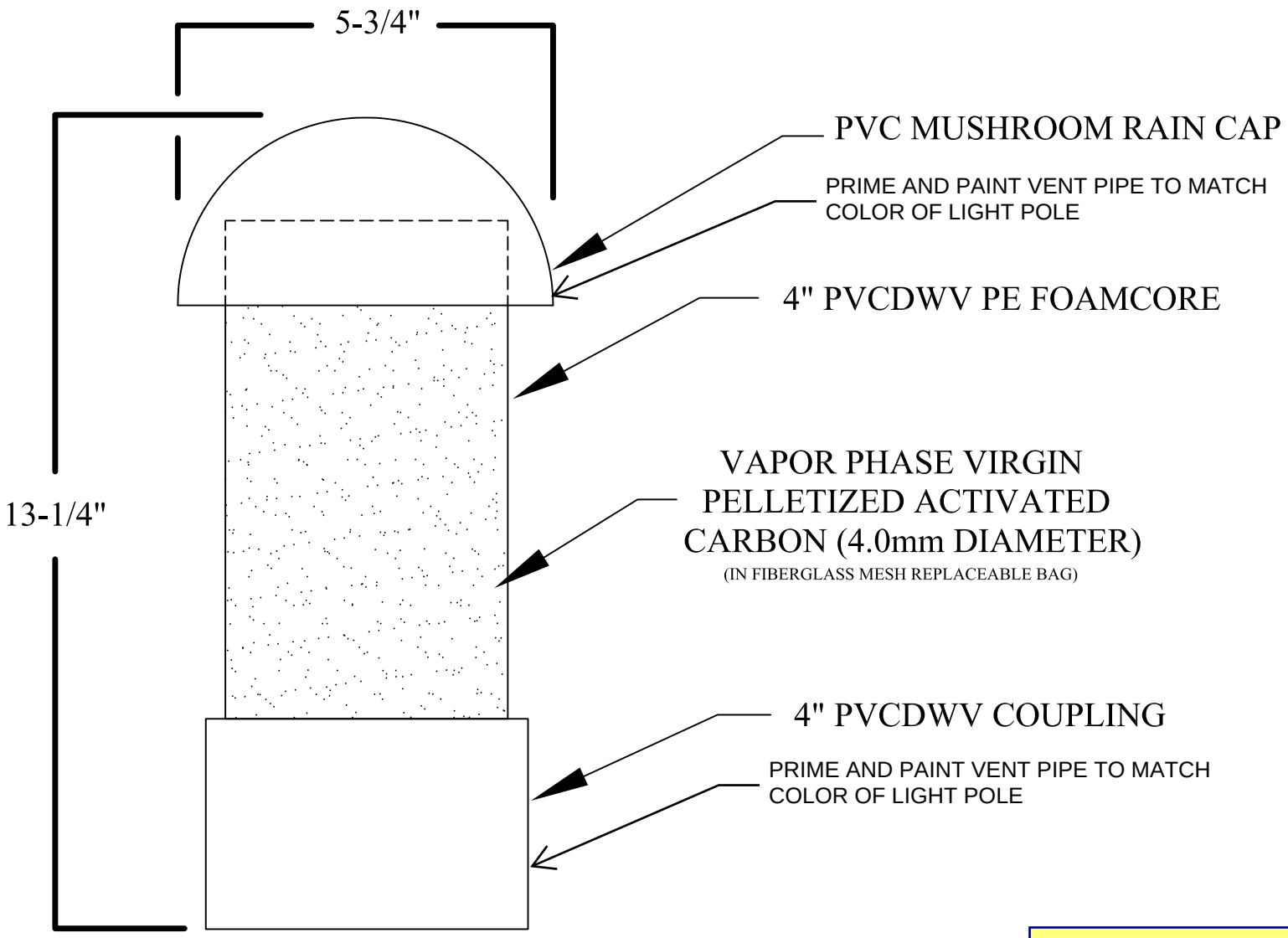
#Tolerance of +/- 1/4" allowed

Prices are subject to a firm policy of "Price in effect at time of shipment on regular purchases"

DIAMOND PLASTICS® CORPORATION

Rev 12/2013

Corporate Headquarters • 1212 Johnstown Road • P.O. Box 1608 • Grand Island, NE 68802-1608



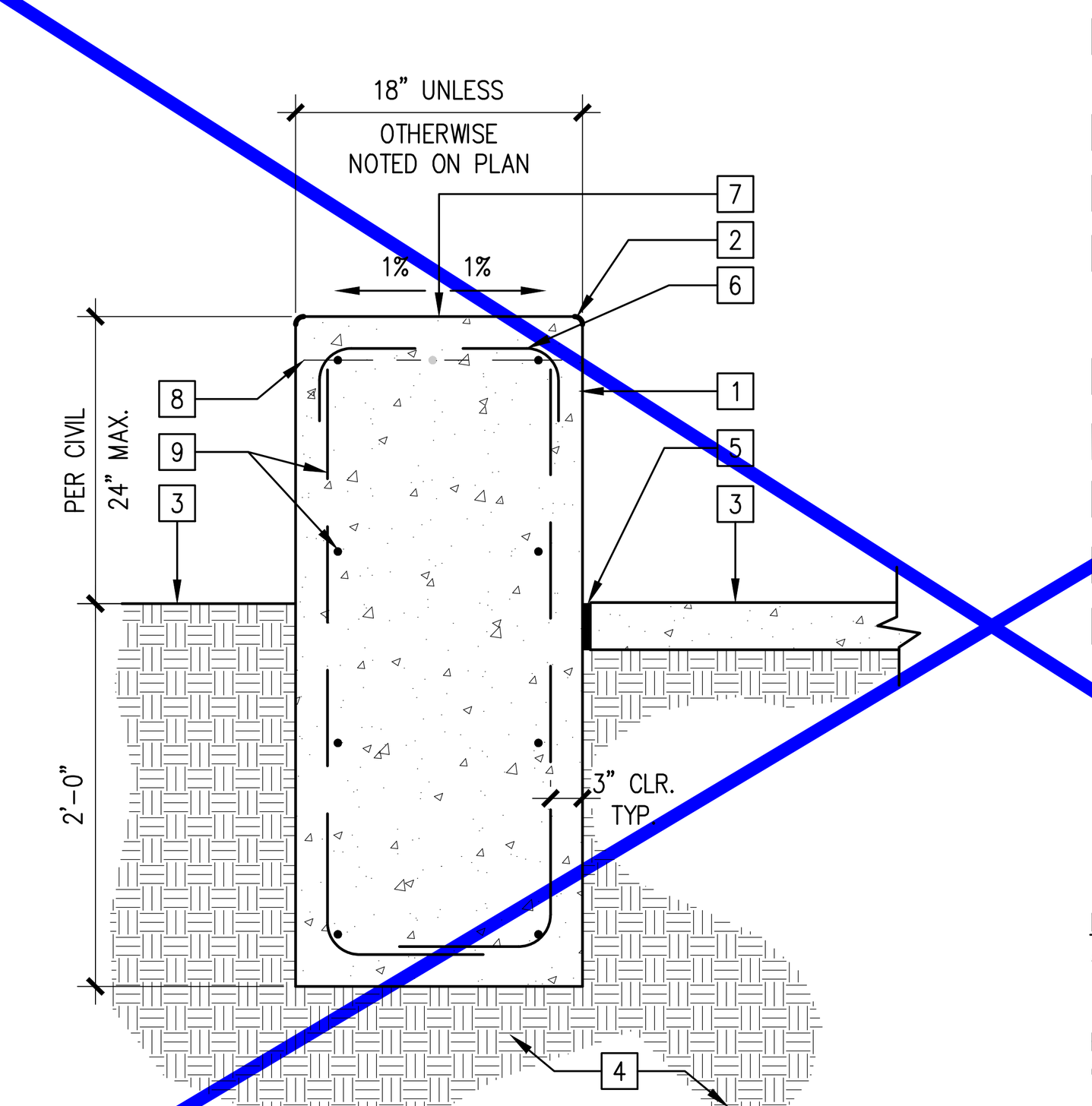
INSTALL WITH CLAMP-ON SYSTEM AT TOP OF VENT PIPE

(Not to Scale)

OdorHog Inc.
1-800-963-6746

4" PVC ODORHOG™ VENT PIPE FILTER

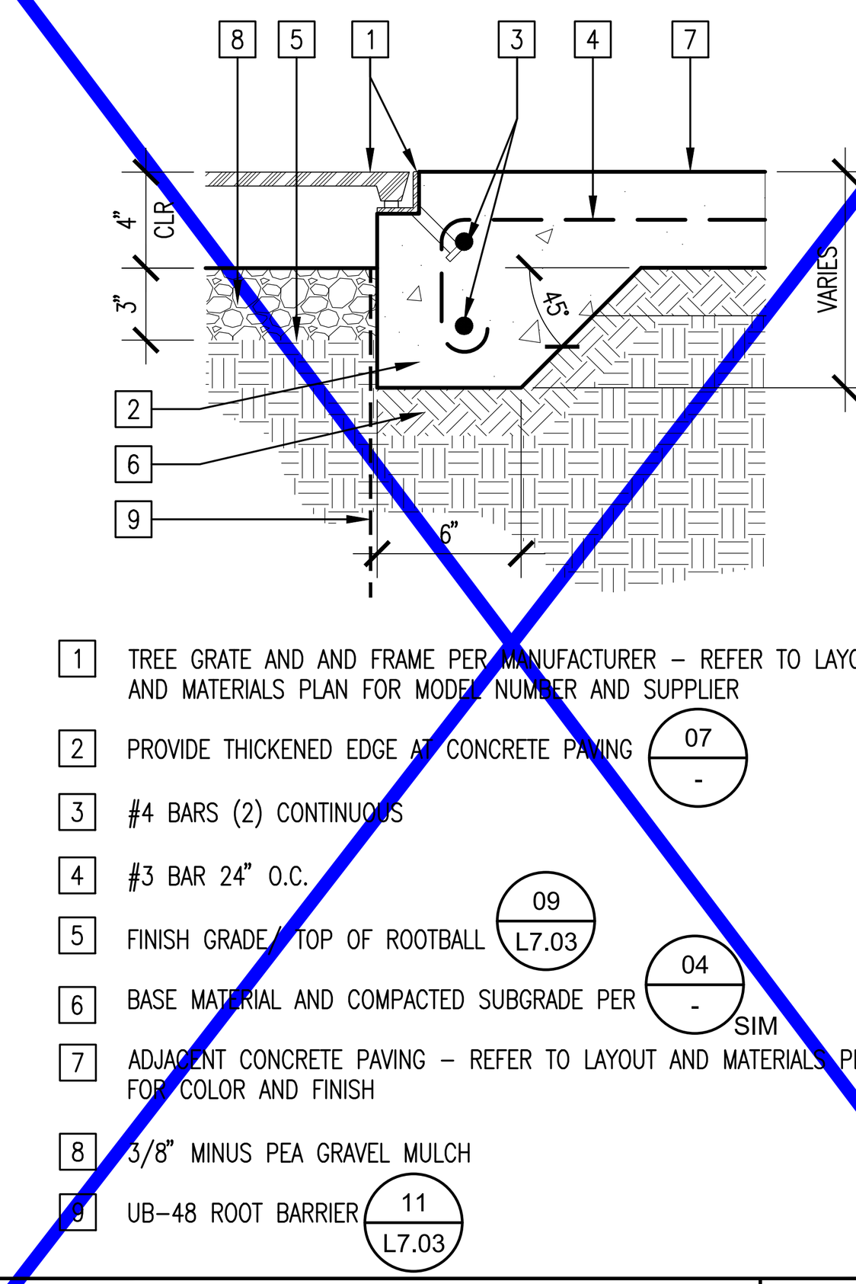
Section 6: Concrete Pavement Details



1. CONCRETE FREE-STANDING WALL PER MATERIALS PLAN. REFER TO KEYNOTE LEGEND FOR COLOR & FINISH
2. 1/8" EASED EDGE RADIUS, TYP. ALL EDGES. NO CHAMFERS
3. FINISH SURFACE/FINISH GRADE
4. SUBGRADE OVER-EXCAVATION AND COMPACTION REFER TO GEOTECHNICAL REPORT
5. EXPANSION JOINT PER 02/-
6. #4 @ 12" O.C.
7. TOP OF WALL PER CIVIL GRADING PLAN. HOLD DATUM LINE.
8. (2) #4 CONTINUOUS AT TOP
9. #4 @ 12" O.C. EACH WAY

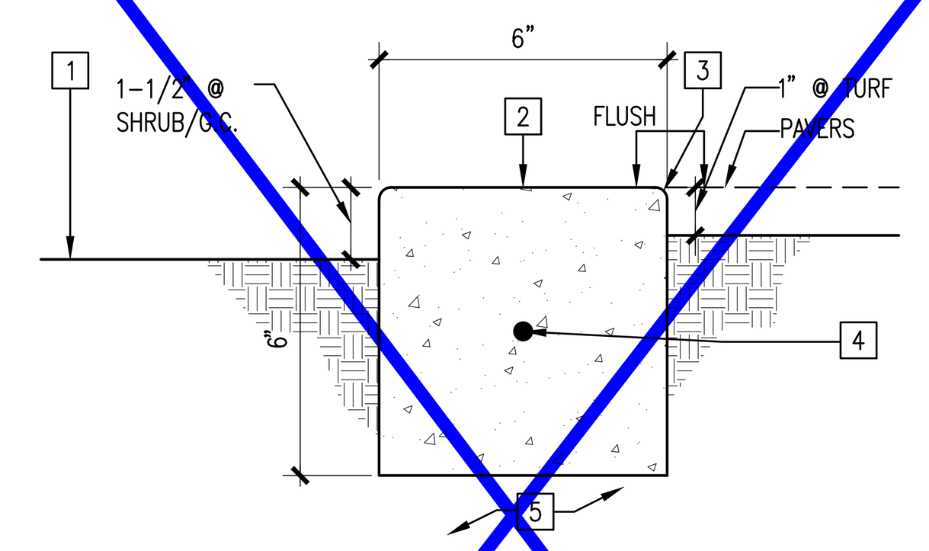
NOTES:
A. REVEAL 19/-
B. REFER TO PLANS & ELEVATIONS FOR LOCATION OF JOINTS.
C. ALL FORM SEAMS ARE TO ALIGN WITH REVEALS SHOWN ON ELEVATIONS & PLANS. PROVIDE CUSTOM FORM BOARDS AS REQUIRED.
D. PROVIDE PERMANENT NON-SACRIFICIAL ANTI-GRAFFITI COATING ON ALL EXPOSED WALL SURFACES.(SEE SPECS)

CONCRETE FREE-STANDING WALL — 1" = 1'-0" — 20



1. TREE GRATE AND AND FRAME PER MANUFACTURER – REFER TO LAYOUT AND MATERIALS PLAN FOR MODEL NUMBER AND SUPPLIER
2. PROVIDE THICKENED EDGE AT CONCRETE PAVING 07/-
3. #4 BARS (2) CONTINUOUS
4. #3 BAR 24" O.C.
5. FINISH GRADE @ TOP OF ROOTBALL 09/L7.03
6. BASE MATERIAL AND COMPACTED SUBGRADE PER 04/- SIM
7. ADJACENT CONCRETE PAVING – REFER TO LAYOUT AND MATERIALS PLAN FOR COLOR AND FINISH
8. 3/8" MINUS PEA GRAVEL MULCH
9. UB-48 ROOT BARRIER 11/L7.03

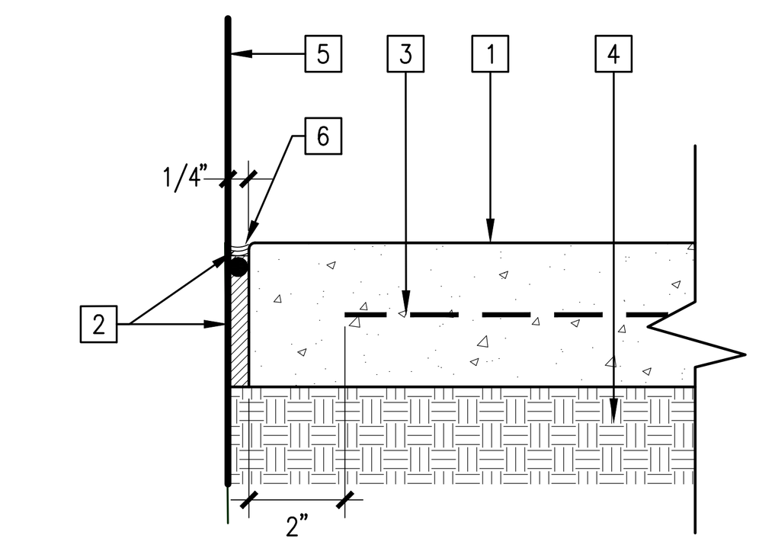
METAL TREE GRATE — 1 1/2" = 1'-0" — Same — 16



1. FINISH SURFACE/FINISH GRADE.
2. MOW CURB PER MATERIALS PLAN. REFER TO KEYNOTE LEGEND FOR COLOR & FINISH
3. 1/4" RADIUS TYP.
4. #4 REBAR CONTINUOUS.
5. BASE MATERIAL & COMPACTED SUBGRADE PER 04/-

NOTES:
A. PROVIDE SAWCUT JOINT EVERY 10' & EXPANSION JOINT EVERY 30' & @ EVERY CHANGE IN DIRECTION PER 02/-
B. CORNER @ MOW CURB PER 11/-

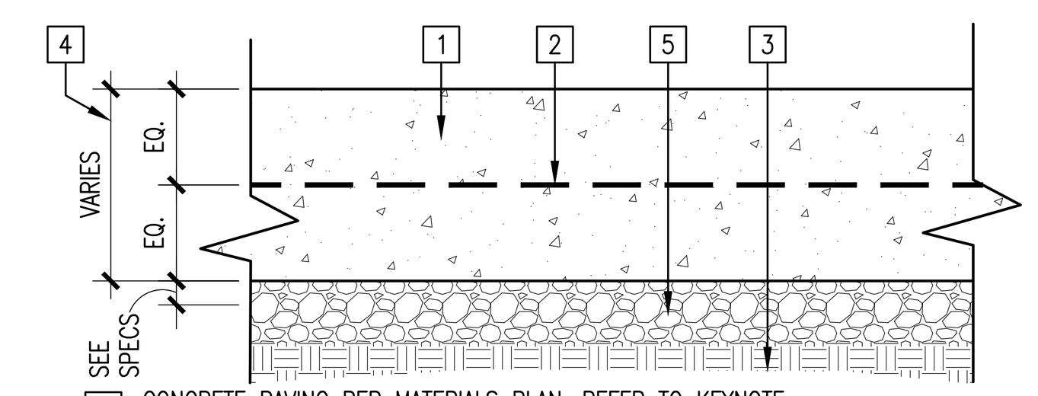
CONCRETE MOW CURB — 3"=1'-0" — - — 12



1. CONCRETE PAVING PER MATERIALS PLAN.
2. 1/4" EXPANSION MATERIAL W/BACKER ROD & JOINT SEALANT TO MATCH CONCRETE COLOR W/SEEDED SILICA SAND.
3. STEEL REINFORCEMENT PER 04/–
4. BASE MATERIAL & COMPACTED SUBGRADE PER 04/–
5. VERTICAL SURFACE
6. 1/8" RADIUS

NOTES:
A. PROVIDE EXPANSION JOINT @ ALL VERTICAL SURFACES.
B. EXPANSION JOINT @ CURB PER 05/–

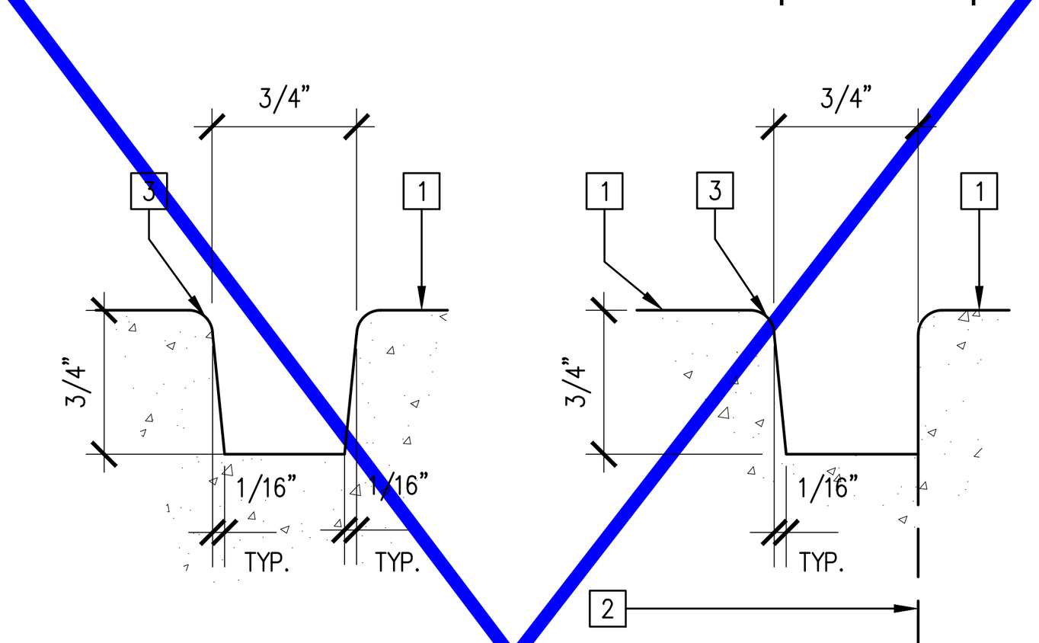
E.J. @ VERTICAL SURFACE — 3"=1'-0" — -



1. CONCRETE PAVING PER MATERIALS PLAN. REFER TO KEYNOTE LEGEND FOR FINISH & COLOR.
2. #3 REBAR 18" O.C. BOTH WAYS.
3. SUBGRADE OVEREXCAVATION AND COMPACTION PER GEOTECHNICAL REPORT.
4. PEDESTRIAN: 4" THICK.
VEHICULAR: 6" THICK.
5. COMPACTED AGGREGATE BASE PER GEOTECHNICAL REPORT – VEHICULAR PAVING: 6", PEDESTRIAN: 4"

NOTES:
A. CONTROL JOINTS & EXPANSION JOINTS PER 02/–
B. PROVIDE DOWELS WHERE NEW CONCRETE TIES INTO EXISTING PER 06/–
C. DO NOT ALLOW CONCRETE OVER-POUR INTO ADJACENT PLANTERS.
D. EXPANSION JOINTS @ VERTICAL SURFACE PER 08/–
E. EXPANSION JOINTS @ CURB PER 05/–
F. PROVIDE THICKENED EDGE & TRIM BARS @ ALL PROTRUSIONS IN PAVING, WHERE PAVING IS ADJACENT TO PLANTING AREAS, EDGES OF AC PAVING & DG AND @ ALL WEAKENED PLANE CONDITIONS. SUCH AS COLUMNS, WALLS, OR OTHER SIMILAR CONDITIONS. 07/–

CONCRETE PAVING — 3" = 1'-0" — DT32PV10



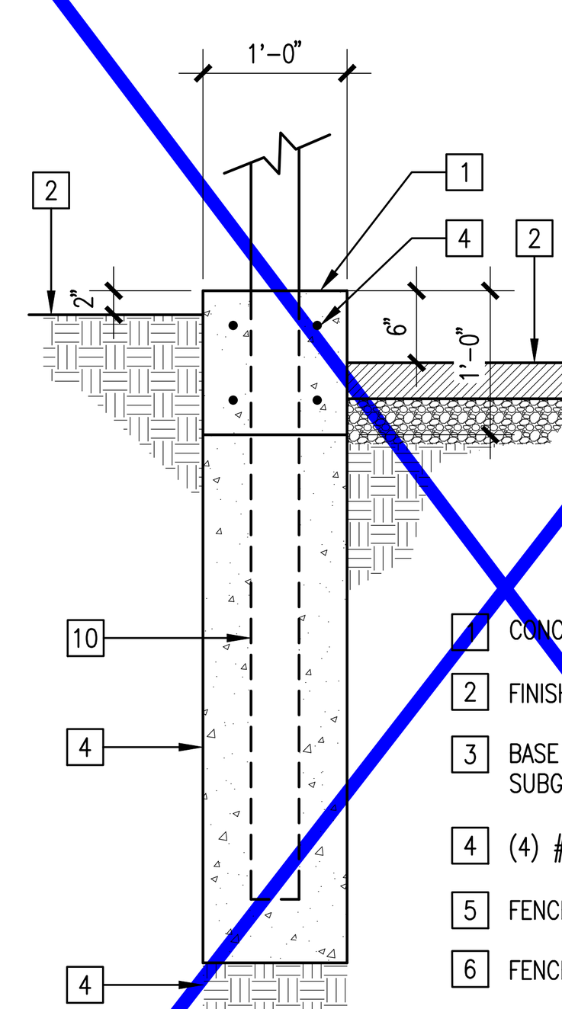
REVEAL

REVEAL @ COLD JOINT

1. CONCRETE WALL PER MATERIALS PLAN.
2. COLD JOINT.
3. 1/8" MACHINE ROUTED CORNERS & EDGES.

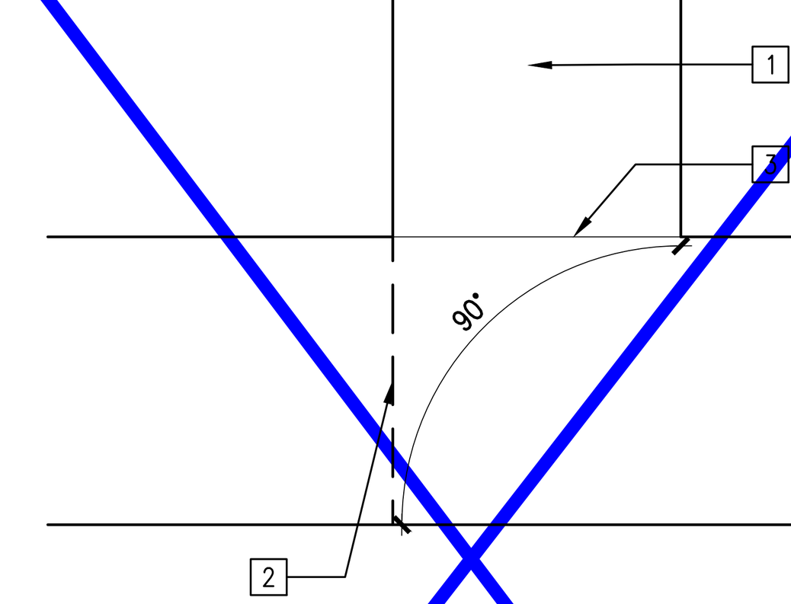
NOTES:
A. PROVIDE REVEAL @ ALL COLD JOINTS.
B. REVEAL SHOULD BE CONTINUOUS ON SIDES & TOP OF WALL, UNLESS OTHERWISE NOTED ON PLAN OR ELEVATION.
C. REFER TO PLANS & ELEVATIONS FOR JOINT SIZE & LOCATION.
D. ALIGN ALL FORM JOINTS W/REVEALS. CUSTOM CUT FORMS AS REQUIRED.

CONCRETE WALL REVEALS — FULL — SAME — 19



1. CONCRETE BAND
2. FINISH SURFACE/GRADE
3. BASE MATERIAL AND COMPACT SUBGRADE PER GEOTECHNICAL REPORT
4. (4) #4 BARS CONTINUOUS, TYP
5. FENCE POST (WHERE OCCURS) PER 17/L5.02
6. FENCE POST FOOTING PER 09/L5.02

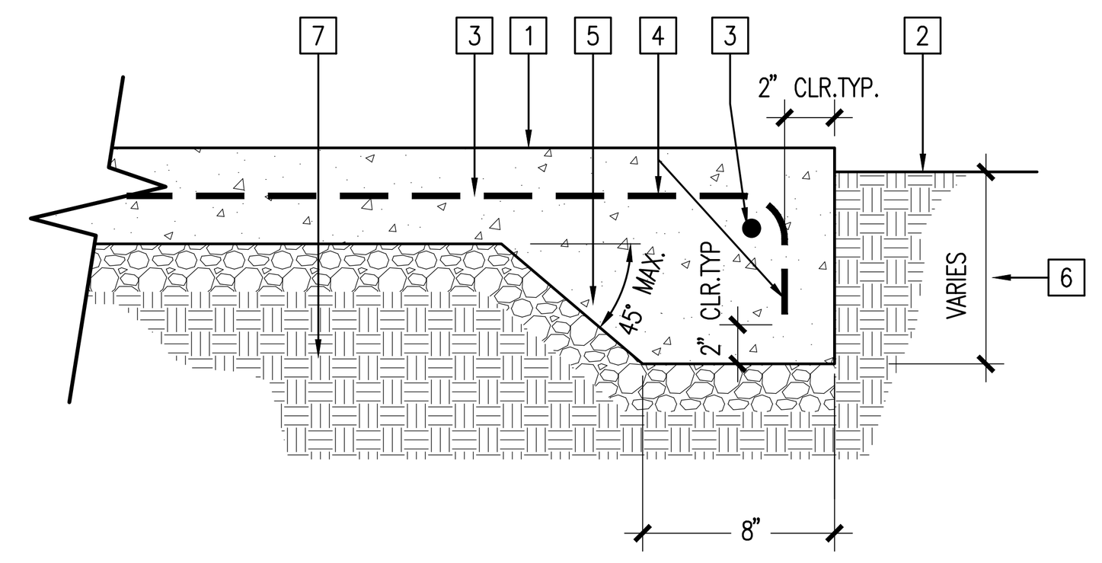
CONCRETE BAND W/ FENCE — 3/4" = 1'-0" — - — 15



1. CONCRETE MOW CURB
2. EXPANSION JOINT, SEE 02/- SIM.
3. SAWCUT, SEE 02/- SIM.

NOTE:
A. PROVIDE EXPANSION JOINT AS SHOWN AT ALL CHANGES IN DIRECTION.

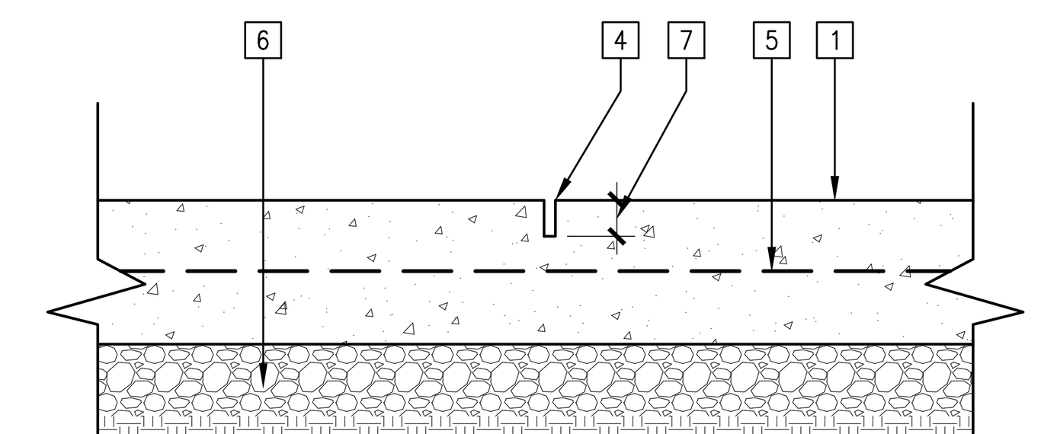
CORNER @ MOW CURB — 3"=1'-0" — - — 11



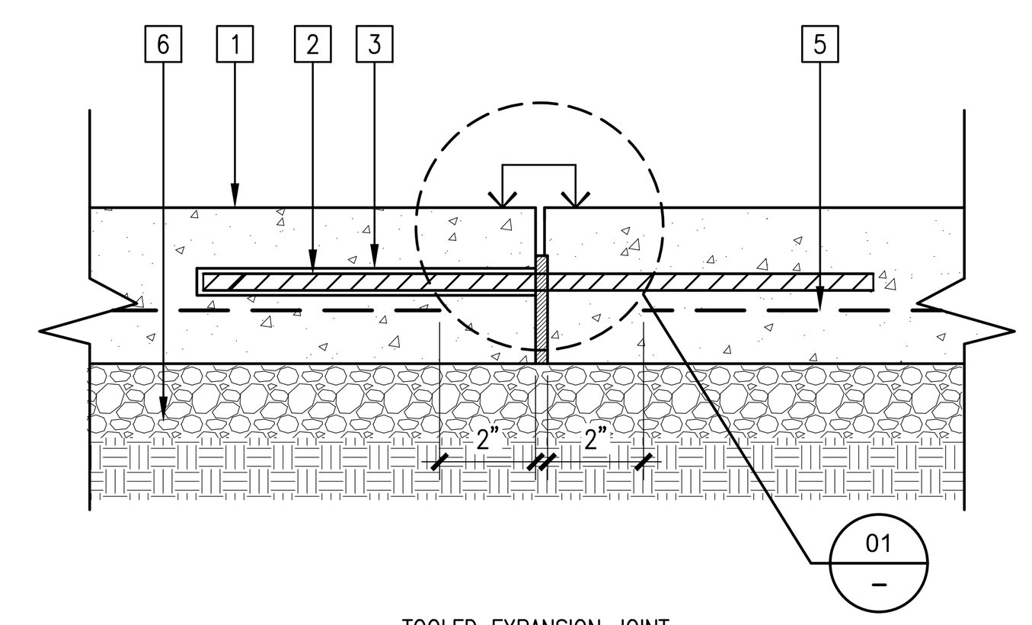
1. CONCRETE PAVING PER 04/–
2. ADJACENT SURFACE PER MATERIALS PLAN
3. #3 REBAR CONTINUOUS @ 18" O.C.
4. EXTEND REINFORCEMENT FROM PAVING INTO THICKENED EDGE & BEND ENDS
5. THICKENED EDGE
6. 9" DEPTH FOR PEDESTRIAN PAVING; 12" DEPTH FOR VEHICULAR PAVING
7. BASE MATERIAL & COMPACTED SUBGRADE PER 04/–

NOTES:
A. ADD EXPANSION JOINTS @ ALL THICKENED EDGE CONDITIONS ADJACENT TO OTHER PAVING TYPES PER 06/–
B. EXPANSION JOINT @ CURB PER 05/–

CONC. PAVING W/ THICKENED EDGE — 1 1/2"=1'-0" — -



SAWCUT JOINT

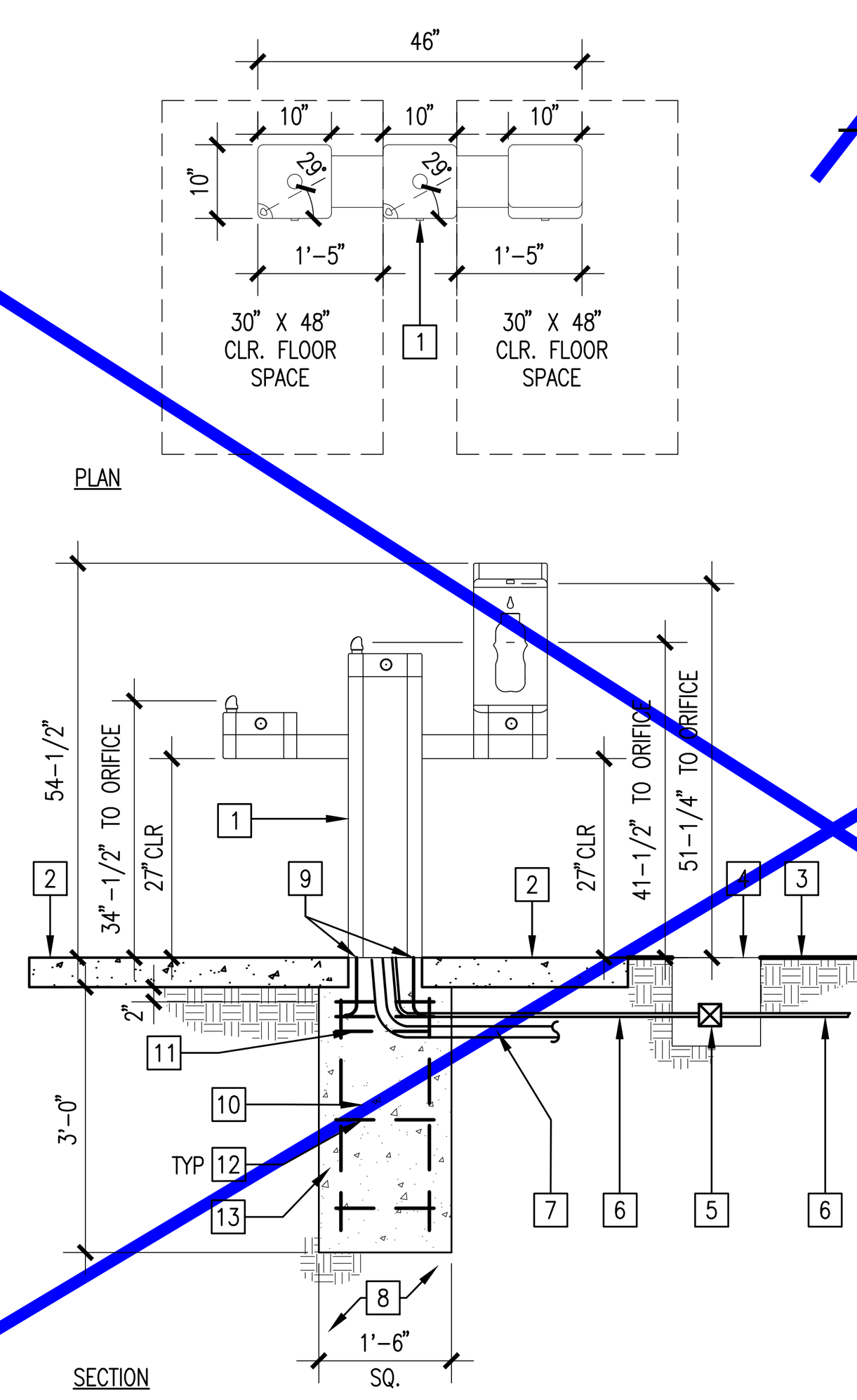


TOOLED EXPANSION JOINT

1. CONCRETE PAVING & JOINT LOCATION PER MATERIALS PLAN.
2. 1/2" SMOOTH STEEL DOWEL X 12" @ 24" O.C.
3. "SPEED DOWEL" BY "GREEN STREAK" CONCRETE ACCESSORIES. PRODUCT# PSD12/#4TX
4. 1/8" WIDE SAWCUT JOINT.
5. STEEL REINFORCEMENT PER 04/–
6. BASE MATERIAL & COMPACTED SUBGRADE PER 04/–
7. 1/4 DEPTH OF PAVING PLUS 1/4".

NOTES:
A. EXPANSION JOINT @ VERTICAL SURFACE PER 08/–
B. EXPANSION JOINT @ CURB PER 05/–
C. EXPANSION JOINT WHERE NEW CONCRETE TIES INTO EXISTING PER 06/–

CONTROL JOINTS — 3"=1'-0" — DT32PV30



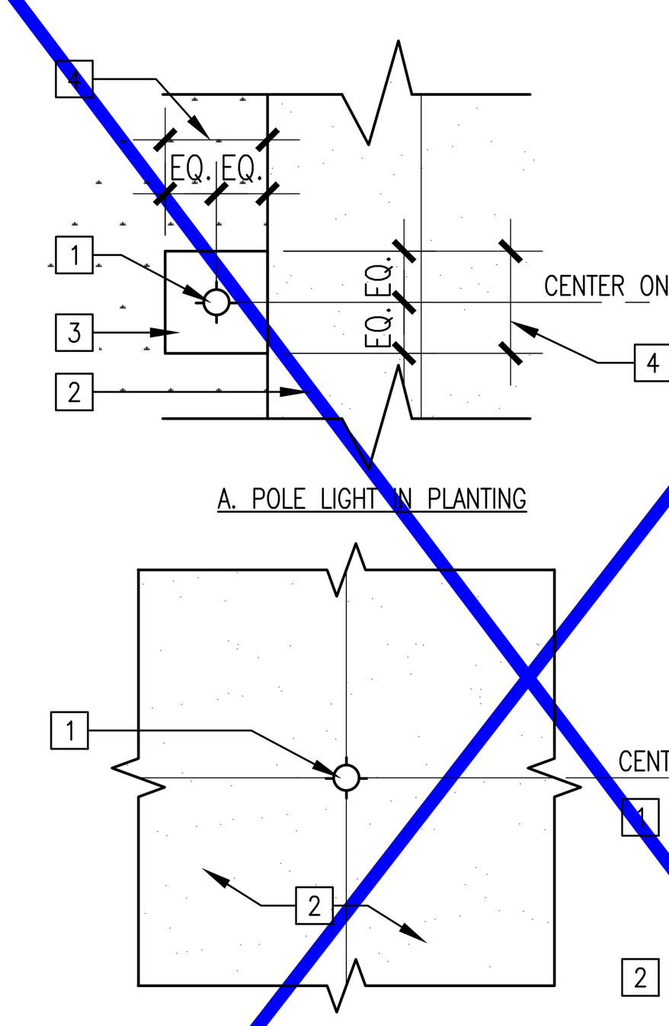
PLAN

SECTION

1. DRINKING FOUNTAIN WITH BOTTLE FILLER
2. CONCRETE PAVING PER MATERIALS PLAN. REFER TO KEYNOTE LEGEND FOR COLOR & FINISH.
3. FINISH GRADE.
4. REMOTELY LOCATE A 10" RND BLACK PLASTIC VALVE BOX IN AN ADJACENT PLANTER @ A LOCATION TO BE DETERMINED IN THE FIELD BY THE LANDSCAPE ARCHITECT.
5. CONTROL VALVE. SIZE PER MANUFACTURER.
6. 1/2" REINFORCED NYLOBROID TUBING. CONNECT TO STUB OUT PER CIVIL UTILITY PLANS.
7. 1 1/2" PVC DRAINLINE. CONNECT TO DRAINLINE PER CIVIL DRAINAGE PLANS.
8. COMPACTED SUBGRADE PER 04/-
9. (4) X 18" X 3/8"-#13 UNC CONCRETE ANCHOR BOLTS
10. CONCRETE FOOTING
11. #3 CLOSED TIES @ 12" O.C.
12. (3) #3 CLOSED TIES WITHIN TOP 5" OF CAISSON
13. (4) #3 VERTICAL BARS

NOTES:
A. CONTRACTOR TO VERIFY MODEL NUMBER AND QUANTITY PRIOR TO PLACING AN ORDER.
B. PER MANUFACTURERS INSTRUCTIONS CONTRACTOR TO ASSEMBLE MODULES TO SUIT THE ARCHITECTS LAYOUT OF MODULAR COMPONENTS.

DRINKING FOUNTAIN — 1/2"=1'-0" — - — 18



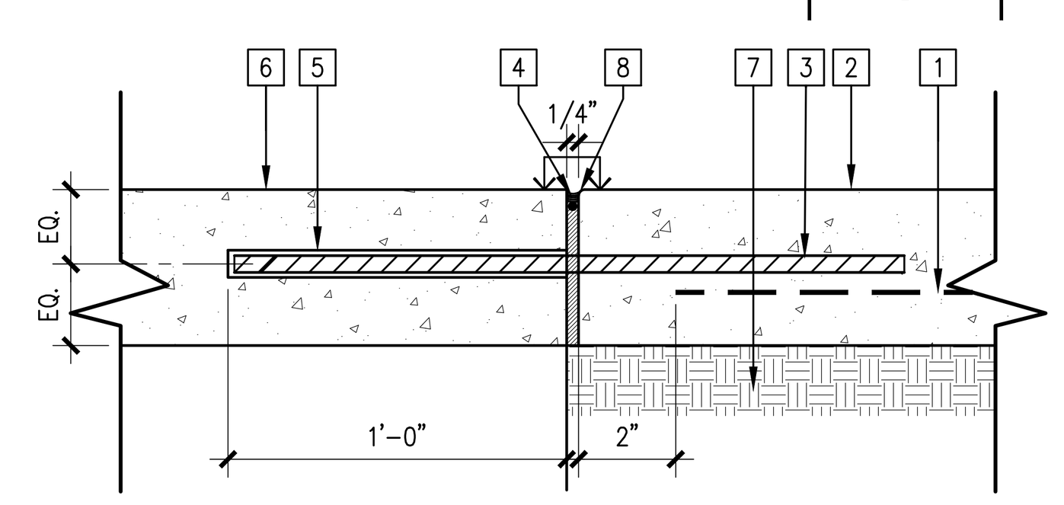
A. POLE LIGHT IN PLANTING

B. POLE LIGHT IN PAVING

1. POLE LIGHT PER ELECTRICAL PLANS. REFER TO SITE LIGHTING LEGEND FOR ADDITIONAL INFORMATION.
2. ADJACENT CONCRETE PAVING PER MATERIALS PLAN.
3. C.I.P. CONCRETE PAD FOR LIGHT POLE. COLOR & FINISH TO MATCH ADJACENT PAVING.
4. 1'-2" @ PEDESTRIAN POLE
1'-6" @ EVENT POLE

NOTE:
ADDITIONAL LIGHT POLE INFORMATION PER 09/- 08/E3.00

POLE LIGHT CONCRETE PAD — NTS — SAME — 10

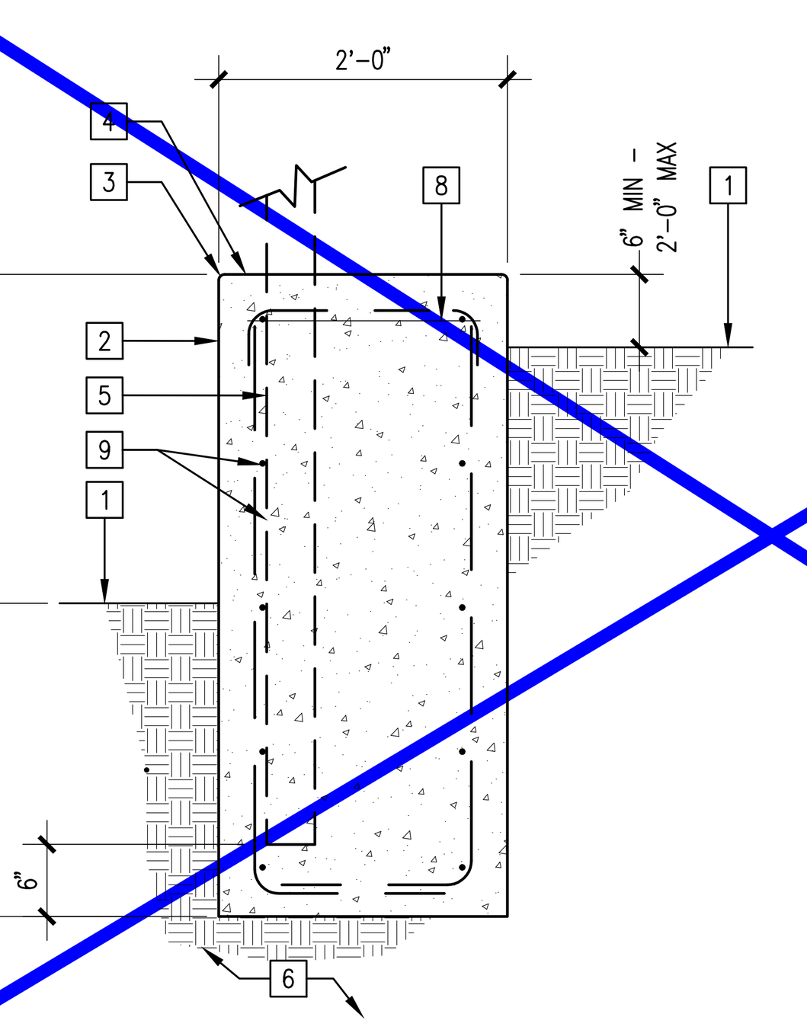


CONCRETE TIE-IN

1. STEEL REINFORCEMENT PER 04/–
2. PROPOSED CONCRETE PAVING. CONCRETE COLOR, FINISH AND JOINT LOCATIONS MATERIALS PLAN.
3. 1/2" X 24" SMOOTH STEEL DOWEL, 18" O.C.
4. EXPANSION JOINT PER 02/– SIM.
5. DRILLED 5/8" SLIP SLEEVE @ EXISTING CONCRETE PAVING. DOWEL TO HAVE FREE MOVEMENT THIS SIDE.
6. EXISTING CONCRETE PAVING
7. BASE MATERIAL AND COMPACTED SUBGRADE PER 04/–
8. 1/8" RADIUS, TYP.

NOTE:
A. PROVIDE AT ALL LOCATIONS WHERE NEW CONCRETE JOINS EXISTING CONCRETE.
B. PROVIDE CLEAN SAWCUT AT EXISTING PAVING. EXTEND PROPOSED PAVING AS REQUIRED TO CLOSEST ADJACENT JOINT.
C. SEE CIVIL PLANS FOR LIMIT OF DEMOLITION.

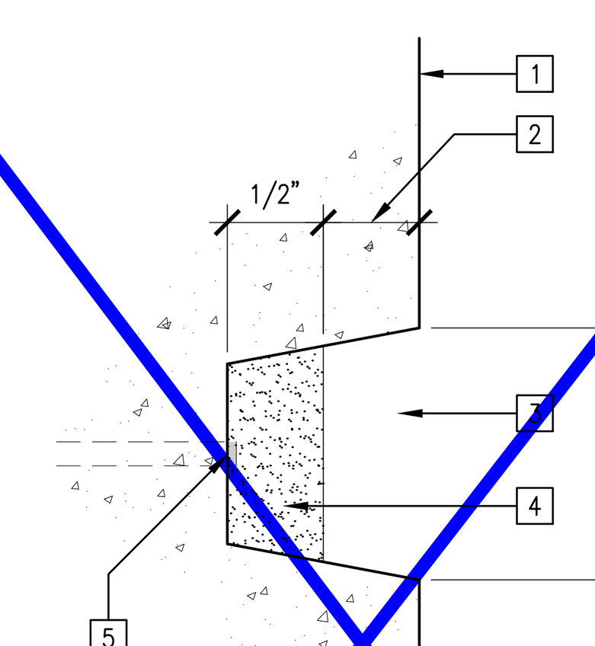
CONCRETE TIE IN — 3"=1'-0" — -



1. FINISH SURFACE/FINISH GRADE
2. CONCRETE WALL PER MATERIALS PLAN. REFER TO KEYNOTE LEGEND FOR COLOR & FINISH
3. 1/8" EASED EDGE RADIUS, TYP. ALL EDGES. NO CHAMFERS
4. TOP OF WALL PER CIVIL GRADING PLAN. HOLD DATUM LINE.
5. FENCE POST (WHERE OCCURS) PER 17/L5.02
6. SUBGRADE OVER-EXCAVATION AND COMPACTION PER GEOTECHNICAL REPORT
7. #4 @ 12" O.C.
8. (4) #5 CONTINUOUS AT TOP
9. #5 @ 12" O.C. EACH WAY

NOTES:
A. REVEAL/COLD JOINT PER 19/-
B. REFER TO PLANS/ELEVATIONS FOR LOCATION OF JOINTS.
C. ALL FORM SEAMS ARE TO ALIGN WITH REVEALS SHOWN ON ELEVATIONS & PLANS. PROVIDE CUSTOM FORM BOARDS AS REQUIRED.
D. INFILL @ SNAP TIE PER 13/-

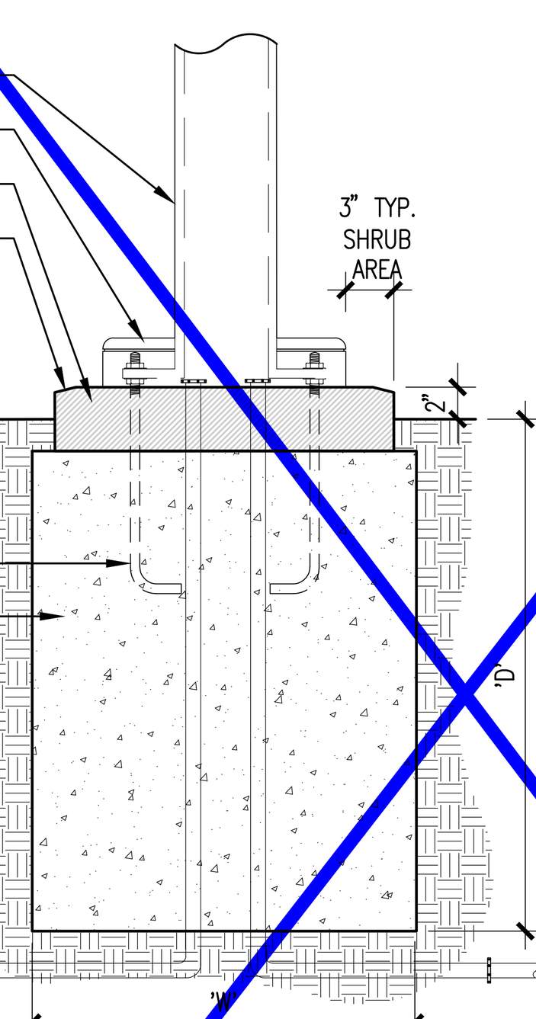
CONCRETE RETAINING WALL — 3/4" = 1'-0" — - — 17



1. FACE OF WALL
2. AS REQUIRED
3. VOID FROM SNAP TIE CONE
4. QUICK SET HYDRAULIC NON-SHRINK CEMENT
5. SNAP TIE – CUT FLUSH WITH BACK OF CONE VOID

NOTES:
A. ALL SNAP TIES TO BE ALIGNED VERTICALLY AND HORIZONTALLY ALONG THEIR CENTERLINES.
B. CONTRACTOR TO SUBMIT SHOP DRAWINGS OF SNAP TIE LAYOUT TO LANDSCAPE ARCHITECT PRIOR TO CONSTRUCTION.

INFILL AT SNAP TIE VOID — FULL — - — 13



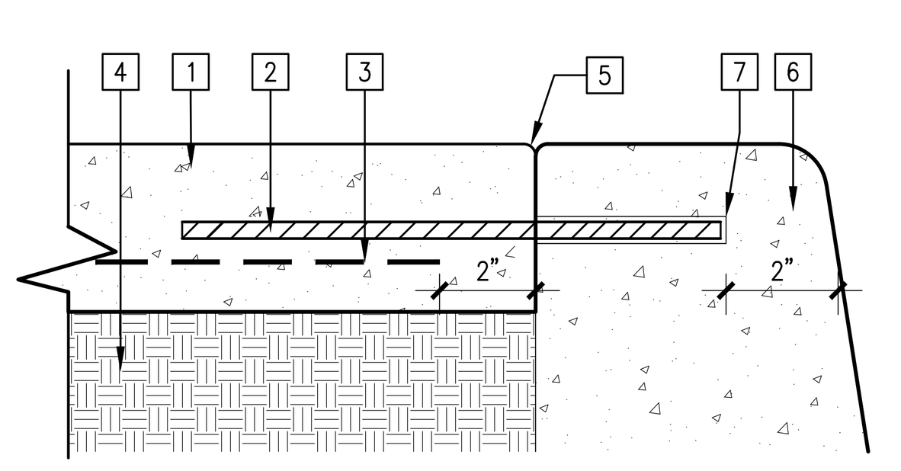
1. LIGHT POLE PER ELECTRICAL PLANS. SEE SHEET E1.00. FOR MORE INFORMATION.
2. POLE BASE COVER (IF REQURED). REFER TO ELECTRICAL PLANS FOR ADDITIONAL INFORMATION
3. FINISH GRADE @ PLANTING.
4. FINISHED SURFACE PER MATERIALS PLAN
5. C.I.P. CONCRETE FOOTING DIMENSIONS AND REINFORCEMENT PER CHART
6. CONDUIT & STUB OUT PER ELECTRICAL PLANS.
7. BASE MATERIAL & COMPACTED SUBGRADE PER THE GEOTECHNICAL REPORT.
8. ¼" RADIUS CONTINUOUS – TYPICAL
9. BASE PLATE AND ANCHOR BOLTS PER POLE MANUFACTURER SPEC'S.
10. AT PLANTING CONDITION – TOP 4" OF CONCRETE FOOTING TO BE SQUARE AND TRANSITION TO CIRCULAR BASE. REFER TO STRUCTURAL PLANS

NOTES:
1. REFER TO DETAIL 10 (THIS SHEET) FOR SCORE JOINT ALIGNMENT AT PAVING CONDITIONS
2. CONCRETE BASE AT LIGHT (CONDITION B) TO MATCH ADJACENT PAVING IN COLOR AND FINISH

LIGHT POLE FOOTING SCHEDULE

CAISSON DESCRIPTION	'H'	'D'	'W'	REINFORCEMENT
PEDESTRIAN POLE	15'-0"	4'-6"	18"	(6) #5 VERT. BARS, #3 STIRRUPS @ 6" O.C. (IN TOP 5")
EVENT POLE	25'-0"	5'-0"	24"	(8) #5 VERT. BARS, #3 STIRRUPS @ 6" O.C. (IN TOP 5")

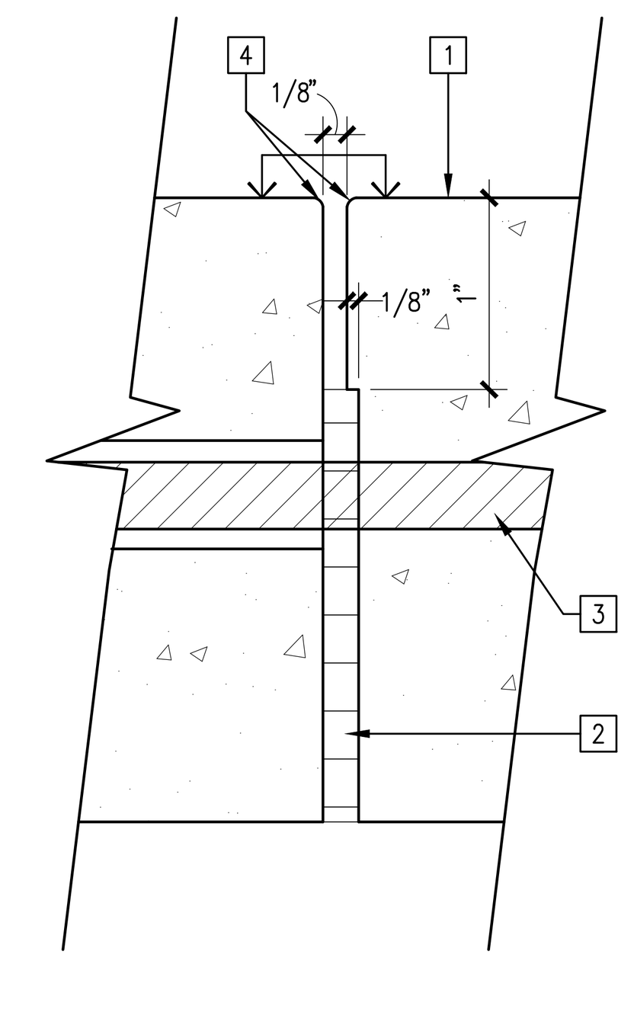
LIGHT POLE FOOTING — 1" = 1'-0" — SCALE — 09



1. CONCRETE PAVING PER MATERIALS PLAN.
2. DOWEL PER 02/–
3. STEEL REINFORCEMENT PER 04/–
4. BASE MATERIAL & COMPACTED SUBGRADE PER 04/–
5. 1/8" RADIUS
6. CONCRETE CURB PER CIVIL
7. DRILLED 5/8" DIA. SLIP SLEEVE @ CONCRETE CURB @ 24" O.C. DOWEL TO HAVE FREE MOVEMENT THIS SIDE

NOTES:
A. EXPANSION JOINT @ VERTICAL SURFACE PER 08/–

PAVING JOINT @ CURB — 3"=1'-0" — -



1. CONCRETE PAVING PER MATERIALS PLAN.
2. 1/4" EXPANSION MATERIAL. SEE SPEC.
3. DOWEL PER
4. 1/8" TOOLED RADIUS OR 1/8" SAW CUT

NOTES:
ADDITIONAL INFORMATION PER

LPA

LICENSED LANDSCAPE ARCHITECT — CORRIE G. LINDSAY NO. 5955 — SIGNATURE — 4/30/2020 RENEWAL DATE — 10/28/2019 DATE — STATE OF CALIFORNIA

Developed for

Section 7: Project Specifications

SECTION 011000
SUMMARY

PART 1 GENERAL

1.01 PROJECT

A. Project Name: Tokay HS Site - Increment 1

B. Owner's Name: Lodi USD.

C. Architect's Name: LPA Inc.

1.02 OWNER OCCUPANCY

A. Owner intends to occupy the Project upon Substantial Completion.

B. Owner intends to occupy a certain portion of the Project prior to the completion date for the conduct of normal operations.

C. Cooperate with Owner to minimize conflict and to facilitate Owner's operations.

D. Schedule the Work to accommodate Owner occupancy.

1.03 CONTRACTOR USE OF SITE AND PREMISES

A. Arrange use of site and premises to allow:

1. Owner occupancy.
2. Work by Others.

B. Provide access to and from site as required by law and by Owner:

1. Emergency Building Exits During Construction: Keep all exits required by code open during construction period; provide temporary exit signs if exit routes are temporarily altered.
2. Do not obstruct roadways, sidewalks, or other public ways without permit.

C. Utility Outages and Shutdown:

1. Do not disrupt or shut down life safety systems, including but not limited to fire sprinklers and fire alarm system, without 7 days notice to Owner and authorities having jurisdiction.
2. Limit shutdown of utility services to two hours at a time, arranged at least 24 hours in advance with Architect.
3. Prevent accidental disruption of utility services to other facilities.

D. Controlled Substances: Use of tobacco products and other controlled substances on the Project site is not permitted.

1.04 WORK SEQUENCE

A. Construct Work in stages during the construction period:

1. Refer to Responsibility Matrix for Increment 2 scope of work coordination with work performed in Increment 3.

B. Coordinate construction schedule and operations with Owner.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 012100
ALLOWANCES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Owner Contingency allowance.

1.02 CONTINGENCY ALLOWANCE

A. Contractor's costs for products, delivery, installation, labor, insurance, payroll, taxes, bonding, equipment rental, overhead and profit will be included in Change Orders authorizing expenditure of funds from this Owner Contingency Allowance.

B. Funds will be drawn from the Owner Contingency Allowance only with Owner authorization via Change Order.

C. At closeout of Contract, funds remaining in Owner Contingency Allowance will be credited to Owner by Change Order.

1.03 ALLOWANCES SCHEDULE

A. Owner Contingency Allowance: Include the stipulated sum/price of $250,000 (Two hundred and fifty thousand dollars) for use upon Owner's instructions.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 012500
SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes administrative and procedural requirements for substitutions.

1.02 RELATED SECTIONS

A. Section 016000 - Product Requirements, for submittal procedures and contract document revisions initiated by Contractor.

1.03 DEFINITIONS

A. Project Completion: Final Completion, unless otherwise indicated.

B. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.

2. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to Contractor or Owner.

a. Substitutions for Convenience shall include any comparable ("or equivalent") product, including proposed changes to named products, proposed changes to listed manufacturers and proposed changes to basis-of-design products, unless a Substitution for Cause regarding the comparable products can be properly demonstrated by the Contractor.

1.04 SUBMITTALS

A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Substitution Request Form: Use facsimile of appropriate form provided in the Project Manual.

2. Documentation: Submit the information indicated below to provide the Architect with the minimum information necessary to fairly review and evaluate the proposed substitutions, proposed comparable products and proposed changes to specified products. Show compliance with requirements and the following, as applicable:

a. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.

b. Coordination information which will be necessary to accommodate proposed substitution, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate contractors.

c. Detailed side by side comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable specification section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.

d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.

e. Samples and mock-ups, where applicable or requested.

f. Certificates and qualification data, where applicable or requested.

g. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.

h. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.

i. Research reports evidencing compliance with building code in effect for Project, from ICC-ES or other code organizations acceptable to authorities having jurisdiction.

j. Detailed comparison of Contractor's construction schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.

k. Cost information, including a proposal of change, if any, in the Contract Sum.

l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.

m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven days of receipt of a request for substitution. Architect will notify Contractor through Construction Manager of acceptance or rejection of proposed substitution within fourteen days of receipt of request, or within fourteen days of receipt of additional information or documentation, whichever is later.

a. Forms of Acceptance: Change Order or Construction Change Directive. Architect's Supplemental Instructions may be used for minor changes in the Work.

b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

1.05 **QUALITY ASSURANCE**

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

1.06 **PROCEDURES**

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

PART 2 - PRODUCTS

2.01 **SUBSTITUTIONS**

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

1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect

will return requests without action, except to record noncompliance with these requirements:

a. Requested substitution is consistent with the Contract Documents and will produce indicated results.

b. Substitution request is fully documented and properly submitted.

c. Requested substitution will not adversely affect Contractor's construction schedule.

d. Requested substitution has received necessary approvals of authorities having jurisdiction.

e. Requested substitution is compatible with other portions of the Work.

f. Requested substitution has been coordinated with other portions of the Work.

g. Requested substitution provides specified warranty.

h. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

B. Substitutions for Convenience: Architect will consider requests for substitution if received within 35 days after the Notice of Award. Requests received after that time may be considered or rejected at discretion of Architect.

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

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

b. Requested substitution does not require extensive revisions to the Contract Documents.

c. Requested substitution is consistent with the Contract Documents and will produce indicated results.

d. Substitution request is fully documented and properly submitted.

e. Requested substitution will not adversely affect Contractor's construction schedule.

f. Requested substitution has received necessary approvals of authorities having jurisdiction.

g. Requested substitution is compatible with other portions of the Work.

h. Requested substitution has been coordinated with other portions of the Work.

i. Requested substitution provides specified warranty.

j. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

PART 3 - EXECUTION (NOT USED)

END OF SECTION 012500.00

SUBSTITUTION REQUEST - FORM "A"

- For use during BIDDING period -

Project Name:	**Job No.** **Date:**
To: Architect: **LPA, Inc.**	**Contractor:**
Specified Item:	

Specification Section	Paragraph No.	Drawing No.	Detail No.

Contractor's Proposed Substitution:

Reason For Request: _____

_____

Manufacturer: _____

Manufacturer Contact: _____

Manufacturer Telephone: _____

Trade Name and Model: _____

History: ☐**New Product** ☐**1-4 years in market** ☐**5-10 years in market** ☐**over 11 years in market**

Mandatory for Consideration: Specification Section 012500– Substitution Procedures

☐**Drawings** ☐**Product Data** ☐**Samples** ☐**Test Data** ☐**Reports** ☐**Other** _____

Attach a **Point-by-Point Comparison** between proposed product and product indicated. Provide complete data for proposed product, including product / material descriptions, specifications, drawings, photographs, performance, MSDS data sheet and test data adequate for evaluation of the request. Clearly annotate applicable portions of the data. Include ICC Evaluation Service (ICC ES) Evaluation Report, if applicable.

The Undersigned certifies:
- Proposed substitution has been fully investigated and determined to be equivalent or superior in all respects to specified product.
- Proposed substitution complies with applicable Codes, ordinances and standards.
- Proposed substitution complies with Contract requirements.
- Same warranty will be furnished for proposed substitution as for specified products.
- Same maintenance service and source of replacement parts, as applicable, are available.
- Proposed substitution will have no adverse effect on related Work and will not affect or delay progress of the Work.
- Proposed substitution does not affect dimensions and functional clearances.
- Payment will be made for changes to building design, including A/E design, detailing, and construction costs caused by the substitution.

Submitted by: (name)_____ **Title:** _____

Signed: _____ **Date:** _____

SUBSTITUTION REQUEST - FORM "A"

- For use during BIDDING period -

Architect's Recommended Action:

☐ **Approved.** Refer to Addendum #____

☐ **Approved As Noted.** Refer to Addendum # ____

☐ Proposed substitution SUBJECT to receive approval by Division of the State Architect (DSA) for compliance with applicable provisions of California Code of Regulations (CCR), Title 24 of the California Building Standards Code (CBSC).

☐ **Rejected - Use specified product / materials.**

☐ **Request received too late - Use specified product / materials.**

☐ **Request does not have DSA approval - Use specified product / materials.**

Name:_____ **Date:**_____

Remarks:_____

_____

_____

SUBSTITUTION REQUEST - FORM "B"

- For use AFTER execution of Contract -

Project Name: Tokay HS Site - Increment 1	**LPA Inc. Job No.** 18180.10
	Substitution No.
To: LPA Inc.	**Contractor:**

Specified Item:

Specification Section	Paragraph No.	Drawing No.	Detail No.

Contractor's Proposed Substitution:

Reason For Request: _____

_____

Manufacture: _____

Manufacturer Contact: _____

Manufacturer and Telephone: _____

Trade Name and Model: _____

Mandatory for Consideration: (Specification Section 012500 – Substitution Procedures)

☐**Drawings** ☐**Product Data** ☐**Samples** ☐**Test Data** ☐**Reports** ☐**Other** _____

Attach a **Point-by-Point comparison against detailed and specified products** with complete data, including product / material descriptions, specifications, drawings, photographs, performance, MSDS data sheet and test data adequate for evaluation of the request. Clearly annotate applicable portions of the data. Include ICC Evaluation Service (ICC ES) Evaluation Report, if applicable.

The Undersigned certifies:
- Proposed substitution has been fully investigated and determined to be equivalent or superior in all respects to specified product.
- Proposed substitution complies with applicable Codes, ordinances and standards.
- Same warranty will be furnished for proposed substitution as for specified products.
- Same maintenance service and source of replacement parts, as applicable, are available.
- Proposed substitution will have no adverse effect on related Work and will not affect or delay progress of the Work.
- Proposed substitution does not affect dimensions and functional clearances.
- Payment will be made for changes to building design, including A/E design, detailing, and construction costs caused by the substitution.

Submitted by: (name)_____ **Title:** _____

Signed: _____ **Date:** _____

Architect's Recommended Action:

☐ **Approved.** Refer to Change Order #____

☐ **Approved As Noted.** Refer to Change Order # ____

☐ **Rejected - Use specified product / materials.**

Name:_____ **Date:**_____

Remarks:_____

_____

SECTION 012600
CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes administrative and procedural requirements for handling and processing Contract modifications.

B. Related Requirements:

1. Division 01 Sections "Substitution Procedures" for administrative procedures for handling requests for substitutions made after Contract award.

1.02 MINOR CHANGES IN THE WORK

A. Architect may issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on the following form:

1. AIA Document G710, "Supplemental Instructions" or similar form acceptable to the Architect.

1.03 PROPOSAL REQUESTS

A. Owner-Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.

1. Proposal Requests issued by Architect are not instructions either to stop work in progress or to execute the proposed change.

2. Within time specified in Proposal Request or twenty days, when not otherwise specified, after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.

a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.

b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.

c. Include costs of labor and supervision directly attributable to the change.

d. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.

e. Quotation Form: Use form acceptable to Architect.

B. Contractor-Initiated Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Architect.

1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.

2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.

3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
4. Include costs of labor and supervision directly attributable to the change.
5. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
6. Comply with requirements in Division 01 Section "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.
7. Proposal Request Form: Use form acceptable to Architect.

1.04 **CHANGE ORDER PROCEDURES**

A. On Owner's approval of a Proposal Request, Architect will issue a Change Order for signatures of Owner and Contractor on AIA Document G701, or similar form.

1.05 **CONSTRUCTION CHANGE DIRECTIVE**

A. Construction Change Directive: Architect may issue a Construction Change Directive on AIA Document G714 or similar form. Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
   1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.

B. Documentation: Unless otherwise directed, provide detailed change pricing prior to actual change in Work. When directed, and when change pricing cannot be completed and agreed prior to actual change in Work, maintain detailed records on a time and material basis of work required by the Construction Change Directive.
   1. Submit an itemized account and supporting data necessary to substantiate cost adjustments to the Contract.
      a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If required or requested, furnish survey data to substantiate quantities.
         1) Provide invoices and billing statements supporting material and labor costs.
      b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
      c. Include costs of labor and supervision directly attributable to the change.
         1) Provide copies of detailed daily reports, verified by Project inspector, or accepted third party, supporting labor and supervision costs.
      d. Include overhead and profit itemization.
         1) Overhead and profit shall not exceed 10% for work directly self-performed by Subcontractor.
         2) Overhead and profit shall not exceed 5% for any work not directly self-performed by Contractor.
      e. Include bond costs where change amount causes Contract Sum to exceed bonded amount.
         1) Bond costs shall not exceed 1.5% of the proposed cost adjustment.

2. Submit an itemized account and supporting data necessary to substantiate time adjustments to the Contract.
    a. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 012600

SECTION 012900
PAYMENT PROCEDURES

PART 1 - GENERAL

1.01 SUMMARY

A. This Section specifies administrative and procedural requirements necessary to prepare and process Applications for Payment.

B. Related Requirements:

1. Division 01 Section "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.
2. Division 01 Section "Construction Progress Documentation" for administrative requirements governing the preparation and submittal of the Contractor's construction schedule.
3. Division 01 Section "Submittal Procedures" for administrative requirements governing the preparation and submittal of the submittal schedule.

1.02 DEFINITIONS

A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

1.03 SCHEDULE OF VALUES

A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule.

1. Correlate line items in the schedule of values with other required administrative forms and schedules, including the following:
    a. Application for Payment forms with continuation sheets.
    b. Submittal schedule.
    c. Items required to be indicated as separate activities in Contractor's construction schedule.
2. Submit the schedule of values to Architect at earliest possible date but no later than ten days before the date scheduled for submittal of initial Application for Payment.
3. Subschedules for Separate Design Contracts: Where the Owner has retained design professionals under separate contracts who will each provide certification of payment requests, provide subschedules showing values coordinated with the scope of each design services contract as described in Division 01 Section "Summary."

B. Format and Content: Use the Project Manual table of contents as a guide to establish line items for the schedule of values. Provide at least one line item for each Specification Section. Provide additional detail as required or requested.

1. Identification: Include the following Project identification on the schedule of values:
    a. Project name and location.
    b. Name of Architect.
    c. Architect's project number.
    d. Contractor's name and address.
    e. Date of submittal.
2. Arrange schedule of values consistent with format of AIA Document G703.

3. Arrange the schedule of values in tabular form with separate columns to indicate the following for each item listed:
    a. Item number.
    b. Description of the Work.
    c. Dollar value.
        1) Labor.
        2) Materials.
        3) Equipment.
4. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual table of contents. Provide at least two line items for principal subcontract amounts in excess of five percent of Contract Sum, as follows:
    a. Labor
    b. Equipment and material.
5. Include separate line items under Division 01 heading for prime contract and principal subcontracts for project closeout requirements in an amount of at least five percent of the Contract Sum and subcontract amounts.
6. Round all amounts to nearest whole dollar; total shall equal the Contract Sum.
7. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
    a. Differentiate between items stored on-site and items stored off-site.
8. Provide separate line items in the schedule of values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
9. Allowances: Provide a separate line item in the schedule of values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.
10. Purchase Contracts: Provide a separate line item in the schedule of values for each purchase contract. Show line-item value of purchase contract. Indicate owner payments or deposits, if any, and balance to be paid by Contractor.
11. Each item in the schedule of values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.
    a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the schedule of values or distributed as general overhead expense, at Contractor's option.
12. Schedule Updating: Update and resubmit the schedule of values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.04 **APPLICATIONS FOR PAYMENT**

A. Each Application for Payment shall be consistent with previous applications and payments as certified by Architect and paid for by Owner.

1. Initial Application for Payment, Application for Payment at time of Project Completion, and final Application for Payment involve additional requirements.

B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction work covered by each Application for Payment is the period indicated in the Agreement.

C. Payment Application Times: Progress payments shall be submitted to Architect by the twenty-fifth day of the month. The period covered by each Application for Payment is one month, ending on the last day of the month.

1. Submit draft copy of Application for Payment five days prior to due date for review by Architect.

D. Application for Payment Forms: Use AIA Document G702 and AIA Document G703 or similar form acceptable to Architect as form for Applications for Payment.

E. Application for Payment Forms: Use forms provided by Owner for Applications for Payment. Sample copies are included in the Project Manual.

F. Application for Payment Forms: Use forms acceptable to Architect and Owner for Applications for Payment. Submit forms for approval with initial submittal of schedule of values.

G. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.

1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.

2. Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.

3. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.

4. Indicate separate amounts for work being carried out under Owner-requested project acceleration.

H. Transmittal: Submit five signed and notarized original copies of each Application for Payment to Architect by a method ensuring receipt within 24 hours. Owner's copy shall include waivers of lien and similar attachments.

1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.

I. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's lien from entities lawfully entitled to file a mechanic's lien arising out of the Contract and related to the Work covered by the payment.

1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.

2. When an application shows completion of an item, submit conditional final or full waivers.

3. Owner reserves the right to designate which entities involved in the Work must submit waivers.

4. Waiver Forms: Submit waivers of lien on forms complying with California law, executed in a manner acceptable to Owner.

J. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's liens from subcontractors, sub-subcontractors, and suppliers for construction period covered by the previous application.

1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
2. When an application shows completion of an item, submit conditional final or full waivers.
3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
4. Submit final Application for Payment with or preceded by conditional final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
5. Waiver Forms: Submit waivers of lien on forms, executed in a manner acceptable to Owner.

K. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:

1. List of subcontractors.
2. Schedule of values.
3. Contractor's construction schedule (preliminary if not final).
4. Submittal schedule (preliminary if not final).
5. List of Contractor's principal consultants.
6. Copies of building permits.
7. Initial progress report.
8. Report of preconstruction conference.

L. Application for Payment at Project Completion: Submit an Application for Payment showing 100 percent completion for portion of the Work claimed as complete.

1. Include documentation supporting claim that the Work is complete and a statement showing an accounting of changes to the Contract Sum.
2. This application shall reflect any Certificates of Partial Project Completion issued previously for Owner occupancy of designated portions of the Work.

M. Final Payment Application: After completing project closeout requirements, submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:

1. Evidence of completion of Project closeout requirements.
2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
3. Updated final statement, accounting for final changes to the Contract Sum.
4. Final, unconditional lien releases (in exchange for final payment).
5. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
6. AIA Document G706A, "Contractor's Affidavit of Release of Liens."
7. AIA Document G707, "Consent of Surety to Final Payment."
8. Evidence that claims have been settled.

9. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Project Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
10. Final liquidated damages settlement statement.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 012900.00

SECTION 013100
PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:

1. General project coordination procedures.
2. Coordination drawings.
3. Requests for Information (RFIs).
4. Project meetings.

B. Related Requirements:

1. Division 01 Section "Construction Progress Documentation" for preparing and submitting Contractor's construction schedule.
2. Division 01 Section "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
3. Division 01 Section "Closeout Procedures" for coordinating closeout of the Contract.

1.02 DEFINITIONS

A. Project Completion: Final Completion, unless otherwise indicated.

B. RFI: Request from Owner, Construction Manager, Architect, or Contractor seeking information from each other during construction.

1.03 INFORMATIONAL SUBMITTALS

A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:

1. Name, address, and telephone number of entity performing subcontract or supplying products.
2. Number and title of related Specification Section(s) covered by subcontract.
3. Drawing number and detail references, as appropriate, covered by subcontract.
4. Key Personnel Names: Within 15 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home, office, and cellular telephone numbers and e-mail addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.

1.04 GENERAL COORDINATION PROCEDURES

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

1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.

2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
3. Make adequate provisions to accommodate items scheduled for later installation.

B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.

1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.

C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

1. Preparation of Contractor's construction schedule.
2. Preparation of the schedule of values.
3. Installation and removal of temporary facilities and controls.
4. Delivery and processing of submittals.
5. Progress meetings.
6. Preinstallation conferences.
7. Project closeout activities.
8. Startup and adjustment of systems.

D. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.

1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. Refer to other Sections for disposition of salvaged materials that are designated as Owner's property.

1.05 **COORDINATION DRAWINGS**

A. Coordination Drawings, General: Prepare coordination drawings in accordance with requirements in individual Sections, where installation is not completely shown on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.

1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Prepare coordination drawings to comply with accepted industry drafting standards. Do not base coordination drawings on standard printed data. Include the following information, as applicable:

a. Applicable Drawings may be used as a basis for preparation of coordination drawings, provide title blocks, stamps and certifications are removed. Prepare additional sections, elevations, and details as needed to describe relationship of various systems and components.

1) Provide review stamp, with signature and date, of each trade proposed to work within the opening or penetration

b. Coordinate the addition of trade-specific information to the coordination drawings by multiple contractors in a sequence that best provides for coordination of the information and resolution of conflicts between installed components before submitting for review.

1) Provide review stamp, with signature and date, of each contractor and trade proposed to work within the opening or penetration.

c. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.

1) Grid lines and levels, and references to appropriate Contract drawings.

2) Location and dimensions of openings and penetrations.

d. Indicate dimensions shown on the Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.

e. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.

f. Show location and size of access doors required for access to concealed dampers, valves, and other controls.

g. Indicate required installation sequences.

B. Coordination Drawing Organization: Organize coordination drawings as follows:

1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire protection, fire alarm, and electrical Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid. Supplement plan drawings with section drawings where required to adequately represent the Work.

2. Plenum Space: Indicate subframing for support of ceiling and wall systems, mechanical and electrical equipment, and related Work. Locate components within ceiling plenum to accommodate layout of light fixtures indicated on Drawings. Indicate areas of conflict between light fixtures and other components.

3. Mechanical Rooms: Provide coordination drawings for mechanical rooms showing plans and elevations of mechanical, plumbing, fire protection, fire alarm, and electrical equipment.

4. Structural Penetrations: Indicate penetrations and openings required for all disciplines.

a. Include all items located within the opening or penetration, and dimensioned clearance to edge of penetration. Include framing, equipment, suspension systems, piping, ductwork, cable systems and other construction. Include insulation, supports, clamps, sealants and accessory items.

5. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.

6. Mechanical and Plumbing Work: Show the following:

a. Sizes and bottom elevations of ductwork, piping, and conduit runs, including insulation, bracing, flanges, and support systems.

b. Dimensions of major components, such as dampers, valves, diffusers, access doors, cleanouts and electrical distribution equipment.

c. Fire-rated enclosures around ductwork.

7. Electrical Work: Show the following:

a. Runs of vertical and horizontal conduit 1-1/4 inches (32 mm) diameter and larger.

b. Light fixture, exit light, emergency battery pack, smoke detector, and other fire alarm locations.

c. Panel board, switch board, switchgear, transformer, busway, generator, and motor control center locations.

d. Location of pull boxes and junction boxes, dimensioned from column center lines.

8. Fire Protection System: Show the following:

a. Locations of standpipes, mains piping, branch lines, pipe drops, and sprinkler heads.

9. Review: Architect will review coordination drawings to confirm that the Work is being coordinated, but not for the details of the coordination, which are the Contractor's responsibility. If the Architect determines that the coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, the Architect will so inform the Contractor, who shall make changes as directed and resubmit.

10. Coordination Drawing Prints: Prepare coordination drawing prints in accordance with requirements of Division 01 Section "Submittal Procedures."

C. Coordination Digital Data Files: At Contractor's option, prepare coordination digital data files in accordance with the requirements of Division 01 Section "Submittal Procedures."

1. File Preparation Format: DWG, Version , operating in Microsoft Windows operating system.

1.06 **REQUESTS FOR INFORMATION (RFIS)**

A. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.

1. Architect will return RFIs submitted to Architect by other entities controlled by Contractor with no response.

2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.

B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:

1. Project name.

2. Project number.

3. Date.

4. Name of Contractor.

5. Name of Architect and Construction Manager.

6. RFI number, numbered sequentially.

7. RFI subject.

8. Specification Section number and title and related paragraphs, as appropriate.

9. Drawing number and detail references, as appropriate.

10. Field dimensions and conditions, as appropriate.

11. Contractor's suggested resolution. If Contractor's solution(s) impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.

12. Contractor's signature.

13. Attachments: Include sketches, descriptions, measurements, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe

items needing interpretation.

a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.

b. Photographs shall not be accepted as a substitute for engineering sketches. Photographs may be submitted as supplements to properly prepared sketches and coordination drawings.

C. RFI Forms: Form bound in the Project Manual, or other software-generated form with substantially the same content as indicated above, acceptable to Architect and Construction Manager.

1. Attachments shall be electronic files in Adobe Acrobat PDF format.

D. Architect's and Construction Manager's Action: Architect and Construction Manager will review each RFI, determine action required, and respond. Allow seven working days for Architect's response for each RFI. RFIs received by Architect or Construction Manager after 1:00 p.m. will be considered as received the following working day.

1. The following RFIs will be returned without action:

a. Requests for approval of submittals.

b. Requests for approval of substitutions.

c. Requests for approval of Contractor's means and methods.

d. Requests for coordination information already indicated in the Contract Documents.

e. Requests for adjustments in the Contract Time or the Contract Sum.

f. Requests for interpretation of Architect's actions on submittals.

g. Incomplete RFIs or inaccurately prepared RFIs.

2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt of additional information.

3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Division 01 Section "Contract Modification Procedures."

a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect and Construction Manager in writing within seven days of receipt of the RFI response.

4. Name and address of Architect and Construction Manager.

5. Date Architect's and Construction Manager's response was received.

E. On receipt of Architect's and Construction Manager's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect and Construction Manager within seven days if Contractor disagrees with response.

1. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.

2. Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate.

F. Upon completion of Project, submit three complete archive copies of Project Web site files to Owner, Construction Manager and to Architect in a digital storage format acceptable to the Architect.

G. Contractor, subcontractors, and other parties granted access by the Contractor to project Web site shall execute a data licensing agreement in the form of an Agreement acceptable to the Owner, Construction Manager and Architect.

1.07 **PROJECT MEETINGS**

A. General: Construction Manager will schedule and conduct basic meetings and conferences at Project site, unless otherwise indicated.

1. Attendees: Entity responsible for conducting meeting will inform participants and others involved, and individuals whose presence is required, of date and time of each meeting.
2. Agenda: Entity responsible for conducting meeting will prepare and distribute the meeting agenda.
3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved, and distribute the meeting minutes to everyone concerned, within seven days of the meeting.

B. Preconstruction Conference: Construction Manager will schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than fifteen days after execution of the Agreement.

1. Conduct the conference to review responsibilities and personnel assignments.
2. Attendees: Authorized representatives of Owner, Construction Manager, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
3. Agenda: Discuss items of significance that could affect progress, including the following:
    a. Tentative construction schedule.
    b. Phasing.
    c. Critical work sequencing and long-lead items.
    d. Designation of key personnel and their duties.
    e. Lines of communications.
    f. Procedures for processing field decisions and Change Orders.
    g. Procedures for RFIs.
    h. Procedures for testing and inspecting.
    i. Procedures for processing Applications for Payment.
    j. Distribution of the Contract Documents.
    k. Submittal procedures.
    l. Sustainable design requirements.
    m. Preparation of record documents.
    n. Use of the premises.
    o. Work restrictions.
    p. Working hours.
    q. Owner's occupancy requirements.
    r. Responsibility for temporary facilities and controls.

s. Procedures for moisture and mold control.

t. Procedures for disruptions and shutdowns.

u. Construction waste management and recycling.

v. Parking availability.

w. Office, work, and storage areas.

x. Equipment deliveries and priorities.

y. First aid.

z. Security.

aa. Progress cleaning.

bb. Labor law, including payment and reporting requirements.

4. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.

C. Preinstallation Conferences: Contractor shall conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.

1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting.

a. Advise the following of scheduled meeting dates:

1) Construction Manager

2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:

a. Contract Documents.

b. Options.

c. Related RFIs.

d. Related Change Orders.

e. Purchases.

f. Deliveries.

g. Submittals.

h. Sustainable design requirements.

i. Review of mockups.

j. Possible conflicts.

k. Compatibility problems.

l. Time schedules.

m. Weather limitations.

n. Manufacturer's written recommendations.

o. Warranty requirements.

p. Compatibility of materials.

q. Acceptability of substrates.

r. Temporary facilities and controls.

s. Space and access limitations.

t. Regulations of authorities having jurisdiction.

u. Testing and inspecting requirements.

v. Installation procedures.

w. Coordination with other work.

x. Required performance results.

y. Protection of adjacent work.

z. Protection of construction and personnel.

3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.

4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.

5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.

D. Project Closeout Conference: The project closeout conference shall review requirements and responsibilities related to Project closeout.

1. If not conducted as part of a normally scheduled job progress meeting, Construction Manager will schedule and conduct a Project closeout conference, at a time convenient to Owner, Architect and Contractor, but no later than thirty days prior to the scheduled date of Project Completion.

2. Attendees: Authorized representatives of Owner, Architect, Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.

3. Agenda: Discuss items of significance that could affect or delay Project closeout, including the following:

a. Preparation of record documents.

b. Procedures required prior to inspection for Project Completion and for final inspection for acceptance.

c. Submittal of written warranties.

d. Requirements for completing sustainable design documentation.

e. Requirements for preparing operations and maintenance data.

f. Requirements for delivery of material samples, attic stock, and spare parts.

g. Requirements for demonstration and training.

h. Preparation of Contractor's punch list.

i. Procedures for processing Applications for Payment at Project Completion and for final payment.

j. Submittal procedures.

k. Coordination of separate contracts.

l. Requirements for completing sustainable design documentation.

m. Owner's partial occupancy requirements.

n. Installation of Owner's furniture, fixtures, and equipment.

o. Responsibility for removing temporary facilities and controls.

4. Minutes: Entity conducting meeting will record and distribute meeting minutes.

E. Progress Meetings: Construction Manager will conduct progress meetings at weekly intervals.

1. Coordinate preparation of payment requests with dates of meetings.
2. Attendees: In addition to representatives of Owner, Construction Manager, and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
3. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
    a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
        1) Review schedule for next period.
    b. Review present and future needs of each entity present, including the following:
        1) Interface requirements.
        2) Sequence of operations.
        3) Resolution of BIM component conflicts.
        4) Status of submittals.
        5) Status of sustainable design documentation.
        6) Deliveries.
        7) Off-site fabrication.
        8) Access.
        9) Site utilization.
        10) Temporary facilities and controls.
        11) Progress cleaning.
        12) Quality and work standards.
        13) Status of correction of deficient items.
        14) Field observations.
        15) Status of RFIs.
        16) Status of proposal requests.
        17) Pending changes.
        18) Status of Change Orders.
        19) Pending claims and disputes.
        20) Documentation of information for payment requests.
4. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.

a. Schedule Updating: Contractor shall revise construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Contractor shall provide revised schedule to reporting entity so that is may be issued concurrently with the report of each meeting.

F. Coordination Meetings: Project coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and preinstallation conferences.

1. Construction Manager will conduct project coordination meetings at weekly intervals. Revise first subparagraph below if Project requires coordination meetings on a monthly or weekly basis.

2. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meetings shall be familiar with Project and authorized to conclude matters relating to the Work.

3. Agenda: Review and correct or approve minutes of the previous coordination meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.

a. Combined Contractor's Construction Schedule: Review progress since the last coordination meeting. Determine whether each contract is on time, ahead of schedule, or behind schedule, in relation to combined Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.

b. Schedule Updating: Revise combined Contractor's construction schedule after each coordination meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with report of each meeting.

c. Review present and future needs of each contractor present, including the following:

1) Interface requirements.

2) Sequence of operations.

3) Resolution of BIM component conflicts.

4) Status of submittals.

5) Deliveries.

6) Off-site fabrication.

7) Access.

8) Site utilization.

9) Temporary facilities and controls.

10) Work hours.

11) Hazards and risks.

12) Progress cleaning.

13) Quality and work standards.

14) Change Orders.

4. Reporting: Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 013100

REQUEST FOR INTERPRETATION

LPA

Project Name: Tokay HS Site - Increment 1	**LPA Inc. Job No.** 18180.10 **RFI No.**
To: LPA Inc. **431 I Street, Suite 107** **Sacramento CA 95814**	**Contractor:**
Subject:	

Specified Section	Paragraph No.	Drawing No.	Detail No.

Category:

- ☐ **Need for Clarification**
- ☐ **Unforeseen Condition**
- ☐ **Conflict Within Documents**
- ☐ **Coordination Problem**
- ☐ **Other**

Description:

Contractor's Proposed Resolution:

- ☐ **Attachments:**
- ☐ **Cost Impact: $** **(Estimated)** ☐ **Time Impact:**

Contractor Signature	**Date:**

Architect's Response:

- ☐ **Attachments:**

Architect Signature:	**Date:**

SECTION 013200
CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.01 SUMMARY

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

1. Contractor's construction schedule.
    a. Upcoming Work Summaries (Short Interval Schedules).
2. Construction schedule updating reports.
3. Special reports.

B. Related Requirements:

1. Division 01 Section "DSA Quality Requirements" for submitting a schedule of tests and inspections.

1.02 DEFINITIONS

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

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

B. Cost Loading: The allocation of the schedule of values for the completion of an activity as scheduled. The sum of costs for all activities must equal the total Contract Sum, unless otherwise approved by Architect.

C. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Relational calculations determine when activities can be performed and the critical path of the Project.

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

E. Event: The starting or ending point of an activity.

F. Float: The measure of leeway in starting and completing an activity.

1. Float time is not for the exclusive use or benefit of either Owner or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.
2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.

G. Project Completion: Substantial Completion.

H. Project Completion: Final Completion.

1.03 INFORMATIONAL SUBMITTALS

A. Format for Submittals: Submit required submittals in the following formats, of size required to display entire schedule for entire construction period:

1. Paper copies, in the number required by Division 01 Section "Submittal Procedures."

B. Start-up construction schedule.

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

D. CPM Reports: Concurrent with CPM schedule, submit each of the following reports. Format for each activity in reports shall contain activity number, activity description, cost and resource loading, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float in calendar days.

1. Activity Report: List of all activities sorted by activity number and then early start date, or actual start date if known.
2. Logic Report: List of preceding and succeeding activities for all activities, sorted in ascending order by activity number and then early start date, or actual start date if known.
3. Total Float Report: List of all activities sorted in ascending order of total float.
4. Earnings Report: Compilation of Contractor's total earnings from the Notice to Proceed until most recent Application for Payment.

E. Material Location Reports: Submit at monthly intervals.

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

G. Qualification Data: For scheduling consultant.

1.04 **QUALITY ASSURANCE**

A. Prescheduling Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination." Review methods and procedures related to the preliminary construction schedule and Contractor's construction schedule, including, but not limited to, the following:

1. Discuss constraints, including work stages.

1.05 **COORDINATION**

A. Coordinate preparation and processing of schedules and reports with performance of construction activities and with scheduling and reporting of separate contractors.

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

1. Secure time commitments for performing critical elements of the Work from entities involved.
2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

C. Contract Time generally refers to calendar days. Coordinate working days, nonworking days and holidays as required to correlate with Contract Time.

PART 2 - PRODUCTS

2.01 **CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL**

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

B. Activities: Treat each building, story or separate area as a separate numbered activity group for each principal element of the Work, as applicable. Comply with the following:

1. Activity Duration: Define activities so no activity is longer than twenty days, unless specifically allowed by Architect.

2. Procurement Activities: Include procurement process activities for the following long lead items and other major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
3. Submittal Review Time: Include review and resubmittal times indicated in Division 01 Section "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's construction schedule with submittal schedule.
4. Startup and Testing Time: Include not less than fourteen days for startup and testing.
5. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's and Construction Manager's administrative procedures necessary for certification of Substantial Completion.
6. Punch List and Final Completion: Include not more than thirty days for punch list and final completion.

C. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.
1. Work Restrictions: Show the effect of the following items on the schedule:
a. Coordination with existing construction.
b. Uninterruptible services.
c. Use of premises restrictions.
d. Environmental control.

D. Upcoming Work Summaries (Short Interval Schedules): Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update, but not less than two week's activity. Submit an updated upcoming work schedule at each job progress meeting. Summarize the following issues:
1. Unresolved issues.

2.02 START-UP CONSTRUCTION SCHEDULE

A. Bar-Chart Schedule: Submit start-up horizontal bar-chart-type construction schedule within seven days of date established for the Notice to Proceed.

B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line. Outline significant construction activities for first 90 days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.

2.03 CONTRACTOR'S CONSTRUCTION SCHEDULE (GANTT CHART)

A. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.
1. For construction activities that require three months or longer to complete, indicate an estimated completion percentage in 10 percent increments within time bar.

2.04 CONTRACTOR'S CONSTRUCTION SCHEDULE (CPM SCHEDULE)

A. Start-up Network Diagram: Submit diagram within 14 days of date established for the Notice to Proceed. Outline significant construction activities for the first 90 days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.

B. CPM Schedule Requirements: Prepare Contractor's construction schedule using a cost- and resource-loaded, time-scaled CPM network analysis diagram for the Work.

1. Develop network diagram in sufficient time to submit CPM schedule so it can be accepted for use no later than 60 days after date established for the Notice to Proceed.

C. CPM Schedule Requirements: Prepare a list of all activities required to complete the Work. Using the start-up network diagram, prepare a skeleton network to identify probable critical paths.

1. Activities: Indicate the estimated time duration, sequence requirements, and relationship of each activity in relation to other activities. Include estimated time frames for the following activities:

a. Delivery.

b. Fabrication.

c. Testing and commissioning.

2. Cost- and Resource-Loading of CPM Schedule: Assign cost to construction activities on the CPM schedule. Do not assign costs to submittal activities. Obtain Architect's approval prior to assigning costs to fabrication and delivery activities. Assign costs under principal subcontracts for testing and commissioning activities, operation and maintenance manuals, punch list activities, Project record documents, and demonstration and training (if applicable), in the amount of 5 percent of the Contract Sum.

D. Value Summaries: Prepare two cumulative value lists, sorted by finish dates.

1. Prepare list for ease of comparison with payment requests; coordinate timing with progress meetings.

a. Submit value summary printouts one week before each regularly scheduled progress meeting.

2.05 **REPORTS**

A. Material Location Reports: At monthly intervals, prepare and submit a comprehensive list of materials delivered to and stored at Project site. List shall be cumulative, showing materials previously reported plus items recently delivered. Include with list a statement of progress on and delivery dates for materials or items of equipment fabricated or stored away from Project site. Indicate the following categories for stored materials:

2.06 **SPECIAL REPORTS**

A. General: Submit special reports directly to Owner within one day(s) of an occurrence. Distribute copies of report to parties affected by the occurrence.

PART 3 - EXECUTION

3.01 **CONTRACTOR'S CONSTRUCTION SCHEDULE**

A. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.

B. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.

C. As the Work progresses, indicate final completion percentage for each activity.

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

END OF SECTION 013200.00

SECTION 013300
SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Administrative and procedural requirements for submittals required for the Work, including but not limited to; Shop Drawings, Product Data, Samples, material lists, and quality control items as required by the Contract Documents.

B. Wherever possible, throughout the Contract Documents, the minimum acceptable quality of workmanship and products has been defined by the name and catalog number of a manufacturer and by reference of recognized industry standards.

C. To ensure that specified products are furnished and installed in accordance with the design intent, and procedures have been established for submittal of design data and for its review by District REPRESENTATIVE, ARCHITECT, and/or others.

1.02 RELATED SECTIONS

A. Div 00 - General Conditions.

B. Section 01 3100.00: Project Management and Coordination.

C. Section 01 4010.00: DSA Quality Requirements

D. Section 01 5000.00: Temporary Facilities and Controls.

E. Section 01 6000: Product Requirements

F. Division 2 through Division 33.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

3.01 ELECTRONIC DOCUMENT SUBMITTAL SERVICE

A. All documents transmitted for purposes of administration of the contract are to be in electronic (PDF) format and transmitted via an Internet-based submittal service that receives, logs and stores documents, provides electronic stamping and signatures, and notifies addressees via email.

B. Besides submittals for review, information, and closeout, this procedure applies to requests for information (RFIs), progress documentation, contract modification documents (e.g. supplementary instructions, change proposals, change orders), applications for payment, field reports and meeting minutes, and any other document any participant wishes to make part of the project record.

C. Contractor and Architect are required to use this service.

D. It is Contractor's responsibility to submit documents in PDF format.

E. Subcontractors, suppliers, and Architect's consultants will be permitted to use the service at no extra charge.

F. Users of the service need an email address, Internet access, and PDF review software that includes ability to mark up and apply electronic stamps (such as Adobe Acrobat, www.adobe.com, or Bluebeam PDF Revu, www.bluebeam.com), unless such software capability is provided by the service provider.

G. Paper document transmittals will not be reviewed (except DSA Deferred Approvals and close out M&O Manuals); emailed PDF documents will not be reviewed.

H. All other specified submittal and document transmission procedures apply, except that electronic document requirements to not apply to samples or color selection charts.

I. Training: One, one-hour, web-based training session will be arranged for all participants, with representatives of Architect and Contractor participating; further training is the responsibility of the user of the service.

J. Project Closeout: Architect will determine when to terminate the service for the project.

3.02 **GENERAL REQUIREMENT AND PROCEDURES**

A. CONTRACTOR shall package each submittal appropriately for transmittal and handling and will then send ARCHITECT, and DISTRICT REPRESENTATIVE submittal for review per the Project plans and specifications. Submittals will not be accepted from sources other than from CONTRACTOR.

B. CONTRACTOR shall clearly identify any deviations from the Contract Documents on each submittal. Any deviation not so noted, even if stamped reviewed, is not acceptable.

C. After ARCHITECT review, ARCHITECT shall transmit submittals to CONTRACTOR, DISTRICT REPRESENTATIVE, and PI. CONTRACTOR shall further distribute to SUBCONTRACTORS and others as required. Work shall not commence, unless otherwise approved by DISTRICT REPRESENTATIVE, and/or ARCHITECT until approved submittals are transmitted to CONTRACTOR.

D. CONTRACTOR'S Review and Approval: **Every submittal upon which proper execution of the Work is dependent shall bear the CONTRACTORS review and approval stamp, dated and signed by CONTRACTOR**. Certifying that CONTRACTOR (a) has reviewed, checked, and approved the submittal and has coordinated the submittal contents with requirements of Work and Contract Documents including related Work, (b) CONTRACTOR coordinated with all other shop drawings received to date and this duty of coordination has not been delegated to subcontractors, material suppliers, the Architect, or the engineers on this project, (c) determined and verified quantities, field measurements, construction criteria, materials, equipment, catalog numbers and identifications, and similar data, or will do so, and (d) states the Work illustrated or described in the submittal is recommended by CONTRACTOR and the CONTRACTORS warranty will fully apply thereto.

E. CONTRACTOR shall coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities requiring sequential activity.

F. Timing of Submittals:

1. In accordance with General Conditions, CONTRACTOR shall submit to the ARCHITECT, those Shop Drawings, Product Data, diagrams, materials lists, Samples and other submittals required by the Contract Documents.

2. The CONTRACTOR shall submit within ten (10) calendar days of the Notice to Proceed, an itemized listing of required submittals with a scheduled date for each submittal. The schedule of submittals shall provide adequate time between submittals in order to allow for proper review without negative impact to the Construction Schedule.

3. Schedule of submittals shall be related to Work progress, and shall be so organized as to allow sufficient time for transmitting, reviewing, corrections, resubmission, and re-reviewing.

4. CONTRACTOR shall coordinate submittal of related items and ARCHITECT reserves the right to withhold action on a submittal requiring coordination with other submittals until all related submittals are received by ARCHITECT.

5. CONTRACTOR shall revise, update and submit submittal schedule to DISTRICT REPRESENTATIVE and ARCHITECT on the first of each month, or as required by the DISTRICT REPRESENTATIVE.

6. CONTRACTOR shall allow in the Construction Schedule, at least fourteen (14) calendar days for ARCHITECT review following ARCHITECT receipt of submittal. For mechanical, plumbing, electrical, structural, and other submittals requiring joint review with ARCHITECT'S Consultants, and/or others, CONTRACTOR shall allow a minimum of eighteen (18) calendar days following ARCHITECT receipt of submittal. Submittals will be reviewed with reasonable promptness, but ARCHITECT reserves the right of additional time where required based on but limited to submittal size, complexity, etc.
7. No adjustments to the Contract Time and/or Milestones will be authorized because of a failure to transmit submittals to ARCHITECT sufficiently in advance of the Work to permit review and processing.
8. In case of product substitution, Shop Drawing preparation shall not commence until such time ARCHITECT and DISTRICT REPRESENTATIVE reviews said submittal relative to the General Conditions.

G. Resubmit submittals in a timely manner. Resubmit as specified for initial submittal but identify as such. Review times for re-submitted items shall be as per the time frames for initial submittal review.

H. ARCHITECT, or authorized agent, will stamp each submittal with a uniform, action stamp marking the stamp appropriately to indicate the action taken, as follows:

1. Final Unrestricted Release: When ARCHITECT, or authorized agent, marks a submittal "Reviewed" the Work covered by the submittal may proceed provided it complies with requirements of the Contract Documents. Final payment depends on that compliance.
2. Final-But-Restricted Release: When ARCHITECT, or authorized agent, marks a submittal "Make Corrections Noted" (Reviewed as Noted) the Work covered by the submittal may proceed provided it complies with notations or corrections on the submittal and requirements of the Contract Documents. Final payment depends on that compliance.
3. Returned for Re-submittal: When ARCHITECT, or authorized agent, marks a submittal "Revise and Resubmit, Submit Speficied Item, Rejected" do not proceed with Work covered by the submittal, including purchasing, fabrication, delivery, or other activity. Revise or prepare a new submittal according to the notations; resubmit without delay. Repeat as necessary to obtain different action mark. In case of multiple submittals covering same items of Work, CONTRACTOR is responsible for any time delays, schedule disruptions, out of sequence Work, or additional costs due to multiple submissions of the same submittal item. Do not use, or allow others to use, submittals marked "Rejected, Revise and Resubmit" at the Project site or elsewhere where Work is in progress.
4. Other Action: Where a submittal is for information or record purposes or special processing or other activity, the ARCHITECT, or authorized agent, will return the submittal marked "Action Not Required".
5. Not Required Submittal: Where a submittal is submitted for review but is not required to be submitted, the ARCHITECT, or authorized agent, will return the submittal identified with "No Action Taken".

I. Review and Approval of Submittals by the ARCHITECT: Submittals will be reviewed but only for conformance with the design concept of the Project and with the information indicated on the Drawings and stated in the Specifications. Approval of a separate item as such will not indicate approval of the assembly in which the item functions. Approval of submittals shall not relieve the CONTRACTOR of responsibility for any deviations from requirements of the Contract Documents or any revisions in resubmittals unless

CONTRACTOR has given written notice of such deviation or revision at the time of submission or resubmission and written approval has been given to the specific deviation or revision, nor shall approval relieve the CONTRACTOR of responsibility for error or omissions in the submittals or for the accuracy of dimensions and quantities, the adequacy of connections, and the proper and acceptable fitting, execution, functioning, and completion to the Work.

J. All costs for the preparation, correction, delivery, and return of the submittals shall be borne by the CONTRACTOR.

3.03 **SHOP DRAWINGS**

A. Shop Drawings are original drawings in electronic format (except DSA deferred Approvals to be hard copies) prepared by CONTRACTOR, Subcontractor, supplier, or distributor illustrating some portion of Work by showing fabrication, layout, setting, or erection details. Do not reproduce Contract Documents or copy standard information as the basis of Shop Drawings. Copies of the Contract Drawing marked to show Shop Drawing information are not acceptable and will be not be reviewed and will be promptly returned to the CONTRACTOR.

B. Produce DSA Deferred Approval Shop Drawings to an accurate scale that is large enough to indicate all pertinent features and methods. Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 24 x 36 inches.

C. Shop Drawings shall include, at a minimum, fabrication and installation drawings, setting diagrams, schedules, patterns, templates, and similar drawings. Include the following information:

1. Dimensions
2. Identification of products and materials included by sheet and detail number.
3. Compliance with specified standards.
4. Notation of coordination requirements.
5. Notation of dimensions established by field measurement.

D. Provide two (2) spaces, approximately 4 by 5 inches, on the label or beside the title block on Shop Drawings to record CONTRACTOR and ARCHITECT review, and the action taken. Include the following information on the label for processing and recording action taken:

1. Project name.
2. Project number.
3. Date.
4. Name and address of ARCHITECT.
5. Name and address of CONTRACTOR.
6. Name and address of Subcontractor.
7. Name and address of supplier.
8. Name and address of manufacturer.
9. Name and title of appropriate Specification section.
10. Drawing number and detail references, as appropriate.

3.04 **PRODUCT DATA**

A. Collect Product Data into a single submittal for each element of Work or system. Product Data includes printed information, such as manufacturer’s installation instructions, catalog cuts, standard color charts, roughing-in diagrams and templates, wiring diagrams,

schedules, illustrations, or performance curves.

1. Mark each copy to show or delineate pertinent materials, products, models, applicable choices, or options. Where Product Data includes information on several products that are not required, clearly mark copies to indicate the applicable information. Include the following information:
    a. Manufacturer’s printed recommendations.
    b. Compliance with trade association standards.
    c. Compliance with recognized testing agency standards.
    d. Application of testing agency labels and seals.
    e. Notation of dimensions verified by field measurement.
    f. Notation of coordination requirements.
    g. Notation of dimensions and required clearances.
    h. Indicate performance characteristics and capacities.
    i. Indicate wiring diagrams and controls.
2. Do not submit Product Data until compliance with requirements of the Contract Documents has been confirmed.

3.05 **SAMPLES**

A. Submit Samples of sufficient size, quantity, cured and finished and physically identical to the proposed product or material. Samples include partial or full sections or range of manufactured or fabricated components, cuts or containers of materials, color range sets, and swatches denoting color, texture, and/or pattern.
    1. Mount or display Samples in the manner to facilitate review of qualities indicated. Include the following:
        a. Specification section number and reference.
        b. Generic description of the Sample.
        c. Sampling source.
        d. Product name or name of manufacturer.
        e. Compliance with recognized standards.
        f. Availability and delivery time.
    2. Submit Samples for review of size, kind, color, pattern, and texture. Submit Samples for a final check of these characteristics with other elements and a comparison of these characteristics between the final submittal and the actual component as delivered and installed.
        a. Where variations in color, pattern, texture, or other characteristic is inherent in the material or product represented, submit at least three (3) multiple units that show the approximate limits of the variations.
        b. Refer to other Specification sections for requirements for Samples that illustrate workmanship, fabrication techniques, assembly details, connections, operation, and similar construction characteristics.
        c. Refer to other sections for Samples to be returned to CONTRACTOR for incorporation into the Work. Such Samples must be undamaged at time of installation. On the transmittal indicate special requests regarding disposition of Sample submittals.

d. Samples not incorporated into the Work, or otherwise not designated as OWNER property, remain the property of CONTRACTOR and shall be removed from the Project site prior to Beneficial Occupancy.

3. Color and Pattern: Whenever a choice of color or pattern is available in a specified product, submit accurate color chips and pattern charts to ARCHITECT for review and selection by ARCHITECT and OWNER.

4. Required Copies and Distribution: Same as denoted in Section 3.02, E.

B. When specified, erect field Samples and mock-ups at the Project site to illustrate products, materials, or workmanship and to establish standards by which completed Work shall be judged.

C. Maintain sets of Samples, as returned, at the Project site, for quality comparisons throughout the course of the Work. Sample sets may be used to obtain final acceptance of the Work associated with each set.

3.06 QUALITY CONTROL SUBMITTALS

A. Submit quality control submittals, including design data, certifications, manufacturer's field reports, and other quality control submittals as required under other sections of the Contract Documents.

B. When other sections of the Contract Documents require manufacturer's certification of a product, material, and/or installation complies with specified requirements, submit a notarized certification from the manufacturer certifying compliance with specified requirements.

C. Certification shall be signed by an officer of the manufacturer or other individual authorized to sign documents on behalf of the represented company.

D. Requirements for submittal of inspection and test reports are specified in other sections of the Contract Documents.

3.07 CERTIFICATES

A. Submit all certificates in triplicate to PI, in accordance with requirements of each Specification Section.

END OF SECTION 013300

ELECTRONIC DOCUMENT REQUEST FORM

From (Company): Project Name:
Address:
Location:
Contact: DSA App. No.:
Phone: LPA Project No.:

Execution of this document will confirm your request for copies of documentation related to the above referenced project. Please return one fully executed copy of this form via mail to LPA, Inc., **431 I Street, Suite 107, Sacramento, CA 95814**; or via Email.

Description of Documentation Requested:

Type of Files Needed: ☐ DWG (AutoCAD) ☐ Other_____ (subject to review and approval)

Purpose of Request:

If Requestor is a subcontractor to the project's General Contractor, A written statement by the Project's General Contractor authorizing LPA to release documentation to a subcontractor of the General Contractor must be written below:

If Requestor is a consultant to the Project's Owner, please indicate below the name and phone number of the contact at Owner's Office:

Disclaimer: LPA can only release electronic files to the Project's Owner, consultants to the Project's Owner and/or the Projects' General Contractor. Please be advised that, in the case of existing construction, the documents requested are reproductions of documentation on file and do not necessarily represent as-built or existing conditions. LPA does not warrant, in any way, the accuracy of this information and shall not be responsible for any discrepancy between this documentation and the existing conditions.
In the case of projects which are currently being designed and/or under construction, the electronic documentation are reproductions of the documentation on file and may be subject to change due to Owner, field and/or coordination revisions. LPA shall not be responsible for reissuing files beyond the Bid Document files which may be revised after issuance of these requested files and shall not be responsible for advising other parties as to the status of document revisions. Also, please be advised that the requested documents are instruments of service and, as such, remain the property of LPA and/or the respective consultant. Any unauthorized re-use of these documents without the written authorization of LPA and/or consultant is strictly prohibited.
Please note all disclaimers and warnings printed on electronic media labels. Electronic media may contain undetected viruses. It is always recommended that disks be checked prior to use. LPA assumes no liability or responsibility for damage to user's property as a result of using this electronic media or its contents.

Fees: The charge for copying the requested files in DWG (AutoCAD) is **$100.00** per sheet. The cost per sheet / files on a different software platform will be determined based on what is requested. Details are not released.

Other costs to be charged for the requested files may include archive storage and retrieval charges, reproduction and handling expenses, etc. The exact costs for these miscellaneous expenses will be determined by LPA upon execution of this request.

Payment of these costs must be made by the Requestor prior to shipping of the requested documents.

By signing this Request, the Requestor agrees to the disclaimer and reimbursement fees to LPA, Inc. as stated above:

Authorized Name and Signature: Date:

SUBMITTAL COVER SHEET

LPA

Project Name: Tokay HS Site - Increment 1 **LPA Inc. Job No.** 18180.10	**Resubmittal** ☐ **YES** *Add "letter" to original number*	**Submittal No.**
SUBCONTRACTOR: **Name:** **Address:** **Telephone:** **Contact:**	**CONTRACTOR:** **Name:** **Signed:** **Dated:** I hereby certify that I have reviewed the attached, have verified field requirements and compliance with the Contract Documents.	
Submittal Description:		**Specification Section:**
Date Received from Contractor:	**Distribution Date:**	
Consultant Review: ☐ **Civil** ☐ **Electrical** ☐ **Mechanical** ☐ **Structural** ☐ **Other:** **Date sent to consultant:** **Date received from consultant:**	**Copies:** ☐ **Contractor** ☐ **Inspector** ☐ **LPA File** ☐ **Owner** ☐ **Other:**_____	

Review and commentary noted below are only for general conformance with (1) the design concept of the project and (2) the information given in the contract documents and for no other purpose. Commentary below is subject to the requirements of the contract documents. The Contractor is not relieved from responsibility for any deviation from the requirements of the contract documents, errors or omissions in drawings, calculations or samples, confirmation and correlation of dimensions at the job site, fabrication process and techniques of construction, coordination of his work with that of all other trades and satisfactory performance of his work.

☐ **REVIEWED**	☐ **SUBMIT SPECIFIED ITEM**
☐ **FURNISH AS CORRECTED**	☐ **REJECTED**
☐ **REVISE & RESUBMIT**	

Reviewed by:	**Date:**

Remarks:

SECTION 014010
DSA QUALITY REQUIREMENTS

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes administrative and procedural requirements for DSA-approved quality assurance and quality control.

B. DSA-approved testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.

1. A minimum Class II Project Inspector employed by the School District and approved by DSA shall provide continuous inspection of the work per Title 24 CCR, Part 1, Section 4-333. The duties of the Project Inspector are defined in Title 24 CCR, Part 1, Section 4-342.

2. Testing and inspection shall comply with Title 24 CCR, Part 1, Section 4-335.

a. Required special tests and inspections shall comply with CBC Chapter 17A. Required special tests and inspections shall be as indicated in specifications, drawings and on the DSA-approved Form 103, ' Statement of Structural Tests and Special Inspections”.

b. A copy of the DSA 103 form is included at the end of this section.

3. All testing and inspection laboratories shall be approved by DSA.

4. Specific quality-assurance and -control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.

5. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.

6. Requirements for Contractor to provide quality-assurance and control services required by Architect, Owner, Construction Manager or authorities having jurisdiction are not limited by provisions of this Section.

C. Related Sections:

1. Divisions 02 through 33 Sections for specific test and inspection requirements.

1.02 DEFINITIONS

A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.

B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect or Construction Manager.

C. Mockups: Full size physical assemblies that are constructed on-site. Mockups are constructed to verify selections made under sample submittals; to demonstrate aesthetic effects and, where indicated, qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.

D. Preconstruction Testing: Tests and inspections performed specifically for the Project before products and materials are incorporated into the Work to verify performance or compliance with specified criteria.

E. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.

F. Source Quality-Control Testing: Tests and inspections that are performed at the source, i.e., plant, mill, factory, or shop.

G. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

H. Testing Agency: A DSA-approved entity engaged to perform specific tests, inspections, or both. DSA-approved testing agencies shall have a current DSA Laboratory Evaluation and Acceptance (LEA) program number. Testing laboratory shall mean the same as testing agency.

I. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.

1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade or trades.

J. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

K. Project Inspector: A Class I Project Inspector employed by the School District and approved by DSA shall provide continuous inspection of the work per Title 24 CCR, Part 1, Section 4-333. The duties of the Project Inspector are defined in Title 24 CCR, Part 1, Section 4-342. “Special Inspector” and “Inspector of Record” shall mean the same as Project Inspector.

1.03 **CONFLICTING REQUIREMENTS**

A. Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Architect for a decision before proceeding.

B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.04 **INFORMATIONAL SUBMITTALS**

A. Contractor's Statement of Responsibility: In accordance with CBC Section 1704A.4, submit copy of written statement of responsibility sent to DSA before starting work on the following systems.

1. Seismic-force resisting system, designated seismic system, or component listed in the designated seismic system quality assurance plan prepared by the Architect or the Structural Engineer of Record.

2. Main wind-force resisting system or a wind-resisting component listed in the wind-force-resisting system quality assurance plan prepared by the Architect or the Structural Engineer of Record.

1.05 **REPORTS AND DOCUMENTS**

A. Test and Inspection Reports: Prepare and submit certified written reports where specified in other Sections. Test and inspection reports shall comply with DSA reporting requirements for testing laboratories, as indicated in DSA reporting forms and templates numbers DSA-201 through DSA-293, inclusive. Where there is no DSA reporting template, test and inspection reports shall include the following:

1. Date of issue.
2. Project title and number.
3. Name, address, and telephone number of testing agency.
4. Dates and locations of samples and tests or inspections.
5. Names of individuals making tests and inspections.
6. Description of the Work and test and inspection method.
7. Identification of product and Specification Section.
8. Complete test or inspection data.
9. Test and inspection results and an interpretation of test results.
10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
12. Name and signature of laboratory inspector.
13. Recommendations on retesting and reinspecting.

B. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:

1. Name, address, and telephone number of technical representative making report.
2. Statement on condition of substrates and their acceptability for installation of product.
3. Statement that products at Project site comply with requirements.
4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
6. Statement whether conditions, products, and installation will affect warranty.
7. Other required items indicated in individual Specification Sections.

C. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:

1. Name, address, and telephone number of factory-authorized service representative making report.
2. Statement that equipment complies with requirements.

3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
4. Statement whether conditions, products, and installation will affect warranty.
5. Other required items indicated in individual Specification Sections.

D. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.06 **QUALITY ASSURANCE**

A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.

B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

D. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar to those indicated for this Project in material, design, and extent.

F. Testing Agency Qualifications: An agency with current DSA LEA program approval.

G. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

H. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

I. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:

1. Contractor responsibilities include the following:
    a. Provide test specimens representative of proposed products and construction.
    b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
    c. Provide sizes and configurations of test assemblies, mockups and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.

d. Build mockups and site-assembled test assemblies using installers who will perform same tasks for Project.

e. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.

f. When testing is complete, remove mockups, test specimens and assemblies; do not reuse products on Project.

2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect , through Construction Manager, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.

J. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:

1. Build mockups in location and of size indicated or, if not indicated, as directed by Architect or Construction Manager.

2. Notify Architect and Construction Manager seven days in advance of dates and times when mockups will be constructed.

3. Employ supervisory personnel who will oversee mockup construction. Employ workers that will be employed during the construction at the Project.

4. Demonstrate the proposed range of aesthetic effects and workmanship.

5. Obtain Architect's and Construction Manager's approval of mockups before starting work, fabrication, or construction.

a. Allow seven days for initial review and each re-review of each mockup.

6. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.

7. Demolish and remove mockups when directed, unless otherwise indicated.

K. Integrated Exterior Mockups: Construct integrated exterior mockup as indicated on Drawings. Coordinate installation of exterior envelope materials and products for which mockups are required in individual Specification Sections, along with supporting materials.

L. Room Mockups: Construct room mockups incorporating required materials and assemblies, finished according to requirements. Provide required lighting and additional lighting where required to enable Architect to evaluate quality of the Work. Provide room mockups of the following rooms:

M. Laboratory Mockups: Comply with requirements of preconstruction testing and those specified in individual Specification Sections in Divisions 02 through 33.

1.07 **QUALITY CONTROL**

A. Owner Responsibilities: Owner will engage one or more DSA-approved, qualified testing agencies to perform these services.

1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.

2. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.

B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.

1. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
2. Notify testing agencies at least 48 hours in advance of time when Work that requires testing or inspecting will be performed.
3. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
4. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
5. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

C. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Division 01 Section "Submittal Procedures."

D. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.

E. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.

F. Testing Agency Responsibilities: Cooperate with Architect, Construction Manager, and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.

1. Notify Architect, Construction Manager, and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
6. Do not perform any duties of Contractor.

G. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:

1. Access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.

3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
4. Facilities for storage and field curing of test samples.
5. Delivery of samples to testing agencies.
6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
7. Security and protection for samples and for testing and inspecting equipment at Project site.

H. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.

1. Schedule times for tests, inspections, obtaining samples, and similar activities.

I. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents as a component of Contractor's quality-control plan. Coordinate and submit concurrently with Contractor's construction schedule. Update as the Work progresses.

1. Distribution: Distribute schedule to Owner, Architect, Construction Manager, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

1.08 **SPECIAL TESTS AND INSPECTIONS**

A. Special Tests and Inspections: Owner will engage a DSA-approved, qualified testing agency and special inspector to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner, as indicated in DSA Form 103, “Statement of Structural Tests and Special Inspections” attached to this Section.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 **TEST AND INSPECTION LOG**

A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:

1. Date test or inspection was conducted.
2. Description of the Work tested or inspected.
3. Date test or inspection results were transmitted to Architect.
4. Identification of testing agency or special inspector conducting test or inspection.

B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Architect's and Construction Manager's reference during normal working hours.

3.02 **REPAIR AND PROTECTION**

A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.

1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Division 01 Section "Execution."

B. Protect construction exposed by or for quality-control service activities.

C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 014010.00

SECTION 015000
TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.

B. Related Sections:

1. Division 01 Section "Summary" for work restrictions and limitations on utility interruptions.
2. Division 01 Section "Closeout Procedures" for final cleaning requirements and for cleaning permanent HVAC ducts used during construction.
3. Division 01 Section "Construction Waste Management and Disposal" for requirements for project waste materials.

1.02 DEFINITIONS

A. Project Completion: Final Completion.

1.03 USE CHARGES

A. General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Owner's construction forces, Architect, occupants of Project, testing agencies, and authorities having jurisdiction.

B. Water Service from Existing System: Water from Owner's existing water system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

C. Existing Sewer Service Systems: Owner's existing sewer system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

D. Existing Storm Drain Systems: Owner's existing storm drain system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

E. Existing Power Service: Owner's existing power service is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

1.04 INFORMATIONAL SUBMITTALS

A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.

B. Erosion- and Sedimentation-Control Plan: Show compliance with requirements of EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent.

C. Moisture-Protection Plan: Describe procedures and controls for protecting materials and construction from water absorption and damage.

1. Describe delivery, handling, and storage provisions for materials subject to water absorption or water damage.

D. Indicate sequencing of work that requires water, such as sprayed fire-resistive materials, plastering, and terrazzo grinding, and describe plans for dealing with water from these operations. Show procedures for verifying that wet construction has dried sufficiently to

permit installation of finish materials.

E. Dust-Control and HVAC-Control Plan: Submit coordination drawing and narrative that indicates the dust-control and HVAC-control measures proposed for use, proposed locations, and proposed time frame for their operation. Identify further options if proposed measures are later determined to be inadequate. Include the following:

1. Locations of dust-control partitions at each phase of the work.
2. Location of proposed air filtration system discharge.
3. Other dust-control measures.
4. Waste management plan.

1.05 **QUALITY ASSURANCE**

A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with CEC.

B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

C. Accessible Temporary Egress: Comply with applicable accessibility provisions in the following documents:

1. As indicated on drawings.
2. 2016 CBC Chapter 11B.

PART 2 - PRODUCTS

2.01 **MATERIALS**

A. Portable Chain-Link Fencing: Minimum 2-inch (50-mm), 0.148-inch- (3.8-mm-) thick, galvanized steel, chain-link fabric fencing; minimum 6 feet (1.8 m) high with galvanized steel pipe posts; minimum 2-3/8-inch- (60-mm-) OD line posts and 2-7/8-inch- (73-mm-) OD corner and pull posts, with 1-5/8-inch- (42-mm-) OD top and bottom rails. Provide concrete or galvanized steel bases for supporting posts. Provide windscreen.

2.02 **TEMPORARY FACILITIES**

A. Common-Use Field Office: Of sufficient size to accommodate needs of Owner, Architect, Construction Manager, and construction personnel office activities and to accommodate project meetings specified in other Division 01 Sections. Keep office clean and orderly. Furnish and equip offices as follows:

1. Furniture required for Project-site documents including file cabinets, plan tables, plan racks, and bookcases.
2. Conference room of sufficient size to accommodate meetings of ten individuals. Provide electrical power service and 120-V ac duplex receptacles, with not less than 1 receptacle on each wall. Furnish room with conference table, chairs, and 4-foot- (1.2-m-) square tack and marker boards.
3. Project Testing & Inspection Office: Provide separate lockable room for use by Owner and Owner's Inspector of Record. Provide (2) tables, chair and file cabinet. Provide electrical power service and 120-V ac duplex receptacles, with not less than 1 receptacle on each wall. Provide separate outside phone line with DSL connectivity.
4. Drinking water and private toilet.
5. Coffee machine and supplies.
6. Heating and cooling equipment necessary to maintain a uniform indoor temperature of 68 to 72 deg F (20 to 22 deg C).

7. Lighting fixtures capable of maintaining average illumination of 20 fc (215 lx) at desk height.

B. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.

1. Store combustible materials apart from building.

2.03 **EQUIPMENT**

A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

B. Permanent HVAC System: If Owner, at Contractor request, authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of 8 at each return air grille in system, remove at end of construction and clean HVAC system as required in Division 01 Section "Closeout Procedures".

PART 3 - EXECUTION

3.01 **INSTALLATION, GENERAL**

A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.

1. Locate facilities to limit site disturbance as specified in Division 01 Section "Summary."

B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.02 **TEMPORARY UTILITY INSTALLATION**

A. General: Install temporary service or connect to existing service.

1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.

B. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.

C. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.

1. Install electric power service overhead, unless otherwise indicated.

D. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.

1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.

E. Electronic Communication Service: Provide a desktop computer in the primary field office adequate for use by Architect and Owner to access project electronic documents and maintain electronic communications. Equip computer with not less than the following:

1. Processor: Intel Pentium D or Intel CoreDuo, 3.0 GHz processing speed.
2. Memory: 4 gigabyte.
3. Disk Storage: 300 gigabyte hard-disk drive and combination DVD-RW/CD-RW drive.
4. Display: 19-inch (480-mm) LCD monitor with 128 Mb dedicated video RAM.
5. Full-size keyboard and mouse.
6. Network Connectivity: 10/100BaseT Ethernet.

7. Operating System: Microsoft Windows XP Professional or Microsoft Windows Vista Business.
8. Productivity Software:
    a. Microsoft Office Professional, XP or higher, including Word, Excel, and Outlook.
    b. Adobe Reader 7.0 or higher.
9. Printer: "All-in-one" unit equipped with printer server, combining color printing, photocopying, scanning, and faxing, or separate units for each of these 3 functions.
10. Internet Service: Broadband modem, router and ISP, equipped with hardware firewall, providing minimum 384 Kbps upload and 1 Mbps download speeds at each computer.
11. Internet Security: Integrated software, providing software firewall, virus, spyware, phishing and spam protection in a combined application.

3.03 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:
    1. Provide construction for temporary offices, shops, and sheds located within construction area or within 30 feet (9 m) of building lines that is noncombustible according to ASTM E 136. Comply with NFPA 241.

B. Temporary Use of Permanent Roads and Paved Areas: Locate temporary roads and paved areas in same location as permanent roads and paved areas. Construct and maintain temporary roads and paved areas adequate for construction operations. Extend temporary roads and paved areas, within construction limits indicated, as necessary for construction operations.
    1. Coordinate elevations of temporary roads and paved areas with permanent roads and paved areas.
    2. Prepare subgrade and install subbase and base for temporary roads and paved areas according to Division 31 Section "Earth Moving."
    3. Recondition base after temporary use, including removing contaminated material, regrading, proofrolling, compacting, and testing.
    4. Delay installation of final course of permanent hot-mix asphalt pavement until immediately before Substantial Completion. Repair hot-mix asphalt base-course pavement before installation of final course according to Division 32 Section "Asphalt Paving."
    5. Delay installation of seal coats for hot-mix asphalt pavement until immediately before Project Completion. Repair hot-mix asphalt pavement before installation of seal coats according to Division 32 Section "Asphalt Paving."

C. Traffic Controls: Comply with requirements of authorities having jurisdiction.
    1. Protect existing site improvements to remain including curbs, pavement, and utilities.
    2. Maintain access for fire-fighting equipment and access to fire hydrants.

D. Parking: Provide temporary parking areas for construction personnel.

E. Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.
    1. Identification Signs: Provide Project identification signs as indicated on Drawings.
    2. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.
        a. Provide temporary, directional signs for construction personnel and visitors.
    3. Maintain and touchup signs so they are legible at all times.

F. Waste Disposal Facilities: Comply with requirements specified in Division 01 Section "Construction Waste Management and Disposal."

G. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with Division 01 Section "Execution" for progress cleaning requirements.

H. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.

1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

3.04 **SECURITY AND PROTECTION FACILITIES INSTALLATION**

A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.

B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

1. Comply with work restrictions specified in Division 01 Section "Summary."

C. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings, requirements of 2003 EPA Construction General Permit, California State Water Resources Control Board and local authorities having jurisdiction, whichever is more stringent, and requirements specified in Division 31 Section "Site Clearing".

1. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross tree- or plant- protection zones.

2. Inspect, repair, and maintain erosion- and sedimentation-control measures during construction until permanent vegetation has been established.

3. Clean, repair, and restore adjoining properties and roads affected by erosion and sedimentation from the project site during the course of the project.

4. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

D. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.

E. Site Enclosure Fence: Before construction operations begin, furnish and install site enclosure fence in a manner that will prevent people and animals from easily entering site except by entrance gates.

1. Extent of Fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations, unless otherwise indicated on Drawings.

2. Maintain security by limiting number of keys and restricting distribution to authorized personnel.

F. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each work day.

G. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.

H. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241.

1. Prohibit smoking in construction areas.

2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.

3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.

4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

3.05 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

B. Operate Project-identification-sign lighting daily from dusk until 12:00 midnight.

C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Project Completion.

D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Project Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.

2. Remove temporary roads and paved areas not intended for or acceptable for integration into permanent construction. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.

3. At Project Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Division 01 Section "Closeout Procedures."

END OF SECTION 015000.00

SECTION 015639
TEMPORARY TREE AND PLANT PROTECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Tree protection of existing trees and plants

B. Tree pruning of existing trees

1.02 RELATED REQUIREMENTS

A. Division 01 Section - Temporary Facilities and Controls

B. Division 31 Section - Site Clearing

C. Division 32 Section - Landscape Work

1.03 DEFINITIONS

A. Caliper: Diameter of a trunk measured by a diameter tape or the average of the smallest and largest diameters at 6 inches (150 mm) above the ground for trees up to, and including, 4-inch (100-mm) size; and 12 inches (300 mm) above the ground for trees larger than 4-inch (100-mm) size.

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 indicated on Drawings.

D. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

1.04 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples for Verification: For each type of the following:

1. Organic Mulch: 1-pint (0.5-L) 1-quart (1-L) volume of organic mulch; in sealed plastic bags labeled with composition of materials by percentage of weight and source of mulch.
2. Protection-Zone Fencing: Assembled Samples of manufacturer's standard size made from full-size components.
3. Protection-Zone Signage: Full-size Samples of each size and text, ready for installation.

C. 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.

D. Qualification Data: For qualified arborist and tree service firm.

E. 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.

F. Maintenance Recommendations: From arborist, for care and protection of trees affected by construction during and after completing the Work.

G. Existing Conditions: Documentation of existing trees and plantings indicated to remain, which establishes preconstruction conditions that might be misconstrued as damage caused by construction activities.

1. Use sufficiently detailed photographs or videotape.
2. Include plans and notations to indicate specific wounds and damage conditions of each tree or other plants designated to remain.

1.05 **QUALITY ASSURANCE**

A. Arborist Qualifications:

1. Certified Arborist as certified by ISA.
2. Licensed Arborist in jurisdiction where Project is located.

B. 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.

C. Preinstallation Conference: Conduct conference at Project site.

1. Review methods and procedures related to temporary tree and plant protection including, but not limited to, the following:
    a. Construction schedule. Verify availability of materials, personnel, and equipment needed to make progress and avoid delays.
    b. Enforcing requirements for protection zones.
    c. Arborist's responsibilities.
    d. Contractor responsibilities
    e. Field quality control.

1.06 **PROJECT CONDITIONS**

A. The following practices are prohibited within protection zones:

1. Storage of construction materials, debris, or excavated material.
2. Parking vehicles or equipment.
3. Foot traffic.
4. Erection of sheds or structures.
5. Impoundment of water.
6. Excavation or trenching or digging unless otherwise indicated.
7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.
8. Do not direct vehicle or equipment exhaust toward protection zones.
9. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones and organic mulch.

PART 2 - PRODUCTS

2.01 **MATERIALS**

A. Topsoil: Natural or cultivated top layer of the soil profile or manufactured topsoil; containing organic matter and sand, silt, and clay particles; friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 1 inch (25 mm) Insert dimension in diameter; and free of weeds, roots, and toxic and other nonsoil materials.

1. Obtain topsoil only from well-drained sites where topsoil is 4 inches (100 mm) deep or more; do not obtain from bogs or marshes.
2. Refer to Section 32 Landscape Work for material requirements.

B. Topsoil: Stockpiled topsoil from location shown on Drawings.

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: 1/2" inch minimum, 1" maximum.
3. Color: Natural.

D. Protection-Zone Fencing: Fencing fixed in position and meeting one of the following requirements. Previously used materials may be used when approved by Architect.

1. Chain-Link Protection-Zone Fencing: Galvanized-steel fencing fabricated from minimum 2-inch (50-mm) opening, 0.148-inch- (3.76-mm-) diameter wire chain-link fabric; with pipe posts, minimum 2-3/8-inch- (60-mm-) OD line posts, and 2-7/8-inch- (73-mm-) OD corner and pull posts; with 1-5/8-inch- (42-mm-) OD top rails and 0.177-inch- (4.5-mm-) diameter bottom tension wire; with tie wires, hog ring ties, and other accessories for a complete fence system.
   a. Height: 6 feet (1.8 m).
   b. Polymer-Coating Color: Black.
2. Gates: Single swing access gates matching material and appearance of fencing, to allow for maintenance activities within protection zones; leaf width 36 inches (914 mm) .

E. 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. Size: as required
2. Text: "TREE PROTECTION ZONE - KEEP OUT. No unauthorized entry. No storage of vehicles, materials, or debris. No dumping of chemicals, slurry, paint, oil, etc. "
3. Lettering: 3-inch (75-mm-)high minimum, black characters on white background.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Erosion and Sedimentation Control: Examine the site to verify that temporary erosion- and sedimentation-control measures are in place. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.

B. For the record, prepare written report, endorsed by arborist, listing conditions detrimental to tree and plant protection.

3.02 PREPARATION

A. Locate and clearly identify trees, shrubs, and other vegetation to remain or to be relocated. Flag - Tie a 1-inch (25-mm) blue-vinyl tape around each tree trunk at 54 inches (1372 mm) 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.

1. Apply 3-inch (100-mm) average thickness of organic mulch. Do not place mulch within 6 inches (150 mm) of tree trunks.

3.03 **TREE- AND PLANT-PROTECTION ZONES**

A. 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 and animals from easily entering protected area 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.
3. Access Gates: Install as 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.

B. Protection-Zone Signage: Install protection-zone signage in visibly prominent locations in a manner approved by Architect. Install one sign spaced approximately every 35 feet (10.5 m) on protection-zone fencing, but no fewer than four signs with each facing a different direction.

C. Maintain protection zones free of weeds and trash.

D. Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations, in a manner approved by Architect.

E. 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.

3.04 **EXCAVATION**

A. General: Excavate at edge of protection zones and for trenches indicated within protection zones according to requirements in Division 31 Section "Earth Moving."

B. Trenching near Trees: Where utility trenches are required within protection zones, hand excavate under or around tree roots or tunnel under the roots by drilling, auger boring, or pipe jacking. Do not cut main lateral tree roots or taproots; cut only roots smaller than 2” in diameter that interfere with installation of utilities. Cut roots as required for root pruning.

C. 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.

D. 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.

3.05 **ROOT PRUNING**

A. Prune roots that are affected by temporary and permanent construction. Prune roots as follows:

1. 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.
2. Cut Ends: Do not paint cut root ends. Coat cut ends of roots more than 1-1/2 inches (38 mm) in diameter with emulsified asphalt or other coating formulated for use on damaged plant tissues as approved by the arborist.
3. Temporarily support and protect roots from damage until they are permanently redirected and covered with soil.
4. Cover exposed roots with burlap and water regularly.
5. Backfill as soon as possible according to requirements in Division 31 Section "Grading”

B. Root Pruning at Edge of Protection Zone: Prune roots 12 inches (300 mm) 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 to the depth of the required excavation to minimize damage to root systems. Use narrow-tine spading forks, comb soil to expose roots, and cleanly cut roots as close to excavation as possible.

3.06 **CROWN PRUNING**

A. Prune branches that are affected by temporary and permanent construction. Prune branches as follows:

1. Prune trees to remain to compensate for root loss caused by damaging or cutting root system. Provide subsequent maintenance during Contract period as recommended by arborist.
2. Pruning Standards: Prune trees according to ANSI A300 (Part 1) and the following:
    a. Type of Pruning: Cleaning Thinning Raising Reduction.
3. Cut branches with sharp pruning instruments; do not break or chop.
4. Do not apply pruning paint to wounds.

B. Chip removed branches and dispose of off-site.

3.07 **REGRADING**

A. 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.

B. 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 4 inches (50 mm) or less below elevation of finish grade, fill with topsoil. Place topsoil in a single uncompacted layer and hand grade to required finish elevations.

3.08 **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.

3.09 **REPAIR AND REPLACEMENT**

A. General: Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations, in a manner approved by Architect.

1. Submit details of proposed root cutting and tree and shrub repairs.
2. Have arborist perform the root cutting, branch pruning, and damage repair of trees and shrubs.
3. Treat damaged trunks, limbs, and roots according to arborist's written instructions.
4. Perform repairs within 24 hours.
5. Replace vegetation that cannot be repaired and restored to full-growth status, as determined by Architect.

B. Trees: Remove and replace trees indicated to remain that are more than 66 percent 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.

1. Provide new trees of same size and species as those being replaced for each tree that measures 4 inches (100 mm) or smaller in caliper size.
2. Provide one new tree(s) of 6-inch (150-mm) caliper size for each tree being replaced that measure more than 4 inches (100 mm) in caliper size.
    a. Species: Species selected by Architect.
3. Plant and maintain new trees as specified in Division 32 Section "Landscape Work"

C. Soil Aeration: Where directed by Architect, aerate surface soil compacted during construction. Aerate 10 feet (3 m) beyond drip line and no closer than 36 inches (900 mm) to tree trunk. Drill 2-inch (50-mm-) diameter holes a minimum of 12 inches (300 mm) deep at 24 inches (600 mm) O.C. Backfill holes with an equal mix of native soil and sand.

3.10 **DISPOSAL OF SURPLUS AND WASTE MATERIALS**

A. Disposal: Remove excess excavated material, displaced trees, trash and debris, and legally dispose of them off Owner's property.

END OF SECTION

SECTION 015713
TEMPORARY EROSION AND SEDIMENT CONTROL

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Prevention of erosion due to construction activities.

B. Prevention of sedimentation of open drainage ways, and storm and sanitary sewers due to construction activities.

C. Restoration of areas eroded due to insufficient preventive measures.

D. Compensation of Owner for fines levied by authorities having jurisdiction due to non-compliance by Contractor.

1.02 RELATED REQUIREMENTS

A. Section 311000 - Site Clearing: Limits on clearing; disposition of vegetative clearing debris.

B. Section 312200 - Grading: Temporary and permanent grade changes for erosion control.

C. Storm Water Pollution Prevention Plan (SWPPP).

1.03 REFERENCE STANDARDS

A. ASTM D4355/D4355M - Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture and Heat in a Xenon Arc Type Apparatus 2014 (Reapproved 2018).

B. ASTM D4491 - Standard Test Methods for Water Permeability of Geotextiles by Permittivity. 1999a (Reapproved 2014).

C. ASTM D4533 - Standard Test Method for Trapezoid Tearing Strength of Geotextiles 2011.

D. ASTM D4632/D4632M - Standard Test Method for Grab Breaking Load and Elongation of Geotextiles 2015a.

E. ASTM D4751 - Standard Test Method for Determining Apparent Opening Size of a Geotextile 2016.

F. ASTM D4873 - Standard Guide for Identification, Storage, and Handling of Geosynthetic Rolls and Samples 2002 (Reapproved 2009).

G. California State Water Resources Control Board, Construction General Permit; current edition.

H. California Stormwater Quality Association (CASQA), California Stormwater Best Management Practice (BMP) Handbook; current edition.

I. EPA (NPDES) - National Pollutant Discharge Elimination System (NPDES), Construction General Permit Current Edition.

1.04 PERFORMANCE REQUIREMENTS

A. Comply with all requirements of agencies for erosion and sedimentation control.

B. Best Management Practices Standard: CASQA Stormwater BMP Handbook.

C. Comply with the requirements of the project Storm Water Pollution Pollution Prevention Plan (SWPPP).

D. Do not begin clearing, grading, or other work involving disturbance of ground surface cover until applicable permits have been obtained; furnish all documentation required to obtain applicable permits.

1. Owner shall obtain permits and pay for securities required by authority having jurisdiction.

2. Owner shall withhold payment to Contractor equivalent to all fines resulting from non-compliance with applicable regulations.

E. Timing: Put preventive measures in place as soon as possible after disturbance of surface cover and before precipitation occurs.

F. Storm Water Runoff: Control increased storm water runoff due to disturbance of surface cover due to construction activities for this project.

1. Prevent runoff into storm and sanitary sewer systems, including open drainage channels, in excess of actual capacity or amount allowed by authorities having jurisdiction, whichever is less.

G. Erosion On Site: Minimize wind, water, and vehicular erosion of soil on project site due to construction activities for this project.

1. Control movement of sediment and soil from temporary stockpiles of soil.
2. Prevent development of ruts due to equipment and vehicular traffic.
3. If erosion occurs due to non-compliance with these requirements, restore eroded areas at no cost to Owner.

H. Erosion Off Site: Prevent erosion of soil and deposition of sediment on other properties caused by water leaving the project site due to construction activities for this project.

1. Prevent windblown soil from leaving the project site.
2. Prevent tracking of mud onto public roads outside site.
3. Prevent mud and sediment from flowing onto sidewalks and pavements.
4. If erosion occurs due to non-compliance with these requirements, restore eroded areas at no cost to Owner.

I. Open Water: Prevent standing water that could become stagnant.

J. Maintenance: Maintain temporary preventive measures until permanent measures have been established.

K. Penalties and Fines: The Contractor is responsible for all penalties and fines assessed to or levied on the project related to stormwater management.

1.05 **SUBMITTALS**

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Maintenance Instructions: Provide instructions covering inspection and maintenance for temporary measures that must remain after Substantial Completion.

PART 2 PRODUCTS

2.01 **MATERIALS**

A. Use materials that conform to California Stormwater Quality Association (CASQA) and the California Stormwater Best Management Practice (BMP) Handbook, current edition.

B. Grass Seed For Temporary Cover: Select a species appropriate to climate, planting season, and intended purpose. If same area will later be planted with permanent vegetation, do not use species known to be excessively competitive or prone to volunteer in subsequent seasons.

PART 3 EXECUTION

3.01 **EXAMINATION**

A. Examine site and identify existing features that contribute to erosion resistance; maintain such existing features to greatest extent possible.

3.02 **PREPARATION**

A. The project SWPPP shall be prepared and electronically uploaded to the State Water Board's SMARTS system database by the District's Qualified SWPPP Developer (QSD), the District's Approved Signatory (AS), or by a data submitter as designated by the District.

B. The Contractor shall employ the services of a Qualified SWPPP Practitioner (QSP). The QSP shall download copies of the approved SWPPP from the State, and is responsible for implementation and enforcement of the SWPPP and the Erosion Control Plan. At least one (1) copy of the SWPPP shall be available at the site at all times.

C. The QSP is responsible for training of personnel for proper implementation of the SWPPP, monitoring, and all required reports.

D. Schedule work so that soil surfaces are left exposed for the minimum amount of time.

3.03 **INSTALLATION**

A. The Contractor shall implement preventative measures in accordance with the SWPPP and as required by the State Water Board.

B. Temporary Seeding:

1. When hydraulic seeder is used, seedbed preparation is not required.
2. When surface soil has been sealed by rainfall or consists of smooth undisturbed cut slopes, and conventional or manual seeding is to be used, prepare seedbed by scarifying sufficiently to allow seed to lodge and germinate.
3. If temporary mulching was used on planting area but not removed, apply nitrogen fertilizer at 1 pound per 1000 sq ft (0.5 kg per 100 sq m).
4. On soils of very low fertility, apply 10-10-10 fertilizer at rate of 12 to 16 pounds per 1000 sq ft (6 to 8 kg per 100 sq m).
5. Incorporate fertilizer into soil before seeding.
6. Apply seed uniformly; if using drill or cultipacker seeders place seed 1/2 to 1 inch (12 to 25 mm) deep.
7. Irrigate as required to thoroughly wet soil to depth that will ensure germination, without causing runoff or erosion.
8. Repeat irrigation as required until grass is established.

3.04 **MAINTENANCE**

A. Inspect preventive measures as required by the SWPPP and the State Water Board.

B. Repair deficiencies immediately.

C. Clean out temporary sediment control structures and relocate soil on site.

D. Place sediment in appropriate locations on site; do not remove from site.

3.05 **CLEAN UP**

A. Remove temporary measures after permanent measures have been installed, unless permitted to remain by the Owner's representative.

B. Clean out temporary sediment control structures that are to remain as permanent measures.

C. Where removal of temporary measures would leave exposed soil, shape surface to an acceptable grade and finish to match adjacent ground surfaces.

3.06 **SWPPP CLOSE-OUT**

A. Within 90 days of construction completion, the QSP shall eloctronically file a Notice of Termination (NOT) in the Stormwater Multiple Application and Report Tracking System (SMARTS) online.

B. The QSP shall provide a Final Site Map for inclusion with the NOT. The Final Site Map shall provide sufficient information, including photos, to demostrate compliance with the Permit regarding final site stabilization. All photo locations and directions shall be identified on the Final Site map. All photos shall be clearly labeled.

C. The QSP is responsible for filing the Annual Report.

END OF SECTION

SECTION 016000
PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.

B. Related Requirements:

1. Section 012500 "Substitution Procedures".
2. Section 013300 "Submittal Procedures".
3. Section 014010 "DSA Quality Requirements".
4. Section 014213 "Abbreviations, Symbols and Acronyms" for applicable industry standards for products specified.

1.02 DEFINITIONS

A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature, which is current as of date of the Contract Documents.
2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
3. Comparable Product: Product that is demonstrated and approved through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

B. Basis-of-Design Product Specification: A specification in which a specific manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of additional manufacturers named in the specification.

1.03 ACTION SUBMITTALS

A. Comparable Product Requests: Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles. **Read PART 3 carefully**.

1. Include data to indicate compliance with the requirements specified in "Comparable Products" Article.
2. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Architect will notify Contractor through Construction Manager of approval or rejection of proposed comparable product request within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
    a. Form of Approval: As specified in Section 013300 "Submittal Procedures."

b. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.

B. Basis-of-Design Product Specification Submittal: Comply with requirements in Section 013300 "Submittal Procedures." Show compliance with requirements.

1.04 **QUALITY ASSURANCE**

A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.

1.05 **PRODUCT DELIVERY, STORAGE, AND HANDLING**

A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.

B. Delivery and Handling:

1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.

C. Storage:

1. Store products to allow for inspection and measurement of quantity or counting of units.
2. Store materials in a manner that will not endanger Project structure.
3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
4. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
6. Protect stored products from damage and liquids from freezing.
7. Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.

1.06 **PRODUCT WARRANTIES**

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.

2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.

1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.

2. See other Sections for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time: Comply with requirements in Section 017700 "Closeout Procedures."

1.07 **CLOSEOUT SUBMITTALS**

A. Contractor and subcontractors shall certify that no asbestos containing materials and no lead base paint were used in this project. Certification letter must be addressed to Owner, including project and Contractors' information; to be notarized.

PART 2 - PRODUCTS

2.01 **NON- ASBESTOS PRODUCTS**

A. No asbestos or asbestos containing materials or lead base paint may be used in this project or in any tools, devices, clothing or equipment used to affect this construction. All work or materials found to contain asbestos, or material installed with asbestos containing equipment or lead base paint will be immediately rejected and this work will be removed by a certified EPA hazard material Contractor under the supervision of a certified hazard material consultant at no additional cost to Owner.

2.02 **PRODUCT SELECTION PROCEDURES**

A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.

1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.

2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.

3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.

4. Where products are accompanied by the term "as selected," Architect will make selection.

5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.

6. Or Equal: For products specified by name and accompanied by the term "or equal," or "or approved equal," or "or approved," comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product.

B. Product Selection Procedures:

1. Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.

2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.

3. Products:
    a. Restricted List: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered unless otherwise indicated.
4. Manufacturers:
    a. Restricted List: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered unless otherwise indicated.
5. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.

C. Visual Matching Specification: Where Specifications require "match Architect's sample", provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.
1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Section 012500 "Substitution Procedures" for proposal of product.

D. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.03 **COMPARABLE PRODUCTS**

A. Conditions for Consideration: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with these requirements:
1. Evidence that the proposed product does not require revisions to the Contract Documents that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
3. Evidence that proposed product provides specified warranty.
4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
5. Samples, if requested.

PART 3 - EXECUTION

3.01 **CONTRACT DOCUMENT REVISIONS**

A. Should a Contractor-initiated proposed substitution, alternative sequence, method of construction, products listed or equivalent other than the Basis of Design product shown involves engineering, feasibility, scope or cost, that require a revision of the Contract

Drawings or Specifications for the purpose of obtaining review and approval by Authorities Having Jurisdiction (AHJ), the Contractor accepts and agrees to the following:

1. Services of the Architect, his consultants, and / or other District's consultants who are the responsible design professionals, for researching and reporting on proposed substitutions or alternative sequence and method of construction shall be paid by Contractor in Time and Materials basis.
2. Costs related to the Services by the Architect, his consultants, and / or other District's consultants who are the responsible design professionals, for any expenses such as, but not limited to reproduction, long distance telephone, traveling and shipping costs, to be reimbursable at cost plus usual and customary mark-up for handling and billing.
3. Such fees shall be paid by Contactor whether or not the proposed substitution or alternative sequence or method of construction is ultimately accepted by Authorities Having Jurisdiction (AHJ) and / or the District.
4. Such fees shall be paid from Contractor's portion of savings from the proposed change, if a net reduction in Contract Sum results. If fees exceed Contractor's portion of net reduction, Contractor shall pay all remaining fees.

END OF SECTION 016000

SECTION 017300
EXECUTION

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:

1. Construction layout.
2. Field engineering and surveying.
3. Installation of the Work.
4. Cutting and patching.
5. Progress cleaning.
6. Starting and adjusting.
7. Protection of installed construction.
8. Correction of the Work.

B. Related Sections:

1. Division 01 Section "Submittal Procedures" for submitting surveys.
2. Division 01 Section "DSA Quality Control" for testing and inspection procedures.
3. Division 01 Section "Construction Waste Management and Disposal" for waste disposal procedures.

1.02 DEFINITIONS

A. Cutting: Removal of in-place construction necessary to permit installation or performance of other work.

B. Patching: Fitting and repair work required to restore construction to original conditions after installation of other work.

C. Project Completion: Final Completion.

1.03 INFORMATIONAL SUBMITTALS

A. Qualification Data: For land surveyor.

B. Certified Surveys: Submit four copies signed by land surveyor.

C. Final Property Survey: Submit 10 copies showing the Work performed and record survey data.

1.04 QUALITY ASSURANCE

A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified and licensed to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.

B. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.

1. Structural Elements: When cutting and patching structural elements, notify Architect, through Construction Manager, of locations and details of cutting and await directions from the Architect before proceeding. Shore, brace, and support structural element during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection
2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended

or that results in increased maintenance or decreased operational life or safety. Operational elements include the following:

a. Primary operational systems and equipment.

b. Fire separation assemblies.

c. Air or smoke barriers.

d. Fire-suppression systems.

e. Mechanical systems piping and ducts.

f. Control systems.

g. Communication systems.

h. Fire-detection and -alarm systems.

i. Conveying systems.

j. Electrical wiring systems.

k. Operating systems of special construction.

3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety. Other construction elements include but are not limited to the following:

a. Water, moisture, or vapor barriers.

b. Membranes and flashings.

c. Exterior curtain-wall construction.

d. Sprayed fire-resistive material.

e. Equipment supports.

f. Piping, ductwork, vessels, and equipment.

4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

C. Cutting and Patching Conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

D. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

PART 2 - PRODUCTS

2.01 MATERIALS

A. General: Comply with requirements specified in other Sections.

B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.

1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to the Architect, through Construction

Manager, for the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, mechanical and electrical systems, and other construction affecting the Work.

1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; underground electrical services, and other utilities.
2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.

B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.

1. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
2. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
3. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.

C. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:

1. Description of the Work.
2. List of detrimental conditions, including substrates.
3. List of unacceptable installation tolerances.
4. Recommended corrections.
5. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.02 PREPARATION

A. Existing Utility Information: Furnish information to local utility and Owner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.

B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of the Contractor, submit a request for information according to requirements in Division 01 Section "Project Management and Coordination."

3.03 CONSTRUCTION LAYOUT

A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect and Construction Manager promptly.

B. General: Engage a land surveyor to lay out the Work using accepted surveying practices.

1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
2. Establish limits on use of Project site.
3. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
4. Inform installers of lines and levels to which they must comply.
5. Check the location, level and plumb, of every major element as the Work progresses.
6. Notify Architect and Construction Manager when deviations from required lines and levels exceed allowable tolerances.
7. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.

C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.

D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.

E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect and Construction Manager.

3.04 FIELD ENGINEERING

A. Identification: Owner will identify existing benchmarks, control points, and property corners.

B. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.

1. Do not change or relocate existing benchmarks or control points without prior written approval of Architect or Construction Manager. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Architect and Construction Manager before proceeding.

C. Final Property Survey: Engage a land surveyor to prepare a final property survey showing significant features (real property) for Project. Include on the survey a certification, signed by land surveyor, that principal metes, bounds, lines, and levels of Project are accurately positioned as shown on the survey.

3.05 INSTALLATION

A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.

1. Make vertical work plumb and make horizontal work level.

2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
3. Conceal pipes, ducts, and wiring in finished areas, unless otherwise indicated.
4. Maintain minimum headroom clearance of 96 inches (2440 mm) in occupied spaces and 90 inches (2300 mm) in unoccupied spaces and at all means of egress.

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.

D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.

E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.

F. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.

G. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.

H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.

1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
2. Allow for building movement, including thermal expansion and contraction.
3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

I. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.

J. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.06 **CUTTING AND PATCHING**

A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.

1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

B. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties

C. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.

D. Temporary Support: Provide temporary support of work to be cut.

E. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

F. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching in accordance with requirements of Division 01 Section "Summary."

G. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to prevent unscheduled interruption to occupied areas.

H. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.

1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
4. Excavating and Backfilling: Comply with requirements in applicable Division 31 Sections where required by cutting and patching operations.
5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
6. Proceed with patching after construction operations requiring cutting are complete.

I. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.
    a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
    b. Restore damaged pipe covering to its original condition.
3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
    a. Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply

final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.

4. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition.

J. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.07 OWNER-INSTALLED PRODUCTS

A. Site Access: Provide access to Project site for Owner's construction personnel.

B. Coordination: Coordinate construction and operations of the Work with work performed by Owner's construction personnel.

1. Construction Schedule: Inform Owner of Contractor's preferred construction schedule for Owner's portion of the Work. Adjust construction schedule based on a mutually agreeable timetable. Notify Owner if changes to schedule are required due to differences in actual construction progress.

2. Preinstallation Conferences: Include Owner's construction personnel at preinstallation conferences covering portions of the Work that are to receive Owner's work. Attend preinstallation conferences conducted by Owner's construction personnel if portions of the Work depend on Owner's construction.

3.08 PROGRESS CLEANING

A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.

1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.

2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F (27 deg C).

3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.

a. Utilize containers intended for holding waste materials of type to be stored.

4. Coordinate progress cleaning for joint-use areas where more than one installer has worked.

B. Site: Maintain Project site free of waste materials and debris.

C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.

1. Remove liquid spills promptly.

2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.

D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Project Completion.

G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Division 01 Section "Construction Waste Management and Disposal."

H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Project Completion.

I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.09 STARTING AND ADJUSTING

A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

B. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.

C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. Manufacturer's Field Service: Comply with qualification requirements in Division 01 Section "DSA Quality Requirements."

3.10 PROTECTION OF INSTALLED CONSTRUCTION

A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Project Completion.

B. Comply with manufacturer's written instructions for temperature and relative humidity.

C. Limiting Exposures: Supervise construction operations to ensure that no part of the Work, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period. Where applicable, such exposures include, but are not limited to, the following:

1. Excessive static or dynamic loading.
2. Excessive internal or external pressures.
3. Excessively high or low temperatures.
4. Thermal shock.
5. Excessively high or low humidity.
6. Pollution and air contamination.
7. Water or ice.
8. Chemicals and solvents.
9. Light.
10. Radiation.
11. Puncture.
12. Abrasion.
13. Heavy traffic.
14. Soiling, staining, and corrosion.

15. Bacteria.
16. Rodent and insect infestation.
17. Combustion.
18. Electrical current.
19. High-speed operation.
20. Improper lubrication.
21. Unusual wear or other misuse.
22. Contact between incompatible materials.
23. Destructive testing.
24. Misalignment.
25. Excessive weathering.
26. Unprotected storage.
27. Improper shipping or handling.
28. Theft or vandalism.

3.11 **CORRECTION OF THE WORK**

A. Repair or remove and replace defective construction. Restore damaged substrates and finishes.

1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.

B. Restore permanent facilities used during construction to their specified condition.

C. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.

D. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.

E. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

END OF SECTION 017300.00

SECTION 017419
CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes administrative and procedural requirements for the following:

1. Salvaging nonhazardous demolition and construction waste.
2. Recycling nonhazardous demolition and construction waste.
3. Disposing of nonhazardous demolition and construction waste.

1.02 DEFINITIONS

A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.

B. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.

C. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.

D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.

1.03 PERFORMANCE REQUIREMENTS

A. General: Achieve end-of-Project rates for salvage/recycling of **75**-percent by weight of total non-hazardous solid waste generated by the Work. Practice efficient waste management in the use of materials in the course of the Work. Use all reasonable means to divert construction and demolition waste from landfills and incinerators. Facilitate recycling and salvage of materials, including the following:

1. Demolition Waste:
    a. Asphalt paving.
    b. Concrete.
    c. Concrete reinforcing steel.
    d. Concrete masonry units.
    e. Switchgear and panelboards.
    f. Transformers.
2. Construction Waste:
    a. Masonry and CMU.
    b. Lumber.
    c. Wood sheet materials.
    d. Wood trim.
    e. Metals.
    f. Roofing.
    g. Insulation.
    h. Carpet and pad.
    i. Gypsum board.

j. Piping.

k. Electrical conduit.

l. Packaging: Regardless of salvage/recycle goal indicated in "General" Paragraph above, salvage or recycle 100 percent of the following uncontaminated packaging materials:

1) Paper.

2) Cardboard.

3) Boxes.

4) Plastic sheet and film.

5) Polystyrene packaging.

6) Wood crates.

7) Plastic pails.

1.04 **ACTION SUBMITTALS**

A. Waste Management Plan: Submit plan within 30 days of date established for the Notice to Proceed.

1.05 **INFORMATIONAL SUBMITTALS**

A. Waste Reduction Calculations: Before request for Substantial Completion, submit calculated end-of-Project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work.

B. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

C. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

1.06 **QUALITY ASSURANCE**

A. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.

1.07 **WASTE MANAGEMENT PLAN**

A. General: Develop a waste management plan according to ASTM E 1609 and requirements in this Section. Plan shall consist of waste identification, waste reduction work plan, and cost/revenue analysis. Distinguish between demolition and construction waste. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.

B. Waste Identification: Indicate anticipated types and quantities of demolition site-clearing and construction waste generated by the Work. Use Form CWM-1 for construction waste and Form CWM-2 for demolition waste. Include estimated quantities and assumptions for estimates.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 **PLAN IMPLEMENTATION**

A. General: Implement approved waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.

1. Comply with operation, termination, and removal requirements in Section 015000 "Temporary Facilities and Controls."

B. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work.

1. Distribute waste management plan to everyone concerned within three days of submittal return.

2. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.

C. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.

2. Comply with Section 015000 "Temporary Facilities and Controls" for controlling dust and dirt, environmental protection, and noise control.

3.02 RECYCLING DEMOLITION AND CONSTRUCTION WASTE, GENERAL

A. General: Recycle paper and beverage containers used by on-site workers.

B. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall be shared equally by Owner and Contractor.

C. Preparation of Waste: Prepare and maintain recyclable waste materials according to recycling or reuse facility requirements. Maintain materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to the recycling process.

D. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical according to approved construction waste management plan.

1. Provide appropriately marked containers or bins for controlling recyclable waste until removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.

a. Inspect containers and bins for contamination and remove contaminated materials if found.

2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.

3. Stockpile materials away from construction area. Do not store within drip line of remaining trees.

4. Store components off the ground and protect from the weather.

5. Remove recyclable waste from Owner's property and transport to recycling receiver or processor.

3.03 RECYCLING DEMOLITION WASTE

A. Asphalt Paving: Grind asphalt to maximum 1-1/2-inch (38-mm) size.

B. Asphalt Paving: Break up and transport paving to asphalt-recycling facility.

C. Concrete: Remove reinforcement and other metals from concrete and sort with other metals.

1. Pulverize concrete to maximum 1-1/2-inch (38-mm) size.

2. Crush concrete and screen to comply with requirements in Section 312000 "Earth Moving" for use as satisfactory soil for fill or subbase.

3.04 **RECYCLING CONSTRUCTION WASTE**

A. Packaging:

1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
2. Polystyrene Packaging: Separate and bag materials.
3. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.
4. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.

B. Wood Materials:

1. Clean Cut-Offs of Lumber: Grind or chip into small pieces.
2. Clean Sawdust: Bag sawdust that does not contain painted or treated wood.

C. Gypsum Board: Stack large clean pieces on wood pallets or in container and store in a dry location.

1. Clean Gypsum Board: Grind scraps of clean gypsum board using small mobile chipper or hammer mill. Screen out paper after grinding.

3.05 **DISPOSAL OF WASTE**

A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.

1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Burning: Do not burn waste materials.

C. Disposal: Remove waste materials from Owner's property and legally dispose of them.

3.06 **ATTACHMENTS**

A. Form CWM-1 for construction waste identification.

B. Form CWM-2 for demolition waste identification.

END OF SECTION 017419

FORM CWM-1: CONSTRUCTION WASTE IDENTIFICATION							
MATERIAL CATEGORY	GENERATION POINT	EST. QUANTITY OF MATERIALS RECEIVED*	EST. WASTE (%)	TOTAL EST. QUANTITY OF WASTE*	EST. VOLUME CY (CM)	EST. WEIGHT TONS (TONNES)	REMARKS AND ASSUMPTIONS
		(A)	(B)	(C = A x B)			
Packaging: Cardboard							
Packaging: Boxes							
Packaging: Plastic Sheet or Film							
Packaging: Polystyrene							
Packaging: Pallets or Skids							
Packaging: Crates							
Packaging: Paint Cans							
Packaging: Plastic Pails							
Site-Clearing Waste							
Masonry or CMU							
Offs							
Lumber: Warped Pieces							
Plywood or OSB (scraps)							
Wood Forms							
Wood Waste Chutes							
Wood Trim (cut-offs)							
Metals							
Insulation							
Roofing							
Joint Sealant Tubes							
Gypsum Board (scraps)							
Carpet and Pad (scraps)							
Piping							
Electrical Conduit							
Other:							

* Insert units of measure

SECTION 017800
CLOSEOUT SUBMITTALS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Project Record Documents.

B. Operation and Maintenance Data.

C. Warranties and bonds.

1.02 RELATED REQUIREMENTS

A. Section 013000 - Administrative Requirements: Submittals procedures, shop drawings, product data, and samples.

B. Individual Product Sections: Specific requirements for operation and maintenance data.

C. Individual Product Sections: Warranties required for specific products or Work.

1.03 SUBMITTALS

A. Project Record Documents: Submit documents to Architect with claim for final Application for Payment.

B. Operation and Maintenance Data:

1. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit completed documents within ten days after acceptance.
2. Submit two sets of revised final documents in final form within 10 days after final inspection.

C. Warranties and Bonds:

1. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within 10 days after acceptance.
2. Make other submittals within 10 days after Date of Substantial Completion, prior to final Application for Payment.
3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within 10 days after acceptance, listing the date of acceptance as the beginning of the warranty period.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PROJECT RECORD DOCUMENTS

A. Maintain on site one set of the following record documents; record actual revisions to the Work:

1. Drawings.
2. Addenda.
3. Change Orders and other modifications to the Contract.
4. Reviewed shop drawings, product data, and samples.

B. Ensure entries are complete and accurate, enabling future reference by Owner.

C. Store record documents separate from documents used for construction.

D. Record information concurrent with construction progress.

E. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:

1. Measured depths of foundations in relation to finish first floor datum.
2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
3. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.

3.02 **OPERATION AND MAINTENANCE DATA**

A. Source Data: For each product or system, list names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.

B. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.

C. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use Project Record Documents as maintenance drawings.

D. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

3.03 **OPERATION AND MAINTENANCE DATA FOR EQUIPMENT AND SYSTEMS**

A. For Each Item of Equipment and Each System:

1. Description of unit or system, and component parts.
2. Identify function, normal operating characteristics, and limiting conditions.
3. Include performance curves, with engineering data and tests.
4. Complete nomenclature and model number of replaceable parts.

B. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.

C. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.

D. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and trouble shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.

E. Provide servicing and lubrication schedule, and list of lubricants required.

F. Include manufacturer's printed operation and maintenance instructions.

G. Include sequence of operation by controls manufacturer.

H. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

I. Additional Requirements: As specified in individual product specification sections.

3.04 **WARRANTIES AND BONDS**

A. Obtain warranties and bonds, executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within 10 days after completion of the applicable item of work. Except for items put into use with Owner's permission, leave date of beginning of time of warranty until Date of Substantial completion is determined.

B. Verify that documents are in proper form, contain full information, and are notarized.

C. Co-execute submittals when required.

D. Retain warranties and bonds until time specified for submittal.

E. Include originals of each in operation and maintenance manuals, indexed separately on Table of Contents.

F. Manual: Bind in commercial quality 8-1/2 by 11 inch (216 by 279 mm) three D side ring binders with durable plastic covers.

G. Cover: Identify each binder with typed or printed title WARRANTIES AND BONDS, with title of Project; name, address and telephone number of Contractor and equipment supplier; and name of responsible company principal.

END OF SECTION

SECTION 017823
OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:

1. Operation and maintenance documentation directory.
2. Emergency manuals.
3. Operation manuals for systems, subsystems, and equipment.
4. Product maintenance manuals.
5. Systems and equipment maintenance manuals.

B. Related Requirements:

1. Section 013300 "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.

1.02 DEFINITIONS

A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.

B. Subsystem: A portion of a system with characteristics similar to a system.

1.03 CLOSEOUT SUBMITTALS

A. Manual Content: Operations and maintenance manual content is specified in individual Specification Sections to be reviewed at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.

1. Architect and Commissioning Authority will comment on whether content of operations and maintenance submittals are acceptable.
2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.

B. Format: Submit operations and maintenance manuals in the following format:

1. PDF electronic file. Assemble each manual into a composite electronically indexed file. Submit on digital media acceptable to Architect.
    a. Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically linked operation and maintenance directory.
    b. Enable inserted reviewer comments on draft submittals.
2. Three paper copies. Include a complete operation and maintenance directory. Enclose title pages and directories in clear plastic sleeves. Architect, through Construction Manager, will return two copies.

C. Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 15 days before commencing demonstration and training. Architect and Commissioning Authority will return copy with comments.

1. Correct or revise each manual to comply with Architect's and Commissioning Authority's comments. Submit copies of each corrected manual within 15 days of receipt of Architect's and Commissioning Authority's comments and prior to commencing demonstration and training.

PART 2 - PRODUCTS

2.01 **OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY**

A. Directory: Prepare a single, comprehensive directory of emergency, operation, and maintenance data and materials, listing items and their location to facilitate ready access to desired information. Include a section in the directory for each of the following:

1. List of documents.
2. List of systems.
3. List of equipment.
4. Table of contents.

B. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.

C. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.

D. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.

E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

2.02 **REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS**

A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:

1. Title page.
2. Table of contents.
3. Manual contents.

B. Title Page: Include the following information:

1. Subject matter included in manual.
2. Name and address of Project.
3. Name and address of Owner.
4. Date of submittal.
5. Name and contact information for Contractor.
6. Name and contact information for Construction Manager.
7. Name and contact information for Architect.
8. Name and contact information for Commissioning Authority.
9. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
10. Cross-reference to related systems in other operation and maintenance manuals.

C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.

1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each

volume of the set.

D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.

E. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.

1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.

2. File Names and Bookmarks: Enable bookmarking of individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.

F. Manuals, Paper Copy: Submit manuals in the form of hard copy, bound and labeled volumes.

1. Binders: Heavy-duty, three-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch (215-by-280-mm) paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.

a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.

b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents, and indicate Specification Section number on bottom of spine. Indicate volume number for multiple-volume sets.

2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.

3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment.

4. Supplementary Text: Prepared on 8-1/2-by-11-inch (215-by-280-mm) white bond paper.

5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.

a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.

b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

2.03 **EMERGENCY MANUALS**

A. Content: Organize manual into a separate section for each of the following:

1. Type of emergency.
2. Emergency instructions.
3. Emergency procedures.

B. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:

1. Fire.
2. Flood.
3. Gas leak.
4. Water leak.
5. Power failure.
6. Water outage.
7. System, subsystem, or equipment failure.
8. Chemical release or spill.

C. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.

D. Emergency Procedures: Include the following, as applicable:

1. Instructions on stopping.
2. Shutdown instructions for each type of emergency.
3. Operating instructions for conditions outside normal operating limits.
4. Required sequences for electric or electronic systems.
5. Special operating instructions and procedures.

2.04 **OPERATION MANUALS**

A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:

1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
2. Performance and design criteria if Contractor has delegated design responsibility.
3. Operating standards.
4. Operating procedures.
5. Operating logs.
6. Wiring diagrams.
7. Control diagrams.
8. Piped system diagrams.
9. Precautions against improper use.
10. License requirements including inspection and renewal dates.

B. Descriptions: Include the following:

1. Product name and model number. Use designations for products indicated on Contract Documents.
2. Manufacturer's name.

3. Equipment identification with serial number of each component.
4. Equipment function.
5. Operating characteristics.
6. Limiting conditions.
7. Performance curves.
8. Engineering data and tests.
9. Complete nomenclature and number of replacement parts.

C. Operating Procedures: Include the following, as applicable:

1. Startup procedures.
2. Equipment or system break-in procedures.
3. Routine and normal operating instructions.
4. Regulation and control procedures.
5. Instructions on stopping.
6. Normal shutdown instructions.
7. Seasonal and weekend operating instructions.
8. Required sequences for electric or electronic systems.
9. Special operating instructions and procedures.

D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.

E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

2.05 **PRODUCT MAINTENANCE MANUALS**

A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

C. Product Information: Include the following, as applicable:

1. Product name and model number.
2. Manufacturer's name.
3. Color, pattern, and texture.
4. Material and chemical composition.
5. Reordering information for specially manufactured products.

D. Maintenance Procedures: Include manufacturer's written recommendations and the following:

1. Inspection procedures.
2. Types of cleaning agents to be used and methods of cleaning.
3. List of cleaning agents and methods of cleaning detrimental to product.

4. Schedule for routine cleaning and maintenance.
5. Repair instructions.

E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

1. Include procedures to follow and required notifications for warranty claims.

2.06 **SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS**

A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.

B. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:

1. Standard maintenance instructions and bulletins.
2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
3. Identification and nomenclature of parts and components.
4. List of items recommended to be stocked as spare parts.

D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:

1. Test and inspection instructions.
2. Troubleshooting guide.
3. Precautions against improper maintenance.
4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
5. Aligning, adjusting, and checking instructions.
6. Demonstration and training video recording, if available.

E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.

1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.

F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.

G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.

H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

1. Include procedures to follow and required notifications for warranty claims.

PART 3 - EXECUTION

3.01 **MANUAL PREPARATION**

A. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals.

B. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.

C. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.

D. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.

1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.

2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.

E. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.

1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.

F. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.

1. Do not use original project record documents as part of operation and maintenance manuals.

2. Comply with requirements of newly prepared record Drawings in Section 017839 "Project Record Documents."

G. Comply with Section 017700 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION 017823

SECTION 017839
PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes administrative and procedural requirements for project record documents, including the following:

1. Record Drawings:
    a. Marked-Up Record Prints.
    b. Scanned PDF Electronic Files of Marked-Up Record Prints.
2. Record Specifications.
3. Record Contract Modification Documents.

B. Related Sections:

1. Division 01 Section "Submittal Procedures" for general submittal procedures and for definition of PDF electronic file format.
2. Division 01 Section "Closeout Procedures" for general closeout procedures.
3. Division 01 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
4. Divisions 02 through 33 Sections for specific requirements for project record documents of the Work in those Sections.

1.02 CLOSEOUT SUBMITTALS

A. Record Drawings. Comply with the following::

1. Marked-Up Record Prints. Submit paper copies of record Drawings as follows:
    a. Initial Submittal: Submit one paper set of marked-up record prints. Architect will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.
    b. Final Submittal: Make all corrections, changes and additions from marked-up record prints. Submit one paper set of final marked-up record prints.
2. Scanned PDF Electronic Files of Marked-Up Record Prints. Submit electronic copies of record Drawings as follows:
    a. Final Submittal: Submit three scanned PDF electronic file copies of final marked-up record prints.

B. Record Specifications (Project Manual): Submit copies of final project specifications as follows:

1. Initial Submittal: Submit one paper set of updated project specifications. Architect will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.
2. Final Submittal: Make all corrections, changes and additions from marked-up specifications. Submit one paper set and three scanned PDF electronic file copies of final marked-up specifications.

C. Record Contract Modification Documents: Submit copies of all contract modification documents relating to the physical work, including Addenda, Construction Change Directives, RFI's, ASI's and other contract modifications as follows:

1. Initial Submittal: Submit one paper set of marked-up contract modification documents. Architect will indicate whether general scope of changes, additional information

recorded, and quality of drafting are acceptable.

2. Final Submittal: Make all corrections, changes and additions from marked-up contract modification documents. Submit one paper set and three scanned PDF electronic file copies of final marked-up specifications.

D. Monthly Reviews: Review job-site copy of record marked-up prints concurrent with submittal of application for payment. Demonstrate that change items are incorporated in Project record documents concurrent with progress of the Work, including modifications, RFI's, ASI's, CCD's, concealed conditions, field changes, product selections, and other notations.

PART 2 - PRODUCTS

2.01 **RECORD DRAWINGS**

A. Marked-Up Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings as follows:

1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.

   a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.

   b. Accurately record information in an acceptable drawing technique.

   c. Record data as soon as possible after obtaining it.

   d. Record and check the markup before enclosing concealed installations.

   e. Cross-reference record prints to corresponding archive photographic documentation.

2. Content: Types of items requiring marking include, but are not limited to, the following:

   a. Dimensional changes to Drawings.

   b. Revisions to details shown on Drawings.

   c. Depths of foundations below first floor.

   d. Locations and depths of underground utilities.

   e. Revisions to routing of piping and conduits.

   f. Revisions to electrical circuitry.

   g. Actual equipment locations.

   h. Duct size and routing.

   i. Locations of concealed internal utilities.

   j. Changes made by Change Order or Construction Change Directive.

   k. Changes made following Architect's written orders, including RFI's and ASI's.

   l. Details not on the original Contract Drawings.

   m. Field records for variable and concealed conditions.

   n. Record information on the Work that is shown only schematically.

3. Mark the Contract Drawings and Shop Drawings completely and accurately. Utilize personnel proficient at recording graphic information in production of marked-up record prints.

4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.

5. Mark important additional information that was either shown schematically or omitted from original Drawings.
6. Note Construction Change Directive numbers, RFI numbers, ASI numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.
7. Prepare a full set of corrected marked-up record prints of the Contract Drawings after conducting a final review of the marked-up record prints with Architect and Construction Manager:
    a. Conduct the final review immediately before inspection for Preliminary Completion.

B. Record Digital Data Files: After final review and preparation of the marked-up record prints and when authorized, prepare a full set of corrected digital data files of the Contract Drawings, as follows:

1. Incorporate changes and additional information previously marked on record prints. Delete, redraw, and add details and notations where applicable. Refer instances of uncertainty to Architect, through Construction Manager for resolution

C. Format: Identify and date each record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location (lower right hand corner of sheet):

1. Marked-Up Record Prints: Organize record prints and newly prepared record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
2. Format: Annotated PDF electronic file[with comment function enabled].
3. Scanned PDF Electronic Files of Marked-Up Record Prints: Organize scanned PDF electronic copies of record Drawings into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include sheet identification within each file.
    a. Media: Provide electronic files on DVD ROM media, in UDF version 1.02 disk format. Provided clearly labeled jewel cases.
4. Identification: Provide the following designation on each sheet or file of the Record Drawings:
    a. Project name.
    b. Date.
    c. Designation "PROJECT RECORD DRAWINGS."
    d. Name of Architect and Construction Manager.
    e. Name of Contractor.

2.02 **RECORD SPECIFICATIONS**

A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications and as follows:

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.

4. For each principal product, indicate whether record Product Data has been submitted in operation and maintenance manuals instead of submitted as record Product Data.
5. Note related addenda, Construction Change Directives, RFI's, ASI's, Change Orders and other contract modifications, and Record Drawings where applicable.

B. Format:

1. Paper: Bind paper copies in three-ring binders, each identified according to document type. Include record Specification directory organized by specification section number and title.
2. Electronic Media: Organize PDF files by types within directories and identify each file by name. Provide electronic files on DVD ROM media, in UDF version 1.02 disk format. Provided clearly labeled jewel cases.

2.03 **RECORD CONTRACT MODIFICATIONS**

A. Preparation: Assemble Addenda, Construction Change Directives, RFI's, ASI's and other contract modification documents relating to the physical work. Include all pertinent attachments, including associated Record Drawings and Record Specifications where applicable, and bind.

1. Record Drawings: Full-size drawings issued as part of contract modifications may be incorporated into the Record Drawing set, if cross-referencing is clearly provided between the contract modification document and the Record Drawing and between the Record Drawing and the issuing document.
2. Record Specifications: Specifications issued as part of contract modifications may be incorporated into the Record Specification set, if cross-referencing is clearly provided between the contract modification document and the Record Specification and between the Record Specification and the issuing document.

B. Mark Record Drawings and Record Specifications to indicate the appropriate contract modification of the physical work.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Provide a complete record of all products installed, and the details and locations of the installation. Include proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected, or cross reference to the modification document.
3. Note related Addenda, Construction Change Directives, RFI's, ASI's, Change Orders and other contract modifications, on Record Drawings and Specifications where applicable.

C. Format:

1. Paper: Bind paper copies in three-ring binders, each identified according to document type. Include all attachments smaller than the size of the Drawings. Include a Record Contract Modification directory organized by number and title.
2. Electronic Media: Organize PDF files by types within directories and identify each file by name. Provide electronic files on DVD ROM media, in UDF version 1.02 disk format. Provided clearly labeled jewel cases.

PART 3 - EXECUTION

3.01 **RECORDING AND MAINTENANCE**

A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and modifications to project record documents as

they occur; do not wait until the end of Project.

B. Maintenance of Record Documents and Samples: Store record documents and Samples in the field office apart from the Contract Documents used for construction. Do not use project record documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to project record documents for reference during normal working hours.

END OF SECTION 017839.00

SECTION 017900
DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:

1. Demonstration of operation of systems, subsystems, and equipment.

1.02 INFORMATIONAL SUBMITTALS

A. Instruction Program: Submit outline of instructional program for demonstration and training, including a list of training modules and a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.

B. Attendance Record: For each training module, submit list of participants and length of instruction time.

1.03 COORDINATION

A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations and to ensure availability of Owner's personnel.

PART 2 - PRODUCTS

2.01 INSTRUCTION PROGRAM

A. Program Structure: Develop an instruction program that includes individual training modules for each system and for equipment not part of a system, as required by individual Specification Sections.

PART 3 - EXECUTION

3.01 PREPARATION

A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a training manual organized in coordination with requirements in Section 017823 "Operation and Maintenance Data."

3.02 INSTRUCTION

A. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.

B. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.

1. Schedule training with Owner, through Construction Manager, with at least seven days' advance notice.

END OF SECTION 017900

SECTION 019113
GENERAL COMMISSIONING REQUIREMENTS

PART 1 GENERAL

1.01 SUMMARY

A. Commissioning is intended to achieve the following specific objectives; this section specifies the Contractor's responsibilities for commissioning:

1. Verify that the work is installed in accordance with the Contract Documents and the manufacturer’s recommendations and instructions, and that it receives adequate operational checkout prior to startup: Startup reports and Prefunctional Checklists executed by Contractor are utilized to achieve this.
2. Verify and document that functional performance is in accordance with the Contract Documents: Functional Tests executed by Contractor and witnessed by the Commissioning Authority are utilized to achieve this.
3. Verify that operation and maintenance manuals submitted to Owner are complete: Detailed operation and maintenance (O&M) data submittals by Contractor are utilized to achieve this.
4. Verify that the Owner’s operating personnel are adequately trained: Formal training conducted by Contractor is utilized to achieve this.

B. The Commissioning Authority directs and coordinates all commissioning activities; this section describes some but not all of the Commissioning Authority's responsibilities.

1.02 RELATED REQUIREMENTS

A. Section 017800 - Closeout Submittals: Scope and procedures for operation and maintenance manuals and project record documents.

PART 2 PRODUCTS

2.01 TEST EQUIPMENT

A. Provide all standard testing equipment required to perform startup and initial checkout and required Functional Testing; unless otherwise noted such testing equipment will NOT become the property of Owner.

B. Calibration Tolerances: Provide testing equipment of sufficient quality and accuracy to test and/or measure system performance with the tolerances specified. If not otherwise noted, the following minimum requirements apply:

1. Temperature Sensors and Digital Thermometers: Certified calibration within past year to accuracy of 0.5 degree F (0.3 degree C) and resolution of plus/minus 0.1 degree F (0.05 degree C).
2. Pressure Sensors: Accuracy of plus/minus 2.0 percent of the value range being measured (not full range of meter), calibrated within the last year.
3. Calibration: According to the manufacturer’s recommended intervals and when dropped or damaged; affix calibration tags or keep certificates readily available for inspection.

C. Equipment-Specific Tools: Where special testing equipment, tools and instruments are specific to a piece of equipment, are only available from the vendor, and are required in order to accomplish startup or Functional Testing, provide such equipment, tools, and instruments as part of the work at no extra cost to Owner; such equipment, tools, and instruments are to become the property of Owner.

D. Dataloggers: Independent equipment and software for monitoring flows, currents, status, pressures, etc. of equipment.

1. Dataloggers required to for Functional Tests will be provided by the Commissioning Authority and will not become the property of Owner.

PART 3 EXECUTION

3.01 **COMMISSIONING PLAN**

A. Commissioning Authority has prepared the Commissioning Plan.

1. Attend meetings called by the Commissioning Authority for purposes of completing the commissioning plan.
2. Require attendance and participation of relevant subcontractors, installers, suppliers, and manufacturer representatives.

B. Contractor is responsible for compliance with the Commissioning Plan.

C. Commissioning Plan: The commissioning schedule, procedures, and coordination requirements for all parties in the commissioning process.

D. Commissioning Schedule:

1. Submit anticipated dates of startup of each item of equipment and system to Commissioning Authority within 60 days after award of Contract.
2. Re-submit anticipated startup dates monthly, but not less than 4 weeks prior to startup.
3. Prefunctional Checklists and Functional Tests are to be performed in sequence from components, to subsystems, to systems.
4. Provide sufficient notice to Commissioning Authority for delivery of relevant Checklists and Functional Test procedures, to avoid delay.

3.02 **STARTUP PLANS AND REPORTS**

A. Startup Plans: For each item of equipment and system for which the manufacturer provides a startup plan, submit the plan not less than 8 weeks prior to startup.

B. Startup Reports: For each item of equipment and system for which the manufacturer provides a startup checklist (or startup plan or field checkout sheet), document compliance by submitting the completed startup checklist prior to startup, signed and dated by responsible entity.

C. Submit directly to the Commissioning Authority.

3.03 **PREFUNCTIONAL CHECKLISTS**

A. A Prefunctional Checklist is required to be filled out for each item of equipment or other assembly specified to be commissioned.

1. No sampling of identical or near-identical items is allowed.
2. These checklists do not replace manufacturers' recommended startup checklists, regardless of apparent redundancy.
3. Prefunctional Checklist forms will not be complete until after award of the contract; the following types of information will be gathered via the completed Checklist forms:
    a. Certification by installing contractor that the unit is properly installed, started up, and operating and ready for Functional Testing.
    b. Confirmation of receipt of each shop drawing and commissioning submittal specified, itemized by unit.
    c. Manufacturer, model number, and relevant capacity information; list information "as specified," "as submitted," and "as installed."
    d. Serial number of installed unit.

e. List of inspections to be conducted to document proper installation prior to startup and Functional Testing; these will be primarily static inspections and procedures; for equipment and systems may include normal manufacturer's start-up checklist items and minor testing.

f. Sensor and actuator calibration information.

B. Contractor is responsible for filling out Prefunctional Checklists, after completion of installation and before startup; witnessing by the Commissioning Authority is not required unless otherwise specified.

1. Each line item without deficiency is to be witnessed, initialed, and dated by the actual witness; checklists are not complete until all line items are initialed and dated complete without deficiencies.

2. Checklists with incomplete items may be submitted for approval provided the Contractor attests that incomplete items do not preclude the performance of safe and reliable Functional Testing; re-submission of the Checklist is required upon completion of remaining items.

3. Individual Checklists may contain line items that are the responsibility of more than one installer; Contractor shall assign responsibility to appropriate installers or subcontractors, with identification recorded on the form.

4. If any Checklist line item is not relevant, record reasons on the form.

5. Contractor may independently perform startup inspections and/or tests, at his option.

6. Regardless of these reporting requirements, Contractor is responsible for correct startup and operation.

7. Submit completed Checklists to Commissioning Authority within two days of completion.

C. Commissioning Authority is responsible for furnishing the Prefunctional Checklists to Contractor.

1. Initial Drafts: Contractor is responsible for initial draft of Prefunctional Checklist where so indicated in the Contract Documents.

2. Provide all additional information requested by Commissioning Authority to aid in preparation of checklists, such as shop drawing submittals, manufacturers' startup checklists, and O&M data.

3. Commissioning Authority may add any relevant items deemed necessary regardless of whether they are explicitly mentioned in the Contract Documents or not.

4. When asked to review the proposed Checklists, do so in a timely manner.

D. Commissioning Authority Witnessing: Required for:

1. Each piece of primary equipment, unless sampling of multiple similar units is allowed by the commissioning plan.

2. A sampling of non-primary equipment, as allowed by the commissioning plan.

E. Deficiencies: Correct deficiencies and re-inspect or re-test, as applicable, at no extra cost to Owner.

1. If difficulty in correction would delay progress, report deficiency to the Commissioning Authority immediately.

3.04 **FUNCTIONAL TESTS**

A. A Functional Test is required for each item of equipment, system, or other assembly specified to be commissioned, unless sampling of multiple identical or near-identical units is

allowed by the final test procedures.

B. Contractor is responsible for execution of required Functional Tests, after completion of Prefunctional Checklist and before closeout.

C. Commissioning Authority is responsible for witnessing and reporting results of Functional Tests, including preparation and completion of forms for that purpose.

D. Contractor is responsible for correction of deficiencies and re-testing at no extra cost to Owner; if a deficiency is not corrected and re-tested immediately, the Commissioning Authority will document the deficiency and the Contractor's stated intentions regarding correction.

1. Deficiencies are any condition in the installation or function of a component, piece of equipment or system that is not in compliance with the Contract Documents or does not perform properly.
2. When the deficiency has been corrected, the Contractor completes the form certifying that the item is ready to be re-tested and returns the form to the Commissioning Authority; the Commissioning Authority will reschedule the test and the Contractor shall re-test.
3. Identical or Near-Identical Items: If 10 percent, or three, whichever is greater, of identical or near-identical items fail to perform due to material or manufacturing defect, all items will be considered defective; provide a proposal for correction within 2 weeks after notification of defect, including provision for testing sample installations prior to replacement of all items.
4. Contractor shall bear the cost of Owner and Commissioning Authority personnel time witnessing re-testing.
5. Contractor shall bear the cost of Owner and Commissioning Authority personnel time witnessing re-testing if the test failed due to failure to execute the relevant Prefunctional Checklist correctly; if the test failed for reasons that would not have been identified in the Prefunctional Checklist process, Contractor shall bear the cost of the second and subsequent re-tests.

E. Functional Test Procedures:

1. Some test procedures are included in the Contract Documents; where Functional Test procedures are not included in the Contract Documents, test procedures will be determined by the Commissioning Authority with input by and coordination with Contractor.
2. Examples of Functional Testing:
    a. Test the dynamic function and operation of equipment and systems (rather than just components) using manual (direct observation) or monitoring methods under full operation (e.g., the chiller pump is tested interactively with the chiller functions to see if the pump ramps up and down to maintain the differential pressure setpoint).
    b. Systems are tested under various modes, such as during low cooling or heating loads, high loads, component failures, unoccupied, varying outside air temperatures, fire alarm, power failure, etc.
    c. Systems are run through all the HVAC control system’s sequences of operation and components are verified to be responding as the sequence's state.
    d. Traditional air or water test and balancing (TAB) is not Functional Testing; spot checking of TAB by demonstration to the Commissioning Authority is Functional Testing.

F. Deferred Functional Tests: Some tests may need to be performed later, after substantial completion, due to partial occupancy, equipment, seasonal requirements, design or other site conditions; performance of these tests remains the Contractor's responsibility regardless of timing.

3.05 **SENSOR AND ACTUATOR CALIBRATION**

A. Calibrate all field-installed temperature, relative humidity, carbon monoxide, carbon dioxide, and pressure sensors and gages, and all actuators (dampers and valves) on this piece of equipment shall be calibrated. Sensors installed in the unit at the factory with calibration certification provided need not be field calibrated.

B. Calibrate using the methods described below; alternate methods may be used, if approved by Commissioning Authority and Owner beforehand. See PART 2 for test instrument requirements. Record methods used on the relevant Prefunctional Checklist or other suitable forms, documenting initial, intermediate and final results.

C. All Sensors:

1. Verify that sensor location is appropriate and away from potential causes of erratic operation.
2. Verify that sensors with shielded cable are grounded only at one end.
3. For sensor pairs that are used to determine a temperature or pressure difference, for temperature make sure they are reading within 0.2 degree F (0.1 degree C) of each other, and for pressure, within tolerance equal to 2 percent of the reading, of each other.
4. Tolerances for critical applications may be tighter.

D. Sensors Without Transmitters - Standard Application:

1. Make a reading with a calibrated test instrument within 6 inches (150 mm) of the site sensor.
2. Verify that the sensor reading, via the permanent thermostat, gage or building automation system, is within the tolerances in the table below of the instrument-measured value.
3. If not, install offset, calibrate or replace sensor.

E. Sensors With Transmitters - Standard Application.

1. Disconnect sensor.
2. Connect a signal generator in place of sensor.
3. Connect ammeter in series between transmitter and building automation system control panel.
4. Using manufacturer’s resistance-temperature data, simulate minimum desired temperature.
5. Adjust transmitter potentiometer zero until 4 mA is read by the ammeter.
6. Repeat for the maximum temperature matching 20 mA to the potentiometer span or maximum and verify at the building automation system.
7. Record all values and recalibrate controller as necessary to conform with specified control ramps, reset schedules, proportional relationship, reset relationship and P/I reaction.
8. Reconnect sensor.
9. Make a reading with a calibrated test instrument within 6 inches (150 mm) of the site sensor.

10. Verify that the sensor reading, via the permanent thermostat, gage or building automation system, is within the tolerances in the table below of the instrument-measured value.
11. If not, replace sensor and repeat.
12. For pressure sensors, perform a similar process with a suitable signal generator.

F. Sensor Tolerances for Standard Applications: Plus/minus the following maximums:

1. Watthour, Voltage, Amperage: 1 percent of design.
2. Pressure, Air, Water, Gas: 3 percent of design.
3. Air Temperatures (Outside Air, Space Air, Duct Air): 0.4 degrees F (0.2 degree C).
4. Relative Humidity: 4 percent of design.
5. Barometric Pressure: 0.1 inch of Hg (340 Pa).
6. Flow Rate, Air: 10 percent of design.
7. Flow Rate, Water: 4 percent of design.
8. AHU Wet Bulb and Dew Point: 2.0 degrees F (1.1 degrees C).

G. Critical Applications: For some applications more rigorous calibration techniques may be required for selected sensors. Describe any such methods used on an attached sheet.

H. Valve/Damper Stroke Setup and Check:

1. For all valve/damper actuator positions checked, verify the actual position against the control system readout.
2. Set pump/fan to normal operating mode.
3. Command valve/damper closed; visually verify that valve/damper is closed and adjust output zero signal as required.
4. Command valve/damper to open; verify position is full open and adjust output signal as required.
5. Command valve/damper to a few intermediate positions.
6. If actual valve/damper position does not reasonably correspond, replace actuator or add pilot positioner (for pneumatics).

I. Isolation Valve or System Valve Leak Check: For valves not associated with coils.

1. With full pressure in the system, command valve closed.
2. Use an ultra-sonic flow meter to detect flow or leakage.

3.06 TEST PROCEDURES - GENERAL

A. Provide skilled technicians to execute starting of equipment and to execute the Functional Tests. Ensure that they are available and present during the agreed upon schedules and for sufficient duration to complete the necessary tests, adjustments and problem-solving.

B. Provide all necessary materials and system modifications required to produce the flows, pressures, temperatures, and conditions necessary to execute the test according to the specified conditions. At completion of the test, return all affected equipment and systems to their pre-test condition.

C. Sampling: Where Functional Testing of fewer than the total number of multiple identical or near-identical items is explicitly permitted, perform sampling as follows:

1. Identical Units: Defined as units with same application and sequence of operation; only minor size or capacity difference.
2. Sampling is not allowed for:

a. Major equipment.

b. Life-safety-critical equipment.

c. Prefunctional Checklist execution.

3. XX = the percent of the group of identical equipment to be included in each sample; defined for specific type of equipment.

4. YY = the percent of the sample that if failed will require another sample to be tested; defined for specific type of equipment.

5. Randomly test at least XX percent of each group of identical equipment, but not less than three units. This constitutes the "first sample."

6. If YY percent of the units in the first sample fail, test another XX percent of the remaining identical units.

7. If YY percent of the units in the second sample fail, test all remaining identical units.

8. If frequent failures occur, resulting in more troubleshooting than testing, the Commissioning Authority may stop the testing and require Contractor to perform and document a checkout of the remaining units prior to continuing testing.

D. Manual Testing: Use hand-held instruments, immediate control system readouts, or direct observation to verify performance (contrasted to analyzing monitored data taken over time to make the “observation”).

E. Simulating Conditions: Artificially create the necessary condition for the purpose of testing the response of a system; for example apply hot air to a space sensor using a hair dryer to see the response in a VAV box.

F. Simulating Signals: Disconnect the sensor and use a signal generator to send an amperage, resistance or pressure to the transducer and control system to simulate the sensor value.

G. Over-Writing Values: Change the sensor value known to the control system in the control system to see the response of the system; for example, change the outside air temperature value from 50 degrees F to 75 degrees F to verify economizer operation.

H. Indirect Indicators: Remote indicators of a response or condition, such as a reading from a control system screen reporting a damper to be 100 percent closed, are considered indirect indicators.

I. Monitoring: Record parameters (flow, current, status, pressure, etc.) of equipment operation using dataloggers or the trending capabilities of the relevant control systems; where monitoring of specific points is called for in Functional Test Procedures:

1. All points that are monitored by the relevant control system shall be trended by Contractor; at the Commissioning Authority’s request, Contractor shall trend up to 20 percent more points than specified at no extra charge.

2. Other points will be monitored by the Commissioning Authority using dataloggers.

3. At the option of the Commissioning Authority, some control system monitoring may be replaced with datalogger monitoring.

4. Provide hard copies of monitored data in columnar format with time down left column and at least 5 columns of point values on same page.

5. Graphical output is desirable and is required for all output if the system can produce it.

6. Monitoring may be used to augment manual testing.

3.07 **OPERATION AND MAINTENANCE MANUALS**

A. See Section 017800 - Closeout Submittals for additional requirements.

B. Add design intent documentation furnished by Architect to manuals prior to submission to Owner.

C. Submit manuals related to items that were commissioned to Commissioning Authority for review; make changes recommended by Commissioning Authority.

D. Commissioning Authority will add commissioning records to manuals after submission to Owner.

END OF SECTION

SECTION 024100
DEMOLITION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Building demolition .

B. Abandonment and removal of existing utilities and utility structures.

1.02 RELATED REQUIREMENTS

A. Section 011000 - Summary: Limitations on Contractor's use of site and premises.

B. Section 015000 - Temporary Facilities and Controls: Site fences, security, protective barriers, and waste removal.

C. Section 017000 - Execution and Closeout Requirements: Project conditions; protection of bench marks, survey control points, and existing construction to remain; reinstallation of removed products; temporary bracing and shoring.

D. Section 312323 - Fill: Filling holes, pits, and excavations generated as a result of removal operations.

PART 3 EXECUTION

2.01 GENERAL PROCEDURES AND PROJECT CONDITIONS

A. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.

1. Obtain required permits.
2. Take precautions to prevent catastrophic or uncontrolled collapse of structures to be removed; do not allow worker or public access within range of potential collapse of unstable structures.
3. Provide, erect, and maintain temporary barriers and security devices.
4. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
5. Do not close or obstruct roadways or sidewalks without permit.
6. Conduct operations to minimize obstruction of public and private entrances and exits; do not obstruct required exits at any time; protect persons using entrances and exits from removal operations.
7. Obtain written permission from owners of adjacent properties when demolition equipment will traverse, infringe upon or limit access to their property.

B. Do not begin removal until receipt of notification to proceed from Owner.

C. Protect existing structures and other elements that are not to be removed.

1. Provide bracing and shoring.
2. Prevent movement or settlement of adjacent structures.
3. Stop work immediately if adjacent structures appear to be in danger.

2.02 EXISTING UTILITIES

A. Coordinate work with utility companies; notify before starting work and comply with their requirements; obtain required permits.

B. Protect existing utilities to remain from damage.

C. Do not disrupt public utilities without permit from authority having jurisdiction.

D. Do not close, shut off, or disrupt existing life safety systems that are in use without at least 7 days prior written notification to Owner.

E. Do not close, shut off, or disrupt existing utility branches or take-offs that are in use without at least 3 days prior written notification to Owner.

F. Locate and mark utilities to remain; mark using highly visible tags or flags, with identification of utility type; protect from damage due to subsequent construction, using substantial barricades if necessary.

G. Remove exposed piping, valves, meters, equipment, supports, and foundations of disconnected and abandoned utilities.

2.03 **EXISTING TREE REMOVAL**

A. Existing trees marked for removal with a DBH of 14" and larger shall be offhauled to a designated Relaimed Lumber Mill for reuse onsite.

1. Logs measuring a min caliper of 14" dia. shall be debranched, cut to a min of 10' long and loaded on a truck at max capacity to be hauled to the follwoing address at the expense of the General Contractor:

a. Urban Wood Rescue

b. 6045 Midway St, Sacramento, CA 95828

c. Contact: Jennifer Szeliga

d. Direct: 916-974-4325

e. Email: Jennifer@sactree.com

B. The delivery(s) shall contain enough logs for a min of 4,800 linear board feet.

1. The is no additional charge for excess clean log delivery, the excess will be donated to Urban wood rescue, so all loads shall be full.

C. The General Contractor is responsible for obtianing the contract with Urban Wood Rescue to prepare the lumber for reuse

1. The General Contractor shall allow eight (8x) weeks min. for the logs to be milled into lumber and kiln dried to a min of 12% moisture condition.

2. The General Contractor shall be responsible for picking up the kiln dried lumber and delivering back to the site.

D. The General Contractor Shall assemble 32 picnic tables with the reclaimed lumber per the detail provided in the landscpae construction drawings.

2.04 **DEBRIS AND WASTE REMOVAL**

A. Remove debris, junk, and trash from site.

B. Leave site in clean condition, ready for subsequent work.

C. Clean up spillage and wind-blown debris from public and private lands.

END OF SECTION

SECTION 031000
CONCRETE FORMING AND ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Formwork for cast-in place concrete, with shoring, bracing and anchorage.

B. Form stripping.

1.02 RELATED REQUIREMENTS

A. Section 032000 - Concrete Reinforcing.

1.03 REFERENCE STANDARDS

A. ACI 318 - Building Code Requirements for Structural Concrete and Commentary; 2014.

B. ACI 117 - Specifications for Tolerances for Concrete Construction and Materials 2010 (Reapproved 2015).

C. ACI 301 - Specifications for Structural Concrete 2016.

D. ACI 347R - Guide to Formwork for Concrete 2014, with Errata (2017).

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate pertinent dimensions, materials, bracing, and arrangement of joints and ties.

PART 2 PRODUCTS

2.01 FORMWORK - GENERAL

A. Provide concrete forms, accessories, shoring, and bracing as required to accomplish cast-in-place concrete work.

B. Design and construct to provide resultant concrete that conforms to design with respect to shape, lines, and dimensions.

C. Comply with applicable state and local codes with respect to design, fabrication, erection, and removal of formwork.

PART 3 EXECUTION

3.01 ERECTION - FORMWORK

A. Erect formwork, shoring and bracing to achieve design requirements, in accordance with requirements of ACI 301.

B. Provide bracing to ensure stability of formwork. Shore or strengthen formwork subject to overstressing by construction loads.

3.02 FORM REMOVAL

A. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads.

END OF SECTION

SECTION 032000
CONCRETE REINFORCING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Reinforcing steel for cast-in-place concrete.

1.02 RELATED REQUIREMENTS

A. Section 031000 - Concrete Forming and Accessories.

1.03 REFERENCE STANDARDS

A. ACI 301 - Specifications for Structural Concrete 2016.

B. ACI 318 - Building Code Requirements for Structural Concrete and Commentary 2014 (Errata 2018).

C. ACI SP-66 - ACI Detailing Manual 2004.

D. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement 2018.

E. ASTM A704/A704M - Standard Specification for Welded Steel Plain Bar or Rod Mats for Concrete Reinforcement 2018.

F. AWS D1.4/D1.4M - Structural Welding Code - Reinforcing Steel 2018.

G. CRSI (DA4) - Manual of Standard Practice 2009.

H. CRSI (P1) - Placing Reinforcing Bars 2011.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Comply with requirements of ACI SP-66. Include bar schedules, shapes of bent bars, spacing of bars, and location of splices.

PART 2 PRODUCTS

2.01 REINFORCEMENT

A. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi) (420 MPa).

2.02 RE-BAR SPLICING:

A. Coupler Systems: Mechanical devices for splicing reinforcing bars; capable of developing full steel reinforcing design strength in tension and compression.

B. Dowel Bar Splicer with Dowel-Ins: Mechanical devices for connecting dowels; capable of developing full steel reinforcing design strength in tension and compression.

2.03 FABRICATION

A. Fabricate concrete reinforcing in accordance with CRSI (DA4) - Manual of Standard Practice.

PART 3 EXECUTION

3.01 PLACEMENT

A. Place, support and secure reinforcement against displacement. Do not deviate from required position.

END OF SECTION

SECTION 312316
EXCAVATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Excavating for footings, slabs-on-grade, paving, site structures and utilities within the building.

B. Trenching for utilities outside the building .

1.02 RELATED REQUIREMENTS

A. Section 015713 - Temporary Erosion and Sedimentation Control: Slope protection and erosion control.

B. Section 017000 - Execution and Closeout Requirements: General requirements for dewatering of excavations and water control.

C. Section 312200 - Grading

D. Section 312316.13 - Trenching: Excavating for utility trenches outside the building to utility main connections.

E. Section 312323 - Fill

F. Geotechnical Engineering Report, Tokay High School New Classrooms and Gym, Lodi, California, Project No. NA185132 by Terracon Consultants, Inc. dated October 30, 2018

PART 2 PRODUCTS - NOT USED

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that survey monuments and intended elevations for the work are as indicated.

3.02 PREPARATION

A. Identify required lines, levels, contours, and datum locations.

B. Locate, identify, and protect utilities that remain and protect from damage.

C. Protect bench marks, survey control points, existing structures, fences, sidewalks, paving and curbs from excavating equipment and vehicular traffic.

D. Protect plants, lawns, rock outcroppings and other features to remain.

E. Grade top perimeter of excavation to prevent surface water from draining into excavation. Provide temporary means and methods, as required, to maintain surface water diversion until no longer needed, or as directed by Architect.

3.03 EXCAVATING

A. Excavate to accommodate new structures and construction operations.

B. Notify Architect of unexpected subsurface conditions and discontinue affected Work in area until notified to resume work.

C. Notify the Geotechnical Engineer of unexpected subsurface conditions and discontinue affected Work in area until notified to resume work.

D. Do not interfere with 45 degree bearing splay of foundations.

E. Grade top perimeter of excavation to prevent surface water from draining into excavation.

F. If excavated material is to be re-used as fill, stockpiling of soil must be in an area designated for stockpiling on site in accordance with Section 312200.

3.04 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for general requirements for field inspection and testing.

B. Provide for visual inspection of load-bearing excavated surfaces before placement of foundations.

3.05 **PROTECTION**

A. Divert surface flow from rains or water discharges from the excavation.

B. Prevent displacement of banks and keep loose soil from falling into excavation; maintain soil stability.

C. Protect open excavations from rainfall, runoff, freezing groundwater, or excessive drying so as to maintain foundation subgrade in satisfactory, undisturbed condition.

D. Protect bottom of excavations and soil adjacent to and beneath foundation from freezing.

E. Keep excavations free of standing water and completely free of water during concrete placement.

END OF SECTION

SECTION 312316.13
TRENCHING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Excavating, backfilling and compacting for utilities outside the building to point of connection with public and/or private utility mains.

1.02 RELATED REQUIREMENTS

A. Section 312200 - Grading: Site grading.

B. Section 312316 - Excavation: Building and foundation excavating.

C. Section 312323 - Fill: Backfilling at building and foundations.

D. Geotechnical Engieneering Report, Tokay High School New Classrooms and Gym, Lodi, California, Project No. NA185132 by Terracon Consultants, Inc. dated October 30, 2018

1.03 REFERENCES

A. AASHTO T 180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18 in.) Drop 2018.

B. ASTM C136/C136M - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates 2014.

C. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3)) 2012, with Editorial Revision (2015).

D. ASTM D1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method 2007.

E. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN m/m3)) 2012, with Editorial Revision (2015).

F. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method 2015.

G. ASTM D2487 - Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System) 2017.

H. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth) 2005.

I. ASTM D4318 - Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils 2017, with Editorial Revision (2018).

J. ASTM D6938 - Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth) 2017a.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Samples: 10 lb (4.5 kg) sample of each type of fill; submit in air-tight containers to the District's testing laboratory.

C. Materials Sources: Submit name of imported materials source.

D. Fill Composition Test Reports: Results of laboratory tests on proposed and actual materials used.

E. Compaction Density Test Reports.

1.05 DELIVERY, STORAGE, AND HANDLING

A. When necessary, store materials on site in advance of need.

B. When fill materials need to be stored on site, locate stockpiles where allowed by the Owner's representative.

1. Protect stockpiles from erosion and deterioration of materials.

PART 2 PRODUCTS

2.01 **FILL MATERIALS**

A. Backfill above Pipe Bedding: Controlled Low-Strength Material, CLSM, per Caltrans Section 19-3.02G.

B. Granular Fill- Pea Gravel: Natural stone; washed, free of clay, shale, organic matter.

1. Graded in accordance with ASTM C136/C136M, within the following limits:

a. Minimum Size: 1/4 inch (6 mm).

b. Maximum Size: 5/8 inch (16 mm).

C. Sand: Natural river or bank sand; washed; free of silt, clay, loam, friable or soluble materials, and organic matter.

1. Graded in accordance with ASTM C136/C136M; within the following limits:

a. No. 4 (4.75 mm) sieve: 100 percent passing.

b. No. 14 (1.40 mm) sieve: 10 to 100 percent passing.

c. No. 50 (300 micro m) sieve: 5 to 90 percent passing.

d. No. 100 (150 micro m) sieve: 4 to 30 percent passing.

2.02 **ACCESSORIES**

A. Geotextile Fabric: Non-biodegradable, woven Mirafi ; 140N manufactured by Mirafi.

2.03 **SOURCE QUALITY CONTROL**

A. See Section 014000 - Quality Requirements, for general requirements for testing and analysis of soil material.

B. Where fill materials are specified by reference to a specific standard, testing of samples for compliance will be provided before delivery to site.

C. If tests indicate materials do not meet specified requirements, change material and retest.

D. Provide materials of each type from same source throughout the Work.

PART 3 EXECUTION

3.01 **EXAMINATION**

A. Verify that survey monuments and intended elevations for the work are as indicated.

3.02 **PREPARATION**

A. Identify required lines, levels, contours, and datum locations.

B. Locate, identify, and protect utilities that remain and protect from damage.

C. Protect bench marks, survey control points, existing structures, fences, sidewalks, paving and curbs from excavating equipment and vehicular traffic.

D. Protect plants, lawns, rock outcroppings and other features to remain.

E. Grade top perimeter of trenching area to prevent surface water from draining into trench. Provide temporary means and methods, as required, to maintain surface water diversion until no longer needed, or as directed by the Architect.

F. Protect existing trees and tree roots. Trenching under the dripline of existing trees shall be performed by hand using hand tools.

3.03 **TRENCHING**

A. Notify the Geotechnical Engineer of unexpected subsurface conditions and discontinue affected Work in area until notified to resume work.

B. Slope banks of excavations deeper than 4 feet (1.2 meters) to angle of repose or less until shored.

C. Do not interfere with 45 degree bearing splay of foundations.

D. Cut trenches wide enough to allow inspection of installed utilities.

E. Hand trim excavations. Remove loose matter.

F. Remove large stones and other hard matter that could damage piping or impede consistent backfilling or compaction.

G. Remove excavated material that is unsuitable for re-use from site.

H. Stockpile excavated material to be re-used in area designated in Section 312200.

I. Remove excess excavated material from site.

J. Provide temporary means and methods, as required, to remove all water from trenching until directed by the Architect. Remove and replace soils deemed unsuitable by classification and which are excessively moist due to lack of dewatering or surface water control.

K. Determine the prevailing groundwater level prior to trenching. If the proposed trench extends less than 1 foot (305 mm) into the prevailing groundwater, control groundwater intrusion with perimeter drains routed to sump pumps, or as directed by the Architect.

L. Trenching under the dripline of existing trees shall be performed by hand using hand tools only. Contractor shall not cut or damage existing roots unless approved by a certified Arborist.

3.04 **PREPARATION FOR UTILITY PLACEMENT**

A. Cut out soft areas of subgrade not capable of compaction in place. Backfill with general fill.

B. Compact subgrade to density equal to or greater than requirements for subsequent fill material.

C. Until ready to backfill, maintain excavations and prevent loose soil from falling into excavation.

3.05 **BACKFILLING**

A. Backfill to elevations indicated using unfrozen materials.

B. Fill up to subgrade elevations unless otherwise indicated.

C. Employ a placement method that does not disturb or damage other work.

D. Systematically fill to allow maximum time for natural settlement. Do not fill over porous, wet, frozen or spongy subgrade surfaces.

E. Maintain optimum moisture content of fill materials to attain required compaction density.

F. Correct areas that are over-excavated.

1. Thrust bearing surfaces: Fill with concrete.
2. Other areas: Use general fill, flush to required elevation, compacted to minimum 95 percent of maximum dry density.

G. Reshape and re-compact fills subjected to vehicular traffic.

3.06 **TOLERANCES**

A. Top Surface of General Backfilling: Plus or minus 1 inch (25 mm) from required elevations.

B. Top Surface of Backfilling Under Paved Areas: Plus or minus 1 inch (25 mm) from required elevations.

3.07 **FIELD QUALITY CONTROL**

A. See Section 014000 - Quality Requirements, for general requirements for field inspection and testing.

B. Perform compaction density testing on compacted fill in accordance with ASTM D1556, ASTM D2167 or ASTM D6938.

C. Evaluate results in relation to compaction curve determined by testing uncompacted material in accordance with ASTM D1557 ("modified Proctor"), AASHTO T 180 or ASTM D698 ("standard Proctor").

D. If tests indicate work does not meet specified requirements, remove work, replace and retest.

E. Frequency of Tests: One test per every 100 feet of trench, or as required by the Geotechnical Engineer..

3.08 **CLEANING**

A. Remove unused stockpiled materials, leave area in a clean and neat condition. Grade stockpile area to prevent standing surface water.

B. Leave borrow areas in a clean and neat condition. Grade to prevent standing surface water.

END OF SECTION

SECTION 312323
FILL

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Filling, backfilling, and compacting for footings, slabs-on-grade, paving and site structures.

B. Backfilling and compacting for utilities outside the building to utility main connections.

C. Filling holes, pits, and excavations generated as a result of removal (demolition) operations.

1.02 RELATED REQUIREMENTS

A. Section 015713 - Temporary Erosion and Sediment Control: Slope protection and erosion control.

B. Section 033000 - Cast-in-Place Concrete.

C. Section 312200 - Grading: Site grading.

D. Section 312316 - Excavation: Removal and handling of soil to be re-used.

E. Section 312316.13 - Trenching: Excavating for utility trenches outside the building to utility main connections.

F. Geotechnical Engieneering Report, Tokay High School New Classrooms and Gym, Lodi, California, Project No. NA185132 by Terracon Consultants, Inc. dated October 30, 2018

1.03 REFERENCE STANDARDS

A. AASHTO M 147 - Standard Specification for Materials for Aggregate and Soil-Aggregate Subbase, Base and Surface Courses 2017.

B. AASHTO T 180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18 in.) Drop 2018.

C. ASTM C136/C136M - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates 2014.

D. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3)) 2012, with Editorial Revision (2015).

E. ASTM D1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method 2007.

F. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN m/m3)) 2012, with Editorial Revision (2015).

G. ASTM D4318 - Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils 2017, with Editorial Revision (2018).

H. Standard Specifications, California State Department of Transportation (Caltrans), latest edition.

I. Standard Specifications for Public Works Construction (the "Greenbook"), latest edition.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Materials Sources: Submit name of imported materials source.

C. Fill Composition Test Reports: Results of laboratory tests on proposed and actual materials used, including manufactured fill.

D. Compaction Density Test Reports.

1.05 DELIVERY, STORAGE, AND HANDLING

A. When fill materials need to be stored on site, locate stockpiles where designated.

1. Protect stockpiles from erosion and deterioration of materials.

PART 2 PRODUCTS

2.01 **FILL MATERIALS**

A. General Fill: Stripped topsoil or expansive soil with clay usable in landscape or non-structural areas.

1. Free of lumps larger than 3 inches (75 mm), rocks larger than 2 inches (50 mm), and debris.

B. Engineered Fill: Structural fill conforming to the requirements of the Geotechnical Report, and as indicated on the plans.

1. Non-expansive (no clay) fill material, suitable for structural areas, with less than 3% organics by volume, and free of debris and fragments greater than 6 inches in maximum dimension, and not more than 15% larger than 2.5 inches.
2. Percent passing No. 200 sieve: 15% to 50%.
3. Plasticity Index (PI): 10% maximum
4. Expansion Index: 20% maximum
5. Clean sand or very sandy soil is not acceptable.

C. Aggregate Base: Per the requirements of Section 32 11 23.

D. Concrete for Backfill of Structures: Slurry cement per Caltrans Section 19-3.02E, 1000 psi compressive strength, minimum. Acceptable as structural Engineered Fill.

E. Concrete for Backfill of Utility Trenches: Controlled Low-Strength Material, CLSM, per Caltrans Section 19-3.02G for bedding of storm drainage or sanitary sewer pipes, 100 psi compressive strength, minimum.

F. Granular Fill- Pea Gravel : Natural stone; washed, free of clay, shale, organic matter.

1. Graded in accordance with ASTM C136/C136M, within the following limits:
    a. Minimum Size: 1/4 inch (6 mm).
    b. Maximum Size: 5/8 inch (16 mm).

G. Sand: Per the requirements of Section 31 23 13.16.

H. Drain rock: Hard, durable, clean crushed stone, free of organic matter and other deleterious substances.

1. Graded in accordance within the following limits:
    a. 1 inch (25 mm) sieve: 100 percent passing.
    b. 3/4 inch (19 mm) sieve: 80 to 100 percent passing.
    c. 1/2 inch (12 mm) sieve: 10 to 20 percent passing.
    d. 3/8 inch (9 mm) sieve: 0 to 10 percent passing.
    e. No. 4 (4.75 mm) sieve: 0 to 7 percent passing.
    f. No. 200 (75 micro m) sieve: 0 to 1 percent passing.

2.02 **ACCESSORIES**

A. Geotextile Fabric: Non-biodegradable, woven Mirafi ; 140N manufactured by Mirafi.

B. Vapor Retarder: 10 mil (0.25 mm) thick, polyethylene.

2.03 **SOURCE QUALITY CONTROL**

A. See Section 014000 - Quality Requirements, for general requirements for testing and analysis of soil material.

B. Where fill materials are specified by reference to a specific standard, testing of samples for compliance will be provided before delivery to site.

C. If tests indicate materials do not meet specified requirements, change material and retest.

D. Provide materials of each type from same source throughout the Work.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that survey bench marks and intended elevations for the Work are as indicated.

B. Identify required lines, levels, contours, and datum locations.

C. See Section 312200 for additional requirements.

D. Verify subdrainage, dampproofing, or waterproofing installation has been inspected.

E. Verify structural ability of unsupported walls to support imposed loads by the fill.

F. Verify areas to be filled are not compromised with surface or ground water.

3.02 PREPARATION

A. Scarify the site in accordance with the Geotechnical Report and as indicated on the plans.

B. Cut out soft areas of subgrade not capable of compaction in place. Backfill with general fill.

C. Compact subgrade to density equal to or greater than requirements for subsequent fill material.

D. Until ready to fill, maintain excavations and prevent loose soil from falling into excavation.

3.03 FILLING

A. Fill to contours and elevations indicated using unfrozen materials.

B. Fill up to subgrade elevations unless otherwise indicated.

C. Employ a placement method that does not disturb or damage other work.

D. Systematically fill to allow maximum time for natural settlement. Do not fill over porous, wet, frozen or spongy subgrade surfaces.

E. Maintain optimum moisture content of fill materials to attain required compaction density.

F. Soil Fill: Place and compact material in equal continuous layers not exceeding 8 inches (200 mm) compacted depth.

G. Slope grade away from building minimum 2 inches in 10 feet (50 mm in 3 m), unless noted otherwise. Make gradual grade changes. Blend slope into level areas.

H. Correct areas that are over-excavated.

1. Load-bearing foundation surfaces: Use structural fill, flush to required elevation, compacted to 90 to 95 percent of maximum dry density.

2. Other areas: Use general fill, flush to required elevation, compacted to minimum 90 percent of maximum dry density.

I. Compaction Density Unless Otherwise Specified or Indicated:

1. Under paving, slabs-on-grade and similar construction: 90 to 95 percent of maximum dry density as indicated in the Geotechnical Report, "Earthwork".

2. At landscaped areas: 90 percent of maximum dry density.

J. Reshape and re-compact fills subjected to vehicular traffic.

K. Maintain temporary means and methods, as required, to remove all water while fill is being placed as required, or until directed by the Architect. Remove and replace soils deemed unsuitable by classification and which are excessively moist due to lack of dewatering or surface water control.

3.04 **TOLERANCES**

A. Top Surface of General Filling: Plus or minus 1 inch (25 mm) from required elevations.

B. Top Surface of Filling Under Paved Areas: Plus or minus 1 inch (25 mm) from required elevations.

3.05 **FIELD QUALITY CONTROL**

A. See Section 014000 - Quality Requirements, for general requirements for field inspection and testing.

B. Evaluate results in relation to compaction curve determined by testing uncompacted material in accordance with ASTM D1557 ("modified Proctor").

C. If tests indicate work does not meet specified requirements, remove work, replace and retest.

D. Frequency of Tests: As required by the Geotechnical Engineer..

E. Proof roll compacted fill at surfaces that will be under slabs-on-grade.

3.06 **CLEANING**

A. See Section 017419 - Construction Waste Management and Disposal, for additional requirements.

B. Remove unused stockpiled materials, leave area in a clean and neat condition. Grade stockpile area to prevent standing surface water.

C. Leave borrow areas in a clean and neat condition. Grade to prevent standing surface water.

END OF SECTION

SECTION 321123
AGGREGATE BASE COURSES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Aggregate base course.

1.02 RELATED REQUIREMENTS

A. Section 312200 - Grading: Preparation of site for base course.

B. Section 312316.13 - Trenching: Compacted fill over utility trenches under base course.

C. Section 312323 - Fill: Compacted fill under base course.

D. Section 321216 - Asphalt Paving: Finish and binder asphalt courses.

E. Section 321313 - Concrete Paving: Finish concrete surface course.

F. Section 330513 - Manholes and Structures: Manholes including frames.

1.03 REFERENCE STANDARDS

A. AASHTO M 147 - Standard Specification for Materials for Aggregate and Soil-Aggregate Subbase, Base and Surface Courses 2017.

B. AASHTO T 180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18 in.) Drop 2018.

C. ASTM C136/C136M - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates 2014.

D. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3)) 2012, with Editorial Revision (2015).

E. ASTM D1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method 2007.

F. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN m/m3)) 2012, with Editorial Revision (2015).

G. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method 2015.

H. ASTM D2487 - Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System) 2017.

I. ASTM D6938 - Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth) 2017a.

J. Standard Specification of the State of California (Caltrans), latest edition.

1.04 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Materials Sources: Submit name of imported materials source.

C. Aggregate Composition Test Reports: Results of laboratory tests on proposed and actual materials used.

D. Compaction Density Test Reports.

1.05 DELIVERY, STORAGE, AND HANDLING

A. When aggregate materials need to be stored on site, locate where directed by Owner.

B. Aggregate Storage, General:

1. Separate differing materials with dividers or stockpile separately to prevent intermixing.
2. Prevent contamination.
3. Protect stockpiles from erosion and deterioration of materials.

PART 2 PRODUCTS

2.01 MATERIALS

A. Aggregate Base: 3/4" Class 2 conforming to Caltrans Section 26 with a minimum R-value of 78.

2.02 SOURCE QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for general requirements for testing and analysis of aggregate materials.

B. Where aggregate materials are specified using ASTM D2487 classification, testing of samples for compliance will be provided before delivery to site.

C. If tests indicate materials do not meet specified requirements, change material and retest.

D. Provide materials of each type from same source throughout the Work.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that survey bench marks and intended elevations for the work are as indicated.

B. Verify substrate has been inspected, gradients and elevations are correct, and is dry.

3.02 PREPARATION

A. Correct irregularities in substrate gradient and elevation by scarifying, reshaping, and re-compacting.

B. Do not place aggregate on soft, muddy, or frozen surfaces.

3.03 INSTALLATION

A. Spread aggregate over prepared substrate to a total compacted thickness as indicated on plans.

B. Place aggregate in maximum 4 inch (100 mm) layers and roller compact to specified density.

C. Level and contour surfaces to elevations and gradients indicated.

D. Add small quantities of fine aggregate to coarse aggregate as appropriate to assist compaction.

E. Add water to assist compaction. If excess water is apparent, remove aggregate and aerate to reduce moisture content.

F. Use mechanical tamping equipment in areas inaccessible to compaction equipment.

3.04 TOLERANCES

A. Flatness: Maximum variation of 1/4 inch (6.4 mm) measured with 10 foot (3 m) straight edge.

B. Scheduled Compacted Thickness: Within 1/4 inch (6.4 mm).

C. Variation From Design Elevation: Within 1/2 inch (12.8 mm).

3.05 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for general requirements for field inspection and testing.

B. Compaction density testing will be performed on compacted aggregate base course in accordance with ASTM D1556, ASTM D2167 or ASTM D6938.

C. Results will be evaluated in relation to compaction curve determined by testing uncompacted material in accordance with AASHTO T 180, ASTM D698 ("standard Proctor") or ASTM D1557 ("modified Proctor").

D. If tests indicate work does not meet specified requirements, remove work, replace and retest.

E. Proof roll compacted aggregate at surfaces that will be under slabs-on-grade.

3.06 **CLEANING**

A. Remove unused stockpiled materials, leave area in a clean and neat condition. Grade stockpile area to prevent standing surface water.

B. Leave borrow areas in a clean and neat condition. Grade to prevent standing surface water.

END OF SECTION

SECTION 321313
CONCRETE PAVING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Driveways.

B. Roadways.

C. Parking lots.

D. Curbs and gutters.

E. Walks.

F. Mow strips.

G. Wheel stops.

H. Pavement marking paint.

I. Detectable warnings.

1.02 RELATED REQUIREMENTS

A. Division 03 Section Cast-in-Place Concrete

B. Division 05 Section Metal Fabrications

C. Division 05 Section Pipe and Tube Railings.

D. Division 05 Section Decorative Metal Railings

E. Division 31 Section Earthwork

F. Division 32 Section Architectural Site Concrete

G. Division 32 Section Concrete Paving Joint Sealants

H. Division 32 Section Chain Link Fences and Gates

I. Division 32 Section Decorative Metal Fences and Gates

1.03 PREINSTALLATION CONFERENCE

A. Conduct conference at Project site two weeks prior to start of work of this section. Required attendance of all affected installers.

1. Review methods and procedures related to concrete paving, including but not limited to, the following:
2. Concrete mixture design
3. Testing and inspection procedures.
4. Concrete finishes and finishing.
5. Cold- and hot-weather concreting procedures.
6. Curing procedures.
7. Construction joints.
8. Forms and form-removal limitations.
9. Reinforcement accessory installation.
10. Concrete repair procedures.
11. Protection of cast-in-place architectural site concrete.
12. Review special testing and inspection procedures.

13. Placement sequence and schedule.
14. Require representatives of each entity directly concerned with concrete paving to attend, including the following:
    a. Contractor's superintendent.
    b. Independent testing agency responsible for concrete design mixtures.
    c. Ready-mix concrete manufacturer.
    d. Concrete paving subcontractor.
    e. District's Representative
    f. Architect's Representative
    g. Inspector of Record
    h. Manufacturer's representative for specialty concrete paving finishes.
    i. Provide meeting minutes for pre-installation conference

1.04 **SUBMITTALS**

A. Product Data: For each type of product indicated.
    1. Proprietary admixtures, pigments, curing compounds, hardeners, sealers, form-release agents, etc.: Indicate compatibility with other materials used.
    2. Stenciling material

B. Samples for Initial Selection: For each type of product, finish, ingredient, or admixture requiring color selection.
    1. Submit full range of manufacturer’s standard and custom range of colors and products for review and selection. Provide custom colors on samples as required. Upon selection of color, submit 12”x12” sample of material in the specified color finish for review by Landscape Architect in addition to the specified mock ups.
    2. Stencil Shop Drawing submittal to Architect for approval is required before mock up work for stenciling is to begin.
    3. Wheel Stops: 6 - 7 inches wide in cross section; with fasteners.

C. Design Mixtures: Submit proposed mix designs and test data for each class of concrete and for each method of placement.
    1. Prepare mix designs on the basis of field experience (preferred) and/or trial mixes, in compliance with California Building Code (CBC), Section 1905A and ACI 318
    2. Mix designs shall be prepared, stamped and signed by a structural or civil engineer registered in the State of California.
        a. Mix designs shall be reviewed by the Architect (AOR) and Structural Engineer of Record (SEOR).
    3. Identify for each mix design submitted the method by which proportions have been selected.
        a. For mix designs based on field experience, include individual strength test results, standard deviation, and required average compressive strength f'c calculations.
        b. For mix designs based on trial mixtures, include trial mix proportions, test results, graphical analysis and show required average compressive strength f'c results. Provide gross weight and yield per cubic yard of trial mixes.
        c. Indicate quantity of each ingredient per cubic yard of concrete and percentages.
        d. Indicate type and quantity of admixtures proposed or required.

e. Indicate water to cement ratio by weight.

f. Measured slump.

g. Measured air content.

h. Provide shrinkage test results.

4. Multiple mix designs or multiple manufacturers shall not be permitted for the same application.

D. Mix designs should contain no fly ash.

E. Submit proposed alternate design mixtures for review by the Architect and SEOR when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

F. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement. Shop drawings should include details such as reveals, recessed lights, handrails, or other elements requiring steel coordination.

1. Coordinate with and identify the details of the Contract Drawings on the shop drawings.

2. Comply with ACI 315, part B and CRSI requirements.

G. Construction Joint Layout: Indicate proposed construction joints required to construct the structure. Submit dimensioned drawing indicating layout of construction joints, contraction (control) joints, dowelled joints, decorative scoring and placement sequence of concrete if different than layout indicated on plans.

1. Location of construction joints are subject to approval of the Architect.

2. All form seams are to align with construction joints or reveals.

H. Placement Schedule: Submit concrete placement schedule before start of placement operations. Include locations of all joints including construction joints.

I. Pavement-Marking Shop Drawings: Indicate pavement markings, lane separations, and defined parking spaces. Indicate, with international symbol of accessibility, spaces allocated for people with disabilities.

J. Qualification Data: For qualified ready-mix concrete manufacturer (batch plant) and installer of detectable warnings.

K. Welding Certificates: Submit certifications signed by AWS Certified Welding Inspector of prequalified welding procedures, qualifications of welding procedures unless prequalified, qualifications of welding operators and qualifications of welders.

L. Material Certificates: For the following, submit manufacturer data, test results, and technical information for aggregate, sand and cement, submit ½ cubic foot physical sample. For sealant submit manufacturer color standard and custom palette together with physical samples:

1. Cementitious materials.

2. Aggregates and sand.

3. Steel reinforcement and reinforcement accessories.

4. Fiber reinforcement.

5. Admixtures.

6. Curing compounds.

7. Applied finish materials.
8. Bonding agent and epoxy adhesives.
9. Joint fillers.
10. Sealer
11. Sealant.
12. Pigments.

M. Material Test Reports: For each of the following:

1. Aggregates. Include service-record data indicating absence of deleterious expansion of concrete due to alkali-aggregate reactivity.

N. Detectable Warning Device Warranty: Submit copies of manufacture's five year warranty for each of these products and manufacturer custom and standard color palette.

O. Field quality-control reports.

1. Submit copies of delivery tickets complying with ASTM C 94 for each load of concrete delivered to the site. Tickets shall include all information required by the referenced standard.

P. Minutes of pre-installation conference.

1.05 **QUALITY ASSURANCE**

A. Regulatory Requirements: Comply with CBC Chapter 19A.

1. Chemical products field-applied to concrete shall comply with the air quality requirements of authorities having jurisdiction.
2. Comply with requirements of local, State and other authorities having jurisdiction for work performed within public right-of ways.

B. Chemical products field-applied to concrete shall comply with the air quality requirements of authorities having jurisdiction.

C. Comply with requirements of local, State and other authorities having jurisdiction for work performed within public right-of ways.

D. Industry Standards: Comply with the following unless modified by requirements in the Contract Documents.

1. ACI 301, "Specifications for Structural Concrete".
2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials".
3. ACI 302.1R, "Guide for Concrete Floor and Slab Construction".
4. ACI 304R, "Guide for Measuring, Mixing, Transporting, and Placing Concrete".
5. ACI 305R, "Hot Weather Concreting".
6. ACI 306.1, "Standard Specification for Cold Weather Concreting".
7. ACI 318, "Building Code Requirements for Structural Concrete".
8. ACI 347, "Guide to Formwork for Concrete".
9. ACI SP-66, "ACI Detailing Manual".
10. CRSI, "Manual of Standard Practice".
11. CRSI, "Placing Reinforcing Bars".

E. Detectable Warning Installer Qualifications: An employer of workers trained and approved by manufacturer of cast-in-place, surface-applied unit-paver-type detectable truncated dome products.

F. Ready-Mix-Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities" (Quality Control Manual - Section 3, "Plant Certification Checklist").

G. Source Limitations for Concrete Paving: Obtain each color, size, type, and variety of concrete material and concrete mixture from single manufacturer with resources to provide concrete of consistent quality in appearance and physical properties. Secure all material required for the duration of the project as needed to ensure consistent quality in appearance.

H. Welding Qualifications: Comply with CBC Chapter 17A.

1. Qualify welding procedures and welding personnel according to AWS D1.4/D 1.4M, "Structural Welding Code - Reinforcing Steel" prior to performing any welding.

2. Qualify welding inspection personnel according to AWS QC1, "Standard for AWS Certification of Welding Inspectors."

I. Concrete Testing Service: Engage a qualified testing agency to perform material evaluation tests and to design concrete mixtures.

J. ACI Publications: Comply with ACI 301 unless otherwise indicated.

K. Mockups: Before casting concrete paving, build mockups to verify selections made under Sample submittals and to fully demonstrate typical joints (including expansion and saw cut joints), surface finish, texture, color tolerances, standard of workmanship and completed product. Build mockups to comply with the following requirements, using materials indicated for the completed Work:

1. Build mockups in the location and of the size indicated or, if not indicated, as directed by Architect.

a. Paving Modules: Construct at least one 6 ft. x 6 ft. mockup of each color, finish, and mix design of special paving module, including stenciled areas, banding and curbs

b. Radial Paving Patterns: Construct at least one 180 sq. ft. mockup of curved or radial paving patterns.

c. Abrasive-Blast Finishes: Mockups shall clearly demonstrate 3 levels of depth of cut for abrasive-blast finishes for Architect's review.

d. Stairs: Construct minimum 2 risers and treads X 4’ long with nosing grooves and stained color within groves for each color and finish specified.

e. Mow Strip: minimum 6’ long for each specified width and color.

f. Stenciled Letters or Graphics: minimum 4 letters and one full size graphic for each size, font setting and finish. Mock up to be set on concrete pavement or wall matching conditions of final install.

g. Truncated Domes: minimum 3’X6’ long set in concrete with concrete base and grout.

h. Repairs: In presence of Architect, damage part of the exposed-face surface for each finish, color, and texture, and demonstrate materials and techniques proposed for repair of tie holes, honeycombing, spalls, surface blemishes, etc. to match adjacent undamaged surfaces.

2. Build mockups full-size, matching site concrete components indicated on the Drawings. Mock-ups shall be complete in every detail, including joints, reveals, edges, chamfers, etc. Include complex joinery conditions where necessary to integrate to other Project components as indicated including multiple pour conditions. Mockups should be provided for each finish, color, joint and detail specified.
3. Maintain accurate records of variables associated with each mockup to facilitate the matching of accepted mockups during actual construction.
4. Demonstrate curing, cleaning, and protecting of cast-in-place concrete paving, finishes, and contraction and expansion joints, as applicable.
5. Mockup Acceptance: Obtain Architect's approval of mockups before casting architectural site concrete and paving.
    a. The Architect may reject mockups that, in the Architect's sole judgment, do not demonstrate an acceptable completed product, including, but not limited to, color, joint work, surface finish, texture, tolerances, and standard of workmanship
    b. The Architect may require modifications to mockups to obtain acceptable results.
    c. The Architect may require modifications to mockup repairs to obtain acceptable results.
    d. The Architect may require removal and reconstruction of mockups to obtain acceptable results. Multiple mock ups maybe required.
    e. Contractor shall provide additional mockups as required to obtain results acceptable to the Architect at no additional cost to the Owner.
6. Mockup Disposition: Accepted mockups shall not become part of the completed Project. Maintain mockup onsite for the duration of construction and until all work has been accepted. Remove and legally dispose mockups after acceptance of final installed work. prior to Project Completion. If sufficient permanent concrete paving work has been completed, Contractor may submit a written request to Architect to transfer quality control for concrete paving from the accepted mockups to one or more designated portions of the permanent work.
7. Provide written meeting minutes for each mock up review indicating items reviewed, approvals, rejections, connections, or other action items.

1.06 **PROJECT CONDITIONS**

A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.

B. Pavement-Marking Paint: Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature of 55 deg F for water-based materials, and not exceeding 95 deg F.

1.07 **DELIVERY, STORAGE, AND HANDLING**

A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending, damage, and rust.
    1. Label bundles with durable identification tags. Maintain reinforcement identification after bundles are broken.
    2. Store reinforcement to avoid excessive rusting or fouling with grease, oil, dirt or other bond-weakening contaminants.
    3. Avoid damaging applied coatings, if any, on steel reinforcement.

PART 2 - PRODUCTS

2.01 **FORMS**

A. Formwork: / Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, and smooth surfaces.

1. Set forms to alignment, grade and required dimensions. Formwork shall not deviate more than 1/4 inch from required vertical positions and 1/4 inch from required horizontal positions. Exposed Surfaces: Provide faced plywood panels complying with, or equivalent to, DOC PS 1, Structural I. Provide minimum 7-ply plywood and provide balance sheets for panels coated one-side only. Furnish in largest practicable sizes to minimize number of joints. Provide Medium-Density Overlay (MDO) panels or high density overlay (HDO) panels, with mill-applied release agent and edge sealant. Provide one of the following panels, or comparable substituted product:
    a. Olympic Panel Products, "B-Matte 333 MDO Concrete Form." Overlay Color: Brown.
    b. Pacific Laminate Products, "ProFace MDO." Overlay Color: Black.
    c. Sylvan Products, LLC, "Armor Ply MDO" Overlay Color: Brown.
2. Hold forms rigidly in place by stakes, clamps, spreaders, and braces at 3 feet on centers, and where required to ensure rigidity.
3. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and that will not impair subsequent treatments of concrete surfaces.
4. Place joint filler or backer rod on vertical surfaces in contact with concrete paving.
5. Benders or thin plank forms may be used on curves, grade changes, or curb returns. Back forms for curb returns may be made of ½-inch thick benders cleated together for full depth of the curb.
6. Keep forms in place until concrete is sufficiently hard to prevent damage to concrete.
7. Reuse of Forms:
    a. Do not reuse forms if there is any evidence of surface wear or defect which would impair quality of surface or edge.
    b. Thoroughly clean and properly coat forms before reuse.
    c. Do not use forms from previous projects.
8. Provide new forms specifically purchased for this project. Reuse of forms from past projects or contractors stock will not be accepted.

B. Curved Work: Kerf back of plywood form-facing panels, or use accepted flexible or curved forms for curved work with a radius of 100 feet or less.

C. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and that will not impair subsequent treatments of concrete surfaces.

1. Obtain written acceptance of form release agent from integral colored concrete pigment manufacturer.
2. Form-release agents shall be non-staining and can cause no visual effect to the finish.
3. Formulate form-release agent with rust inhibitor for steel form-facing materials.

2.02 **STEEL REINFORCEMENT**

A. Recycled Content: Provide steel reinforcement with an average recycled content of steel so postconsumer recycled content plus one-half of pre-consumer recycled content is not less than 60 percent.

B. Plain-Steel Welded Wire Reinforcement: ASTM A 185/A 185M, fabricated from as-drawn steel wire into flat sheets.

C. Deformed-Steel Welded Wire Reinforcement: ASTM A 497/A 497M, flat sheet.

D. Reinforcing Bars: ASTM A 615/A 615M, Grade 60; deformed.

E. Low-Alloy-Steel Reinforcing Bars (for Welding): ASTM A 706/A 706M, Grade 60, deformed, unless otherwise indicated.

F. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60 plain-steel bars. Cut bars true to length with ends square and free of burrs.

1. Provide two-component "Speed Dowel System" manufactured by Greenstreak.

G. Tie Bars: ASTM A 615/A 615M, Grade 60, deformed.

H. Hook Bolts: ASTM A 307, Grade A, internally and externally threaded. Design hook-bolt joint assembly to hold coupling against paving form and in position during concreting operations, and to permit removal without damage to concrete or hook bolt.

I. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars, welded wire reinforcement, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete of greater compressive strength than concrete specified, and as follows:

1. Equip wire bar supports with sand plates or horizontal runners where base material will not support chair legs.

J. Zinc Repair Material: ASTM A 780.

2.03 **CONCRETE MATERIALS**

A. Cementitious Material: Use the following cementitious materials, of same type, brand, and source throughout Project:

1. Portland Cement: ASTM C 150, Type II/V, Type I/II or Type IV, gray, unless white cement is required to achieve colors indicated. Supplement with the following:

a. Fly Ash: none accepted.

B. Normal-Weight Aggregates: ASTM C 33, complying with building code. Provide aggregates from a single source. All aggregates shall be free of materials with deleterious reactivity to alkali in cement when tested in accordance with ASTM C 289.

1. Comply with CBC section 1903A.3.

2. Service Class, based on CBC Figure 1904A.2., "Weathering Probability Map":

a. Negligible: Class 2N.

3. Service Class, based on CBC Figure 1904.2., "Weathering Probability Map":

a. Negligible: Class 2N.

4. Maximum Coarse-Aggregate Size: 1 inch nominal.

a. Source: Reliance, Vulcan, San Gabriel, or Carrol Canyon

b. Hard rock mix; no pea gravel will be accepted.

5. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

a. Source: Reliance, Foster, Corona

b. Color to be white to light no dark material.

C. Water: Potable and complying with ASTM C 94/C 94M.

D. Shrinkage-Reducing Admixture: Commercially formulated, shrinkage inhibitor capable of reducing initial shrinkage by 80% and long-term shrinkage by 50%. Provide product suitable

for use with either air-entrained or non-air-entrained concrete as appropriate to structural member and project location.

1. Products: Subject to compliance with requirements, provide one of the following(as required):
    a. Euclid Chemical Company (The), an RPM company; EUCON SRA, SRA+.
    b. Grace Construction Products, W. R. Grace & Co.; Eclipse Floor, Eclipse Plus.
    c. Sika Corporation; Control 40.

2.04 **CURING MATERIALS**

A. Water: Potable.

B. Evaporation Retarder: Waterborne, monomolecular, film forming, manufactured for application to fresh concrete. Provide products with not more than 100g/L volatile organic content.

1. Products: Subject to compliance with requirements, provide one of the following:
    a. BASF Construction Chemicals, LLC; Confirm.
    b. Conspec by Dayton Superior; Aquafilm.
    c. Nox-Crete Products Group; MONOFILM.

C. Clear, Waterborne, Membrane-Forming Curing Compound (Colored Concrete): Provide products that are acceptable to concrete color pigment manufacturer complying with ASTM C 309, Type 1, Class B, 18 to 25 percent solids, nondissipating, certified by curing compound manufacturer to not interfere with bonding of sealers with no glossy finish and compatible with specified sealer. Provide products with not more than 100g/L volatile organic content.

1. Products: Subject to compliance with requirements, provide one of the following:
    a. Sinak Corporation; The Cure WCE or Lithium Cure 1000.
    b. L. M. Scofield; Cureseal-W.
    c. Butterfield Color; Clear Guard H2O.

D. All curing materials should be dissipating without leaving a shiny, cloudy, or glossy finish. Curing material does not substitute requirement of a sealer.

2.05 **HARDENERS AND SEALERS**

A. Penetrating Liquid Floor and Horizontal Surface Treatment (Sealer): Clear, chemically reactive, waterborne solution of inorganic silicate or siliconate water-based lithium quartz materials and proprietary components; odorless; that penetrates, hardens, and densifies concrete surfaces. Materials hsall be compatible with concrete admixtures and shall be recommended by manufacturer for intended use. Provide product with 0g/L volatile organic content.

1. Products: Subject to compliance with requirements, provide one of the following:
    a. Sinak Corporation; Concrete Sealer HLQ 125.
    b. L. M. Scofield; Cureseal-W.
    c. Butterfield Color; Clear Guard H2O.
    d. BASF Construction Chemicals - Building Systems; Kure-N-Harden.
    e. Dayton Superior Corporation; Edoco by Dayton Superior; Titan Hard.
    f. Euclid Chemical Company (The), an RPM company; Euco Diamond Hard.
    g. L&M Construction Chemicals, Inc.; Seal Hard.

2.06 **AGGREGATE BASE**

A. Granular Fill: Class II crushed aggregate per Section 26 of Cal-Trans standards. Clean mixture of crushed stone or crushed or uncrushed gravel; ASTM D 448, Size 57, with 100 percent passing a 1-1/2-inch (37.5-mm) sieve and 0 to 5 percent passing a No. 8 (2.36-mm) sieve.

2.07 **RELATED MATERIALS**

A. Joint Fillers:

1. Deck-O-Foam polyethylene closed cell expansion joint filler by W.R. Meadows.
2. 1/4" thickness.

B. Slip-Resistive Aggregate Finish: Factory-graded, packaged, rustproof, nonglazing, abrasive aggregate of fused aluminum-oxide granules or crushed emery aggregate containing not less than 50 percent aluminum oxide and not less than 20 percent ferric oxide; unaffected by freezing, moisture, and cleaning materials.

C. Bonding Agent: ASTM C 1059, Type II, non-re-emulsifiable. Provide proprietary products composed of latex polymers.

1. Products: Subject to compliance with requirements, provide one of the following:
   a. W. R. Meadows, Inc.; “Acry-Lok”.
   b. Grace Construction Products, W. R. Grace & Co.; "Daraweld C".
   c. Larsen Products Corp., "Weld-Crete".

D. Epoxy Bonding Adhesive: ASTM C 881/C 881M, two-component epoxy resin capable of humid curing and bonding to damp surfaces; of class suitable for application temperature, of grade complying with requirements, and of the following types:

1. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete, and for anchoring dowels to hardened concrete.

2.08 **DETECTABLE WARNING MATERIALS**

A. General: All detectable warning systems shall comply with Americans with Disabilities Act (28 CFR Part 36 ADA Standards for Accessible Design, Appendix A, Section 4.29.2 Detectable Warnings on Walking Surfaces), and CBC requirements (Section 11B-24, 11B-705 and others). All detectable warning materials shall have raised truncated domes with a base diameter of nominal 0.90 inch (22.9 mm), tapering to a top diameter of 0.45 inch (11.4 mm),a height of nominal 0.20 inch (5.08 mm), and a center-to-center spacing of 2.35 inches (59.7 mm) nominal. The orientation of the dome pattern for all panels shall be parallel with the panel edges. Detectable warning materials shall visually contrast with surrounding areas.

1. California Compliance Warranty: All detectable warning systems shall be approved by DSA-AC. If not approved, DSA will accept a written five (5) year product warranty provided by the manufacturer of detectable warning products and directional surfaces. Such warranty shall indicate compliance with architectural standards as published in the current edition of the California Building Standards Code, and also include durability criteria which indicate that the shape, color fastness, confirmation, sound-on-cane acoustic quality, resilience, and attachment will not degrade significantly for at least five (5) years after initial installation. As defined by the State, "not degrade significantly" means that the product maintains at least 90 percent of its approved design characteristics, as determined by the enforcing agency.

B. Concrete Paver Detectable Dome Warning System: Provide standard size precast architectural concrete paving units for installation in sand or mortar beds.

1. Basis-of Design Product: Provide the following, or comparable substitute product:
    a. Acker-Stone Industries, Inc., ADA Pavers-Truncated Domes.
        1) Size: per approved plans and details. Nominal 12 inches by 12 inches by 2 3/8 inches (4.7 cm by 4.7 cm by 6 cm).
        2) Color: per approved plans and details. As selected by Architect from manufacturer's complete range.
    b. Tectura designs - ADA-2 Truncated dome pavers.
        1) 12 inches by 12 inches nominal(actual 11.8 inches X 11.8 inches) by 2 3/8 inches
        2) Color as selected by Architect from manufacturer's complete range.

2.09 PAVEMENT MARKINGS

A. Color: As indicated.

B. Pavement-Marking Paint: MPI #97 Latex Traffic Marking Paint; paint to be at least as slip resistant as the adjacent surface.
    1. Color: White, green, unless otherwise indicated. Use for non-accessible striping, directional arrows, numbering, and lettering.
    2. Accessibility Color: Paint accessibility lines and markings blue color equal to Color No. 15090 per Federal Specification 595C.

2.10 WHEEL STOPS

A. Wheel Stops: Precast, air-entrained concrete, 2500-psi minimum compressive strength, 6 inches high by 7 inches wide by 72 inches long at singles stalls and XX inches long at shared stalls. Provide chamfered corners and drainage slots on underside and holes for anchoring to substrate.
    1. Dowels: Galvanized steel, 5/8 inch in diameter, 18-inch minimum length.

2.11 CONCRETE MIXTURES

A. Prepare design mixtures, proportioned according to ACI 301 (ACI 301M), for each type and strength of normal-weight concrete, and as determined by either laboratory trial mixtures or field experience.
    1. Use a qualified independent testing agency for preparing and reporting proposed concrete design mixtures for the trial batch method.
    2. Proportioning:
        a. The proportioning of ingredients shall be such that the concrete can be readily worked into forms and around reinforcement under the conditions of placement to be used, without segregation or excessive bleeding.
        b. When proportioning by weight of loose, dry material, 94 pounds of cement shall be considered 1 cubic foot.
            1) Float/Broom Finish: Coarse aggregate 50 percent-50 percent fine aggregate.
            2) Retarder finish: Coarse aggregate 40 percent, fine aggregate 60 percent.
            3) Exposed Aggregate Finish: Coarse aggregate 65 percent, fine aggregate 35 percent.
            4) Abrasive blast finish: Coarse aggregate 40 percent, fine aggregate 60 percent.
        c. Total water content shall not exceed 35 gallons per cubic yard of concrete.

d. Weighing equipment shall be accurate within 1 pound and shall be adjustable for varying aggregate moisture content.

e. A beam auxiliary shall register any part of the last 100 pounds of each aggregate. The aggregate hopper shall have a volume adjustment.

3. Prepare compressive strength data for both 7-day and 28-day strengths.

a. The 7-day compressive strength shall be at least 60 percent of the required 28-day strength.

b. The 28-day compressive strength shall be as indicated.

c. Provide drying shrinkage test data at 28 days, from not less than 3 test specimens.

B. When automatic machine placement is used, prepare and submit design mixtures suitable for use with machine placement, including reduced slump as required. Obtain laboratory test results that meet or exceed requirements.

C. Proportion mixtures to provide normal-weight concrete with the following properties:

1. Typical Compressive Strength (28 Days): Provide the following minimum compressive strength (28 days) for concrete paving unless otherwise indicated: 3000 psi.

2. Maximum Water-Cementitious Materials Ratio at Point of Placement: 0.50

3. Slump Limit: 4 inches, plus or minus 1 inch, unless indicated otherwise.

a. Slump Limit (High-Range Water-reducing Admixture): 8 inches for concrete with verified slump of 2 to 4 inches before adding high-range water-reducing admixture, plus or minus 1 inch, unless indicated otherwise.

b. Slump Limit (Plasticizing Admixture): 8 inches for concrete with verified slump of 2 to 4 inches before adding plasticizing admixture, plus or minus 1 inch, if required.

D. Limit water-soluble, chloride-ion content in hardened concrete to 0.06 percent by weight of cement. Limit total chloride-ion content in hardened concrete to 0.10 percent by weight of concrete when tested per AASHTO T 260 potentiometric titration.

E. Limit "drying shrinkage" after 28 days of curing hardened concrete to 0.045 percent of the original concrete volume.

F. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.

G. Chemical Admixtures: Admixtures may only be used if they are incorporated into the accepted concrete mix designs. Use admixtures according to manufacturer's written instructions.

1. Use water-reducing admixture in concrete as required for placement and workability.

2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.

3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.

4. Use corrosion-inhibiting admixture in concrete mixtures where indicated.

2.12 **CONCRETE MIXING**

A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M[and ASTM C 1116/C 1116M]. Furnish batch certificates for each batch discharged and used in the Work.

1. When air temperature is between 85 and 90 deg. F (30 and 32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg. F (32 deg. C), reduce mixing and delivery time to 60 minutes.

B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Mix concrete materials in appropriate drum-type batch machine mixer.

C. For concrete batches of 1 cu. yd. (0.76 cu. m) or smaller, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released.

D. For concrete batches larger than 1 cu. yd., increase mixing time by 15 seconds for each additional 1 cu. yd.

E. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixing time, quantity, and amount of water added.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine exposed subgrades and subbase surfaces for compliance with requirements for dimensional, grading, and elevation tolerances.

B. Proof-roll prepared subbase surface below concrete paving with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding.

1. Completely proof-roll subbase in one direction and repeat in perpendicular direction. Limit vehicle speed to 3 mph.

2. Correct subbase with soft spots and areas of pumping or rutting exceeding depth of 1/2 inch according to requirements in Division 31 Section "Earth Moving."

C. Proceed with concrete paving installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Remove loose material from compacted subbase surface immediately before placing concrete.

3.03 EDGE FORMS AND SCREED CONSTRUCTION

A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.

B. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

C. Slope stair and step treads at not less than 1.0 percent and not more than 2.0 percent cross slope to drain.

3.04 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.

B. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.

C. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.

D. Install fabricated bar mats in lengths as long as practicable. Handle units to keep them flat and free of distortions. Straighten bends, kinks, and other irregularities, or replace units as

required before placement. Set mats for a minimum 2-inch overlap of adjacent mats.

3.05 **JOINTS**

A. General: Form construction, isolation or expansion joint, and saw cut / contraction joints and tool edges true to line, with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline unless otherwise indicated.

1. When joining existing paving, place transverse joints to align with previously placed joints unless otherwise indicated.

B. Isolation (Expansion) Expansion Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, other fixed objects, and where indicated.

1. Locate expansion joints at intervals of 20 feet maximum unless otherwise indicated.
2. Extend joint fillers full width and depth of joint and recess 1 inch from finish surface where no joint sealant is indicated.
3. Terminate joint filler not less than 1/2 inch or more than 1 inch below finished surface if joint sealant is indicated.
4. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.
5. Break steel at expansion joints.
6. Dowels- provide prefabricated ‘speed dowel’ assemblies.

C. Saw Cut (Control) Joints: Form weakened-plane saw cut joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth plus 1/4 inch of the concrete thickness, as follows, and to match jointing of existing adjacent concrete paving:

1. Continue steel reinforcement across sawcut joints unless otherwise indicated.

D. Edging: After initial floating, tool edges of paving, gutters, curbs, and joints in concrete with an edging tool to a 1/8-inch radius unless otherwise noted. Repeat tooling of edges after applying surface finishes. Eliminate edging-tool marks on concrete surfaces.

3.06 **CONCRETE PLACEMENT**

A. Before placing concrete, inspect and complete formwork installation, steel reinforcement, and items to be embedded or cast-in. Notify other trades as necessary to permit installation of their work.

B. Remove snow, ice, or frost from subbase surface and steel reinforcement before placing concrete. Do not place concrete on frozen surfaces.

C. Moisten subbase to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.

D. Comply with ACI 301 requirements for measuring, mixing, transporting, and placing concrete.

E. Do not add water to concrete during delivery or at Project site. Do not add water to fresh concrete after testing.

F. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.

G. Consolidate concrete according to ACI 301 by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping.

1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, and side forms. Use only square-faced shovels for hand spreading and consolidation. Consolidate with care to prevent dislocating reinforcement, dowels and joint devices.

H. Screed paving surface with a straightedge and strike off.

I. Commence initial floating using bull floats or darbies to impart an open-textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.

J. Curbs and Gutters: Produce curbs and gutters to required cross section, lines, grades, finish, and jointing.

K. Slip-Form Paving: Use accepted design mixture for automatic machine placement. Produce paving to required thickness, lines, grades, finish, and jointing.

L. Compact subbase and prepare subgrade of sufficient width to prevent displacement of slip-form paving machine during operations.

M. Cold-Weather Placement: Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing, or low temperatures. Comply with ACI 306.1 and the following:

1. When air temperature has fallen to or is expected to fall below 40 deg. F (4.4 deg C), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg. F (10 deg C) and not more than 80 deg. F (27 deg C) at point of placement.
2. Do not use frozen materials or materials containing ice or snow.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in design mixtures.

N. Hot-Weather Placement: Comply with ACI 305R (ACI 305R M) and as follows when hot-weather conditions exist:

1. Cool ingredients before mixing to maintain concrete temperature below 90 deg. F (32 deg C) at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated in total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Cover steel reinforcement with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

O. Provide sand and base materials as indicated.

3.07 FLOAT/BROOM FINISHING

A. General: Do not add water to concrete surfaces during finishing operations.

B. Float Finish: Begin the second floating operation when bleed-water sheen has disappeared and concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture.

1. Medium-to-Fine-Textured Broom Finish: Draw a soft-bristle broom across float-finished concrete surface perpendicular to line of traffic to provide a uniform, fine-line texture. Required to meet slip coefficient requirement.

2. Portland cement concrete paving shall be stable, firm, and slip resistant and shall comply with CBCSections 11B-302 and 11B-403.

3.08 ABRASIVE BLAST FINISHING

A. General: Perform abrasive blasting after compressive strength of concrete exceeds 2000 psi, and is at least 28 days old Coordinate with formwork removal to ensure that surfaces to be abrasive blasted are treated at same age for uniform results.

1. Surface Continuity: Perform abrasive-blast finishing in as continuous an operation as possible, maintaining continuity of finish on each surface or area of Work. Maintain required patterns or variances in depths of blast to match design reference sample or mockup.
2. Abrasive Blasting: Abrasive blast corners and edges of patterns carefully, using backup boards, to maintain uniform corner or edge line. Determine type of nozzle, nozzle pressure, and blasting techniques required to match design reference sample or mockup.
3. Depth of Cut: Use an abrasive grit of proper type and gradation to expose aggregate and surrounding matrix surfaces to match design reference sample or mockup, as follows and as required by Architect:
    a. Retain degree of abrasive-blast cut in "Brush," "Light," "Medium," or "Heavy" subparagraphs below to suit Project.
    b. Brush: Remove cement matrix to dull surface sheen and expose face of fine aggregate; with no significant reveal.
    c. Light to Medium: Expose fine aggregate with occasional exposure of coarse aggregate and uniform color; with maximum reveal of 1/16 inch.
    d. Medium: Generally expose coarse aggregate; with slight reveal, a maximum of 1/8 inch.
    e. Heavy: Expose and reveal coarse aggregate to a maximum projection of one-third its diameter; with reveal range of 1/4 to 5/16 inch.
    f. Portland cement concrete paving shall have a medium sandblast finish equal to medium broom finish on all surfaces sloped less than 6% and slip resistant (heavy sandblast finish equal to heavy broom finish) on all surfaces sloped greater than 6%.
    g. Portland cement concrete paving shall be stable, firm and slip resistant and shall comply with **CBC Sections 11B-302 and 11B-403.**
4. Abrasive Blasting: Abrasive blast corners and edges of patterns carefully, using backup boards, to maintain uniform corner or edge line. Determine type of nozzle, nozzle pressure, and blasting techniques required to match design reference sample or mockup.
5. Insert specific abrasive materials or processes if required for Project.

3.09 DETECTABLE WARNINGS

A. Detectable Warnings, General: Install detectable warnings as part of the concrete paving placement sequence. Set true to line and elevation. Comply with maximum slope and cross-slope requirements for accessible walkways.

1. Blockouts: Form blockouts in concrete and asphalt pavements for installation of detectable paving units.
    a. Tolerance for Opening Size: Plus 1/4 inch, no minus.

B. Detectable warnings surfaces shall comply with **CBC Section 11B-705.1.**

C. Detectable warning surfaces shall be yellow conforming to FS 33538 of Federal Standard 595C, except for locations at curb ramps, islands, or cut through medians where color used shall contrast visually with that of adjacent walking surfaces, either light-on-dark or dark-on-light. **CBC Sections 11B-705.1.1.3 and 11B-705.1.1.5.**

D. Detectable warning surfaces shall differ from adjoining surfaces in resiliency or sound-on-cane contact. **CBC Section 11B-705.1.1.4.**

E. Provide 5 year minimum warranty per **DSA Bulletin 10/31/02, revised 04/09/08.**

F. Precast Detectable Warning Tiles: Comply with approved plans and details along with manufacturer's written instructions.

G. Surface-Mounted Detectable Warning Tiles: Comply with manufacturer's written instructions. Do not install directly over asphalt pavements.

H. For installation at asphalt pavements, comply with installation indicated on Drawings. If not indicated, provide one of the following installation methods:

I. Saw-cut and remove asphalt pavement in location of warning tile to a minimum depth of 6 inches. Replace removed pavement materials with reinforced concrete paving materials. When cured, install surface-mounted detectable warning tiles.

J. Provide 0.032 inch aluminum separation sheet cut to same size as surface mounted tiles. Adhere sheet to asphalt paving with a thin coat of urethane adhesive, holding adhesive 1 inch from edge of sheet. Install surface-mounted detectable warning tiles to sheet with adhesive and mechanical fasteners per manufacturer's written instructions.

K. Cast-in-Place Detectable Warning Pavers: Integrate into installation of unit pavers. Comply with manufacturer's written instructions.

L. Cast-in-Place Detectable Warning Grooves: Install detectable warnings as part of the concrete paving placement sequence. Set true to line and elevation. Form well-defined, clean grooves with appropriate tools.

3.10 **CONCRETE PROTECTION, CURING AND SEALING:**

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

B. Comply with ACI 306.1 for cold-weather protection.

C. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete but before float finishing.

D. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.

E. Curing Methods: Cure concrete by moisture curing, moisture-retaining-cover curing, curing compound or a combination of these as follows:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
    a. Water.
    b. Continuous water-fog spray.
    c. Absorptive cover, water saturated and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover, placed in widest practicable width, with sides and ends lapped at least 12 inches and sealed by waterproof tape or adhesive. Immediately repair any holes or

tears occurring during installation or curing period using cover material and waterproof tape.

3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas that have been subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating, and repair damage during curing period.

F. Seal Concrete: Apply specified sealer in accordance with manufacturer’s recommendations.

1. Apply full strength in two coats with airless sprayer at the manufacturer’s recommended rate.
2. After the first coat is completely dry, apply second coat at right angles to the first coat.

3.11 PAVING TOLERANCES

A. Comply with tolerances in ACI 117, the Americans with Disabilities Act, the CBC and as follows:

1. Elevation: 1/8 inch.
2. Thickness: Plus 3/8 inch, minus 1/4 inch.
3. Surface: Gap below 10-foot- long, unleveled straightedge not to exceed 1/8 inch. Surface must properly drain.
4. Surface Discontinuities: Maximum 1/4 inch, subject to further limitations of accessible routes.
5. Alignment of Tie-Bar End Relative to Line Perpendicular to Paving Edge: 1/2 inch per 12 inches of tie bar.
6. Lateral Alignment and Spacing of Dowels: 1/4 inch.
7. Vertical Alignment of Dowels: 1/8 inch.
8. Alignment of Dowel-Bar End Relative to Line Perpendicular to Paving Edge: 1/8 inch per 12 inches of dowel.
9. Joint Spacing: 3 inches, except joint position shall be within 1/4 inch of objects in alignment with joint such as benches, light poles, pull boxes, etc.
10. Sawcut Joint Depth: Plus 1/4 inch, no minus.
11. Joint Width: Plus 1/16 inch, no minus.

B. Stair Treads: Stair treads within a run shall be constructed equally and shall shed water away from the path of travel. Maximum tread slope down from riser to nosing in direction of travel: 1.0 percent, plus or minus 0.5 percent. Maximum tread cross-slope perpendicular to direction of travel: 2.0 percent, plus 0.0 percent, minus 1.0 percent or as required to shed water.

C. Ramps: Ramps shall shed water away from the path of travel. Maximum ramp slope in direction of travel: 8.33 percent. Maximum ramp cross-slope perpendicular to direction of travel: 2.0 percent, plus 0.0 percent, minus 1.0 percent or as required to shed water.

3.12 PAVEMENT MARKING

A. Do not apply pavement-marking paint until layout, colors, and placement have been verified with Architect.

B. Allow concrete paving to cure for a minimum of 28 days and be dry before starting pavement marking.

C. Sweep and clean surface to eliminate loose material and dust.

D. Apply paint with mechanical equipment to produce markings of dimensions indicated with uniform, straight edges. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of 15 mils. Provide markings with a minimum width of 3 inches.

1. Apply graphic symbols and lettering with paint-resistant, die-cut stencils, firmly secured to concrete surface. Mask an extended area beyond edges of each stencil to prevent paint application beyond stencil. Apply paint so that it cannot run beneath stencil.
2. Broadcast glass beads uniformly into wet markings at a rate of 6 lb./gal.

E. Accessible parking spaces serving a particular building or facility shall be located, and dispersed if serving more than one accessible entrance, on the shortest accessible routes to an entrance or to mulitple accessible entrances. **CBC Section 11B-208.3.1.**

F. Accessible parking spaces in a parking facility not serving a particular building or facility shall be located on the shortest accessible route to an accessible pedestrian entrance of the parking facility. **CBC Section 11B-208.3.1.**

G. Minimum number of required accessible parkng spaces shall be provided in accordance with **CBC Table 11B-208.2** for each parking facility provided.

H. For every six or fraction of six accessible parking spaces, at least one shall be an accessible van parking space. **CBC Section 11B-208.3.1.**

I. Accessible parking spaces and access aisles shall comply with **CBC Section 11B-502** and shall be dimensioned to the cenerlines of the marked lines as follows:

1. Parking spaces and access aisles shall be mareked according to **CBC figures 11B-502.2, 11B-502.3, and 11B-502.3.3**. Their surfaces shall comply with **CBC Section 11B-302** and shall be at the same level with the slopes not steeper than 1:48 in any direction. **CBC Section 11B-502.4.**
2. Parking spaces shall be 9'x18' minimum and van parking spaces shall be 12'x18' minimum with an adjacent access aisle of 5'x18' minimum. Access aisles shall be placed on either side of the parking spaces except be located on teh passenger side for van parking spaces. Van parking spaces shall be permitted to be 9'x18' minimum where the access aisle is 8'x18' minimum.
3. Access aisles shall be marked by a blue painted borderline around their perimeter. The areas within the blue borderlines shall be mareked with hatched lines a maxiumum of 36" on center in a color contrasting with that of the aisle surface, preferably blue or white. Access aisle markings may extend beyond the minimum requied length. **CBC Section 11B-502.3.3**
4. Access aisles(parking spaces as well- similar application) shall not overlap the vehicular way. **CBC Section 11B-502.3.4**
5. A verticle clearance of 8'-2" minimum shall be provided for accessible parking spaces, access aisles, and vehicular routes serving them. **CBC Section 11B-502.5**

J. At least one passenger loading zone shall be provided in every continuous 100 linear feet of loading zone space, or fraction thereof, complying with **CBC Section 11B-209 and 11B-503** as follows:

1. Vehicle pull-up spaces shall be 8' x 20' minimum. Access aisles shall be 5' x 20' minimum and shall be adjacent and parallel to the vehicular pull-up spaces. They shall be the same level with slopes not steeper than 1:48 in any direction. **CBC Section 11B-503.4.**
2. Access aisles for passenger drop-off and loading zones shall be marked with a painted borderlines around their perimeter. The areas within the borderlines shall be marked with hatched lines a maxiumum of 36" on center in a color contrasting with

that of the aisle surface. **CBC Section 11B-503.3.**

3. A vertical clearance of 9'-6" minimum shall be provided for vehicle pull-up spaces, access aisles, and a vehicular route serving them connecting a vehicular entrance and a vehicular exit. **CBC Section 11B503.5.**

3.13 **WHEEL STOPS**

A. Securely attach wheel stops to paving with not less than two #5 galvanized steel dowels, minimum 24 inches long, located at one-quarter to one-third points. Install dowels in drilled holes in the paving and bond dowels to wheel stop. Recess head of dowel beneath top of wheel stop.

B. Install preformed speed [bumps] [humps] [cushions] in bed of adhesive applied as recommended by manufacturer for heavy traffic.

C. Securely attach preformed speed [bumps] [humps] [cushions] to paving with hardware spaced as recommended by manufacturer for heavy traffic. Recess head of hardware beneath top surface.

3.14 **FIELD QUALITY CONTROL**

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

B. Testing Services: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:

1. Testing Frequency: Obtain at least one composite sample for each 20 cu. Yd., or fraction thereof of each concrete mixture placed each day.

    a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.

2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.

3. Air Content: ASTM C 231, pressure method; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.

4. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg. F and below and when it is 80 deg. F and above, and one test for each composite sample.

5. Compression Test Specimens: ASTM C 31/C 31M; cast and laboratory cure one set of three standard cylinder specimens for each composite sample.

6. Compressive-Strength Tests: ASTM C 39/C 39M; test one specimen at seven days and two specimens at 28 days.

    a. A compressive-strength test shall be the average compressive strength from two specimens obtained from same composite sample and tested at 28 days.

C. Strength of each concrete mixture will be satisfactory if average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.

D. Test results shall be reported in writing to Owner, Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive

strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.

E. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.

F. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect.

G. Remove and replace concrete pavement where test results indicate that it does not comply with specified requirements. Concrete paving will be considered defective if it does not pass tests and inspections.

H. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

I. Prepare test and inspection reports.

3.15 REPAIRS AND PROTECTION

A. Remove and replace concrete paving that is broken, damaged, cracked, chipped, stained or defective or that does not comply with requirements in this Section as determined by Landscape Architect. Remove work in complete sections from joint to joint unless otherwise approved by Architect.

B. Drill test cores, where directed by Architect, when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory paving areas with Portland cement concrete bonded to paving with epoxy adhesive.

C. Protect concrete paving from damage. Exclude all but pedestrian traffic from paving for at least 28 days after placement. When construction traffic is permitted, maintain paving as clean as possible by providing adequate surface protection and by removing surface stains and spillage of materials as they occur.

1. Rubber tire marks are unacceptable in the completed construction.

D. Maintain concrete paving free of stains, discoloration, dirt, and other foreign material. Sweep paving not more than two days before date scheduled for Project Completion inspections.

E. Repair of damaged, defective or rejected concrete is not permitted. Remove all concrete from expansion joint to expansion joint or greater as required to provide a constant continuous finish.

3.16 FINAL CLEANING

A. Remove all excess concrete, form materials, over pours, waste, etc., and legally dispose off-site.

B. Provide a final acid and power wash for all concrete paving surfaces. Do not use any material that will affect the appearance of the concrete.

C. All over pours in planting areas should be removed prior to landscape operations.

D. Clean concrete paving to remove stains, markings, dust, and debris.

END OF SECTION

SECTION 321373
PAVEMENT JOINT SEALERS

PART 1 - GENERAL

1.01 SECTION INCLUDES: RELATED DOCUMENTS

A. Exterior joint sealant for non-traffic surfaces.

1.02 RELATED REQUIREMENTS

A. Division 32 Section Concrete Paving.

B. Division 32 Section Architectural Site Concrete

1.03 SUBMITTALS

A. Product Data: For each joint-sealant product indicated.

B. Samples for Verification: For each type and color of joint sealant required. Install joint-sealant samples in 1/2-inch- (13-mm-), and 1/4-inch (6.4-mm) wide joints formed between two 6-inch- (150-mm-) long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.

1.04 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers trained and approved by manufacturer.

B. Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.

C. Preconstruction Compatibility and Adhesion Testing: Submit to joint-sealant manufacturers, for testing indicated below, samples of materials that will contact or affect joint sealants.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration date, pot life, curing time, and mixing instructions for multi-component materials.

B. Store and handle materials to comply with manufacturer's written instructions to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

1.06 PROJECT CONDITIONS

A. Do not proceed with installation of joint sealants under the following conditions:

B. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F (4.4 deg C).

C. When joint substrates are wet or covered with frost.

D. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.

E. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products listed in other Part 2 articles.

2.02 MATERIALS, GENERAL

A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer, based on testing and field experience.

B. Colors of Exposed Joint Sealants: As selected by Landscape Architect from manufacturer's full range.

2.03 **ELASTOMERIC JOINT SEALANTS**

A. Elastomeric Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied chemically curing sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.

B. Stain-Test-Response Characteristics: Where elastomeric sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.

2.04 **JOINT-SEALANT BACKER MATERIALS**

A. General: Provide joint-sealant backer materials that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by joint-sealant manufacturer based on field experience and laboratory testing.

B. Round Backer Rods for Cold- and Hot-Applied Sealants: ASTM D 5249, Type 1, of diameter and density required to control sealant depth and prevent bottom-side adhesion of sealant.

PART 3 EXECUTION

3.01 **EXAMINATION**

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.

3.02 **PREPARATION**

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions.

B. Joint Priming: Prime joint substrates where indicated or where recommended in writing by joint-sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

3.03 **INSTALLATION OF JOINT SEALANTS**

A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Install backer materials of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of backer materials.
2. Do not stretch, twist, puncture, or tear backer materials.
3. Remove absorbent backer materials that have become wet before sealant application and replace them with dry materials.

D. Install sealants using proven techniques that comply with the following and at the same time backings are installed:

1. Place sealants so they directly contact and fully wet joint substrates.
2. Completely fill recesses provided for each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

E. Provide joint configuration to comply with joint-sealant manufacturer's written instructions, unless otherwise indicated.

F. Provide recessed joint configuration for silicone sealants of recess depth and at locations indicated.

3.04 **CLEANING**

A. Clean off excess sealants or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved by manufacturers of joint sealants and of products in which joints occur.

3.05 **PROTECTION**

A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately and replace with joint sealant so installations with repaired areas are indistinguishable from the original work.

3.06 **SCHEDULE**

A. Horizontal Joints, less than 5 percent slope; Sealant No. 1.

B. Horizontal Joints, grades steeper than 5 percent; Sealant No. 2

C. Vertical Joints; Sealant No. 2

END OF SECTION

SECTION 333113
SITE SANITARY SEWERAGE GRAVITY PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Sanitary sewerage drainage piping, fittings, and accessories.

B. Connection of building sanitary sewer system to existing on-site system.

1.02 RELATED REQUIREMENTS

A. Section 033000 - Cast-in-Place Concrete: Concrete for cleanout base pad construction.

B. Section 312316.13 - Trenching: Excavating, bedding, and backfilling.

C. Section 312323 - Fill: Bedding and backfilling.

D. Section 330513 - Manholes and Structures.

1.03 DEFINITIONS

A. Bedding: Fill placed under, beside and directly over pipe, prior to subsequent backfill operations.

1.04 REFERENCE STANDARDS

A. ASTM A746 - Standard Specification for Ductile Iron Gravity Sewer Pipe 2018.

B. ASTM C12 - Standard Practice for Installing Vitrified Clay Pipe Lines 2016a.

C. ASTM C443 - Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets 2012 (Reapproved 2017).

D. ASTM C425 - Standard Specification for Compression Joints for Vitrified Clay Pipe and Fittings 2004 (Reapproved 2018).

E. ASTM D1785 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120 2015, with Editorial Revision (2018).

F. ASTM D2321 - Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications 2014.

G. ASTM D2729 - Standard Specification for Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings 2011.

H. AWWA C111/A21.11 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings 2017.

I. Standard Specifications for Public Works Construction (Greenbook), latest edition.

1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data indicating pipe, pipe accessories .

C. Manufacturer's Installation Instructions: Indicate special procedures required to install Products specified.

PART 2 PRODUCTS

2.01 SEWER PIPE MATERIALS

A. Provide products that comply with applicable code(s).

B. Ductile Iron Pipe: ASTM A746, Pressure Class 350, with asphaltic lining, inside nominal diameter as indicated, bell and spigot end.

C. Joint Seals for Ductile Iron Pipe: AWWA C111/A21.11 rubber gaskets.

D. Joint Seals for Clay Pipe: ASTM C425 compression gasket joint devices.

E. Plastic Pipe: ASTM D3034, SDR 35, Poly(Vinyl Chloride) (PVC) material; inside nominal diameter as indicated, bell and spigot style rubber gasket joints.

F. Fittings: Same material as pipe molded or formed to suit pipe size and end design, in required tee, bends, elbows, cleanouts, reducers, traps and other configurations required.

2.02 **PIPE ACCESSORIES**

A. Detectable warning tape: 4-mil polyethylene tape, 3-inch width minimum, imprinted with "CAUTION SEWER LINE BELOW".

2.03 **SEWER STRUCTURES**

A. Cleanouts: In accordance with the plans and as specified by the local jurisdictional authority.

2.04 **BEDDING AND COVER MATERIALS**

A. Pipe Bedding Material: As specified in Section 312316.13.

B. Pipe Cover Material: As specified in Section 312316.13.

PART 3 EXECUTION

3.01 **GENERAL**

A. Perform work in accordance with applicable code(s).

3.02 **EXAMINATION**

A. Prior to beginning work, verify that building service connections, municipal and site storm main size, location, and invert are as indicated.

3.03 **TRENCHING**

A. See Section 312316.13 for additional requirements.

B. Hand trim excavation for accurate placement of pipe to elevations indicated.

C. Backfill around sides and to top of pipe with cover fill, tamp in place and compact, then complete backfilling.

3.04 **INSTALLATION - PIPE**

A. Verify that trench cut is ready to receive work and excavations, dimensions, and elevations are as indicated on layout drawings.

B. Install pipe, fittings, and accessories in accordance with manufacturer's instructions. Seal watertight.

1. Plastic Pipe: Also comply with ASTM D2321.

C. Lay pipe to slope gradients noted on layout drawings; with maximum variation from true slope of 1/8 inch (3 mm) in 10 feet (3 m).

D. Connect to building sanitary sewer outlet and municipal sewer system , through installed sleeves.

E. Install detectable warning tape 6 inches (150 mm) above top of pipe; coordinate with Section 312316.13.

3.05 **INSTALLATION - CLEANOUTS**

A. Form bottom of excavation clean and smooth to correct elevation.

B. Form and place cast-in-place concrete base pad, with provision for sanitary sewer pipe end sections.

C. Establish elevations and pipe inverts for inlets and outlets as indicated.

D. Mount lid and frame level in grout, secured to top cone section to elevation indicated.

3.06 **FIELD QUALITY CONTROL**

A. Perform field inspection and testing in accordance with Section 014000.

B. Air Pressure Test: Test in accordance with Greenbook, Section 306-7.8.2.4.

C. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to Owner.

3.07 **PROTECTION**

A. Protect pipe and bedding cover from damage or displacement until backfilling operation is in progress.

END OF SECTION