

California State Water Resource Control Board  
Division of Drinking Water  
Valley District Well Siting Inspection Checklist

Well Name: Well 6A

Water System Name: City of Colusa

Water System Number: CA0610002

Proposed Location: Intersection 10th and Jay Street, aka Memorial Park, Colusa, CA

Date: February 4, 2025 Engineer: David Swartz, PE

	<b>Y/N</b>
Above 100-year flood level?	Y
Storm water drainage flows away from site instead of toward it?	Y
All season access to well site for maintenance vehicles?	Y
Water system own or have easement to use property for well?	Y

<b><u>Separation requirements:</u></b>	<b><u>Min. Feet</u></b>	<b><u>Actual</u></b>
Sewer & house laterals	50	>100'
Sewer manhole	100	>100'
Sewage pumping station	100	>100'
Sewage treatment plant	150	>1,000'
Sewage lagoons	500	>1,000'
Lined effluent discharge channel	200	>1,000'
Sewage irrigation areas	500	>1,000'
Sewage spreading areas	500	>1,000'
Sewage percolation/evaporation ponds	500	>1,000'
Watertight septic tank	100	>1,000'
Horizontal leach lines	100	>1,000'
Seepage pit and cesspool	150	>1,000'
Pit privy or vault privy (pump-out)	50	N/A
Storm sewers	50	N/A
Drainage channel	50	>1,000'
Barnyard, feedlot, stable, pastures	100	>1,000'
Petroleum storage tanks (subsurface)	100	>500'
Petroleum transmission mains	500	N/A
Dwelling	25	120'
Pond, lake, stream	50 - 100	1,000'+/-
Abandoned/Destroyed Well	50	60'

Comments: Well No. 6 will be abandoned and destroyed as a part of this project.

**Approval Recommended:**    Yes     No



**CITY OF COLUSA**  
**Department of Public Works**

**CONTRACT DOCUMENTS**  
**FOR**  
**Water Well No. 6A**  
**Volume 1**

**PRE BID MEETING – TUESDAY, March 11<sup>th</sup>, 2025 2:00 PM, at City Hall**  
**BID OPENING – TUESDAY, March 25<sup>th</sup>, 2025; 2:00 PM at City Hall**

Mayor:	Ryan Codorniz
Mayor Pro Tem:	Denise Conrado
Council Members:	Daniel Vaca Greg Ponciano Dave Markss
City Manager:	Jesse Cain
Public Works Administrative Director:	Jesse Cain

**CONTRACT DOCUMENTS  
AND  
SPECIFICATIONS  
FOR  
WATER WELL NO. 6A  
PROJECT NO. 25-101**

**Volume 1  
FEBRUARY 2025  
BID SUBMITTAL**

**Prepared by:**



**California Engineering Company, Inc.  
Civil Engineering ↔ Planning ↔ Surveying ↔ Construction Management  
[www.cecusa.net](http://www.cecusa.net) p 530.751.0952  
Yuba City and Chico, CA**

**CITY OF COLUSA**  
**WATER WELL NO. 6A**

**LICENSEE RESPONSIBLE FOR SPECIFICATIONS**

Contract Documents prepared by or under the direction of the following registered persons:

David L. Swartz (Civil, LS)  
CEC, Inc.  
1110 Civic Center Blvd. Ste 404  
Yuba City, CA 95993  
530-751-0952



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**CITY OF COLUSA**  
**DEPARTMENT OF PUBLIC WORKS**

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**NOTICE TO CONTRACTORS**

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**CONTRACT NO. 25-101**

Sealed proposals for the work shown on the plans entitled:

**CITY OF COLUSA;  
DEPARTMENT OF PUBLIC WORKS  
PROJECT PLANS FOR:**

**WATER WELL NO. 6A**

**IN**

**THE CITY OF COLUSA**

will be received at the City of Colusa City Hall, 425 Webster St. Colusa, Ca 95932, until **2:00 PM on March 25<sup>th</sup>, 2025**, at which time they will be publicly opened and read.

Proposal forms for this work are included herein:

General work for this project consists of drilling a new well and installing a new well casing and screens, near existing Well No. 6 located at Memorial Park in the City of Colusa, and then moving the existing pump motor to the new well head, and connecting the existing VFD, flow meter and disinfection equipment, which will remain in the current building, and testing and development a new well that can produce up to 2000 gpm. As a bid additive alternative the City is also seeking to drill a 4" diameter test well on a separate parcel.

**A mandatory pre-bid meeting is scheduled for March 11<sup>th</sup>, 2025 @ 2:00 pm** at Colusa City Hall, 425 Webster St. Colusa, Ca 95932.

**A preconstruction conference will be required for this project. The time and date will be determined after contract award.**

Bids are required for the entire work described herein. All documents shall be submitted in the original Proposal and Contract book, or attached to the appropriate pages, to be considered a responsible bid. (Pages may be stapled in.)

The contractor shall possess either a Class A license or a combination of license classes required for all work at the time this contract is awarded.

This contract is subject to state contract nondiscrimination and compliance requirements pursuant to Government Code, Section 12990.

Plans and specifications for bidding of this project are obtainable at regional bid exchanges or electronically from the cities web site.

Please direct questions to the Project Manager, California Engineering Company, Inc., Yuba City, CA (530) 751-0952, attention David L. Swartz, PE, PLS – prefer email : [swartz@cecusa.net](mailto:swartz@cecusa.net)

The successful bidder shall furnish a payment bond and a performance bond.

Pursuant to Section 1773 of the Labor Code, the general prevailing wage rates in the county, or counties, in which the work is to be done have been determined by the Director of the California Department of Industrial Relations. These wages are set forth in the General Prevailing Wage Rates for this project, available at the County of Colusa and available from the California Department of Industrial Relations' Internet web site at <http://www.dir.ca.gov>. The Federal minimum wage rates for this project as predetermined by the United States Secretary of Labor are set forth in the books issued for bidding purposes entitled "Proposal and Contract," and in copies of this book that may be examined at the offices described above where project plans, special provisions, and proposal forms may be seen. Addenda to modify the Federal minimum wage rates, if necessary, will be issued to holders of "Proposal and Contract" books. Future effective general prevailing wage rates which have been predetermined and are on file with the California Department of Industrial Relations are referenced but not printed in the general prevailing wage rates.

Attention is directed to the Federal minimum wage rate requirements in the books entitled "Proposal and Contract." If there is a difference between the minimum wage rates predetermined by the Secretary of Labor and the general prevailing wage rates determined by the Director of the California Department of Industrial Relations for similar classifications of labor, the Contractor and subcontractors shall pay not less than the higher wage rate. The Department will not accept lower State wage rates not specifically included in the Federal minimum wage determinations. This includes "helper" (or other classifications based on hours of experience) or any other classification not appearing in the Federal wage determinations. Where Federal wage determinations do not contain the State wage rate determination otherwise available for use by the Contractor and subcontractors, the Contractor and subcontractors shall pay not less than the Federal minimum wage rate which most closely approximates the duties of the employees in question.

CITY OF COLUSA

CITY CLERK:

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Shelly Kittle

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DATED

**ENGINEER'S ESTIMATE**

Item	Description	Original Quantity	Unit
<b><u>WELL NO. 6A</u></b>			
1	Mobilization/Demobilization and Final Clean Up.	1	LS
2	Drill 52-inch Borehole, furnish and install 40-inch OD x 3/8 inch wall ASTM A 139 Mild Steel Conductor Casing, Cement into Place	50	LF
3	Drill 17.5 inch Pilot Bore Hole 50 ft to 500 feet	450	LF
4	Provide Borehole Geophysical Surveys	1	LS
5	Completing Well including test pumping, grouting, gravel well casing, screening and disinfecting.	500	LF
6	Install Isolated Aquifer Zone Tool, Seals and Gravel Envelop, and Provide for Initial Development by Airlifting	3	EA
7	Provide Temporary holding tanks, Temporary Conveyance piping, booster pumps and any other equipment necessary to provide for discharge routing to City SD.	1	LS
8	Electrical Work – Moving Existing Motor and Well head, to new Well, Connecting Motor to Existing VFD, and installing weather proof 110 Duplex Receptacle.	1	LS
9	Pump Isolated Aquifer Zones (est. 12 hrs per zone).	3	EA
10	Connection of new well facilities to city water system 12” DI Pipe	1	LS
11	Provide Isolated Aquifer Zone Test Laboratory Analysis	3	EA
12	Ream Pilot Borehole to 34-inch 50 – 500 ft	450	LF
13	Reconnecting existing well head disinfection and water meter equipment to new well head.	1	LS
14	Provide Caliper Survey of Reamed Borehole	1	LS
15	Furnish and install 20-inch x 3/8” Wall ASTM A778 304L Stainless Steel Blank Casing +2 – 500 feet.	502	LF
16	Furnish and install 20-inch x 5/16-inch Wall ASTM A778 304L Stainless Steel Ful-Flo louvered Well Screen with 0.060 inch slots 275’ – 300’ and 320’ – 340’ and 400’ – 420’.	65	LF
17	Furnish and install two (2) 3-inch Sch. 40 304L Stainless Steel Gravel Feed Pipes +1 – 270’	540	LF
18	Furnish and install 4-inch Sch. 40 304L Stainless Steel Camera Access Tube and 8-foot connection box +1-500 ft.	501	LF
19	Furnish and install 2 inch SCH 40 Stainless Steel sounding Tube and 2 foot connection box. +1-500 ft.	500	LF
20	Furnish and install Engineered Gravel Envelope and #60 Fine Transition Sand	1	LS



21	Furnish and install 10.3 – sack Sand Cement Slurry Annular Seal	1	LS
22	Provide initial development by Swabbing and Focused Intake Pumping	1	LS
23	Provide, Install, and Remove Development Test Pump	1	LS
24	Provide Final Development by Pumping and Surging	1	LS
25	Conduct Aquifer Pumping Tests (8-hr step drawdown, 24 hr. constant rate drawdown, and 4-hr recovery tests)	1	LS
26	Provide Downhole Video Survey	1	LS
27	Provide Plumbness and Alignment Surveys	1	LS
28	Provide Well Disinfection	1	LS
29	Provide Pump shaft and Bowls for the existing 100 hp motor which will yield 2000 gpm at 300' TDH	1	LS

BID ADDEITIVE ALTERNATE:

Drill 1000' deep test well, and provide geophysical surveys (elog), aquifer reports and zone water quality testing as described herein, and isolated aquifer zone pumping for 12 hrs to estimate potential yield.

*CITY OF COLUSA*

*DEPARTMENT OF PUBLIC WORKS*

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**PROPOSAL AND CONTRACT**

**FOR**

**WATER WELL NO. 6A**

**IN**

**CITY OF COLUSA**

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For use in Connection with Standard Specifications and Standard Plans Dated July, 2010, of the California Department of Transportation, and the Labor Surcharge and Equipment Rental Rates in effect on the date the work is accomplished.

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**Contract No. 25-101**

**Bid Opening Date: March 25<sup>th</sup>, 2025**

**PROPOSAL TO THE CITY OF COLUSA  
DEPARTMENT OF PUBLIC WORKS**

**CONTRACT NO. 25-101**

**NAME OF BIDDER** \_\_\_\_\_

**BUSINESS P.O. BOX** \_\_\_\_\_

**CITY, STATE, ZIP** \_\_\_\_\_

**BUSINESS STREET ADDRESS** \_\_\_\_\_

*(Please include even if P.O. Box used)*

**CITY, STATE, ZIP** \_\_\_\_\_

**TELEPHONE NO:**                    **AREA CODE ( )** \_\_\_\_\_

**FAX NO:**                            **AREA CODE ( )** \_\_\_\_\_

**CONTRACTOR LICENSE NO.** \_\_\_\_\_

The work for which this proposal is submitted is for construction in conformance with these contract documents, and technical specifications, with the City of Colusa standards and municipal code and standard details, and the Cal Trans Standard Plans (including the payment of not less than the State general prevailing wage rates or Federal minimum wage rates). The project plans described below, including any addenda thereto, the contract annexed hereto, and also in conformance with the California Department of Transportation Standard Plans, dated July, 2010, the Standard Specifications, dated July, 2010, and the Labor Surcharge and Equipment Rental Rates in effect on the date the work is accomplished.

Bids are to be submitted for the entire work. The amount of the bid for comparison purposes will be the total of all items. The bidder shall set forth for each unit basis item of work a unit price and a total for the item, and for each lump sum item a total for the item, all in clearly legible figures in the respective spaces provided for that purpose. In the case of unit basis items, the amount set forth under the "Item Total" column shall be the product of the unit price bid and the estimated quantity for the item.

In case of discrepancy between the unit price and the total set forth for a unit basis item, the unit price shall prevail, except as provided in (a) or (b), as follows:

- (a) If the amount set forth as a unit price is unreadable or otherwise unclear, or is omitted, or is the same as the amount as the entry in the item total column, then the amount set forth in the item total column for the item shall prevail and shall be divided by the estimated quantity for the item and the price thus obtained shall be the unit price;
- (b) (Decimal Errors) If the product of the entered unit price and the estimated quantity is exactly off by a factor of ten, one hundred, etc., or one-tenth, or one-hundredth, etc. from the entered total, the discrepancy will be resolved by using the entered unit price or item total, whichever most closely approximates percentage wise the unit price or item total in the *CITY OF COLUSA*'s Final Estimate of cost.

If both the unit price and the item total are unreadable or otherwise unclear, or are omitted, the bid may be deemed irregular. Likewise if the item total for a lump sum item is unreadable or otherwise unclear, or is omitted, the bid may be deemed irregular unless the project being bid has only a single item and a clear, readable total bid is provided.

Symbols such as commas and dollar signs will be ignored and have no mathematical significance in establishing any unit price or item total or lump sums. Written unit prices, item totals and lump sums will be interpreted according to the number of digits and, if applicable, decimal placement. Cents symbols also have no significance in establishing any unit price or item total since all figures are assumed to be expressed in dollars and/or decimal fractions of a dollar. Bids on lump sum items shall be item totals only; if any unit price for a lump sum item is included in a bid and it differs from the item total, the items total shall prevail.

The foregoing provisions for the resolution of specific irregularities cannot be so comprehensive as to cover every omission, inconsistency, error or other irregularity which may occur in a bid. Any situation not specifically provided for will be determined in the discretion of the *CITY OF COLUSA*, and that discretion will be exercised in the manner deemed by the *CITY OF COLUSA* to best protect the public interest in the prompt and economical completion of the work. The decision of the *CITY OF COLUSA* respecting the amount of a bid, or the existence or treatment of an irregularity in a bid, shall be final.

If this proposal shall be accepted and the undersigned shall fail to enter into the contract and furnish the 2 bonds in the sums required by the State Contract Act, with surety satisfactory to the *CITY OF COLUSA*, within 8 days, not including Saturdays, Sundays and legal holidays, after the bidder has received notice from the *CITY OF COLUSA* that the contract has been awarded, the *CITY OF COLUSA* may, at its option, determine that the bidder has abandoned the contract, and thereupon this proposal and the acceptance thereof shall be null and void and the forfeiture of the security accompanying this proposal shall operate and the same shall be the property of the *CITY OF COLUSA*.

The undersigned, as bidder, declares that the only persons or parties interested in this proposal as principals are those named herein; that this proposal is made without collusion with any other person, firm, or corporation; that he has carefully examined the location of the proposed work, the annexed proposed form of contract, and the plans therein referred to; and he proposes, and agrees if this proposal is accepted, that he will contract with the *CITY OF COLUSA*, in the form of the copy of the contract annexed hereto, to provide all necessary machinery, tools, apparatus and other means of construction, and to do all the work and furnish all the materials specified in the contract, in the manner and time therein prescribed, and according to the requirements of the Engineer as therein set forth, and that he will take in full payment therefor the following prices, to wit:

# CONTRACTOR'S BID

Item	Description	Bid Quantity	Unit	Unit Cost	Base Bid Amount
	<b><u>WELL NO. 6A</u></b>	-			
1	Mobilization/Demobilization and Final Clean Up.	1	LS		
2	Drill 52-inch Borehole, furnish and install 40-inch OD x 3/8 inch wall ASTM A 139 Mild Steel Conductor Casing, Cement into Place	50	LF		
3	Drill 17.5 inch Pilot Bore Hole 50 ft to 500 feet	450	LF		
4	Provide Borehole Geophysical Surveys	1	LS		
5	Completing Well including test pumping, grouting, gravel well casing, screening and disinfecting.	500	LF		
6	Install Isolated Aquifer Zone Tool, Seals and Gravel Envelop, and Provide for Initial Development by Airlifting	3	EA		
7	Provide Temporary holding tanks, Temporary Conveyance piping, booster pumps and any other equipment necessary to provide for discharge routing to City SD.	1	LS		
8	Electrical Work – Moving Existing Motor and Well head, to new Well, Connecting Motor to Existing VFD, and installing weather proof 110 Duplex Receptacle.	1	LS		
9	Pump Isolated Aquifer Zones (est. 12 hrs per zone).	3	EA		
10	Connection of new well facilities to city water system 12” DI Pipe	1	LS		
11	Provide Isolated Aquifer Zone Test Laboratory Analysis	3	EA		
12	Ream Pilot Borehole to 34-inch 50 – 500 ft	450	LF		
13	Reconnecting existing well head disinfection and water meter equipment to new well head.	1	LS		
14	Provide Caliper Survey of Reamed Borehole	1	LS		

15	Furnish and install 20-inch x 3/8" Wall ASTM A778 304L Stainless Steel Blank Casing +2 – 500 feet.	502	LF		
16	Furnish and install 20-inch x 5/16-inch Wall ASTM A778 304L Stainless Steel Ful-Flo louvered Well Screen with 0.060 inch slots 275' – 300' and 320' – 340' and 400' – 420'.	65	LF		
17	Furnish and install two (2) 3-inch Sch. 40 304L Stainless Steel Gravel Feed Pipes +1 – 270'	540	LF		
18	Furnish and install 4-inch Sch. 40 304L Stainless Steel Camera Access Tube and 8-foot connection box +1-500 ft.	501	LF		
19	Furnish and install 2 inch SCH 40 Stainless Steel sounding Tube and 2 foot connection box. +1-500 ft.	500	LF		
20	Furnish and install Engineered Gravel Envelope and #60 Fine Transition Sand	1	LS		
21	Furnish and install 10.3 – sack Sand Cement Slurry Annular Seal	1	LS		
22	Provide initial development by Swabbing and Focused Intake Pumping	1	LS		
23	Provide, Install, and Remove Development Test Pump	1	LS		
24	Provide Final Development by Pumping and Surging	1	LS		
25	Conduct Aquifer Pumping Tests (8-hr step drawdown, 24 hr. constant rate drawdown, and 4-hr recovery tests)	1	LS		
26	Provide Downhole Video Survey	1	LS		
27	Provide Plumbness and Alignment Surveys	1	LS		
28	Provide Well Disinfection	1	LS		
29	Provide Pump shaft and Bowls for the existing 100 hp motor which will yield 2000 gpm at 300' TDH	1	LS		

**TOTAL BID** \_\_\_\_\_

**Contractor Signature** \_\_\_\_\_

**Date Signed** \_\_\_\_\_

**BID ADDEITIVE ALTERNATE:**

Drill 1000' deep test well, and provide geophysical surveys (elog), aquifer reports and zone water quality testing as described herein, and isolated aquifer zone pumping for 12 hrs to estimate potential yield.

**TOTAL BID ALTERNATIVE TEST WELL** \_\_\_\_\_

**Contractor Signature** \_\_\_\_\_

**Date Signed** \_\_\_\_\_

The Bidder shall list the name and address of each subcontractor to whom the Bidder proposes to subcontract portions of the work, as required by the provisions in Section 2-1.054, "Required Listing of Proposed Subcontractors," of the Standard Specifications and Section 2-1.02, " Required Listing of Proposed Subcontractors," of the special provisions.

**LIST OF SUBCONTRACTORS**

**Name and Address and License No.**

**Description of Portion of Work Subcontracted**

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*(THE BIDDER'S EXECUTION ON THE SIGNATURE PORTION OF THIS PROPOSAL SHALL ALSO CONSTITUTE AN ENDORSEMENT AND EXECUTION OF THOSE CERTIFICATIONS WHICH ARE A PART OF THIS PROPOSAL)*



# EQUAL EMPLOYMENT OPPORTUNITY CERTIFICATION

The \_\_\_\_\_ bidder \_\_\_\_\_, proposed subcontractor \_\_\_\_\_, hereby certifies that he has \_\_\_\_\_, has not \_\_\_\_\_, participated in a previous contract or subcontract subject to the equal opportunity clauses, as required by Executive Orders 10925, 11114, or 11246, and that, where required, he has filed with the Joint Reporting Committee, the Director of the Office of Federal Contract Compliance, a Federal Government contracting or administering agency, or the former President's Committee on Equal Employment Opportunity, all reports due under the applicable filing requirements.

**Note:** The above certification is required by the Equal Employment Opportunity Regulations of the Secretary of Labor (41 CFR 60-1.7(b) (1)), and must be submitted by bidders and proposed subcontractors only in connection with contracts and subcontracts which are subject to the equal opportunity clause. Contracts and subcontracts which are exempt from the equal opportunity clause are set forth in 41 CFR 60-1.5. (Generally only contracts or subcontracts of \$10,000 or under are exempt.)

Currently, Standard Form 100 (EEO-1) is the only report required by the Executive Orders or their implementing regulations.

Proposed prime contractors and subcontractors who have participated in a previous contract or subcontract subject to the Executive Orders and have not filed the required reports should note that 41 CFR 60-1.7(b) (1) prevents the award of contracts and subcontracts unless such contractor submits a report covering the delinquent period or such other period specified by the Federal Highway Administration or by the Director, Office of Federal Contract Compliance, U.S. Department of Labor.

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# **PUBLIC CONTRACT CODE**

## **Public Contract Code Section 10285.1 Statement**

In conformance with Public Contract Code Section 10285.1 (Chapter 376, Stats. 1985), the bidder hereby declares under penalty of perjury under the laws of the State of California that the bidder has \_\_\_\_, has not \_\_\_\_been convicted within the preceding three years of any offenses referred to in that section, including any charge of fraud, bribery, collusion, conspiracy, or any other act in violation of any state or Federal antitrust law in connection with the bidding upon, award of, or performance of, any public works contract, as defined in Public Contract Code Section 1101, with any public entity, as defined in Public Contract Code Section 1100, including the Regents of the University of California or the Trustees of the California State University. The term "bidder" is understood to include any partner, member, officer, director, responsible managing officer, or responsible managing employee thereof, as referred to in Section 10285.1.

Note: The bidder must place a check mark after "has" or "has not" in one of the blank spaces provided. The above Statement is part of the Proposal. Signing this Proposal on the signature portion thereof shall also constitute signature of this Statement. Bidders are cautioned that making a false certification may subject the certifier to criminal prosecution.



## **◆ Public Contract Code Section 10162 Questionnaire**

In conformance with Public Contract Code Section 10162, the Bidder shall complete, under penalty of perjury, the following questionnaire:

Has the bidder, any officer of the bidder, or any employee of the bidder who has a proprietary interest in the bidder, ever been disqualified, removed, or otherwise prevented from bidding on, or completing a federal, state, or local government project because of a violation of law or a safety regulation?

Yes \_\_\_\_\_ No \_\_\_\_\_

If the answer is yes, explain the circumstances in the following space.

## **Public Contract Code 10232 Statement**

In conformance with Public Contract Code Section 10232, the Contractor, hereby states under penalty of perjury, that no more than one final unappealable finding of contempt of court by a federal court has been issued against the Contractor within the immediately preceding two year period because of the Contractor's failure to comply with an order of a federal court which orders the Contractor to comply with an order of the National Labor Relations Board.

Note: The above Statement and Questionnaire are part of the Proposal. Signing this Proposal on the signature portion thereof shall also constitute signature of this Statement and Questionnaire.  
Bidders are cautioned that making a false certification may subject the certifier to criminal prosecution.

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## **Noncollusion Affidavit**

(Title 23 United States Code Section 112 and  
Public Contract Code Section 7106)

To the CITY OF COLUSA  
*DEPARTMENT OF PUBLIC WORKS.*

In conformance with Title 23 United States Code Section 112 and Public Contract Code 7106 the bidder declares that the bid is not made in the interest of, or on behalf of, any undisclosed person, partnership, company, association, organization, or corporation; that the bid is genuine and not collusive or sham; that the bidder has not directly or indirectly induced or solicited any other bidder to put in a false or sham bid, and has not directly or indirectly colluded, conspired, connived, or agreed with any bidder or anyone else to put in a sham bid, or that anyone shall refrain from bidding; that the bidder has not in any manner, directly or indirectly, sought by agreement, communication, or conference with anyone to fix the bid price of the bidder or any other bidder, or to fix any overhead, profit, or cost element of the bid price, or of that of any other bidder, or to secure any advantage against the public body awarding the contract of anyone interested in the proposed contract; that all statements contained in the bid are true; and, further, that the bidder has not, directly or indirectly, submitted his or her bid price or any breakdown thereof, or the contents thereof, or divulged information or data relative thereto, or paid, and will not pay, any fee to any corporation, partnership, company association, organization, bid depository, or to any member or agent thereof to effectuate a collusive or sham bid.

Note: The above Noncollusion Affidavit is part of the Proposal. Signing this Proposal on the signature portion thereof shall also constitute signature of this Noncollusion Affidavit.  
Bidders are cautioned that making a false certification may subject the certifier to criminal prosecution.

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# DEBARMENT AND SUSPENSION CERTIFICATION

TITLE 49, CODE OF FEDERAL REGULATIONS, PART 29

The bidder, under penalty of perjury, certifies that, except as noted below, he/she or any other person associated therewith in the capacity of owner, partner, director, officer, manager:

- is not currently under suspension, debarment, voluntary exclusion, or determination of ineligibility by any Federal agency;
- has not been suspended, debarred, voluntarily excluded or determined ineligible by any Federal agency within the past 3 years;
- does not have a proposed debarment pending; and
- has not been indicted, convicted, or had a civil judgement rendered against it by a court of competent jurisdiction in any matter involving fraud or official misconduct within the past 3 years.

If there are any exceptions to this certification, insert the exceptions in the following space.

Exceptions will not necessarily result in denial of award, but will be considered in determining bidder responsibility. For any exception noted above, indicate below to whom it applies, initiating agency, and dates of action.

Notes: Providing false information may result in criminal prosecution or administrative sanctions. The above certification is part of the Proposal. Signing this Proposal on the signature portion thereof shall also constitute signature of this Certification.

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Accompanying this proposal is \_\_\_\_\_

(NOTICE: INSERT THE WORDS "CASH(\$ \_\_\_\_\_)," "CASHIER'S CHECK,"  
"CERTIFIED CHECK," OR "BIDDER'S BOND," AS THE CASE MAY BE.)

in amount equal to at least ten percent of the total of the bid.

The names of all persons interested in the foregoing proposal as principals are as follows:

## IMPORTANT NOTICE

*If bidder or other interested person is a corporation, state legal name of corporation, also names of the president, secretary, treasurer, and manager thereof; if a co-partnership, state true name of firm, also names of all individual copartners composing firm; if bidder or other interested person is an individual, state first and last names in full.*

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

Licensed in conformance with an act providing for the registration of Contractors,

License No. \_\_\_\_\_ Classification(s) \_\_\_\_\_

### **ADDENDA** -

This Proposal is submitted with respect to the changes to the contract included in addenda number/s \_\_\_\_\_

*(Fill in addenda numbers if addenda have been received and insert, in this Proposal, any Engineer's Estimate sheets that were received as part of the addenda.)*

By my signature on this proposal I certify, under penalty of perjury under the laws of the State of California, that the foregoing questionnaire and statements of Public Contract Code Sections 10162, 10232 and 10285.1 are true and correct and that the bidder has complied with the requirements of Section 8103 of the Fair Employment and Housing Commission Regulations (Chapter 5, Title 2 of the California Administrative Code). By my signature on this proposal I further certify, under penalty of perjury under the laws of the State of California and the United States of America, that the Noncollusion Affidavit required by Title 23 United States Code, Section 112 and Public Contract Code Section 7106; and the Title 49 Code of Federal Regulations, Part 29 Debarment and Suspension Certification are true and correct.

Date: \_\_\_\_\_



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

Signature and Title of Bidder

Business Address \_\_\_\_\_

Place of Business \_\_\_\_\_

Place of Residence \_\_\_\_\_

**CITY OF COLUSA  
DEPARTMENT OF PUBLIC WORKS**

**BIDDER'S BOND**

We, \_\_\_\_\_  
\_\_\_\_\_ as Principal, and

\_\_\_\_\_ as Surety are bound unto the City OF COLUSA, State of California, hereafter referred to as "Obligee", in the penal sum of ten percent (10%) of the total amount of the bid of the Principal submitted to the Obligee for the work described below, for the payment of which sum we bind ourselves, jointly and severally,

THE CONDITION OF THIS OBLIGATION IS SUCH, THAT:

WHEREAS, the Principal is submitted to the Obligee, for \_\_\_\_\_

\_\_\_\_\_  
*(Copy here the exact description of work, including location as it appears on the proposal)*

for which bids are to be opened at \_\_\_\_\_ on \_\_\_\_\_  
*(Insert place where bids will be opened) (Insert date of bid opening)*

NOW, THEREFORE, if the Principal is awarded the contract and, within the time and manner required under the specifications, after the prescribed forms are presented to him for signature, enters into a written contract, in the prescribed form, in conformance with the bid, and files two bonds with the Obligee, one to guarantee faithful performance of the contract and the other to guarantee payment for labor and materials as provided by law, then this obligation shall be null and void; otherwise, it shall remain in full force.

In the event suit is brought upon this bond by the Obligee and judgement is recovered, the Surety shall pay all costs incurred by the Obligee in such suit, including a reasonable attorney's fee to be fixed by the court.

Dated: \_\_\_\_\_, 20 \_\_\_\_ .

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
*Principal*  
\_\_\_\_\_  
*Surety*  
By \_\_\_\_\_  
*Attorney-in-fact*

**CERTIFICATE OF ACKNOWLEDGEMENT**

State of California  
City / County of \_\_\_\_\_ SS

On this \_\_\_\_\_ day of \_\_\_\_\_ in the year 20 \_\_\_\_ before me  
\_\_\_\_\_, personally appeared \_\_\_\_\_,  
*Attorney-in-fact*

personally known to me (or proved to me on the basis of satisfactory evidence) to be the person whose name is subscribed to this instrument as the attorney-in-fact of \_\_\_\_\_, and acknowledged to me that he (she) subscribed the name of the said company thereto as surety, and his (her) own name as attorney-in-fact.

(SEAL) \_\_\_\_\_ *Notary Public*

**STANDARD PUBLIC WORKS AGREEMENT FOR  
WATER WELL NO. 6A-EXAMPLE DO NOT FILL THIS OUT**

THIS AGREEMENT (herein "Agreement"), is made and entered into this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_ by and between the CITY OF COLUSA, a municipal corporation, (herein "City") and \_\_\_\_\_, (herein "Contractor"). The parties hereto agree as follows:

R E C I T A L S

A. City requires the construction of \_\_\_\_\_, as set forth more fully in this Agreement. Contractor has represented to City that Contractor is qualified to perform said work and has submitted a proposal to City for same.

B. City desires to have Contractor perform said services on the terms and conditions set forth herein.

NOW, THEREFORE, based on the foregoing Recitals and for good and valuable consideration, the receipt and sufficiency of which is acknowledged by both parties, City and Contractor hereby agree as follows:

1-1 1. SERVICES OF CONTRACTOR

1-1.01 1.1 Scope of Services - In compliance with all terms and conditions of this agreement, the contractor shall provide those services specified in the "Scope of Services" attached hereto as Exhibit "A" and incorporated herein by this reference, which services may be referred to herein as the "Services" or "Work" hereunder. As a material inducement to the City entering into this agreement, contractor represents and warrants that contractor is a provider of first class work and services and contractor is experienced in performing the work and services contemplated herein and, in light of such status and experience, contractor covenants that it shall follow the highest professional standards in performing the work and services required hereunder and that all materials will be of good quality, fit for the purpose intended.

1-1.02 1.2 Documents Included in Contract - This contract consists of the request for proposal, bid documents (hereinafter "proposal"), proposal schedule, designation of subcontractors, Noncollusion affidavit, certification of principal, specifications, plans, this contract services agreement, faithful performance bond, labor and materials bond, supplemental information, guarantee, tax identification form and any and all schedules and attachments to it which are incorporated as if fully set forth herein. In the event of an inconsistency, this agreement shall govern.

1-1.03 1.3 Compliance with Law - All services rendered hereunder shall be provided in accordance with all ordinances, resolutions, statutes, rules, and regulations of the City and any federal, state or local governmental agency having jurisdiction in effect at the time service is rendered.



1-1.04 1.4 Licenses, Permits, Fees and Assessments - Contractor shall obtain at its sole cost and expense such licenses, permits and approvals as may be required by law for the performance of the services required by this agreement, including registration with the department of industrial relations of the state of California as required by labor code section 1725.5 before commencing performance under this agreement. Contractor shall have the sole obligation to pay for any fees, assessments and taxes, plus applicable penalties and interest, which may be imposed by law and arise from or are necessary for the contractor's performance of the services required by this agreement, and shall indemnify, defend and hold harmless City against any such fees, assessments, taxes penalties or interest levied, assessed or imposed against City hereunder. Contractor shall be responsible for all subcontractors' compliance with this section 1.4.

1-1.05 1.5 Familiarity with Work - By executing this contract, contractor warrants that contractor (a) has thoroughly investigated and considered the scope of services to be performed, (b) has carefully considered how the services should be performed, and (c) fully understands the facilities, difficulties and restrictions attending performance of the services under this agreement. If the services involve work upon any site, contractor warrants that contractor has or will investigate the site and is or will be fully acquainted with the conditions there existing, prior to commencement of services hereunder. Should the contractor discover any latent or unknown conditions, which will materially affect the performance of the services hereunder, contractor shall immediately inform the City of such fact and shall not proceed except at contractor's risk until written instructions are received from the contract officer.

1-1.06 1.6 Standard of Performance – Contractor, its subcontractors and their employees, in the performance of contractor's work under this agreement shall be responsible for exercising the degree of skill and care required by customarily accepted good professional practices and procedures used in the contractor's field.

1-1.07

1-1.08 Any costs for failure to meet the foregoing standard or to correct otherwise defective work that requires re-performance of the work, shall be borne in total by the contractor and not by the City. The failure of a project to achieve the performance goals and objectives stated in this agreement is not a basis for requesting re-performance unless the work conducted by contractor and/or its subcontractors is deemed by the City to have failed the foregoing standard of performance.

1-1.09 In the event contractor fails to perform in accordance with the above standard:

1. Contractor will re-perform, at its own expense, any task which was not performed to the reasonable satisfaction of City. Any work re-performed pursuant to this paragraph shall be completed within the time limitations originally set forth for the specific task involved. Contractor shall work any overtime required to meet the deadline for the task at no additional cost to the City;
2. The City shall provide a new schedule for the re-performance of any task pursuant to this paragraph in the event that re-performance of a task within the original time limitations is not feasible; and
3. The City shall have the option to direct contractor not to re-perform any task which was not performed to the reasonable satisfaction of the City project manager pursuant to application of (1) and (2) above. In the event the City directs contractor not to re-perform a task, the City shall negotiate a reasonable settlement for satisfactory work performed. No previous payment shall be considered a waiver of the City's right to reimbursement.

1-1.10 Nothing contained in this section is intended to limit any of the rights or remedies which the City may have under law.

1-1.11 1.7 Care of Work - The contractor shall adopt reasonable methods during the life of the agreement to furnish continuous protection to the work, and the equipment, materials, papers, documents, plans, studies and/or other components thereof to prevent losses or damages, and shall be responsible for all such damages, to persons or property, until acceptance of the work by City, except such losses or damages as may be caused by City's own negligence.

1-1.12 1.8 Further Responsibilities of Parties - Both parties agree to use reasonable care and diligence to perform their respective obligations under this agreement. Both parties agree to act in good faith to execute all instruments, prepare all documents and take all actions as may be reasonably necessary to carry out the purposes of this agreement. Unless hereafter specified, neither party shall be responsible for the service of the other. Contractor shall require all subcontractors to comply with the provisions of this agreement.

1-1.13 1.9 Additional Services - City shall have the right at any time during the performance of the services, without invalidating this agreement, to order extra work beyond that specified in the scope of services or make changes by altering, adding to or deducting from said work. No such extra work may be undertaken unless a written change order is first given by the contract officer to the contractor, incorporating therein any adjustment in (i) the contract sum as set forth in section 2.1, and/or (ii) the time to perform this agreement, which said adjustments are subject to the written approval of the contractor. Any increase in compensation of twenty five percent (25%) or less of the contract sum, or in the time to perform of one hundred eighty (180) days or less may be approved by the contract officer. Any greater increases, taken either separately or cumulatively must be approved by the City council. It is expressly understood by contractor that the provisions of this section shall not apply to services specifically set forth in the scope of services or reasonably contemplated therein. Contractor hereby acknowledges that it accepts the risk that the services to be provided pursuant to the scope of services may be more costly or time consuming than contractor anticipates and that contractor shall not be entitled to additional compensation therefore.

1-1.14 1.10 Prevailing Wage Laws - In accordance with labor code section 1770 et seq., the director of the Department of Industrial Relations of the State of California has ascertained a general prevailing rate of wages, which is the minimum amount, which shall be paid to all workers employed to perform the work pursuant to this agreement. A copy of the general prevailing wage rate determination is on file in the office of the City clerk and is hereby incorporated by reference into this agreement. In accordance with the provisions of labor code section 1810 et seq., eight (8) hours is the legal working day. Contractor must forfeit to the city twenty-five dollars (\$25.00) a day for each worker who works in excess of the minimum working hours when contractor does not pay overtime. Contractor is required to post a copy of such wage rates at all times at the contract site. The statutory penalties for failure to pay prevailing wage or to comply with state wage and hour laws will be enforced. Contractor also shall comply with state law requirements to maintain payroll records and shall provide for certified records and inspection of records as required by California labor code

section 1770 et. Seq., including section 1776. Contractor shall comply with all statutory requirements relating to the employment of apprentices.

1-1.15 2. COMPENSATION

1-1.16 2.1 Contract Sum - For the services rendered pursuant to this agreement, the contractor shall be compensated as specified herein, but not exceeding the maximum contract amount of dollars (\$ .00) (herein "contract sum"), except as provided in section 1.9. The contract sum shall include the attendance of contractor at all project meetings reasonably deemed necessary by the City; contractor shall not be entitled to any additional compensation for attending said meetings.

1-1.17 2.2 Progress Payments - Prior to the first day of the month, during the progress of the work, commencing on the day and month specified in the agreement, contractor shall submit to the contract officer a complete itemized statement of all labor and materials incorporated into the work during the preceding month and the portion of the contract sum applicable thereto. Upon approval in writing by the contract officer, payment shall be made in thirty (30) days. City shall pay contractor a sum based upon ninety percent (90%) of the contract price apportionment of the labor and materials incorporated into the work under the contract during the month covered by said statement. The remaining ten percent (10%) thereof shall be retained as performance security. Refer to section 7.3 of this agreement for retention of funds.

1-2 3. PERFORMANCE SCHEDULE

1-2.01 3.1 Time of Essence - Time is of the essence in the performance of this agreement.

1-2.02 3.2 Schedule of Performance - Contractor shall commence the services pursuant to this agreement upon receipt of a written notice to proceed and shall perform all services within the time period(s) established in the "schedule of performance" attached hereto as Exhibit "B" , and incorporated herein by this reference. When requested by the contractor, extensions to the time period(s) specified in the scope of services may be approved in writing by the contract officer.

1-2.03 3.3 Force Majeure - The time period(s) specified in the scope of services for performance of the services rendered pursuant to this agreement shall be extended because of any delays due to unforeseeable causes beyond the control and without the fault or negligence of the contractor, including, but not restricted to, acts of god or of the public enemy, unusually severe weather, fires, earthquakes, floods, epidemics, quarantine restrictions, riots, strikes, freight embargoes, wars, litigation, and/or acts of any governmental agency, including the City, if the contractor shall within ten (10) days of the commencement of such delay notify the contract officer in writing of the causes for the delay. The contract officer shall ascertain the facts and the extent of delay, and extend the time for performing the services for the period of the enforced delay when and if in the judgment of the contract officer such delay is justified. The contract officer's determination shall be final and conclusive upon the parties to this agreement.

1-2.04 3.4 Term - Unless earlier terminated in accordance with section 7.8 of this agreement, this agreement shall continue in full force and effect until final approval and acceptance of the project by the contract officer.

1-2.05 4. COORDINATION OF WORK

1-2.06 4.1 representative of contractor - the following principals of contractor are hereby designated as being the principals and representatives of contractor authorized to act in its behalf with respect to the work specified herein and make all decisions in connection therewith:

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1-2.07

It is expressly understood that the experience, knowledge, capability and reputation of the foregoing principals were a substantial inducement for City to enter into this agreement. Therefore, the foregoing principals shall be responsible during the term of this agreement for directing all activities of contractor and devoting sufficient time to personally supervise the services hereunder. For purposes of this agreement, the foregoing principals may not be replaced nor may their responsibilities be substantially reduced by contractor without the express written approval of City.

1-2.08

1-2.09 4.2 Contract Officer - The contract officer shall be such person as may be designated by the City manager or City engineer of City. It shall be the contractor's responsibility to assure that the contract officer is kept informed of the progress of the performance of the services and the contractor shall refer any decisions that must be made by City to the contract officer. Unless otherwise specified herein, any approval of City required hereunder shall mean the approval of the contract officer. The contract officer shall have authority to sign all documents on behalf of the City required hereunder to carry out the terms of this agreement.

1-2.10 4.3 Prohibition Against Assignment - The experience, knowledge, capability and reputation of contractor, its principals and employees were a substantial inducement for the City to enter into this agreement. Neither this agreement nor any interest herein may be transferred, assigned, conveyed, hypothecated or encumbered voluntarily or by operation of law, whether for the benefit of creditors or otherwise, without the prior written approval of city. Transfers restricted hereunder shall include the transfer to any person or group of persons acting in concert of more than twenty five percent (25%) of the present ownership and/or control of contractor, taking all transfers into account on a cumulative basis. In the event of any such unapproved transfer, including any bankruptcy proceeding, this agreement shall be void. No approved transfer shall release the contractor or any surety of contractor of any liability hereunder without the express consent of City.

1-2.11 4.4 Independent Contractor - Neither the City nor any of its employees shall have any control over the manner, mode or means by which contractor, its subcontractors, agents or employees, performs the services required herein, except as otherwise set forth herein. City shall have no voice in the selection, discharge, supervision or control of contractor's employees, subcontractors, servants, representatives or agents, or in fixing their number, compensation or hours of service. Contractor

shall perform all services required herein as an independent contractor of City and shall remain at all times as to City a wholly independent contractor with only such obligations as are consistent with that role. Contractor shall not at any time or in any manner represent that it or any of its subcontractors, agents or employees are agents or employees of City. City shall not in any way or for any purpose become or be deemed to be a partner of contractor in its business or otherwise or a joint venture or a member of any joint enterprise with contractor.

1-2.12 4.5 Identity of Persons Performing Work - Contractor represents that it employs or will employ at its own expense all personnel required for the satisfactory performance of any and all tasks and services set forth herein. Contractor represents that the tasks and services required herein will be performed by contractor or under its direct supervision, and that all personnel engaged in such work shall be fully qualified and shall be authorized and permitted under applicable state and local law to perform such tasks and services.

1-2.13 4.6 Utility Relocation - City is responsible for removal, relocation, or protection of existing main or trunkline utilities to the extent such utilities were not identified in the invitation for bids or specifications. City shall reimburse contractor for any costs incurred in locating, repairing damage not caused by contractor and removing or relocating such unidentified utility facilities, including equipment idled during such work. Contractor shall not be assessed liquidated damages for delay arising from the removal or relocation of such unidentified utility facilities.

4.7 Trenches or Excavations - Pursuant to California Public Contract Code Section 7104, in the event the work included in this agreement requires excavations more than four (4) feet in depth, the following shall apply.

(a) Contractor shall promptly, and before the following conditions are disturbed, notify City, in writing, of any: (1) material that contractor believes may be material that is hazardous waste, as defined in section 25117 of the health and safety code, that is required to be removed to a class i, class ii, or class iii disposal site in accordance with provisions of existing law; (2) subsurface or latent physical conditions at the site different from those indicated; or (3) unknown physical conditions at the site of any unusual nature, different materially from those ordinarily encountered and generally recognized as inherent in work of the character provided for in the contract.

(b) City shall promptly investigate the conditions, and if it finds that the conditions do materially so differ, or do involve hazardous waste, and cause a decrease or increase in contractor's cost of, or the time required for, performance of any part of the work shall issue a change order per section 1.9 of this agreement.

(c) that, in the event that a dispute arises between City and Contractor whether the conditions materially differ, or involve hazardous waste, or cause a decrease or increase in Contractor's cost of, or time required for, performance of any part of the work, Contractor shall not be excused from any scheduled completion date provided for by the contract, but shall proceed with all work to be performed under the contract. Contractor shall retain any and all rights provided either by contract or by law, which pertain to the resolution of disputes and protests between the contracting parties.

1-3 5. INSURANCE, INDEMNIFICATION AND BONDS

1-3.01 5.1 Insurance - The contractor shall procure and maintain, at its sole cost and expense, in a form and content satisfactory to City, during the entire term of this agreement including any extension thereof, the following policies of insurance:

Coverage (check if applicable)	Minimum Limits
( ) Comprehensive general liability insurance (including premises and operations)	\$1,000,000 per occurrence combined single limit
( ) Contractual liability insurance products liability insurance	\$1,000,000 limit
( ) Comprehensive automobile liability insurance (includes owned, non-owned, and hired automobile hazard)	\$1,000,000 per occurrence combined single limit
( ) Errors and omissions insurance (providing for a one-year discovery period)	\$1,000,000 limit
( ) Workers' compensation/employers' Liability insurance	\$1,000,000 per occurrence

Conditions:

in accordance with Public Contract Code Section 20170, the insurance of surety companies who provide or issue the policy shall have been admitted to do business in the state of California with a credit rating of a- or better.

This insurance shall not be canceled, limited in scope or coverage or non-renewed until after thirty (30) days prior written notice has been given to the City engineer, City of Colusa, 401 e. Chapman ave., Colusa, California 92870.

Any insurance maintained by the City of Colusa shall apply in excess of and not combined with insurance provided by this policy.

the City of Colusa, its officers, employees, representatives, attorneys, and volunteers shall be named as additional named insureds.

Prior to commencement of any work under this contract, contractor shall deliver to the City insurance endorsements confirming the existence of the insurance required by this contract, and including the applicable clauses referenced above.

Such endorsements shall be signed by an authorized representative of the insurance company and shall include the signator's company affiliation and title. Should it be deemed necessary by the City, it shall be contractor's responsibility to see that the City receives documentation, acceptable to the City, which sustains that the individual signing said endorsements is indeed authorized to do so by the insurance company.

If the contractor fails to maintain the aforementioned insurance, or secure and maintain the aforementioned endorsement, the City may obtain such insurance, and deduct and retain the amount of the premiums for such insurance from any sums due under the agreement. However, procuring of said insurance by the city is an alternative to other remedies the City may have, and is not the exclusive remedy for failure of contractor to maintain said insurance or secure said endorsement. In addition to any other remedies the City may have upon contractor's failure to provide and maintain any insurance or policy endorsements to the extent and within the time herein required, the City shall have the right to order Contractor to stop work hereunder, and/or withhold any payment(s) which became due to contractor hereunder until contractor demonstrates compliance with the requirements hereof.

Nothing herein contained shall be construed as limiting in any way the extent to which contractor may be held responsible for payments of damages to persons or property resulting from contractor's or its subcontractor's performance of the work covered under this agreement.

1-3.02 Each contract between the contractor and any subcontractor shall require the subcontractor to maintain the same policies of insurance that the contractor is required to maintain pursuant to this section 5.1.

1-3.03 5.2 Indemnification - Contractor shall indemnify the City of Colusa, its officers, agents and employees against, and will hold and save them and each of them harmless from, any and all actions, suits, claims, damages to persons or property, losses, costs, penalties, obligations, errors, omissions or liabilities, (herein "claims or liabilities") that may be asserted or claimed by any person, firm or entity arising or alleged to arise out of or in connection with the performance of the work, operations or activities of contractor, its agents, employees, subcontractors, or invitees, provided for herein, or arising or alleged to arise from the negligent acts or omissions of contractor hereunder, or arising or alleged to arise from contractor's performance of or failure to perform any term, provision, covenant or condition of this agreement, but excluding such claims or liabilities or portion of such

claims or liabilities arising or alleged to arise from the willful misconduct of the City, its officers, agents or employees, and in connection therewith:

1-3.03.A

1-3.03.B (a) Contractor will defend any action or actions filed in connection with any of said claims or liabilities and will pay all costs and expenses, including legal costs and attorneys' fees incurred in connection therewith;

1-3.03.C

1-3.03.D (b) Contractor will promptly pay any judgment rendered against the City, its officers, agents or employees for any such claims or liabilities arising or alleged to arise out of or in connection with contractor's (or its agents', employees', subcontractors' or invitees') negligent performance of or failure to perform such work, operations or activities hereunder; and contractor agrees to save and hold the City, its officers, agents, and employees harmless therefrom;

1-3.03.E (c) In the event the City, its officers, agents or employees is made a party to any action or proceeding filed or prosecuted against contractor for such damages or other claims arising or alleged to arise out of or in connection with the performance of or failure to perform the work, operation or activities of contractor hereunder, contractor shall pay to the City, its officers, agents or employees, any and all costs and expenses incurred by the City, its officers, agents or employees in such action or proceeding, including but not limited to, legal costs and attorneys' fees for counsel acceptable to City.

1-3.03.F (d) Contractor's duty to defend and indemnify as set out in this section 5.2 shall include any claims, liabilities, obligations, losses, demands, actions, penalties, suits, costs, expenses or damages or injury to persons or property arising or alleged to arise from, in connection with, as a consequence of or pursuant to any state or federal law or regulation regarding hazardous substances, including but not limited to the federal insecticide, fungicide and rodenticide act ("Fifra"), comprehensive environmental response, compensation and liability act of 1980 ("Cercla"), resource conservation and recovery act of 1976 ("Rcra"), the hazardous and solid waste amendments of 1984, the hazardous material transportation act, the toxic substances control act, the clean air act, the clean water act, the California hazardous substance account act, the California hazardous waste control law or the porter-cologne water quality control act, as any of those statutes may be amended from time to time.

The contractor's indemnification obligations pursuant to this section 5.2 shall survive the termination of this agreement. Contractor shall require the same indemnification from all subcontractors.

1-3.04 5.3 Labor and Materials and Performance Bonds – Concurrently with execution of this agreement, contractor shall deliver to City a labor and materials bond and a performance bond each in the sum of the amount of this agreement, in the forms provided by the City clerk, which secures the faithful performance of this agreement. The bonds shall contain the original notarized signature of an authorized officer of the surety and affixed thereto shall be a certified and current copy of his



power of attorney. The bonds shall be unconditional and remain in force during the entire term of the agreement and shall be null and void only if the contractor promptly and faithfully performs all terms and conditions of this agreement.

1-3.05 5.4 Sufficiency of Insurer or Surety - Insurance or bonds required by this agreement shall be satisfactory only if issued by companies qualified to do business in California, rated "a" or better in the most recent edition of best rating guide, the key rating guide or in the federal register, and only if they are of a financial category class vii or better, unless such requirements are waived by the risk manager of the City due to unique circumstances. In the event the risk manager of City ("risk manager") determines that the work or services to be performed under this agreement creates an increased risk of loss to the City, the contractor agrees that the minimum limits of the insurance policies and the performance bond required by this section 5 may be changed accordingly upon receipt of written notice from the risk manager; provided that the contractor shall have the right to appeal a determination of increased coverage by the risk manager to the City council of within ten (10) days of receipt of notice from the risk manager.

1-3.06 5.5 Substitution of Securities - Pursuant to California Public Contract Code Section 22300, substitution of eligible equivalent securities for any moneys withheld to ensure performance under the contract for the work to be performed will be permitted at the request and expense of the successful bidder.

## 1-4 6. RECORDS AND REPORTS

1-4.01 6.1 Reports - Contractor shall periodically prepare and submit to the contract officer such reports concerning the performance of the services required by this agreement as the contract officer shall require. Contractor hereby acknowledges that the City is greatly concerned about the cost of work and services to be performed pursuant to this agreement. For this reason, contractor agrees that if contractor becomes aware of any facts, circumstances, techniques, or events that may or will materially increase or decrease the cost of the work or services contemplated herein or, if contractor is providing design services, the cost of the project being designed, contractor shall promptly notify the contract officer of said fact, circumstance, technique or event and the estimated increased or decreased cost related thereto and, if contractor is providing design services, the estimated increased or decreased cost estimate for the project being designed.

1-4.02 6.2 Records - Contractor shall keep, and require subcontractors to keep, such books and records (including but not limited to payroll records as required herein) as shall be necessary to perform the services required by this agreement and enable the contract officer to evaluate the performance of such services. The contract officer shall have full and free access to such books and records at all times during normal business hours of City, including the right to inspect, copy, audit and make records and transcripts from such records. Such records shall be maintained for a period of three (3) years following completion of the services hereunder, and the City shall have access to such records in the event any audit is required.

1-4.03 6.3 Ownership of Documents - All drawings, specifications, reports, records, documents and other materials prepared by contractor, its employees, subcontractors and agents in the performance of this agreement shall be the property of City and shall be delivered to City upon request of the contract officer or upon the termination of this agreement, and contractor shall have no claim for further employment or additional compensation as a result of the exercise by City of its full rights of ownership of the documents and materials hereunder. Contractor may retain copies of such documents for its own use. Contractor shall have an unrestricted right to use the concepts embodied therein. All subcontractors shall provide for assignment to City of any documents or materials prepared by them, and in the event contractor fails to secure such assignment, contractor shall indemnify city for all damages resulting therefrom.

1-5

## 1-6 7. ENFORCEMENT OF AGREEMENT

1-6.01 7.1 California Law - This agreement shall be construed and interpreted both as to validity and to performance of the parties in accordance with the laws of the state of California. Legal actions concerning any dispute, claim or matter arising out of or in relation to this agreement shall be instituted in the superior court of the County of Colusa, state of California, or any other appropriate court in such county, and contractor covenants and agrees to submit to the personal jurisdiction of such court in the event of such action.

1-6.02 7.2 Disputes - In the event either party fails to perform its obligations hereunder, the nondefaulting party shall provide the defaulting party written notice of such default. The defaulting party shall have ten (10) days to cure the default; provided that, if the default is not reasonably susceptible to being cured within said ten (10) day period, the defaulting party shall have a reasonable time to cure the default, not to exceed a maximum of thirty (30) days, so long as the defaulting party commences to cure such default within ten (10) days of service of such notice and diligently prosecutes the cure to completion; provided further that if the default is an immediate danger to the health, safety and general welfare, the defaulting party shall take such immediate action as may be necessary. Notwithstanding the foregoing, the nondefaulting party may, in its sole and absolute discretion, grant a longer cure period. Should the defaulting party fail to cure the default within the time period provided in this section, the nondefaulting party shall have the right, in addition to any other rights the nondefaulting party may have at law or in equity, to terminate this agreement. Compliance with the provisions of this section 7.2 shall be a condition precedent to bringing any legal action, and such compliance shall not be a waiver of any party's right to take legal action in the event that the dispute is not cured.

1-6.03 7.3 Retention of Funds - Progress payments shall be made in accordance with the provisions of section 2.2 of this agreement. In accordance with said section, City shall pay contractor a sum based upon ninety-five percent (95%) of the contract price apportionment of the labor and materials incorporated into the work under the contract during the month covered by said statement. The remaining five percent (5%) thereof shall be retained as performance security to be paid to the contractor within sixty (60) days after final acceptance of the work by the City council, after contractor shall have furnished City with a release of all undisputed contract amounts if required by City. In the event there are any claims specifically excluded by contractor from the operation of the release, the city may retain proceeds (per public contract code 7107) of

up to 150% of the amount in dispute. City's failure to deduct or withhold shall not affect contractor's obligations hereunder.

1-6.04 7.4 Waiver - No delay or omission in the exercise of any right or remedy by a nondefaulting party on any default shall impair such right or remedy or be construed as a waiver. A party's consent to or approval of any act by the other party requiring the party's consent or approval shall not be deemed to waive or render unnecessary the other party's consent to or approval of any subsequent act. Any waiver by either party of any default must be in writing and shall not be a waiver of any other default concerning the same or any other provision of this agreement.

1-6.05 7.5 Rights and remedies are cumulative except with respect to rights and remedies expressly declared to be exclusive in this agreement, the rights and remedies of the parties are cumulative and the exercise by either party of one or more of such rights or remedies shall not preclude the exercise by it, at the same or different times, of any other rights or remedies for the same default or any other default by the other party.

1-6.06

1-6.07 7.6 Legal Action - In addition to any other rights or remedies, either party may take legal action, law or in equity, to cure, correct or remedy any default, to recover damages for any default, to compel specific performance of this agreement, to obtain declaratory or injunctive relief, or to obtain any other remedy consistent with the purposes of this agreement.

1-6.08 7.7 Liquidated Damages - Since the determination of actual damages for any delay in performance of this agreement would be extremely difficult or impractical to determine in the event of a breach of this agreement, the contractor and its sureties shall be liable for and shall pay to the City five hundred dollars (\$500) as liquidated damages for each working day of delay in the performance of any service required hereunder, as specified in the scope of services (exhibit "a") or "schedule of performance" (exhibit b). The City may withhold from any moneys payable on account of services performed by the contractor any accrued liquidated damages.

1-6.09 7.8 Termination for Default of Contractor - If termination is due to the failure of the contractor to fulfill its obligations under this agreement, contractor shall vacate any City owned property which contractor is permitted to occupy hereunder and City may, after compliance with the provisions of section 7.2, take over the work and prosecute the same to completion by contract or otherwise, and the contractor shall be liable to the extent that the total cost for completion of the services required hereunder exceeds the compensation herein stipulated (provided that the City shall use reasonable efforts to mitigate such damages), and City may withhold any payments to the contractor for the purpose of setoff or partial payment of the amounts owed the City as previously stated.

1-7

1-8 8. CITY OFFICERS AND EMPLOYEES, NONDISCRIMINATION

1-8.01 8.1 Non-liability of City Officers and Employees - No officer or employee of the City shall be personally liable to the contractor, or any successor in interest, in the event of any default or

breach by the City or for any amount which may become due to the contractor or to its successor, or for breach of any obligation of the terms of this agreement.

1-8.02 8.2 Conflict of Interest - The contractor warrants that it has not paid or given and will not pay or give any third party any money or other consideration for obtaining this agreement.

8.3 Covenant Against Discrimination - Contractor covenants that, by and for itself, its heirs, executors, assigns, and all persons claiming under or through them, that there shall be no discrimination against or segregation of, any person or group of persons on account of race, color, creed, religion, sex, marital status, national origin, or ancestry in the performance of this agreement. To the extent required by law, contractor shall take affirmative action to ensure that applicants are employed and that employees are treated during employment without regard to their race, color, creed, religion, sex, marital status, national origin, or ancestry.

1-9 9. MISCELLANEOUS PROVISIONS

1-9.01 9.1 Notice - Any notice, demand, request, document, consent, approval, or communication either party desires or is required to give to the other party or any other person shall be in writing and shall be deemed to be given when served personally or deposited in the us mail, prepaid, first-class mail, return receipt requested, addressed as follows:

To City: City of Colusa  
425 Webster street  
Colusa, California 95932  
Attn.:

To Contractor:

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

1-9.02

1-9.03 9.2 Interpretation - The terms of this agreement shall be construed in accordance with the meaning of the language used and shall not be construed for or against either party by reason of the authorship of this agreement or any other rule of construction which might otherwise apply.

1-9.049.3 Integration; Amendment it is understood that there are no oral agreements between the parties hereto affecting this agreement and this agreement supersedes and cancels any and all previous negotiations, arrangements, agreements and understandings, if any, between the parties, and

none shall be used to interpret this agreement. This agreement may be amended at any time by the mutual consent of the parties by an instrument in writing.

1-9.059.4 Severability. In the event that any one or more of the phrases, sentences, clauses, paragraphs, or sections contained in this agreement shall be declared invalid or unenforceable by a valid judgment or decree of a court of competent jurisdiction, such invalidity or unenforceability shall not affect any of the remaining phrases, sentences, clauses, paragraphs, or sections of this agreement which are hereby declared as severable and shall be interpreted to carry out the intent of the parties hereunder unless the invalid provision is so material that its invalidity deprives either party of the basic benefit of their bargain or renders this agreement meaningless.

1-9.06 9.5 Hiring of Illegal Aliens Prohibited - Contractor shall not hire or employ any person to perform work within the City of Colusa or allow any person to perform work required under this agreement unless such person is properly documented and legally entitled to be employed within the united states.

9.6 Unfair Business Practices Claims - In entering into a public works contract or a subcontract to supply goods, services or materials pursuant to a public works contract, the contractor or subcontractor offers and agrees to assign to the awarding body all rights, title, and interest in and to all causes of action it may have under section 4 of the clayton act (15 u.s.c. sec. 15) or under the Cartwright Act (chapter 2, (commencing with section 16700) of part 2 of division 7 of the Business and Professions Code), arising from purchases of goods, services or materials pursuant to the Public Works Contract or the subcontract. This assignment shall be made and become effective at the time the awarding body renders final payment to the contractor without further acknowledgment by the parties. (sec. 7103.5, California Public Contract Code).

1-9.07 9.7 Corporate Authority - The persons executing this agreement on behalf of the parties hereto warrant that (i) such party is duly organized and existing, (ii) they are duly authorized to execute and deliver this agreement on behalf of said party, (iii) by so executing this agreement, such party is formally bound to the provisions of this agreement, and (iv) the entering into this agreement does not violate any provision of any other agreement to which said party is bound.

9.8 **Independent Contractor** - The Contractor is and shall at all times remain as to the City, a wholly independent contractor. Neither the City, nor any of their officer, employees or agents shall have control over the conduct of the Contractor or any of the Contractors' officers, employees or agents, except as herein set forth. The Contractor shall not at any time or in any manner represent that it or any of its officers, employees or agents are in any manner officers, employees or agents of the City, nor shall City officers, employees or agents be deemed the officers, employees, or agents of Contractor as a result of this Agreement.

9.9 **Legal Responsibilities** - The Contractor shall keep itself informed of City, State, and Federal laws, ordinances and regulations, which may in any manner affect the performance of its services pursuant to this Agreement. The Contractor shall at all times observe and comply with all such laws, ordinances and regulations. Neither the City, nor their officers, agents, or employees shall be liable at law or in equity as a result of the Contractor's failure to comply with this section.

9.10 **Termination for Convenience** – The City may terminate this Agreement without cause for convenience of the City upon giving contractor 30 days prior written notice of termination of the Agreement. Upon receipt of the notice of termination the Contractor shall cease all further work pursuant to the Agreement. Upon such termination by the City the Contractor shall not be entitled to any other remedies, claims, actions, profits, or damages except as provided in this paragraph. Upon the receipt of such notice of termination Contractor shall be entitled to the following compensation:

1. The contract value of the work completed to and including the date of receipt of the notice of termination, less the amount of progress payments received by contractor.
2. Actual move-off costs including labor, rental fees, equipment transportation costs, the costs of maintaining on-site construction office for supervising the mover-off.
3. The cost of materials custom made for this Agreement which cannot be used by the Contractor in the normal course of his business, and which have not been paid for by City in progress payments.
4. All costs shall not include any markups as might otherwise be allowed by any plans or specifications which were a part of the Agreement.

**The provisions of this paragraph shall supercede any other provision of the Agreement or any provision of any plans, specification, addendums or other documents which are or may become a part of this Agreement. City and Contractor agree that the provisions of this paragraph are a substantive part of the consideration for this Agreement.**

IN WITNESS WHEREOF, the parties have executed and entered into this Agreement as of the date first written above.

ATTEST:

CITY OF COLUSA,  
A Municipal Corporation

By: \_\_\_\_\_  
City Clerk

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

APPROVED AS TO FORM:

City Attorney

CONTRACTOR:

By: \_\_\_\_\_  
(Print)

By: \_\_\_\_\_  
(Print)

Signature: \_\_\_\_\_

Signature: \_\_\_\_\_

Title: \_\_\_\_\_

Title: \_\_\_\_\_

Address: \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

## EXHIBIT A

### Scope of Services

Item	Description	Bid Quantity	Unit	Unit Cost	Base Bid Amount
	<b><u>WELL NO. 6A</u></b>	-			
1	Mobilization/Demobilization and Final Clean Up.	1	LS		
2	Drill 52-inch Borehole, furnish and install 40-inch OD x 3/8 inch wall ASTM A 139 Mild Steel Conductor Casing, Cement into Place	50	LF		
3	Drill 17.5 inch Pilot Bore Hole 50 ft to 500 feet	450	LF		
4	Provide Borehole Geophysical Surveys	1	LS		
5	Completing Well including test pumping, grouting, gravel well casing, screening and disinfecting.	500	LF		
6	Install Isolated Aquifer Zone Tool, Seals and Gravel Envelop, and Provide for Initial Development by Airlifting	3	EA		
7	Provide Temporary holding tanks, Temporary Conveyance piping, booster pumps and any other equipment necessary to provide for discharge routing to City SD.	1	LS		
8	Electrical Work – Moving Existing Motor and Well head, to new Well, Connecting Motor to Existing VFD, and installing weather proof 110 Duplex Receptacle.	1	LS		
9	Pump Isolated Aquifer Zones (est. 12 hrs per zone).	3	EA		
10	Connection of new well facilities to city water system 12" DI Pipe	1	LS		
11	Provide Isolated Aquifer Zone Test Laboratory Analysis	3	EA		
12	Ream Pilot Borehole to 34-inch 50 – 500 ft	450	LF		
13	Reconnecting existing well head disinfection and water meter equipment to new well head.	1	LS		



14	Provide Caliper Survey of Reamed Borehole	1	LS		
15	Furnish and install 20-inch x 3/8" Wall ASTM A778 304L Stainless Steel Blank Casing +2 – 500 feet.	502	LF		
16	Furnish and install 20-inch x 5/16-inch Wall ASTM A778 304L Stainless Steel Ful-Flo louvered Well Screen with 0.060 inch slots 275' – 300' and 320' – 340' and 400' – 420'.	65	LF		
17	Furnish and install two (2) 3-inch Sch. 40 304L Stainless Steel Gravel Feed Pipes +1 – 270'	540	LF		
18	Furnish and install 4-inch Sch. 40 304L Stainless Steel Camera Access Tube and 8-foot connection box +1-500 ft.	501	LF		
19	Furnish and install 2 inch SCH 40 Stainless Steel sounding Tube and 2 foot connection box. +1-500 ft.	500	LF		
20	Furnish and install Engineered Gravel Envelope and #60 Fine Transition Sand	1	LS		
21	Furnish and install 10.3 – sack Sand Cement Slurry Annular Seal	1	LS		
22	Provide initial development by Swabbing and Focused Intake Pumping	1	LS		
23	Provide, Install, and Remove Development Test Pump	1	LS		
24	Provide Final Development by Pumping and Surging	1	LS		
25	Conduct Aquifer Pumping Tests (8-hr step drawdown, 24 hr. constant rate drawdown, and 4-hr recovery tests)	1	LS		
26	Provide Downhole Video Survey	1	LS		
27	Provide Plumbness and Alignment Surveys	1	LS		
28	Provide Well Disinfection	1	LS		
29	Provide Pump shaft and Bowls for the existing 100 hp motor which will yield 2000 gpm at 300' TDH	1	LS		

**TOTAL BID** \_\_\_\_\_

**Contractor Signature** \_\_\_\_\_

**Date Signed** \_\_\_\_\_

**BID ADDEITIVE ALTERNATE:**

Drill 1000' deep test well, and provide geophysical surveys (elog), aquifer reports and zone water quality testing as described herein, and isolated aquifer zone pumping for 12 hrs to estimate potential yield.

**TOTAL BID ALTERNATIVE TEST WELL** \_\_\_\_\_

**Contractor Signature** \_\_\_\_\_

**Date Signed** \_\_\_\_\_

**EXHIBIT B**  
**Schedule of Performance**

As defined in City of Colusa Construction Specifications

CITY OF COLUSA  
DEPARTMENT OF PUBLIC WORKS

**PERFORMANCE BOND**

(To Accompany Contract)

Bond No.

\_\_\_\_\_

**WHEREAS**, the City of Colusa , acting by and through the Department of Public Works, has awarded to Contractor \_\_\_\_\_, hereafter designated as the “Contractor”, a contract for the work described as follows:

**AND WHEREAS**, the Contractor is required to furnish a bond in connection with said contract, guaranteeing the faithful performance thereof:

**NOW, THEREFORE**, we the undersigned Contractor and Surety are held firmly bound to the City of Colusa in the sum of \$ \_\_\_\_\_ dollars (\$ \_\_\_\_\_), to be paid to said City / County or its certain attorney, its successors and assigns: for which payment, well and truly to be made, we bind ourselves, our heirs, executors and administrators, successors or assigns, jointly and severally, firmly by these presents.

**THE CONDITION OF THIS OBLIGATION IS SUCH,**

That if the above bound Contractor, its heirs, executors, administrators, successors or assigns, shall in all things stand to and abide by, and well and truly keep and perform the covenants, conditions and agreements in the foregoing contract and any alteration thereof made as therein provided, on his or their part to be kept and performed at the time and in the manner therein specified, and in all respects according to their intent and meaning, and shall indemnify and save harmless the City of Colusa , its officers and agents, as therein stipulated, then this obligation shall become and be null and void; otherwise it shall be and remain in full force and virtue.

**IN WITNESS WHEREOF**, We have hereunto set our hands and seals on this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_.

Correspondence or claims relating to this bond should be sent to the surety at the following address:

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

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

Contractor

Name of Surety (SEAL)

By : Attorney-in-Fact

NOTE: Signatures of those executing for the surety must be properly acknowledged.

**CERTIFICATE OF ACKNOWLEDGEMENT**

State of California,  
City / County of \_\_\_\_\_ SS

On this \_\_\_\_\_ day of \_\_\_\_\_ in the year 20\_\_ before me \_\_\_\_\_, a notary public in and for the City / County of \_\_\_\_\_, personally appeared \_\_\_\_\_, known to me to be the person whose name is subscribed to this

*Attorney-in-fact*

instrument and known to me to be the attorney-in-fact of \_\_\_\_\_ and acknowledged to me that he/she subscribed the name of the said company thereto as surety, and his/her own name as attorney-in-fact.

◆ (SEAL)     **Notary Public**

---

CITY OF COLUSA  
DEPARTMENT OF PUBLIC WORKS

**PAYMENT BOND**

(Section 3247, Civil Code)

WHEREAS, The City of Colusa, acting by and through the Department of Public Works, hereafter referred to as "Obligee", has awarded to Contractor \_\_\_\_\_, hereafter designated as the "Principal", a contract for the work described as follows:

AND WHEREAS, said Principal is required to furnish a bond in connection with said contract, to secure the payment of claims of laborers, mechanics, materialmen and other persons as provided by law.

NOW, THEREFORE, we the undersigned Principal and Surety are bound unto the Obligee in the sum of \_\_\_\_\_ dollars (\$ \_\_\_\_\_), for which payment, we bind ourselves, jointly and severally.

**THE CONDITION OF THIS OBLIGATION IS SUCH,**

That if said Principal or its subcontractors shall fail to pay any of the persons named in Civil Code Section 3181, or amounts due under the Unemployment Insurance Code with respect to work or labor performed by such claimant, or any amounts required to be deducted, withheld, and paid over to the Franchise Tax Board for the wages of employees of the Principal and his subcontractors pursuant to Section 18806 of the Revenue and Taxation Code, with respect to such work and labor, that the surety herein will pay for the same in an amount not exceeding the sum specified in this bond, otherwise the above obligation shall be void. In case suit is brought upon this bond, the surety will pay a reasonable attorney's fee to fixed by the court.

This bond shall inure to the benefit of any of the persons named in Civil Code Section 3181 as to give a right of action to such persons or their assigns in any suit brought upon this bond.

Dated: \_\_\_\_\_, 20 \_\_\_\_

Correspondence or claims relating to this bond should be sent to the surety at the following address:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
Principal  
\_\_\_\_\_  
Surety (SEAL)  
\_\_\_\_\_  
By : Attorney-in-Fact

NOTE: Signatures of those executing for the surety must be properly acknowledged.

**CERTIFICATE OF ACKNOWLEDGEMENT**

State of California  
City / County of \_\_\_\_\_ SS

On this \_\_\_\_\_ day of \_\_\_\_\_ in the year 20 \_\_\_\_ before me \_\_\_\_\_, personally appeared \_\_\_\_\_, personally known to me (or proved to me \_\_\_\_\_  
*Attorney-in-fact*

on the basis of satisfactory evidence) to be the person whose name is subscribed to this instrument as the attorney-in-fact of \_\_\_\_\_ and acknowledged to me that he/she subscribed the name of the said company thereto as surety, and his/her own name as attorney-in-fact.

(SEAL)

\_\_\_\_\_  
Notary Public

(Use of City form is not required)

**SUPPLEMENTAL INFORMATION TO BE COMPLETED BY PRINCIPAL**

If an individual, so state. If a firm or co-partnership, state the firm and give the names of all individual co-partners composing the partnership. If a Corporation, state legal name of corporation; state also the names of the president, secretary, treasurer and manager thereof.

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Business Address:

---

---

---

Telephone Number:

---

Date:

---

Print Name:

---

Principal

Signature:

---

Title

(Use of City form is not required)

**TAX IDENTIFICATION NUMBER**

The Tax Equity and Fiscal Responsibility Act of 1982 requires the payer (City of Colusa) to report to the Internal Revenue Service taxable payments to payees.

You (as a payee) are required by law to provide us with your Taxpayer Identification Number (if an individual or partnership, your Social Security Number). If you do not provide us with your correct identification number, you may be subject to a penalty imposed by the Internal Revenue Service. The payments subject to withholdings may include, but are not limited to, interest, dividends, or other payments the City of Colusa and/or the Colusa Redevelopment Agency made to you. Other payments may include rents, royalties, commissions and fees for service of non-employees.

If you are exempt from income tax, we are still required, by law, to maintain a Tax Identification Number on file. **PLEASE PROVIDE YOUR TAX IDENTIFICATION NUMBER next to the appropriate listing below, sign, date and return to:**

CITY OF COLUSA FINANCE DEPARTMENT

401 E. Chapman

Colusa, CA 92870

Exempt: Yes\_\_\_No\_\_\_ Telephone ( ) \_\_\_\_\_

CORPORATION: \_\_\_\_\_

U.S.A. OR ANY AGENCIES THEREOF: \_\_\_\_\_

IRS CODE #501 TAX-EXEMPT ORGANIZATION: \_\_\_\_\_

A NON-COMMISSIONED CITY OF W.C. EMPLOYEE: \_\_\_\_\_

SOLE PROPRIETOR: \_\_\_\_\_

A PARTNERSHIP: \_\_\_\_\_

OTHER: \_\_\_\_\_(Explain)

Signature/Title: \_\_\_\_\_ Date: \_\_\_\_\_

**GUARANTEE**

**TO THE CITY OF COLUSA**

**PROJECT NO. 25-101**

**AS A MATERIAL INDUCEMENT TO THE CITY TO AWARD THE CONTRACT FOR PROJECT NO. \_\_\_\_\_ TO**

**\_\_\_\_\_, THE UNDERSIGNED (“GUARANTOR”) HAS AGREED TO ENTER INTO THIS GUARANTEE. THE GUARANTOR HEREBY UNCONDITIONALLY GUARANTEES TO THE FULLEST EXTENT ALLOWED BY LAW THE FOLLOWING WORK INCLUDED IN THIS PROJECT:**

**(“THE WORK”).**

**GUARANTOR GUARANTEES THAT THE MATERIALS AND EQUIPMENT USED BY ITSELF AND ITS SUBCONTRACTORS WILL BE FREE FROM DEFECTS AND THAT THE WORK WILL CONFORM TO THE PLANS AND SPECIFICATIONS. SHOULD ANY OF THE MATERIALS OR EQUIPMENT PROVE DEFECTIVE OR SHOULD THE WORK AS A WHOLE, OR ANY PART THEREOF, PROVE DEFECTIVE FOR ANY REASON WHATSOEVER (EXCEPT DUE TO INTENTIONAL TORTS BY THE CITY), OR SHOULD THE WORK AS A WHOLE OR ANY PART THEREOF FAIL TO OPERATE PROPERLY OR FAIL TO COMPLY WITH THE PLANS AND SPECIFICATIONS, GUARANTOR WILL, AT THE CITY’S SOLE ELECTION: 1) REIMBURSE THE CITY, UPON WRITTEN DEMAND, FOR ALL OF THE CITY’S EXPENSES INCURRED REPLACING OR RESTORING ANY SUCH EQUIPMENT OR MATERIALS, INCLUDING THE COST OF ANY WORK NECESSARY TO MAKE SUCH REPLACEMENT OR REPAIRS; OR 2) REPLACE ANY SUCH DEFECTIVE MATERIAL OR EQUIPMENT AND REPAIR SAID WORK COMPLETELY, ALL WITHOUT ANY COST TO THE CITY. GUARANTOR FURTHER GUARANTEES THAT ANY SUCH REPAIR WORK WILL CONFORM TO THE PLANS AND SPECIFICATIONS FOR THE PROJECT. THIS GUARANTEE WILL REMAIN IN EFFECT FOR FIVE YEARS FROM THE DATE ON WHICH THE CONTRACTED FOR WORK IS ACCEPTED FOR USE BY THE CITY. THIS GUARANTEE INCORPORATES SECTION 1.9 OF THE WELL DRILLING SPECS.**

Guarantor understands and agrees that the City shall have the unqualified option to make any replacements or repairs itself or to have such replacement, repair, performed by the undersigned. The City shall have no obligation to consult with Guarantor before the City proceeds to perform any repair, replacement, or work itself. If the City elects to have Guarantor perform said repair, replacement, or work, Guarantor agrees that the repair, replacement, or work shall be performed within 15 days after receipt of a written demand from the City.

If the City elects to perform the replacement, repairs itself, Guarantor agrees to make reimbursement payment within 15 days after receipt of a written demand for payment from the City.

If the Guarantor fails or refuses to comply with this guarantee, the City shall be entitled to all costs and expenses, including attorneys and expert fees, reasonably incurred by reason of Guarantor’s failure or refusal.



Guarantor

Date: \_\_\_\_\_

Contractor: \_\_\_\_\_

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

Title: \_\_\_\_\_

**STATEMENT OF NON COLLUSION BY CONTRACTOR**

The undersigned who submits herewith to the City of Colusa a bid or proposal does hereby certify:

- a. That all statements of fact in such bid or proposal are true;
- b. That such bid or proposal was not made in the interest of or on behalf of any undisclosed person, partnership, company, association, organization or corporation;
- c. That such bid or proposal is genuine and not collusive or sham;
- d. That said bidder has not, directly or indirectly by agreement, communication or conference with anyone, attempted to induce action prejudicial to the interest of the City of Colusa or of any other bidder or anyone else interested in the proposed procurement;
- e. Did not, directly or indirectly, collude, conspire, connive or agree with anyone else that said bidder or anyone else would submit a false or sham bid or proposal, or that anyone should refrain from bidding or withdraw his bid or proposal;
- f. Did not in any manner, directly or indirectly seek by agreement, communication or conference with anyone to raise or fix the bid or proposal price of said bidder or of anyone else, or to raise or fix any overhead, profit or cost element of his bid or proposal price, or that of anyone else;
- g. Did not, directly or indirectly, submit his bid or proposal price or any breakdown thereof, or the contents thereof, or divulge information or data relative thereto, to any corporation, partnership, company, association, organization, bid depository, or to any member agent thereof, or to any individual or group of individuals, except to the City of Colusa, or to any person or persons who have a partnership or their financial interest with said bidder in his business.
- h. Did not provide, directly or indirectly to any officer or employee of the City of Colusa any gratuity, entertainment, meals, or anything of value, whatsoever, which could be objectively construed as intending to invoke any form of reciprocation or favorable treatment.
- i. That no officer or principal of the undersigned firm is related to any officer or employee of the city by blood or marriage within the third degree or is employed, either full or part time, by the City of Colusa either currently or within the last two (2) years.
- j. That no officer or principal of the undersigned firm nor any subcontractor to be engaged by the principal has been convicted by a court of competent jurisdiction of any charge of fraud, bribery, collusion, conspiracy or any other act in violation of any state or federal antitrust law in connection with the bidding upon award of, or performance of, any public work contract, with any public entity, within the last three years.

I certify, under penalty of perjury under the laws of the State of California, that the foregoing is true and correct and that this certification was executed:

On \_\_\_\_\_ at \_\_\_\_\_ California.

Firm \_\_\_\_\_

\_\_\_\_\_

(Signature)

Street \_\_\_\_\_

(Print Name & Title)

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

**CONTRACTOR'S/SUBCONTRACTOR'S CERTIFICATION  
CONCERNING STATE LABOR STANDARDS AND PREVAILING WAGES**

All contractors and subcontractors shall give the following certification to the grantee and forward this certification to the grantee within 10 days after the execution of any contract or subcontract.

- A. "I am aware of the provisions of Section 1720 et seq. of the California Labor Code which requires that the State prevailing wage rate shall be paid to employees where this rate exceeds the Federal wage rate."
  
- B. "I am aware of the provisions of Section 3700 of the Labor Code which require every employer to be insured against liability for workers' compensation or to undertake self-insurance in accordance with the provisions of that Code, and I will comply with such provisions before commencing the performance of the work of this contract."
  
- C. "It is further agreed that, except as may be provided in Section 1815 of the California Labor Code, the maximum hours a worker is to be employed is limited to eight hours a day and 40 hours a week and the subcontractor shall forfeit, as a penalty, \$25 for each worker employed in the execution of the subcontract for each calendar day during which a worker is required or permitted to labor more than eight hours in any calendar day or more than 40 hours in any calendar week."

(Contractor/Subcontractor)

By \_\_\_\_\_  
(Signature) (Typed Name and Title) (Date)

**VOLUME 2 TECHNICAL SPECIFICATIONS**  
**For Water Well Drilling & Casing**

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## **WATER WELL DRILLING, CASING & TESTING**

### **1.0 GENERAL**

#### **1.1 DESCRIPTION**

Provide all labor, equipment, materials, and forces necessary to provide the City of Colusa with new, complete and fully developed municipal-supply water well and a test well at two separate locations.

The first location is at an existing well site with a city park known as Memorial Park, and fronts Jay Street, between 9<sup>th</sup> and 10<sup>th</sup> Street. This site is located at on a 2.3-acre parcel, APN 001-073-001. The existing well located on this site has began failing due to casing and screening issues, and is pumping approximately 1/3<sup>rd</sup> of its original capacity. The existing well was drilled to a depth of 501 feet (see drillers report in Appendix A). The plans for the new well are that the contractor will drill a new well 60 feet west of the existing well had, as shown on the civil design plans. We anticipate that the water bearing aquifers will be about the same elevations so the contractor should plan on zone testing at least three zones as shown on the civil design documents, and plan on screening of these zones for bidding purposes. Following the actual drilling of the new well, the Contractor and Engineer shall work together to refine the actual design of the well installation.

The power and disinfection equipment are to remain in the existing building, and the contractor will be responsible for running power and disinfection to the new well head. The well exit into the system will be a strait line connection south, to the existing 8" water main line located in Jay Street.

The existing pump motor is 100 hp and relatively new, and shall be relocated to the new well head site. A new shaft and pump shall be installed which supplies up to 2000 gpm at a TDH of 300 ft.

The new municipal well will be drilled and completed in such a manner as to produce from all water-bearing zones of acceptable properties and water quality identified by the City of Colusa. The final well design will be determined after examination of the formation samples, sieve analyses of drill cuttings, downhole geophysical logs and results of isolated aquifer zone sampling. If water-bearing zones drilled are considered adequate to produce the desired quantity and quality of water, the well will be completed. The design herein anticipates this well will produce up to 2000 gpm.

The second site is considered a bid additive alternate. This site is located within the Colusa Industrial Park on APN 017-030-110.

The test well shall be drilled to a depth of 1000 feet below ground surface for the purposes of determining groundwater elevations via gamma ray temperature logs, for testing of groundwater constituent levels, and potential flow rate.

**Project-specific well requirements are presented in the provision supplement(s) found at the end of this detailed provision.**

## 1.2 WELL CONSTRUCTION STANDARDS

The new well shall be constructed in compliance with (1) the latest edition or supplement(s) of: *State of California Water Well Standards, Bulletin No. 74-81* dated December 1981 and *Bulletin No. 74-90* dated June 1991, (2) local modifications to these Standards, (3) Sections 13800 through 13806 of the California Water Code, and (4) American Water Works Association (AWWA) Standard for Water Wells (AWWA A100-97 or later).

## 1.3 WELL CONSTRUCTION SUMMARY

Except as noted in the provision supplement(s), the general work required for well construction, development and testing shall include, but may not be limited to the following:

- A. Move on and off the well site.
- B. Install temporary security fencing around all construction, material storage and temporary water disposal areas.
- C. Setup and maintain a temporary field office, electrical and telephone service and sanitary facilities.
- D. Provide at least three temporary tanks for settlement of solids from development water prior to discharge to the point of discharge.
- E. Provide temporary pipeline and appurtenances required to convey well development and testing water to the point of discharge.
- F. Install 17.5” Pilot Hole down to 550 ft.
- G. Install permanent conductor casing and sanitary seal.
- H. Conduct downhole geophysical surveys
- I. Conduct isolated aquifer zone testing as specified by the City of Colusa.  
Retain an analytical testing laboratory to complete water sample analyses specified.
- J. Complete a caliper survey of the final reamed borehole.
- K. Install blank and screened well casing, tubing, gravel pack, annular seals, and annular grout seal in accordance with the Plans and Specifications, and well design specified by the City of Colusa.
- L. Complete initial well development by air-lift swabbing (mechanical development).
- M. Install a test pump at a capacity and intake depth specified by the City of Colusa.

- N. Complete well development by pumping and surging.
- O. Conduct well production tests (step-drawdown and constant rate discharge tests).
- P. Complete a flow meter survey during well testing as specified by the City of Colusa.
- Q. Conduct a color video survey of the completed well.
- R. Conduct a well alignment test by gyroscopic methods.
- S. Disinfect the completed well.
- T. Construct a well head foundation
- U. Complete final site cleanup and restoration to the satisfaction of the City of Colusa.
- V. Provide all records required by the specifications and requested by the City of Colusa.

#### 1.4 CONTRACTOR EQUIPMENT

##### A. General

The Contractor shall provide all equipment, tools, supplies, materials, power and personnel required to complete the work.

The Contractor shall provide fencing as needed to secure the well site and entire work area used for material storage and drilling operations including areas occupied by the field office, construction equipment, engines, motors and other equipment. The Contractor shall provide a temporary field office, and sanitary facilities as described in the Special Conditions.

##### B. Drilling Equipment

The new well shall be drilled using a reverse circulation rotary drilling method in which the uncased wall of the drill borehole is held in place at all times with a circulating fluid. The Contractor will provide a complete drilling unit, all tools, accessories, power, lighting, water, other equipment and experienced personnel necessary to conduct efficient drilling operations at the site.

The drilling equipment shall be in good condition and of sufficient mast capacity to drill the borehole required by these specifications to a depth specified in the Drawings (Section P, Standard and Construction Drawings). All drilling equipment including mast and draw-works, air compressors, drilling fluid pumps, drill pipe, etc., must be of requisite size, sufficient capacity, and in suitable condition to drill and set casing to the anticipated depths in the well (see the provision supplement(s), for depth requirements). The mast and all running gear (hoists, cables, etc.) shall have sufficient and demonstrated capacity to lift two (2) times the buoyant weight of either the drill string or the blank and screened well casing assembly (whichever is greater). The drill rig utilized must have the ability to fully lift and land the anticipated



casing loads without the use of cranes, float plugs, or other similar methods.

The Contractor shall submit, upon request, detailed information documenting the capacity of the various components of the rig used including, but not limited to, derrick/mast capacity, drill pipe type and rating, all line and hook load capacities, air compressor rating, mud pump capacity, etc. All drill pipes must utilize threaded flush or upset tool joints, or equal, as approved by the City of Colusa.

Drilling equipment shall be disinfected on site prior to use. The methods, chemicals and dosages employed shall be approved by the City of Colusa.

C. Mud Tanks

Excavated mud pits will not be allowed. Portable tanks are required which allow the drill cuttings to settle. The tanks will have a minimum of three chambers and have sufficient capacity to allow for proper settling of drill cuttings as approved by the City of Colusa. The tanks will be cleaned periodically to ensure that the drilling fluid remains clean prior to its re-entry into the borehole. At no time shall the height of the material settled in the tanks exceed two feet. Drilling fluid re-circulated to the borehole shall not contain in excess of 5 percent sand. Materials cleaned from the tanks shall be hauled off-site for proper disposal at the Contractor's expense.

D. Water Storage Tanks

The Contractor shall utilize at least three 20,000 gallon "Baker Tanks" or approved equal for the retention of fluids generated during the course of the work, prior to their disposal. The tanks shall be joined in series such that water flows between the tanks to maximize settling time and minimize disturbance of settled materials. Water storage and clarification facilities utilized shall be sufficient to meet water discharge requirements of the City of Colusa's NPDES permit. Pipelines or hoses used to link the Baker Tanks and convey clarified water to the point of discharge shall be of a capacity sufficient to handle the maximum quantity of water that can be produced from the well during mechanical and pumping development as required.

E. Discharge Piping

The Contractor shall provide temporary discharge piping of adequate capacity and length to convey water pumped during well development and testing to the point of water discharge specified in the Special Conditions and in the Civil plans.

1.5 CONTRACTOR RESPONSIBILITIES

- A. The Contractor is solely responsible for making all necessary provisions for mobilizing onto and demobilizing from the well site with their equipment, tools, supplies, materials, and personnel.
- B. The Contractor shall haul away all drill cuttings and drilling fluids for proper disposal. Drill cuttings shall not be spread on the well site area unless specifically authorized in the provision supplement(s).

- C. The Contractor shall convey all water discharged during development and testing in a closed pipe to a suitable discharge point specified in the Special Conditions. All water discharged shall meet the requirements of the City of Colusa's NPDES permit.
- D. The Contractor will submit all required reports and data to the City of Colusa and other appropriate agencies.
- E. The Contractor is responsible to have inspected the well site prior to submitting a bid and commencing construction activities.
- F. The Contractor shall keep the City of Colusa and the City of Colusa's Representative continuously informed of the on-site work schedule so that drilling, construction and testing activities can be monitored as required by the City of Colusa.
- G. The Contractor shall retain a State-certified water quality testing laboratory acceptable to the City of Colusa to complete analyses of isolated aquifer zone water samples. Required analyses are specified in the provision supplement(s).
- H. The Contractor is responsible for any damage to properties adjacent to the well site caused by Contractor activities associated with the work described herein and shall restore these properties to their original condition.

#### 1.6 QUALIFICATIONS AND QUALITY ASSURANCE

The Contractor shall have been engaged in the business of well construction using the reverse circulation drilling method and test pumping of wells with a depth, diameter and capacity equivalent to those anticipated for the new well for a period of at least fifteen (15) years.

The Contractor shall submit a list of the last three (3) municipal well owners for whom the Contractor has drilled equivalent municipal-supply water wells. The lists of references shall include (as applicable) the owner's name and address, casing diameter, type, depth, production capacity, specific capacity, sand production and well destruction procedures and methods.

#### 1.7 RECORDS

The Contractor shall keep a daily log and progress record at the site readily available for inspection during drilling of the pilot borehole, construction and testing of the new well.

Specific records associated with each on-site activity are listed in Section 2.0 - Construction (Technical Provisions) of this detailed provision. In general, the Contractor shall keep records providing the following information:

- A. Driller's description of formation materials penetrated at 10-foot intervals and at each major change of formation (from both the conductor casing borehole and pilot borehole).
- B. Log of drill bit types, diameters and changes.
- C. Drilling fluid properties at 4-hour intervals including mud weight, Marsh funnel viscosity, sand content, solids content, water additions and mud additives used.
- D. Collection of one (1) set of representative formation samples from the conductor casing borehole and pilot borehole. Samples shall be collected over a 10-foot interval and at each major change in formation from the ground surface to the full depth of the borehole. The method of sample collection shall be approved by the City of Colusa. Samples collected off a shaker screen are not acceptable unless specifically approved by the City of Colusa. Samples shall be preserved in one-gallon size, heavy (freezer) weight, zip-lock type, plastic bags labeled with the well name, date, time, and depth interval.
- E. Results of sieve analyses of formation samples requested by the City of Colusa and completed by the Contractor. See the provision supplement(s) for number of analyses required.
- F. Results of downhole geophysical surveys
- G. Setup and results of each isolated aquifer zone test conducted including dates, times, intervals sampled, schedule of annular fill materials, development times and results, water sampled, depth to water and discharge measurements.
- H. Borehole reaming activities.
- I. Results of caliper survey of the final reamed borehole.
- J. Results of sieve analyses completed by the Contractor of representative samples of gravel pack materials delivered on-site prior to casing installation. See the provision supplement(s) for number of samples.

- K. Well construction activities including final schedule and diagram of installed blank and screened well casing, gravel feed tube, air vent tube, sounding tube(s) and annular fill materials.
- L. Cross-sectional diagram illustrating the design and structure of the splice section in the well casing for entry of the sounding tube.
- M. Installation of test pump and appurtenances including summary descriptions of pump type, diameter, intake depth, make, model, horse power, rated capacity, flow control valves, flow meter and discharge piping.
- N. Records of well development by mechanical methods (swabbing and air-lift pumping) and pumping methods using a test pump. Records of pumping test results using a test pump. Records shall be maintained at the time intervals requested showing static water level, production rate, pumping water level, drawdown, gravel pack settlement and additions, water clarity, depth interval developed and other information requested by the City of Colusa.
- O. Sand production test results.
- P. Setup and results of flow meter survey.
- Q. Setup and results of well alignment and deviation surveys.
- R. Records on chlorine concentrations used for well development and disinfection.
- S. Results of the downhole color video survey of the completed well.
- T. Schedule of well destruction, if applicable.

## 1.8 SUBMITTALS

All records shall be available to the City of Colusa at all times at the job site. Section 2.0 - Construction (Technical Provisions) of this detailed provision lists submittals required for specific well construction and destruction activities. All records shall be legible, typed as appropriate, and submitted to the City of Colusa on 8 1/2" x 11" paper. Required submittals and submittal schedules are summarized in Table 02734-1. Submittals shall be delivered to the Construction Administrative Representative identified by the City of Colusa at the Pre- construction Conference.

## 1.9 GUARANTEE

### A. General

For a period of three (1) years after acceptance of the well by the City of Colusa, the Contractor shall make the following guarantees and accept the following responsibilities concerning their work:

1. Sand production shall be less than five (5) parts per million (ppm) within fifteen (15) minutes after start of pumping at the agreed production rate of the well.
2. Sand production shall be less than one (1) ppm within two (2) hours after start of pumping at the agreed production rate of the well.
3. The well casing and screen shall remain intact throughout its entire length.
4. Plumbness and alignment of the well shall remain within the tolerances set forth in these specifications.

### B. Demonstration of Compliance

1. To demonstrate compliance with the above, the Contractor shall perform at monthly periods for the first three (3) months of operation, and at periods of every six (6) months, thereafter, a test of the well. Representatives of the City of Colusa shall witness these tests and certified copies of the test results shall be furnished. The tests shall consist of a Rossum sand test of the well for a minimum period of two hours after cycling, and all other information required, to check compliance with the above guarantees.
2. To insure compliance with the terms of this section, the Contractor shall furnish a three (1) year maintenance bond.

## 1.10 SUPERVISION AND COOPERATION

The Contractor shall provide a qualified and experienced foreman and drilling superintendent, one of who shall be constantly in attendance throughout drilling and construction of the new well.

In addition to directing all well construction and testing, the foreman shall be capable of coordinating the work with all personnel, subcontractors, and the City of Colusa so that the overall project is successfully executed and completed without undue conflicts or delays.

## 2.0 CONSTRUCTION (Technical Provisions)

General requirements, materials and execution for construction of City of Colusa wells are presented in the following sections. Contract-specific requirements are presented in the provision supplement(s). Well locations, standard and construction drawings, figures and tables are shown in the Civil Plan set which accompanies these Specifications.

### 2.1 MOBILIZATION

#### PART 1 - GENERAL

##### A. Description

Mobilization shall include: (1) transportation of personnel, equipment, and operating supplies to and from the well site, (2) establishment of temporary fencing, field office, power and telephone service, and portable sanitary facilities, (3) obtaining an adequate source of fresh water from the City of Colusa, (4) setup of temporary water tanks, discharge line and appurtenances, (5) excavation of temporary water storage ponds as required, and (6) other preparatory work required to complete construction of a new well including equipment and related facilities.

##### B. Related Work Specified Elsewhere

1. General Conditions, Section F-42, Measurement and Payment.
2. Pre-bid Walk Through - Special Conditions.
3. Pre-construction Conference - Special Conditions.

##### C. Submittals

Well Driller's Permit from County of Colusa Department of Environmental Health Services.

##### D. Measurement and Payment

Payment for mobilization shall be at the lump sum price bid.

#### PART 2 – MATERIALS

Requirements for Contractor equipment are specified in Section 1.04.

### PART 3 - EXECUTION

- A. The Contractor shall install appropriate fencing around the entire construction area including the well, material storage and temporary water disposal areas. Fencing shall be adequate to ensure the safety and security of equipment, materials, on-site personnel and local residents.
- B. Temporary water service for construction purposes will be supplied by the City of Colusa in accordance with the procedures described in the Special Conditions and established at the Pre-bid Walk Through.
- C. The Contractor shall provide 110-volt power and telephone service to the Field Office and shall provide portable sanitary facilities for use by all personnel connected with this well project. These facilities shall remain in place during all phases of the work.
- D. The Contractor shall keep the well site free from accumulations of waste materials, rubbish, and other debris resulting from the work. At completion of the work, the Contractor shall remove all waste materials, rubbish, and debris from and about the well site as well as all tools, construction equipment, fuel tanks, machinery, temporary structures, and surplus materials. The Contractor shall leave the site clean and ready for use by the City of Colusa. The Contractor shall restore all temporary work areas at the site to their original condition.
- E. The Contractor shall prevent damage to the well site and adjacent properties associated with pumping water during drilling, development, or testing or due to interruption or diversion of storm or wastewater during execution of the work.
- F. Dirt and sediment shall be kept out of water disposal/drain lines at all times. The Contractor shall properly dispose of all drilling, waste, and nuisance water.
- G. Well development and testing water shall be conveyed to the discharge location specified on the design plans. Water discharges shall be conducted under the City of Colusa's NPDES permit.
- H. Drill cuttings and drilling fluids shall be removed from the well site and properly disposed by the Contractor.



2.2 NOISE CONTROL – Not a part of this contract.

## 2.3 CONDUCTOR, BOREHOLE, CASING AND SANITARY SEAL

### PART 1 – GENERAL

#### A. Description

This item includes drilling a 17.5” borehole, performing e-log and zone testing, then installation of sanitary seal bore hole (52”), and casing and installation of a cement grout sanitary seal in the annulus between the borehole and conductor casing to the minimum depth of 50 ft. specified in the provision supplement(s).

The sanitary seal installed shall meet the requirements of California Department of Water Resources Bulletins 74-81 and 74-90, and all requirements of the City of Colusa Department of Environmental Health.

Sanitary Seal will extend down to a depth of 50 feet in a 40” casing.

The main borehole shall be 34” diameter and extend down to 500 ft, and the pump casing shall be 20” (stainless steel), and extend down the full depth. The final design shall be completed with the e-log and zone testing data from the initial bore hole, but for bidding purposes the contractors shall assume the following:

3- aquifers

Rosco-Moss Louverd Screens \_”full flow” installed at the following depths

4” Stainless Steel Camera Port

(2) 3” stainless steel gravel tube – ending at the sanitary seal. (105 ft).

#### B. Submittals and Notifications

1. Certified test reports to show compliance with both the physical and chemical properties of the steel.
2. Cement weigh or batch tickets.
3. The Contractor shall notify the City of Colusa at least 72 hours in advance of commencing drilling. The Contractor shall notify the City of Colusa and County of Colusa Department of Environmental Health at least 48 hours in advance of setting the conductor casing and cement grout sanitary seal around the conductor casing. Unless pre-approved, installation shall not proceed without City of Colusa and DOHS inspectors on site.

#### C. Measurement and Payment

1. Payment for this work item will be based on the unit price bid for the vertical feet of continuous grout seal placed adjacent to the conductor casing measured from the ground surface, excluding any lower portions of the annulus backfilled with non-grout materials. Payment shall include all materials, labor, tools, and

equipment required to drill the conductor borehole, collect formation samples, protect the borehole from collapse, supply and install conductor casing, and supply and install the cement grout sanitary seal.

2. A conductor casing and sanitary seal installed to a depth less than the minimum specified in the bid schedule will not be accepted for payment and shall be replaced by the Contractor at the Contractor's expense.

## PART 2 - MATERIALS

### A. Conductor Casing

1. The conductor casing diameter, wall thickness and material shall be as specified herein and, on the plans, and the provision supplement(s).
2. The conductor casing shall not be fabricated in less than 20-foot lengths. It shall be spiral welded or contain one longitudinal seam parallel to the casing axis and not more than one circumferential seam in 10 feet, or as otherwise approved by the City of Colusa. All spiral or longitudinal and circumferential seams shall be butt-welded with shielded arc electrodes to assure full fusion with the parent metal and complete penetration.
3. The ends of each joint shall be machine-beveled.
4. All joints in the conductor casing shall be securely welded in continuous passes and shall be watertight. All welding shall be done with shielded arc electrodes and shall be performed in accordance with American Welding Society Standards.
5. All casing material shall be new.

### B. Sand-Cement Grout

1. The grout used to fill the annulus between the conductor borehole and conductor casing shall be a sand-cement. Unless specified otherwise, there shall be not more than two parts by weight of sand to one part by weight of cement. The water cement ratio shall be about 7 gallons per sack of cement (94 pounds). All on-site water additions shall be metered.
2. Cement used for the grout shall be Portland ASTM Type II.
3. Water used for cement and grout mixtures shall be clean and of potable quality.
4. Materials used as additives for Portland cement mixtures in the field shall meet the requirements and latest revisions thereof, ASTM-C494, Standard Specifications for Chemical Admixtures for Concrete.

5. Special quick-setting cement, retardants to setting, and other additives, including hydrated lime to make the mix fluid (up to 10 percent of the volume of cement), and bentonite (up to 5 percent) to make the mix more fluid and to reduce shrinkage, may be used.

## PART 3 - EXECUTION

### A. Conductor Casing Borehole

1. The borehole shall be drilled at a location confirmed in the field with the City of Colusa. Drilling shall not commence without the City of Colusa or City of Colusa's Representative on-site unless previously agreed by the City of Colusa.
2. During drilling, the Contractor shall collect and preserve representative samples of formation materials at 10-foot intervals and each major change in formation, in accordance with sampling procedures specified in Section 2.04 - Pilot Borehole.
3. Upon completion of drilling, the Contractor shall condition the borehole and take whatever steps are necessary to maintain and prevent collapse of the borehole prior to and during placement of the conductor casing and cement grout sanitary seal.

### B. Installation of Conductor Casing

1. When the drilling operation has been completed to the satisfaction of the City of Colusa, the conductor casing shall be installed. The MINIMUM length of the conductor casing installed below the ground surface shall be as specified in the provision supplement(s). The final length shall be approved by the City of Colusa. The conductor casing shall extend to the ground surface, be held in plumb position and shall be placed on the bottom of the borehole.
2. All field joints shall be properly butt-welded to assure complete penetration during welding with a minimum of two passes. All joints shall be watertight. Special care shall be exercised to ensure that the casing is straight. All field welding shall be performed in accordance with American Welding Society Standards by a certified welder.
3. Centering guides shall be securely welded to the conductor casing with a minimum of two sets of guides installed (one near the bottom and one near the top). Each set shall consist of three guides equally spaced circumferentially.

The guides shall be fabricated and placed as described in the provision supplement(s) and as shown on the plans.

C. Installation of the Grout Seal

1. After the conductor casing is installed and aligned, the annular space between the conductor casing and the conductor casing borehole shall be filled with cement grout from the bottom of the borehole to the ground surface. **The MINIMUM depth of the grout seal shall be as specified in the provision supplement(s).** Prior to grouting, the Contractor shall fill the inside of the conductor casing with water to balance the hydrostatic pressure between the inside and outside of the casing during placement of the grout.
2. The grout shall be pumped into the annular space through a tremie pipe installed to the bottom of the borehole. The bottom of the tremie pipe shall remain submerged in the grout throughout the placement of the grout. The placement procedure shall be approved by the City of Colusa prior to installation of the grout seal. The Contractor shall take all precautions to prevent the collapse of the conductor casing and borehole during placement of the grout.
3. The grout seal shall be placed in one continuous pour.
4. The Contractor shall not operate any equipment on-site during the 24-hour period immediately after the grout has been placed.
5. In the event the borehole or part of the borehole collapses prior to completion of grouting, the Contractor shall take whatever steps are necessary to reopen the borehole, reset the casing and place the grout as required. Any such remedial action shall be conducted at the Contractor's expense.

2.4 PILOT BOREHOLE

PART 1 - GENERAL

A. Description

This item includes drilling a pilot borehole (minimum 17.5-inch diameter) by the approved drilling method to the depth specified by the City of Colusa.

B. Related Work Specified Elsewhere

1. Drilling Fluid - Section 2.05.

C. Submittals

1. Daily activity report.
2. Samples of formation materials.
3. Results of sieve analysis of formation samples.
4. Lithologic log.
5. Drilling rate log.

D. Measurement and Payment

Payment for pilot borehole drilling will be based on measurement of vertical feet of pilot borehole drilled from below the bottom of the conductor casing to the bottom of the borehole (as verified by the downhole geophysical logs). Payment shall include all materials, labor, tools, and equipment required to drill the pilot borehole, collect formation samples, conduct sieve analysis of formation samples, maintain circulation, and protect the pilot borehole from collapse.

PART 2 - MATERIALS

A. Drilling Fluid

The Contractor shall maintain controlled drilling fluid characteristics during the entire drilling operation as specified in Section 2.05, Drilling Fluids.

B. Borehole

Pilot borehole depth and diameter are specified in the provision supplement(s).

## PART 3 - EXECUTION

### A. Pilot Borehole Drilling

1. The pilot borehole shall be drilled from the bottom of the conductor casing to the specified depth and diameter (see provision supplement[s]). The final depth of the pilot borehole will be determined by the City of Colusa as drilling proceeds. The Contractor shall drill below the specified depth only if requested to do so in writing by the City of Colusa. The Contractor shall take all measures necessary to protect the borehole from caving or raveling.
2. The Contractor shall maintain a record showing any variation in the addition and amount of approved clays or chemical products or water required during drilling. The depths at which such changes are required shall be shown in the daily reports.

### B. Formation Sampling

1. The Contractor shall collect, preserve and label one (1) set of representative samples of drill cuttings at 10-foot intervals and at each major change in formation as drilling proceeds to the full depth of the pilot borehole. The method of collection shall be discussed with and approved by the City of Colusa at the Pre-construction Conference. Samples collected off a shaker screen are not acceptable unless specifically approved by the City of Colusa. Samples shall be placed in one-gallon size, heavy (freezer) weight, zip-lock type, plastic bags and shall be labeled to indicate the well name, date, time and depth interval. Collected samples shall be stored in a manner to prevent breakage or loss.
2. Upon completion of the pilot borehole, downhole geophysical logs shall be run.

### C. Sieve Analysis

1. The Contractor shall conduct sieve analysis of samples of formation materials selected by the City of Colusa. The number of analyses required are specified in the provision supplement(s).
2. Sieve analysis shall be conducted by a firm acceptable to the City of Colusa using a set of sieve sizes previously approved by the City of Colusa.



## 2.5 DRILLING FLUID

### PART 1 - GENERAL

#### A. Description

This section describes requirements for fluid used during drilling.

#### B. Submittals

Concurrently with contract submittals, the Contractor shall provide a description of the drilling method and fluids to be used. The drilling fluid program described shall include: (1) information regarding the types of fluid to be used, (2) intended fluid weights, viscosities, sand and solids contents, (3) name of the supplier of the drilling fluid additives, and (4) name and qualifications of the mud engineer the Contractor would intend to use, if required.

#### C. Measurement and Payment

Payment for maintaining, testing, and disposal of drilling fluid shall be included in the unit prices bid for drilling (see Bidding Sheets).

### PART 2 - MATERIALS

#### A. Drilling Fluid

1. Only fresh water shall be used in the drilling fluid whether employed alone or in combination with drilling additives. All water used during drilling shall meet California State Department of Health standards for safe drinking water. Only high grade approved commercial clays or commercial chemical products in common usage in the City of Colusa for water well drilling shall be used in the make-up of any drilling fluid. Organic drilling additives shall not be used unless previously approved by the City of Colusa. Drilling with a mixture of water and unprocessed mud, clay or other material will not be permitted.
2. The drilling fluid shall possess such characteristics as are required to (a) adequately maintain the walls of the borehole to prevent caving, (b) permit recovery of representative samples of drill cuttings, (c) prevent the swelling of clay zones, (d) prevent loss of shear strength or other borehole stability problems, and (e) allow the fluid and mud cake to be readily removed from the borehole and borehole wall during placement of the gravel pack and

development of the well. All drilling fluid test equipment and procedures shall be equal to those used in the oil well drilling industry.

3. The drilling fluid shall have the following properties in accordance with API Code RP 13B (or recent modification), "Recommended Standard Procedure for Testing Drilling Fluids." In the event the Contractor cannot attain these properties, drilling shall be halted and the mud replaced.
  - a. Weight - a maximum to 80 pounds per cubic foot (10.7 pounds per gallon) during pilot borehole drilling, a maximum of 75 pounds per cubic foot (10.0 pounds per gallon) during pilot borehole reaming, and 70 pounds per cubic foot (9.4 pounds per gallon) during well completions and gravel packing.
  - b. Marsh funnel viscosity - a maximum to 50 seconds during pilot borehole drilling, a maximum of 45 seconds during pilot borehole reaming, and a maximum of 40 seconds during well completion and gravel packing.
  - c. Sand content of mud entering the pump - a maximum of five (5) percent by volume during all stages of drilling.

### PART 3 - EXECUTION

- A. The Contractor shall provide adequate baffled above ground tanks with solids control equipment, for the collection and removal of drill cuttings/solids from the fluid before re-circulation to the borehole. The mud tank capacity shall be sufficient to effectively separate drill cuttings from the fluid and keep sand and solids contents below the specified amounts. Sediment shall be removed periodically from the tank in order to maintain tank volume and keep drilling fluid properties within specifications.
- B. The Contractor shall maintain controlled drilling fluid characteristics during the entire operation of well construction. If proper control of the drilling fluid is not maintained to the satisfaction of the City of Colusa, the Contractor shall be required to retain at the Contractor's own expense a qualified drilling fluid engineer during all operations to supervise and maintain drilling fluid properties.
- C. The Contractor shall maintain the minimum viscosity of the drilling fluid that will raise cuttings and adequately condition the wall of the borehole. The Contractor shall remove all mud cake on the wall of the borehole during the development of the well or placing of the gravel.

- D. The sand content of the drilling fluid shall be measured and recorded a minimum of every four (4) hours during drilling or circulation. The sand content of the fluid returning to the borehole shall be maintained at five (5) percent (by volume), or less, at all times.
- E. In the event that drilling additives are used, the Contractor shall maintain careful mud control. Procedures must be adopted to ensure removal of these additives during the development process. The Contractor shall maintain a continuous log of mud weight, funnel viscosity, 30-minute water loss, wall cake thickness, pH and sand content. Fluid checks shall be taken at a minimum of every four (4) hours during drilling, whenever conditions appear to have changed, or if difficulties arise.
- F. The Contractor shall provide a City of Colusa-approved device or system for collection of whole representative samples of formation materials drilled. Samples collected off a shaker screen are not acceptable unless previously approved by the City of Colusa.
- G. All drilling cuttings and drilling mud shall be properly disposed by the Contractor outside the limits of work site in accordance with applicable ordinances and regulations of governmental agencies having jurisdiction. No additional compensation will be paid to the Contractor for fluid disposal or treatment prior to disposal.
- H. After the borehole has been reamed, and before the caliper survey is run, the drilling fluid shall be appropriately thinned in preparation for installation of the well casing and gravel pack.

## 2.6 DOWNHOLE GEOPHYSICAL SURVEYS

### PART 1 - GENERAL

#### A. Description

This item includes completion of downhole geophysical logs conducted in the pilot borehole by a logging firm retained by the Contractor and approved by the City of Colusa. Geophysical surveys to be completed in the pilot borehole shall as specified in the provision supplement(s).

#### B. Submittals

1. Within ten (10) days of Notice of Award, the Contractor shall submit to the City of Colusa the name and qualifications of the firm proposed for completing geophysical surveys.

2. The Contractor shall provide five (5) field copies of the surveys to the City of Colusa for interpretation upon completion. Within one week of log completion and at no additional cost, the Contractor shall provide the City of Colusa with ten (10) final copies of each survey, one mylar original of each survey, and a compact disk containing survey results in a digital format(s) approved by the City of Colusa.

C. Measurement and Payment

1. Payment for geophysical surveys will be based on the lump sum price bid (see Bidding Sheets). Payment shall include full compensation for fluid circulation, removal of drill string, operation of the drilling rig and other equipment, furnishing and operating geophysical surveying equipment as specified, field and final copies of the surveys, digital copies of the surveys, and providing whatever assistance may be required to complete the surveys.
2. There will be no additional payment for rig time and idle time while waiting for the surveying firm to arrive or while the surveys are being conducted.
3. Upon receipt of copies of geophysical surveys and results of sieve analysis, the City of Colusa may require an evaluation period up to the duration specified in the provision supplement(s) to interpret the data and prepare schedules for isolated aquifer zone testing or a final well design, as applicable. No standby time will be paid during the evaluation period. Standby time will be paid for each hour after the specified evaluation period for which the Contractor waits to receive instructions.

PART 2 - MATERIALS

Surveys completed and survey scales shall as specified in the provision supplement(s).

PART 3 - EXECUTION

- A. Upon completion of the pilot borehole, downhole geophysical surveys shall be conducted. Before conducting geophysical surveys, the Contractor shall cease drilling and circulate fluid for not less than one (1) hour.
- B. The geophysical surveys shall be conducted in the presence of the City of Colusa. The surveys shall become the property of the City of Colusa at the time the surveys are completed.

- C. The logging speed for all surveys shall be 40 feet per minute, unless otherwise approved by the City of Colusa.
- D. If a survey probe fails to descend to the completed depth of the borehole, the Contractor shall at the Contractor's own expense, re-condition the borehole to permit the probe to descend to the maximum depth drilled or other depth approved by the City of Colusa. No additional payment will be made for time required to clean or condition the borehole for logging.
- E. The Contractor shall provide whatever assistance may be necessary to complete the geophysical surveys.
- F. The Contractor shall ensure the stability of the pilot borehole during the analysis period following completion of the geophysical surveys.
- G. Within the evaluation period specified in the provision supplement(s), the City of Colusa will submit to the Contractor a written schedule for isolated aquifer zone testing. If the City of Colusa elects not to complete aquifer zone testing, the City of Colusa will submit a schedule for the final well design. Schedules submitted will be based upon an evaluation of formation samples, results of sieve analyses and the downhole geophysical surveys.
- H. If available information indicates well completion is not warranted, the City of Colusa reserves the right to terminate further work under the contract. In this event, the borehole will be destroyed in accordance with Section 2.26 of the Technical Provisions.

## 2.7 ISOLATED AQUIFER ZONE TESTING

### PART 1 - GENERAL

#### A. Description

1. This item includes installation of sampling equipment in the pilot borehole, development pumping, water quality sampling and analyses, and water level monitoring to be completed at the option of the City of Colusa in isolated aquifer zones selected by the City of Colusa. – Assume 3.
2. Requirements will vary by Contract. See the provision supplement(s) for the Contract status of this work item, the estimated maximum number of zones to be tested, and the potential range in test depths. The final number and depth of individual tests will be determined by the City of Colusa after analysis of a

lithologic log of drill cuttings, results of sieve analyses and downhole geophysical logs.

3. The Contractor shall retain the services of a qualified testing laboratory, acceptable to the City of Colusa, to complete laboratory analyses of collected water samples. Analyses of each sample shall include the chemicals specified in the provision supplement(s). Contractor shall maintain chain-of-custody information for all samples collected and submitted to the laboratory for analysis.
4. Zone sampling to be done by the “pull-back” method.
5. Samples shall be tested to meet Title 22 drinking water standards.

B. Submittals

1. Daily activity reports.
2. Results of testing in each aquifer zone including description of zones isolated (screened interval, schedule of annular fill materials installed, water production rates, water levels and water samples collected).
3. Laboratory results of water sample analyses.

C. Measurement and Payment

Payment for isolated aquifer zone testing will be based on the number of zones tested and the unit price bid per zone. No standby time will be paid during the City of Colusa’s evaluation period after receipt of the laboratory results from the Contractor or its laboratory for the last isolated aquifer zone tested. Standby time will be paid for each hour after the analysis period for which the Contractor waits to receive instructions for pilot borehole reaming and final well construction. The analysis period is specified in the provision supplement(s).

PART 2 - MATERIALS AND EQUIPMENT

A. Slotted Sampling Tool

1. The tool used to sample groundwater quality and water level in an isolated aquifer zone shall consist of a minimum 4-inch diameter mill-slotted steel pipe with 0.060-inch slots.
2. The length of the slotted pipe shall be 10 to 20 feet as approved by the City of Colusa.

3. The approximate open area of the slotted pipe shall be 5.5 square inches per foot of pipe.

B. Gravel Pack

Gravel pack materials installed around the slotted sampling tool shall be coarse-grained sand or pea gravel washed clean of fine-grained sediment.

C. Annular Seals

Fill material used to seal the annulus at the top and bottom of the slotted sampling pipe shall include bentonite and barite.

D. Air Compressor

The compressor used for air-lift pumping shall have the capacity of 750 cubic feet per minute, minimum.

E. Submersible Pump

An environmental sampling submersible pump shall be provided by the Contractor and used at the City of Colusa's option to collect groundwater samples. The pump and column pipe shall be clean and assembled using a threaded joint compound approved for environmental use.

PART 3 - EXECUTION

A. Schedule of Sampling

Upon completion of the downhole geophysical surveys, the City of Colusa will prepare a schedule of testing and sampling for specific isolated aquifer zones. The schedule will specify the number and depth of individual zones to be tested, depth intervals for gravel pack and seals, specific sampling requirements and method of pumping for sample collection (air-lift and/or submersible pump).

Assume 3 zones to be tested.

B. Construction and Testing of Individual Isolated Aquifer Zones

Figure 3 (Section P, Standard and Construction Drawings) shows a schematic diagram depicting requirements and dimensions for isolating a specific aquifer zone for testing. Testing shall commence with the deepest zone selected and proceed progressively to shallower zones until all specified zones have been tested. General procedures for zone construction and testing include:

1. Install the slotted sampling tool to the specified depth. Fill the borehole annulus with gravel pack materials to a depth of approximately 30 feet below the lowest slots of the sampling tool. Install a 10-foot thick lower bentonite/barite seal in the annulus above the gravel pack. Install gravel pack materials above the lower annular seal to a depth of approximately 20 feet above the upper-most slots of the sampling tool. Install a 5-foot thick layer of plaster sand. Install a 10-foot thick upper bentonite/barite seal in annulus above the plaster sand. Install a 20-foot thick layer of gravel pack materials in the annulus above the upper seal. Fill materials shall be installed in the annulus using a tremie pipe and City of Colusa-approved procedures. Upon completion, the Contractor shall allow sufficient time (minimum of 12 hours) for the bentonite/barite seals to hydrate and setup before beginning air-lift development.
2. Install an air line inside the sampling tool string to a depth of at least 150 feet below the static water level in the isolated aquifer zone. Adjust the depth of the air-line as needed to accommodate conditions encountered.
3. Record the static water level in the sampling tool prior to starting air-lifting operations.
4. Develop the isolated aquifer zone by airlifting methods for a minimum of 6 hours or until the discharge water is essentially free of drilling mud and fine sediment and the specific conductance stabilizes to the satisfaction of the City of Colusa. Collect and preserve water samples at one-half hour intervals during air-lifting using containers acceptable to the City of Colusa.
5. Record the final stabilized static water level in the isolated zone after air-lift pumping has stopped.
6. At the City of Colusa's option, install a submersible pump inside the sampling tool string to a depth specified by the City of Colusa (generally on the order of 150 feet below the static water level in the zone tested). Record the static water level. Commence pumping and pump the isolated aquifer zone for a minimum of 2



hours after the discharge water clears and/or the specific conductance, pH, and temperature of the discharge water stabilizes to the satisfaction of the City of Colusa. Measure and record the pumping rate and pumping water level. Assist the City of Colusa with sample collection as requested.

7. After a final water sample is collected, cease pumping and allow the water level in the isolated zone to stabilize. Measure and record the stabilized water level. Remove the sampling pump and repeat the above procedures to construct and test the next isolated aquifer zone.

C. Analysis of Water Samples

1. The Contractor shall be responsible for the collection, storage, transport and analysis of groundwater samples during isolated aquifer zone testing. Laboratory analyses of water samples shall include the chemicals listed and be completed within the time period specified in the provision supplement(s).
2. Laboratory results shall be provided to the City of Colusa in paper copy and City of Colusa- approved digital formats on a compact disk.
3. The City of Colusa may require an evaluation period up to the time specified in the provision supplement(s). The evaluation period shall begin following City of Colusa receipt of laboratory analyses from all aquifer zones tested. No standby time shall accrue during this period.
4. After evaluating the water sample results, the City of Colusa will submit to the Contractor a final schedule of well completion.

2.8 BOREHOLE SEAL

PART 1 - GENERAL

A. Description

1. This work item includes installing a grout seal, at the City of Colusa's option in the lower (bottom) portion of the borehole.
2. Requirements will vary by Contract. The work item status and tentative seal depth are specified in the provision supplement(s) and Bidding Sheets. The final seal depth and thickness will be specified in the final well design submitted to the Contractor by the City of Colusa after evaluation of the lithologic log, geophysical surveys and isolated aquifer zone testing results, as applicable.

B. Submittals

1. Daily activity logs.
2. Cement weigh tickets.
3. Record of actual depth and thickness of seal installed.

C. Measurement and Payment

Payment for installation of a pilot borehole seal shall be at the lump sum price bid (see Bidding Sheets).

PART 2 - MATERIALS

Seal

Cement grout used for the borehole seal shall be a non-shrinking cement mixture approved by the City of Colusa. The grout shall be supplied by a qualified subcontractor.

PART 3 - EXECUTION

- A. The borehole seal may be installed in the pilot borehole after completion of the geophysical surveys or following completion of reaming operations. If installed after reaming, the Contractor shall re-enter the borehole with the pilot hole bit to clean out that portion of the borehole to be sealed.
- B. Cement grout shall be pumped in the borehole using a tremie pipe. The bottom of the tremie pipe shall remain submerged during the entire grouting operation.

2.9 FINAL REAMED  
BOREHOLE

PART 1 - GENERAL

A. Description

This item includes reaming the pilot borehole to the final borehole diameter(s) and depth(s) specified by the City of Colusa in the final well design.

B. Related Work Specified Elsewhere

1. Drilling Fluid - Section 2.05.

2. Contractor Equipment - Section 1.04 (this provision) and Special Conditions.

C. Submittals

Daily activity reports.

D. Measurement and Payment

Payment for reaming operations shall be for the number of linear feet of pilot borehole reamed to the specified diameter(s) (see Bidding Sheets). Measurement for payment for borehole reaming shall be from the bottom of the conductor casing to the bottom of the interval reamed as verified by the caliper survey and approved by the City of Colusa.

PART 2 - MATERIALS

Drilling Fluid

The Contractor shall maintain controlled drilling fluid characteristics during the entire reaming operation as specified in Section 2.05.

PART 3 - EXECUTION

- A. Upon receipt of a written final well design from the City of Colusa, the Contractor shall ream the pilot borehole to the depths and maximum diameters specified.
- B. A record shall be kept showing any variation in the addition and amount of drilling fluid or water required during the drilling operation. The depths at which such changes are required shall be shown in the daily reports.
- C. Upon completion of the reaming operations, a caliper survey shall be run to verify the final diameters and depths reamed.

## 2.10 CALIPER SURVEY

### PART 1 - GENERAL

#### A. Description

This item includes a caliper survey to be conducted by a firm retained by the Contractor and approved by the City of Colusa. The caliper survey shall accurately measure the final diameter(s) of the reamed borehole.

#### B. Submittals

1. Within ten (10) days of the Notice of Award, the Contractor shall submit to the City of Colusa, the name and qualifications of the firm proposed to conduct the caliper survey.
2. The Contractor shall provide five (5) field copies of the caliper survey to the City of Colusa for interpretation upon completion. Within one (1) week of survey completion, the Contractor shall provide the City of Colusa with ten (10) final copies of the caliper survey, one mylar original, and survey results in a City of Colusa-approved digital format on a compact disk.
3. Based upon an examination of caliper survey results, the Contractor shall estimate and report to the City of Colusa the volumes of gravel pack and other annular fill materials required to complete the final well design.

#### C. Measurement and Payment

1. Payment for the caliper survey will be based on the lump sum price bid (see Bidding Sheets). Payment shall include full compensation for fluid circulation, removal of the drill string, operation of the drilling rig and other equipment, furnishing and operating caliper survey equipment as specified, and providing whatever assistance may be required to complete the caliper survey.
2. Upon receipt of field copies of the caliper survey, the City of Colusa may require an evaluation period of up to five (5) days, to review and approve survey results. No standby time will be paid during this evaluation period. Standby time will be paid for each hour after the initial evaluation period for which the Contractor waits for City of Colusa approval of caliper survey results.

## PART 2 - MATERIALS

The caliper equipment used to perform the survey shall have a minimum of three arms and be capable of measuring a borehole diameter to 48 inches. The horizontal scale for the caliper plot shall be four inches of borehole diameter per inch of plot.

## PART 3 - EXECUTION

- A. Upon completion of reaming, and prior to setting the bottom pilot borehole grout seal if required, the caliper survey shall be conducted. Before starting the survey, the Contractor shall ensure the borehole is free of loose drill cuttings by circulating the drilling fluid for a period of at least one (1) hour.
- B. The caliper survey shall become the property of the City of Colusa at the time the survey is completed. The survey will be conducted in the presence of the City of Colusa.
- C. The logging speed for the caliper survey shall be 40 feet per minute, unless approved otherwise by the City of Colusa.
- D. If the caliper survey shows the reamed borehole to be less than the specified diameter(s) at any point or the final borehole is less than the specified depth, the borehole shall be re-reamed or re-drilled and re-surveyed at the Contractor's expense.
- E. The Contractor shall provide whatever assistance may be necessary to complete the caliper survey.
- F. During the evaluation period following completion of the caliper survey, the Contractor shall remain continuously responsible for the integrity of the final reamed borehole. The Contractor shall take all steps necessary to stabilize and preserve the borehole.

## 2.11 WELL CASING AND ACCESSORY TUBING

### PART 1 - GENERAL

#### A. Description

1. This item includes the supply and installation of blank and screened well casing, end cap, cover plate, gravel feed tube, sounding tube(s), and air vent tube required by the final well design. Well construction materials are specified in the provision supplement(s).
2. A final schedule of well casing and tubing will be prepared by the City of Colusa and submitted to the Contractor upon completion of analyses of a lithologic log and sieve analyses of drill cuttings, downhole geophysical surveys and results of isolated aquifer zone testing.

#### B. Submittals

The Contractor shall submit certified test reports and other documentation necessary to demonstrate compliance with (1) the physical and chemical properties of the steel used in the manufacture of blank and screened well casing, and all accessory tubing delivered on-site, and (2) diameter, wall thickness and slot dimensions (as applicable) of blank and screened well casing, and accessory tubing specified in the final well design.

#### C. Measurement and Payment

1. Payment for installation of blank pump house casing will be based on measurement of the vertical feet of casing installed from the ground surface complete and in place, exclusive of other blank and screened well (see Bidding Sheets).
2. Payment for installation blank well casing (below the pump house casing) will be based on measurement of the vertical feet of well casing installed, complete and in place, exclusive of blank pump house casing and screened well casing (see Bidding Sheets).
3. Payment for installation of screened well casing will be based on measurement of the vertical feet of screened well casing installed, complete and in place,

exclusive of the blank pump house casing and other blank well casing (see Bidding Sheets).

4. Payment for the sounding tube(s) will be based on measurement of the vertical feet of tubing installed from the ground surface complete and in place, including the spliced section to connect a sounding tube to the well casing (see Bidding Sheets).
5. Payment for the permanent gravel feed tube will be based on the vertical feet of tubing installed from the ground surface, complete and in place (see Bidding Sheets).
6. Payment for the air vent tube will be based on the lump sum price bid.
7. Payment for the blank and screened well casing, sounding tube(s), air vent tube and permanent gravel feed tube shall include supply and installation of welding collars, centralizers, cover plate, end cap, tubing caps and all equipment, materials and labor required for successful installation at the specified depths.

## PART 2 - MATERIALS

### A. Blank Well Casing

1. Blank Pump House Casing. Blank pump house casing shall be provided as specified in the provision supplement(s), with welded collars attached. A top cover plate shall be fabricated using steel with the same physical and chemical properties as the blank casing.
2. Blank Well Casing. Blank well casing (installed below the pump house casing) shall be provided as specified in the provision supplement(s), with welded collars attached.
3. The casing shall be fabricated in lengths not less than 10, 20 or 40 feet. Random lengths of casing are not permitted. The casing shall be spiral welded or containing one longitudinal seam parallel to the casing axis and not more than one circumferential seam in 10 feet, or as otherwise approved by the City of Colusa. All spiral and longitudinal and circumferential seams shall be butt- welded with shielded arc electrodes to assure full fusion with the parent metal and complete penetration.
4. The blank well casing shall have the same I.D., thickness, physical and chemical properties as the screened well casing.

5. The ends of each casing joint shall be machined perpendicular to the casing axis to ensure the straightness of each assembled section. Joints shall be furnished with collars for welding. Collars shall be of the same thickness and have the same physical and chemical properties as the corresponding casing section. The collars shall be rolled to fit the outside diameter of the casing and factory welded to one end. Three equally spaced 5/16-inch diameter alignment holes shall be provided in each collar to ensure proper matching of the ends upon assembly.
6. All welding shall be done with shielded arc electrodes compatible with the casing material and shall be performed by certified welders in accordance with American Welding Society Standards.
7. All casing materials shall be new.

B. Screened Well Casing

1. The screened well casing shall be the louvered type with machine made openings that are horizontal to the axis of the casing with an aperture facing downward. The louvered screen shall be Roscoe Moss Ful Flo Shutter Screen.
2. The well screen shall be provided as specified in the provision supplement(s), with welded collars attached. The casing shall be spiral welded or containing one longitudinal seam parallel to the casing axis and not more than one circumferential seam in 10 feet, or as otherwise approved by the City of Colusa. All spiral and longitudinal and circumferential seams shall be butt-welded with shielded arc electrodes to assure full fusion with the parent metal and complete penetration.
3. For bidding purposes, the aperture size of the well screen is specified in the provision supplement(s). The final aperture size will be selected after examination of the lithologic log and sieve analyses of drill cuttings and the downhole geophysical surveys and will be specified in the final well design prepared by the City of Colusa.
4. The ends of each casing joint shall be machined perpendicular to the casing axis to ensure the straightness of each assembled section. Joints shall be furnished with collars for welding. Collars shall be of the same thickness and have the same physical and chemical properties as the corresponding screen section. The collars shall be rolled to fit the outside diameter of the screen and factory welded to one end. Three equally spaced 5/16-inch diameter alignment



boreholes shall be provided in each collar to ensure proper matching of the ends upon assembly.

5. The well screen shall be factory assembled in 10-feet, 20-feet or 40-feet lengths as specified by the City of Colusa.
6. The Contractor shall ensure the inside diameter of the well screen is the same as the inside diameter of the blank well casing.
7. All welding shall be done with shielded arc electrodes compatible with the casing material and shall be performed by certified welders in accordance with American Welding Society Standards.
8. All well screen materials shall be new.

C. Casing Centralizers and Bottom End Cap

Casing centralizers and bottom end cap shall be provided as shown on the plans. The centralizers and bottom end cap shall be of the same physical and chemical properties as the well casing.

D. Sounding Tube(s)

The sounding tube(s) shall be as specified in the provision supplement(s).

E. Air Vent Tube

The air vent tube shall be as specified in the provision supplement(s).

F. Permanent Gravel Feed Tube

The permanent gravel feed tube shall be as specified in the provision supplement(s).

G. Welding Electrodes

The following electrodes shall be used for welding various casing materials:

Mild Steel	E-6011 or E-7018
Copper-bearing Steel	E-6011 or E-
7018 Low Alloy Steel (ASTM A 242 or equivalent)	E-7018
Stainless Steel (Type 304L)	E-308L-16

Stainless Steel (Type 316L)

E-316L-16

Depending on the wall thickness, the following electrode sizes shall apply:

<u>Wall Thickness</u>	<u>Electrode Size</u>
1/8-inch	1/8-inch
3/16- to 1/4-inch	5/32- to 3/16-inch
Over 1/4-inch	3/16- to 1/4-inch

### PART 3 - EXECUTION

#### A. General

1. Installation of well casing and screen shall commence upon completion of a City of Colusa-approved caliper survey of the reamed borehole and after all well construction materials delivered on site have been examined and approved by the City of Colusa for compliance with the final well design.
2. The final arrangement of the accessory tubing (sounding tube, gravel feed tube and air vent tube) and temporary tremie pipe around the well casing shall be approved by the City of Colusa prior to installation of well casing.

#### B. Joints

**All field joints shall be properly lap or butt-welded during installation with a minimum of two continuous passes per circumference.** All field welding shall be performed in accordance with American Welding Society Standards by a certified welder.

#### C. Centralizers

Three steel guides shall be welded to the well casing string 120 degrees apart at intervals of not more than 100 feet to centralize and hold the casing in the proper position until the gravel is in place. The first set of guides shall be placed 5 feet from the bottom of the casing. Guides shall be fabricated and placed as shown in the plans. Only like metals shall be welded on the casing.

D. Gravel Feed Tube

A permanent gravel feed tube shall be installed in the reamed borehole prior to installation of the well casing. The bottom of the tube shall be placed below the planned top of the gravel pack as specified in the final well design. The top of the gravel feed tube shall extend above the ground surface and be completed as specified in the provision supplement(s).

E. Construction Tremie Pipe

A temporary construction tremie pipe shall be installed in the reamed borehole prior to installation of well casing. The tremie pipe shall be used to install gravel pack, annular seal and sanitary seal materials in the annulus between the well casing and borehole. The tremie pipe shall be completely removed after placement of the upper annular seal.

F. Air Vent Tube

An air vent tube shall be installed integrally with the sounding tube as shown in the plans and as specified in the provision supplement(s).

G. Sounding Tubes

1. Sounding tubes shall be welded to a cut port in the well casing as shown in the plans and as specified in the final well design and the provision supplement(s). Alternatively, a special entry port may be manufactured into the uppermost section of conductor casing.
2. During installation, sounding tubes shall be secured to the inside of the well casing at 40-foot intervals by welding a ½-inch by 1-inch steel bar to the casing and welding a sounding tube to the bar.
3. Sounding tubes shall enter the well casing at the depths specified in the final well design. At the point of entry, a sounding tube shall be securely welded to the casing in a manner and at an angle as shown in the plans and as approved by the City of Colusa. All rough cut edges shall be ground smooth prior to completing the splice. The spliced section shall be reinforced as needed to prevent collapse of the well casing.
4. The Contractor shall be solely responsible for ensuring the structural integrity of the external sounding tube and spliced section of well casing.

#### H. Blank and Screened Well Casing

1. Prior to casing installation, the Contractor shall inspect for and remove any tags, labels or other deleterious material attached to the interior or exterior of the blank and screened well casing.
2. The well casing string assembled shall be suspended in tension from the surface by means of an appropriate hanger or clamp. Steel bars (clamp anchors) pre-welded to the casing to hold the casing clamp in place during casing installation, shall be removed prior to lowering a new casing section into the borehole. The use of float plugs to land and set casing will not be permitted. The casing string shall be plumb and centered in the borehole. The bottom of the casing shall not rest on the bottom of the borehole.
3. If for any reason the casing cannot be landed in the correct position, or at a depth acceptable to the City of Colusa, the Contractor shall rectify the situation by either (1) removing the casing, re-reaming the borehole and re-installing the casing, or (2) constructing another well in accordance with the specifications, plans and final well design at a location immediately adjacent to the original well. All such remedial work shall be at no additional cost to the City of Colusa. The borehole of the abandoned well shall be properly destroyed at the Contractor's expense in accordance with Section 2.26.
4. If any of the casings should collapse or be damaged prior to well completion, they shall be withdrawn and replaced at the Contractor's expense.
5. All work required to be repeated, and all additional materials, labor and equipment required, shall be furnished at the expense of the Contractor and no claim for additional compensation shall be made or be allowed therefore, except as specifically provided herein.
6. Alignment holes in all collars at casing joints shall be welded completely closed to prevent the entry of water from outside the casing.
7. The top of the well casing string shall extend approximately 24 inches above the ground surface.
8. The bottom of the permanent gravel feed tube shall be placed approximately 20 feet below the top of the gravel pack. The top of the tube shall extend approximately 18 inches above ground surface.

9. Following casing installation, the top of the well casing shall be covered with a welded steel plate at all times when personnel are not on the site.

## 2.12 GRAVEL PACK

### PART 1 - GENERAL

#### A. Description

This item covers the supply and installation of gravel pack materials in the annulus adjacent to the blank and screened well casing.

#### B. Submittals

1. Initial description and recent certified sieve analysis of gravel pack materials to be used for well construction. The sieve analysis shall be submitted to the City of Colusa for approval at least three (3) days prior to the anticipated date of gravel shipment from the supplier.
2. Copies of weigh tickets for gravel delivered on-site.
3. Measurement of the total volume of gravel installed in the well annulus.

#### C. Measurement and Payment

Payment for the gravel pack will be based on measurement of the vertical feet of gravel installed in the annulus from the bottom of the borehole up and includes payment for any consolidation of the gravel pack which occurs during well development (see Bidding Sheets).

### PART 2 - MATERIALS

#### A. Gravel Pack

1. For bidding purposes, the gravel pack shall be as specified in the provision supplement(s).
2. The final gradation and uniformity required shall be specified in the final well design submitted by the City of Colusa after examination of the lithologic log and sieve analyses of drill cuttings.

3. All gravel or coarse-grained sand for packing shall be hard, water-worn, and washed clean of silt, fine sand, dirt, and foreign matter. Crushed gravel will not be accepted. The gravel shall be well-rounded and graded, and subject to the approval of the City of Colusa.
4. The City of Colusa may elect to have a certified testing laboratory perform sieve analyses of the gravel delivered on-site to verify conformance with the final gravel specification. Failure to meet the gradation specified in the final well design shall be grounds for rejection. If rejected, the Contractor shall correct the gradation to meet City of Colusa requirements.
5. The gravel shall be delivered on-site as specified in the provision supplement(s) and shall be protected and kept free of all foreign matter.

### PART 3 - EXECUTION

- A. Prior to placement of the gravel pack, the drilling fluid shall be thinned with clean water (freshwater down the gravel feed tube).
- B. Muddy borehole fluid displaced during gravel packing shall be conveyed to the on-site Baker Tanks for clarification prior to discharge.
- C. Baker Tanks used for fluid clarification shall be setup prior to commencing well construction.
- D. Contractor shall provide gravel tremie pipe in lengths sufficient to ensure the drop during placement of the gravel is acceptable to the City of Colusa. Five and ten foot lengths of pipe shall be available as needed.
- E. The gravel pack shall be installed in the annular space between the reamed borehole and well casing through a construction tremie pipe from the bottom of the borehole. A circulating system with one or more positive displacement pumps utilizing fresh water shall be used for the purpose of introducing the gravel into the annulus. Under no circumstances will the gravel pack be allowed to “free-fall” down into the annular space.
- F. A device approved by the City of Colusa shall be used to sound the level of the gravel during its placement.
- G. During placement, the gravel shall be disinfected as specified in the provision supplement(s).

- H. After the gravel pack has been placed to the depth specified by the City of Colusa, all rock, sand, gravel, and foreign materials shall be removed from the casing by bailing.
- I. The Contractor shall record the volume of gravel installed. The volume shall not be less than the calculated volume of the annular space between the casing and the borehole wall based on the caliper survey. A significant discrepancy may be grounds for rejection of the well by the City of Colusa.
- J. After installation of the gravel pack, an upper annular grout seal shall be installed as specified in the final well design and the provision supplement(s).

## 2.13 ANNULAR SEALS

### PART 1 - GENERAL

#### A. Description

- 1. This item includes placement of annular seals adjacent to blank sections of the well casing. Seals will be installed at the option of the City of Colusa as specified in the final well design.
- 2. Requirements for annular seals will vary by Contract (some contracts may not require seals).
- 3. For bidding purposes, tentative seal requirements are specified in the provision supplement(s), and the Bidding Sheets.

#### B. Submittals

- 1. Daily activity logs.
- 2. Material certification reports.
- 3. Record of actual depth(s) of placement and volume(s) of annular seal materials placed in the annulus.

#### C. Measurement and Payment

Payment for annular seals will be based on the unit price bid and number of 10-foot seals installed (see Bidding Sheets).

## PART 2 - MATERIALS

Annular seals shall consist of a materials mixture specified in the provision supplement(s).

## PART 3 - EXECUTION

- A. A seal shall be installed by pumping the seal mixture through a tremie pipe. The pipe shall extend from the ground surface to the bottom of the interval to be sealed. The seal shall be pumped in place from the bottom of the interval to the top in a continuous operation. The Contractor shall sound the annulus to verify the starting and ending depths of a seal after each load of seal mixture has been pumped.
- B. The Contractor shall keep a record of the volume of seal mixture used. The volume shall not be less than the calculated volume of the annular space between the reamed borehole and the well casing.

### 2.14 UPPER ANNULAR GROUT SEAL

#### PART 1 - GENERAL

##### A. Description

- 1. This item includes installation of a grout seal in the upper portion of the annulus between the pump house casing and borehole wall or pump house casing and conductor casing from the top of the gravel pack to the ground surface.
- 2. Requirements for an upper annular grout seal will vary by Contract. Contract-specific requirements are summarized in the provision supplement(s).
- 3. For bidding purposes, a tentative seal depth is specified in the provision supplement(s) and Bidding Sheets. (50 ft and 100 ft.) The final depth of the seal, if required, will be specified in the final well design submitted by the City of Colusa after evaluation of the lithologic log and sieve analyses of drill cuttings, geophysical surveys and results of isolated aquifer zone testing.

##### B. Submittals

- 1. Daily activity logs.
- 2. Cement weight tickets.



3. Record of depth of placement and volume of grout placed in the annulus.

C. Measurement and Payment

Payment for the sanitary seal will be based on measurement of the vertical feet of seal installed (see Bidding Sheets). No standby time shall accrue or be paid for a 24-hour idle period following seal placement required to allow the grout seal to set.

PART 2 - MATERIALS

The material used for the grout seal shall be as specified in the provision supplement(s).

PART 3 - EXECUTION

- A. The grout seal shall be installed in the annulus in a sufficient number of pours to preclude collapse of the pump house casing. Prior to installing the seal, a two-foot thick layer of medium-grained sand shall be pumped into place at the top of the gravel pack using a tremie pipe.
- B. The grout for the seal shall be pumped into the annulus between the pump house casing and borehole wall using a tremie pipe. The pipe shall extend from the ground surface to the bottom of the zone to be grouted. Grout shall be placed from bottom to top in a continuous operation unless determined by the Contractor that a staged placement is required to prevent casing collapse. The grout pipe shall be raised slowly as grouting proceeds. The discharge end of the pipe shall remain submerged in the grout and the grout pipe maintained full at all times until grouting is completed.
- C. Installation of the tremie pipe required for grouting and placement of the seal shall not commence until the City of Colusa is on-site.
- D. The Contractor shall be responsible for determining the collapse potential of the well casing during grouting and shall take whatever precautions are necessary to prevent casing collapse. In the event the casing collapses prior to completion of seal installation, the Contractor shall take whatever steps are necessary to reopen the well and place the seal as required by the final well design. Any such remedial action shall be conducted at the Contractor's expense.
- E. The Contractor shall keep a record of the actual depth and volume of grout installed. The volume shall not be less than the calculated volume of the annular space between the conductor casing or reamed borehole and the pump house casing.

- F. The Contractor shall not operate any heavy equipment on-site during a 24-hour period immediately following placement of the seal.

## 2.15 MECHANICAL WELL DEVELOPMENT

### PART 1 - GENERAL

#### A. Description

This item includes development of the well by mechanical methods (air-lift swabbing) or other approved method(s).

#### B. Submittals

The Contractor shall maintain a daily record of development activities. The record shall include: (1) depth interval and time developed, (2) measurements of settlement of the gravel pack, (3) volume of gravel added through the gravel feed tube, (4) volume of sediment bailed from the bottom of the well, (5) static water level, (6) approximate well discharge during air-lifting, and total hours developed daily.

#### C. Measurement and Payment

1. Payment for well development will be made at the unit price bid per hour (see Bidding Sheets).
2. The time required for well development will be recorded by the hour with 15-minute intervals as the smallest unit of recorded time. The time recorded for payment shall commence when the equipment installed in the well is placed in operation and shall end when development is stopped at the direction of the City of Colusa. No additional payment will be made running equipment into or out of the well. The time required to run equipment into and out of the well shall be anticipated by the Contractor and included in the hourly rates bid for well development (see Bidding Sheets).
3. No payment will be made for delays resulting from: (a) equipment stuck in the borehole, (b) equipment breakdown, (c) arranging major drilling, pumping or testing apparatus, or (d) failure to conduct the operations in a diligent and workmanlike manner by which the desired results could ordinarily be expected.
4. No additional payment shall be made for gravel added to the annulus as the gravel pack settles.

## PART 2 - MATERIALS

### A. Swab

Swabbing of the well shall be done with close fitting single and double swabs whose outside diameter of the surge blocks shall not be more than 1/8-inch smaller than the inside diameter of the screen section, unless approved otherwise by the City of Colusa.

### B. Water Storage Tanks and Discharge Piping

The Contractor shall provide storage tanks (described in Section 1.04) for clarification of development water prior to discharge to the point specified in the Special Conditions.

The Contractor shall provide temporary discharge piping as needed to convey clarified development water to the point of discharge.

### C. Air Compressor

The Contractor shall provide an air compressor of adequate capacity in both volume (CFM) and pressure (PSI) to maintain air-lifting efficiency at all depths during mechanical development.

## PART 3 - EXECUTION

Contractor shall not commence development until solids settlement, discharge and sound control facilities are installed to the satisfaction of the City of Colusa.

Mechanical development by simultaneous airlifting and swabbing shall commence within 24 hours after completion of the idle period following placement of the upper annular grout seal. Development shall be completed in two stages as described below.

### A. Stage One - Initial Development with Single Swab

1. Initial mechanical development shall be completed with an open-ended single swab attached to the end of the drill pipe.
2. Swabbing shall be completed to remove sediment and heavy fluids from the well casing.

3. The tool shall be moved up and down three to four times in a section of well screen while airlifting. After working the tool to the bottom of the well, airlifting shall continue until all sediment is removed.

B. Stage Two - Development with a Double Swab

1. Development with a double swab shall commence immediately following completion of development with a single swab.
2. The double swab tool shall consist of a perforated steel pipe, 10 to 20 feet in length, fitted with rubber packer assemblies at the top and bottom. The bottom of the perforated pipe shall be capped.
3. Simultaneous airlifting and swabbing using the double-swab tool shall commence in the upper-most screened interval and proceed to the lower-most screened interval. Each screened interval shall be swabbed and airlifted in 20-foot increments until the discharge water becomes substantially clear as determined by the City of Colusa. Approximately 2 1/2 to 3 hours are anticipated for each 20-foot increment of screened well casing
4. Development in each 10- to 20-foot increment of screened well casing shall include raising and lowering the double swab tool three to four times or more in a shorter section of the screened well casing as needed to produce sediment- filled discharge water while airlifting continues. Air-lift swabbing shall be followed by a period of airlifting without swabbing until the discharge water clears. This process shall be repeated until water produced from the 10- to 20-foot section of screened well casing becomes substantially clear and no additional settlement of the gravel pack is observed. Upon completion, the dual-swab tool shall be moved to the next 10- to 20-foot section of screened well casing and the process repeated until all screened intervals have been fully developed.
5. Upon completion of mechanical development, the well shall be accurately sounded in the presence of the City of Colusa to determine the level of accumulated sediment in the well. The sediment level shall be recorded on the Driller's daily activity log. All accumulated sediment shall be bailed from the well prior to installing the temporary test pump.

## 2.16 CHEMICAL DEVELOPMENT

### PART 1 - GENERAL

#### A. Description

3. This item includes introduction of chemicals to augment initial (mechanical) development of the well (Section 2.15). A chlorine solution and clay dispersing agent shall be introduced and swabbed into the well and gravel pack in successive stages.
4. Chemical development will be completed, in whole or in part, at the option of the City of Colusa.
5. This item applies to wells constructed using bentonite-based drilling fluids only.

#### B. Submittals

1. Daily activity log.
2. Descriptions and quantities of chemicals added to the well during development.

#### C. Measurement and Payment

1. Payment for chemicals introduced into the well shall be at the unit price per gallon bid (see Bidding Sheets).
2. Payment for time required to swab the chemicals into the well and airlift the chemicals from the well shall be at the price per hour bid for mechanical well development (see Bidding Sheets and Section 2.15). No standby time shall accrue or be paid for idle time required to allow the chemicals to remain in well for the periods specified.

### PART 2 - MATERIALS

#### A. Chlorine Solution

See provision supplement(s) for assumed quantity and concentration of chlorine solution per 20 feet of well screen.

B. NW-220

See provision supplement(s) for assumed quantity of NW-220 solution required per 20 feet of well screen.

PART 3 - EXECUTION

A. If completed, chemical development shall be conducted in two stages and shall be integrated with mechanical well development.

B. Stage One - Chlorination

1. At the option of the City of Colusa, a 10 percent chlorine solution shall be introduced into the well upon completion of stage one of mechanical development using a double-swab tool.
2. A pre-mixed solution of chlorine and water shall be swabbed into the screened intervals of the well from the bottom of the well to the top.
3. The chlorine solution shall remain in the well for a minimum period of 12 hours, or as approved by the City of Colusa. Following the idle period, the Contractor shall use the double-swab tool to remove the chlorine solution from the well by airlifting.

C. Stage Two - Introduction of Clay-dispersing Agent (NW-220)

1. At the option of the City of Colusa, introduction of NW-220 shall commence immediately upon completion of removal of the chlorine solution from the well. NW-220 shall be introduced and swabbed into each 10-foot section of well screen for a period of 30 minutes (or other period approved by the City of Colusa) using a double-swab tool. Upon completion of swabbing, the NW-220 shall be allowed to stand in the well for a period of 24 hours, or other period approved by the City of Colusa.
2. After the idle period, mechanical well development using a double-swab tool shall continue in accordance with Section 2.15.

2.17 MOBILIZATION AND DEMOBILIZATION OF TEST PUMP AND APPURTENANCES

PART 1 - GENERAL

A. Description

This item includes mobilization and demobilization of equipment, materials and personnel for pumping development and well production tests. For bidding purposes, an estimated depth of the pump intake is specified in the Bidding Sheets. A final depth will be specified in the final well design submitted by the City of Colusa after evaluation of the lithologic log, sieve analyses of drill cuttings, geophysical logs, and results of isolated aquifer zone testing, as applicable.

B. Submittals

1. Daily activity log.
2. Record of pump type, diameter, capacity range, intake depth, number of bowls.

C. Measurement and Payment

Payment for mobilization and demobilization shall be made at the lump sum price bid (see Bidding Sheets).

PART 2 - MATERIALS

A. Test Pump

1. The Contractor shall furnish, install and upon completion of testing remove a deep well turbine pump powered by diesel or gasoline. The prime mover shall be a variable-speed type equipped with suitable throttling devices to control the well discharge within a range specified by the City of Colusa. The prime mover shall meet all noise control requirements during development and test pumping.
2. The pump capacity shall be not less than the maximum capacity specified in the provision supplement(s) against the total head required to convey water to the discharge tanks for water clarification.
3. The pump shall not be equipped with a foot valve.
4. The depth of the pump intake shall be as specified in the provision supplement(s), unless specified otherwise by the City of Colusa in the final well design.
5. The pumping unit and engine shall be capable of continuous operation without interruption for a period of 72 hours.

B. Temporary Access Tube for Flow Meter Survey

The Contractor shall furnish and install a temporary access tube between the well casing and pump column to permit entry and removal of equipment for the flow meter survey specified in Section 2.21. The I.D. of the access tube shall be sufficient to accommodate flow meter equipment planned for use by the survey subcontractor. The access tube shall be placed at a depth at least 10 feet above the top of screen, or other depth specified by the City of Colusa.

C. Discharge Piping and Appurtenances

1. Discharge piping shall be provided for the pumping unit and be of sufficient size and length to conduct water to the point of discharge (see Special Conditions).
2. The Contractor shall provide a flow control (butterfly) valve and dual-reading flow meter or other approved devices to accurately control, maintain and measure the rates of well discharge to within 10 percent of the discharge(s) specified by the City of Colusa.

D. Centrifugal Sand Separating Meter

The Contractor shall provide a meter for measuring the sand content of the discharge water. Sand production shall be measured using a centrifugal sand separating meter (Rossum Centrifugal Sand Sampler, or equivalent) as described in the Journal of American Water Works Association, Volume 46, No. 2, February 1954.

E. Water Level Sounder and Air Line

The Contractor shall furnish an electrical depth gauge capable of indicating changes in the well water level to the nearest one-tenth foot and shall furnish and install an air line with direct reading gauge calibrated in feet. The Contractor shall provide whatever assistance may be required by the City of Colusa for monitoring well water levels.

PART 3 - EXECUTION

- A. Prior to installing the test pump, the bottom of the well shall, in the presence of the City of Colusa, be bailed or pumped clean of any sediment.
- B. A temporary access tube of suitable I.D. shall be installed between the well casing and pump column to facilitate completion of a flow meter survey. The access tube shall be readily accessible during testing and located a safe distance from the pump driveline.



**The Contractor shall notify the City of Colusa in advance of placement of the access tube so a City of Colusa Representative can be on site to verify the installed depth.**

- C. Upon completion of testing and after removal of the test pump, the Contractor shall, in the presence of the City of Colusa, remove any oil (e.g., pump lubricating oil) from the water surface. An acceptable method of removal shall be to lower, via a cable, an oil absorbent “sock” or similar material designed to absorb spilled oil.
- D. After removal of the test pump and any lubricating oil from the well, the Contractor shall, in the presence of the City of Colusa, sound the depth of the well and record the depth to which sediment has accumulated as a result of test pumping. The well shall be then bailed or pumped clean of all sediment and debris.

## 2.18 PUMPING DEVELOPMENT

### PART 1 - GENERAL

#### A. Description

This item includes development of the well by surge pumping using a test pump.

#### B. Submittals

Daily log of pumping development including static water level, totalizer readings, well discharges, pumping water levels, specific capacities, sand content, description of water discharged and hours pumped.

#### C. Measurement and Payment

1. Payment for pumping development will be made at the unit price per hour bid (see Bidding Sheets).
2. The time required for well development will be recorded by the hour with 15-minute intervals as the smallest unit of recorded time. The time recorded for payment shall commence when the equipment installed in the well is placed in operation and shall end when pumping is stopped. Time required to run equipment into and out of the well shall be included in and paid for as described in Section 2.17 (see also the Bidding Sheets).
3. No payment will be made for delays resulting from: (a) equipment stuck in the borehole, (b) equipment breakdown, (c) arranging major drilling, pumping or

testing apparatus, or (d) failure to conduct the operations in a diligent and workmanlike manner by which the desired results could ordinarily be expected.

4. No additional payment shall be made for gravel added to the annulus as the gravel pack settles during development.

PART 2 -  
MATERIALS

Requirements for the test pump, discharge line, and other equipment for pumping development are described in Section 2.17, Mobilization and Demobilization of Test Pump and Appurtenances.

PART 3 -  
EXECUTION

- A. Well development using the test pump shall commence after completion of initial development by air-lift swabbing and pumping. Once started, development pumping shall proceed on a continuous basis at a daily work schedule approved by the City of Colusa.
- B. The well shall be developed by intermittent pumping and surging at an initial rate approved by the City of Colusa and continued until the water is clear. Surging shall allow water to flow back through the bowls with free backspin and through the casing perforations. The pump shall then be started and stopped several times and then pumped at the current rate until the water is clear. The procedure shall be repeated at City of Colusa approved discharge increments up to the maximum pump or well capacity, as specified by the City of Colusa.
- C. During initial pumping development, water clarification may be required in on-site water storage tanks to allow for settling of sediment prior to conveying the water to the specified point of discharge (see Special Conditions).
- D. Development records shall be maintained on at least a half-hour basis showing production rate, pumping level, drawdown, specific capacity, sand production, and all other pertinent information concerning well development. A representative static water level shall be measured and recorded at least once a day.
- E. The rate of sand production shall be measured using the centrifugal sand separating meter. The results of all sand production tests shall be expressed in parts per million at 5-minute intervals and shall be provided to the City of Colusa immediately. The final sand production test shall be conducted in the presence of the City of Colusa.

- F. Clean water shall be added continuously down the gravel feed tube during development.
- G. If during development operations the gravel pack settles, more gravel shall be added as needed and the quantity recorded and reported to the City of Colusa.
- H. Development shall continue at each discharge rate until the following conditions have been met:
  - 1. No further settlement of gravel pack.
  - 2. Well specific capacity (gpm/ft drawdown) remains relatively constant over an approximate 4-hour period or as specified otherwise by the City of Colusa.
  - 3. Sand content meets requirements specified in the provision supplement(s).
- I. The duration of development pumping shall not exceed the bid amount without prior City of Colusa authorization.
- J. Upon completion of development pumping, the Contractor shall (in the presence of the City of Colusa) measure the depth of the well to determine the amount of sediment deposited in the bottom. If the sediment level extends into the screened interval of the well, the Contractor shall pull the pump, clean the well of all accumulated sediment and foreign material, and reinstall the test pump prior to running the production tests.

## 2.19 RESET INTAKE DEPTH OF TEST PUMP

### PART 1 - GENERAL

#### A. Description

- 1. This item includes resetting the depth of the pump intake to a shallower depth, as specified by the City of Colusa, prior to conducting the well production tests. The depth adjustment is intended to permit completion of a flow meter survey during the final production test, in the event the initial depth of the pump intake for development pumping (see Section 2.17) is set below the top of the upper-most screened section of the well.

2. The lump sum price bid for this work item shall include all costs, not included in the bid item for Section 2.17, associated with re-mobilizing the equipment and crew required to complete the work and the time required to remove, re- install and re-connect the above-ground pumping equipment and appurtenances.

The time required to remove pump column to the final depth specified shall be considered part of the lump sum price bid for and paid by the bid item for Section 2.17, MOBILIZATION AND DEMOBILIZATION OF TEST PUMP AND APPURTENANCES.

B. Submittals

Daily log or other documentation summarizing the number of feet of pump column removed and the adjusted final intake depth of the test pump.

C. Measurement and Payment

Payment for re-setting the depth of the pump intake will be made at the lump sum price bid to re-mobilize the equipment and crew required to remove and reinstall the above ground pumping equipment (see Bidding Sheets). The time required to remove pump column to the shallower depth specified by the City of Colusa will be paid by the bid item for Section 2.17.

## PART 2 - MATERIALS

The Contractor shall provide all equipment and materials required to reset the pump intake and temporary access tube for a flow meter survey (see Section 2.17) to a shallower depth specified by the City of Colusa.

## PART 3 – EXECUTION (Not Used)

### 2.20 STEP DRAWDOWN/AQUIFER TESTS

#### PART 1 - GENERAL

A. Description

This item includes a step-drawdown test and long-term, continuous, constant-rate discharge test (aquifer test).

The step-drawdown test shall include pumping the well at stepped rates of discharge for specified periods. The long-term pumping test shall include pumping the well at a fixed rate of discharge for a specified period and monitoring well water level recovery after the pump is stopped. Specific requirements for each test are specified in the provision supplement(s).

B. Submittals

Daily test pumping records.

C. Measurement and Payment

1. Payment for testing will be made at the unit price per hour bid (see Bidding Sheets).
2. The time required for test pumping will be recorded by the hour with one-half hour intervals as the smallest unit of recorded time. The time recorded for payment shall commence when the equipment installed in the well is placed in operation and shall end when a test is stopped at the direction of the City of Colusa. Time required to run equipment into and out of the well shall be included in and paid for as described in Sections 2.17 and 2.19, as applicable (see Bidding Sheets).
3. No payment will be made for delays resulting from: (a) equipment stuck in the borehole, (b) equipment breakdown, (c) arranging major drilling, pumping or testing apparatus, or (d) failure to conduct the operations in a diligent and workmanlike manner by which the desired results could ordinarily be expected.
4. No payment will be made for tests aborted due to the malfunction of testing equipment or inability of the Contractor to maintain the well discharge, as specified by the City of Colusa, within the limits described herein.
5. No additional payment shall be made for gravel added to the annulus as the gravel pack settles.
6. The costs of labor and equipment associated with providing assistance during the recovery period following a pumping test shall be included in the unit prices bid for test pumping (see Bidding Sheets).

## PART 2 - MATERIALS

### A. Test Pump and Discharge Line

For details, see Section 2.17, Mobilization and Demobilization of Test Pump and Appurtenances. The discharge line shall include taps not more than 20 feet from the well; one equipped with a standard water valve for collection of water samples, and the other for measuring sand content.

### B. Discharge Meter and Manometer

The discharge line shall include an in-line meter with six digit, straight reading totalizer, registering in units of 100 gallons with a rate of flow indicator dial which reads in gallons per minute, and is suitable for flow range specified for the test pump in the provision supplement(s). If requested by the City of Colusa, the Contractor shall install and maintain also a manometer for measuring well discharge.

### C. Water Level Sounder and Air Line

The Contractor shall furnish an electrical depth gauge capable of indicating changes in the well water level to the nearest one-tenth foot and shall furnish and install an air line with direct reading gauge calibrated in feet. The Contractor shall provide whatever assistance may be required by the City of Colusa for monitoring well water levels.

## PART 3 - EXECUTION

### A. General

1. Within 48 hours after the completion of well development with a test pump, the Contractor shall commence well production tests. Unless authorized otherwise by the City of Colusa, there shall be a period of at least 24 hours of non- pumping conditions to stabilize the well static water level prior to the start of the step-drawdown test. The Contractor shall schedule all tests sufficiently in advance so that the City of Colusa can be on-site throughout the testing period.
2. The Contractor shall provide qualified personnel on a 24-hour basis during both the step-drawdown and constant rate tests to assure proper operation of the pumping and testing equipment and assist the City of Colusa when necessary.
3. When production tests are complete, the Contractor shall remove the pump and clean the well of all accumulated sediment, foreign material and lubricating

oil. The Contractor shall demonstrate the well has been properly cleaned by measuring the depth of the well in the presence of the City of Colusa.

B. Step-Drawdown Test

1. The well shall be tested at rates (steps) and for step durations specified in the provision supplement(s) subject to City of Colusa analysis of the results of development pumping.
2. The Contractor shall run the pump and change the rate of discharge as requested by the City of Colusa.
3. The rate of discharge shall be controlled by both a butterfly valve and engine throttle. The rate shall be controlled and maintained at the desired discharge for each step with an accuracy of at least plus or minus five percent (+/- 5%).
4. Prior to starting the test, the Contractor shall record the static water level in the well. During the test, the Contractor shall record the time, pumping level, drawdown, discharge rate, specific capacity and rate of sand production.
5. The rate of sand production shall be measured by the Contractor at 30-minute intervals using a centrifugal sand separating meter as specified in Section 2.17. The results shall be expressed in parts per million.

C. Constant Rate Discharge Test

1. The continuous constant rate discharge test (aquifer test) shall commence not less than 12 hours and not more than 48 hours after completion of the step-drawdown test. The well static water level shall be allowed to recover after the step-drawdown test to a level acceptable to the City of Colusa, prior to starting the constant rate test.
2. The test shall include a period of continuous constant-rate pumping followed by a period of recovery after the pump is stopped. The pumping rate, duration of pumping and duration of recovery shall be as specified in the provision supplement(s) subject to City of Colusa evaluation of the results of the step-drawdown test.
4. During pumping, the Contractor shall record the pumping rate, pumping water level, drawdown and specific capacity at 15-minute intervals. The well static water level shall be recorded prior to starting the test.

5. Throughout the test, the Contractor shall ensure the pumping rate remains within plus or minus 5 percent (+/- 5%) of the pumping rate approved by the City of Colusa. **When necessary, adjustments in the pumping rate shall be made using the in-line butterfly valve rather than engine throttle.** Pumping equipment shall remain in the well undisturbed during the entire recovery test.
6. The City of Colusa may elect to collect its own measurements during testing using either manual or automated measurement equipment. The Contractor shall assist the City of Colusa, as requested, with equipment installation and measurements during both the pumping and recovery periods.
7. During pumping, final sand content testing shall be conducted by the Contractor as specified in the provision supplement(s).
8. During the pumping test, the Contractor shall assist the City of Colusa in the collection of representative samples of discharge water, as requested by the City of Colusa.
9. During the pumping portion of the test, the Contractor shall complete a Flow Meter (Spinner) Survey of water production versus depth as described in Section 2.21.
10. During the recovery portion of the test after the pump is stopped, the temporary test pump shall remain in the well, undisturbed, for the full recovery period specified in the provision supplement(s).

D. Aborted Tests

1. Whenever continuous pumping at a uniform rate has been specified, failure of pumping operations for a period greater than one percent of the elapsed pumping time shall require suspension of the test until the water level in the pumped well has recovered to its original level. Recovery shall be considered “complete” after the well has been allowed to rest for a period at least equal to the elapsed pumping time of the aborted test, except that if any three successive water level measurements spaced at least 20 minutes apart show no further rise in the water level in the pumped well, the test may be resumed immediately. The City of Colusa shall be the sole judge as to whether this latter condition exists. The Contractor will not be paid for any re-testing done if the specified time or recovery requirements of the City of Colusa for the aborted test are not first met. These tests are invalid and will not be construed as a test.
2. No payment will be made to the Contractor for pumping tests interrupted by the malfunction or failure of pumping equipment or failure to maintain the rate



of pumping within the prescribed limits (as defined by the City of Colusa). If a test is interrupted, the well water level will be allowed to fully recover, after which the test will be restarted.

E. Discharge Water

Discharge water shall be conveyed from the pump to the point of discharge described in the Special Conditions. The Contractor shall ensure that no damage by flooding or erosion is caused to the chosen drainage structure or water disposal site.

F. Records

The Contractor shall keep accurate records of all pumping tests and furnish copies of all records to the City of Colusa upon completion of the tests. The records shall be available also to the City of Colusa for inspection at any time during a test. For each test, the records shall include physical data describing the construction features such as, but not limited to: well depth and diameter, complete screen description, length and setting, a description of the measuring point and its measured height above land surface and/or mean sea level, the methods used in measuring water levels and pumping rates.

The Contractor shall also keep records on the type of pumping equipment used including engines, drive components, bowls, lines, and shafts. The Contractor will keep records of operation of equipment during the test including engine rpm and horsepower, fuel, use, and other essential information that will be useful in designing a pump system.

2.21 FLOW METER SURVEY

PART 1 - GENERAL

A. Description

This item includes a downhole flow meter (spinner) survey, to be conducted at the option of the City of Colusa, by a firm retained by the Contractor and approved by the City of Colusa. The survey shall be completed during the latter part of the pumping portion of the constant rate pumping test.

B. Submittals

1. Within ten (10) days of Notice of Award, the Contractor shall submit the name and qualifications of the firm retained to conduct the flow meter survey.

2. Immediately upon completion of the flow meter survey, the Contractor shall provide the City of Colusa with five (5) field copies of the survey results.
3. Within one week of survey completion, the Contractor shall provide the City of Colusa with ten (10) final copies of the survey results, one mylar copy, and a compact disk containing digital files of survey results in City of Colusa-approved formats.

C. Measurement and Payment

1. Payment for the flow meter survey will be based on the lump sum price bid (see Bidding Sheets). Payment shall include full compensation for installing and removing all equipment and tools, operating survey equipment, field and final copies of survey results, and providing whatever assistance may be required of the Contractor to accomplish the survey.
2. There will be no additional payment for rig time and idle time while waiting for the survey firm to arrive, during setup and removal of survey equipment, or while the survey is in progress.

PART 2 -  
MATERIALS

Equipment provided for the flow meter survey shall be capable of completing both stationary and dynamic measurements. The downhole meter used shall be of a diameter compatible with the temporary access tube installed for the survey.

PART 3 -  
EXECUTION

- A. Prior to commencing the constant-rate discharge test, the City of Colusa and Contractor shall set a start time for the flow meter survey.
- B. Downhole equipment required to complete the flow meter survey shall be installed inside the well casing through a temporary access tube. The Contractor shall provide whatever assistance or measures are necessary to install and remove the testing equipment and help complete the survey.
- C. The flow meter survey shall be run at the rate of discharge selected for the constant rate discharge test. Unless agreed otherwise by the City of Colusa prior to installation of survey equipment, the flow meter survey completed will include both stationary (stop counts) and dynamic tests.

Stationary tests shall consist of two-minute readings made at 10-foot increments, unless otherwise requested by the City of Colusa. Dynamic tests shall be conducted at a rate of 1-foot per second, unless otherwise requested by the City of Colusa. The record for each test shall indicate either meter speed or percentage of total meter speed with depth.

- D. The meter used for the survey shall be calibrated in the uppermost and lowermost blank sections of the well casing.
- D. Survey results shall become the property of the City of Colusa at the time the survey is completed. The survey shall be run in the presence of the City of Colusa.

## 2.22 COLOR VIDEO CAMERA SURVEY

### PART 1 - GENERAL

#### A. Description

This item includes completion of a downhole color video camera survey over the full depth of the well. The survey shall be conducted (1) after all sediment accumulating in the well from test pumping has been removed, (2) after fresh water has been introduced from the surface to clarify water standing in the well, and (3) before final disinfection of the well. Video survey results will serve as a final inspection document for the well. The survey shall be conducted by a firm retained by the Contractor and approved by the City of Colusa.

#### B. Submittals

1. Within ten (10) days of Notice of Award, the Contractor shall submit the name and qualifications of the firm retained to perform the camera survey.
2. Survey results shall be provided to the City of Colusa in the formats and time period specified in the provision supplement(s).

#### C. Measurement and Payment

1. Payment for the video survey shall be at the lump sum price bid (see Bidding Sheets).
2. There will be no additional payment for rig time or idle time while the survey is being run.

## PART 2 - MATERIALS

### A. Camera

The camera used for the survey shall be equipped with vertical- and side-view cameras and with centralizers. The equipment used to complete the video survey shall produce a tape with an automatic depth indication (to the nearest 0.1 feet).

### B. Recordings

The Contractor shall provide the City of Colusa with recordings of the survey results as specified in the provision supplement(s).

## PART 3 - EXECUTION

### A. **The video survey shall be conducted before final disinfection of the well.**

B. Prior to conducting the survey, the test pump shall be pulled, the well bailed clean of lubricating oil, sediment and debris, and allowed to remain idle for at least 24 hours.

C. Prior to conducting the survey, the Contractor shall introduce clear water into the well for a sufficient period and at sufficient quantity to produce clear viewing conditions during the survey to the satisfaction of the City of Colusa. Should the survey fail to produce a clear picture of the internal casing conditions, additional clear water shall be introduced and additional surveys conducted until a clear video is obtained to the satisfaction of the City of Colusa. All such remedial work and re-surveys shall be conducted at the Contractor's expense.

D. The Contractor shall provide whatever assistance may be required to accomplish the camera survey and shall take whatever steps are necessary to ensure the well water clarity is adequate to produce acceptably clear video images of internal casing conditions.

E. The survey shall become the property of the City of Colusa at the time the survey is completed.

## 2.23 ALIGNMENT/DEVIATION TESTS

### PART 1 - GENERAL

#### A. Description

The Contractor shall conduct alignment/deviation tests, using a gyroscopic tool, to determine the plumbness and straightness of the well casing. For bidding purposes, the casing interval to be tested is specified in the provision supplement(s).

Alignment tests may be performed any time after the downhole color video survey has been completed.

#### B. Submittals

1. Within ten (10) days of Notice of Award, the Contractor shall submit to the City of Colusa the name and qualifications of the firm proposed for completing the alignment/deviation tests.
2. Report of deviation and directional survey measurements and interpretation of well plumbness and alignment.

#### C. Measurement and Payment

Payment for the alignment tests shall be at the lump sum price bid (see Bidding Sheets).

### PART 2 - MATERIALS

#### A. Gyroscopic Tool

The deviation and direction survey shall be performed with a gyroscopic-type tool or a similar type tool as approved by the City of Colusa.

### PART 3 - EXECUTION

- A. Alignment/deviation testing shall be conducted in the presence of the City of Colusa.
- B. Alignment criteria are specified in the provision supplement(s).

## 2.24 WELL DISINFECTION AND CAPPING

### PART 1 - GENERAL

#### A. Description

This item includes disinfection of the well and temporary well capping. Well disinfection shall be completed after the downhole color video camera survey is conducted. The quantity of disinfectant used shall be sufficient to produce a chlorine residual specified in the provision supplement(s). Upon completion of disinfection, the well shall be temporarily capped with a steel plate.

#### B. Submittals

1. Daily activity log.
2. Record of methods and concentration of chlorine used to disinfect the well.

#### C. Measurement and Payment

Payment for well disinfection shall be made at the lump sum price bid (see Bidding Sheets). Payment shall include all time and materials to disinfect and temporarily cap the well.

### PART 2 - MATERIALS

A. Chlorine approved by State or local agencies shall be used to disinfect the well. Materials used shall be recently purchased and delivered on site in original closed containers with original labeling indicating the percentage of available chlorine. Dry granule 65% HTH calcium hypochlorite [Ca(ClO)<sub>2</sub>] is considered an acceptable disinfectant. A dosage estimate is specified in the provision supplement(s). Chlorine compounds in dry form shall not be stored for more than one year. During storage, disinfectants shall not be exposed to the atmosphere or to direct sunlight.

B. Liquid sodium hypochlorite (NaClO) may be used instead of dry calcium

hypochlorite. PART 3 - EXECUTION

A. The disinfecting agent shall be applied uniformly throughout the entire water depth of the well.

- B. Unless otherwise approved by the City of Colusa, a doubly capped, perforated pipe container filled with the granular chlorine compound shall be moved up and down the entire water filled casing and screen section for a minimum of two (2) hours.
- C. After an initial two (2) hour contact period, the dispersion of the disinfectant shall be assisted (if requested by the City of Colusa) by pouring into the well a volume of water equal to the volume of water contained in the well.
- D. All accessible portions of the well above the water level shall be maintained in a damp condition with water containing the required concentration of disinfectant for a period of not less than 20 minutes.
- E. The disinfecting agent shall be left in the well for a period of at least 12 hours.
- F. Upon completion of disinfection, the upper portion of well casing above the water level shall be washed clean of granular chlorine or chlorine solution.
- G. Upon completion of disinfection, the well shall be capped with a welded steel plate. The cap shall completely cover the opening to the pump house casing and be sufficiently welded to prevent entry into the well casing by unauthorized personnel.

2.25 STANDBY TIME

PART 1 – GENERAL

A. Description

During the progress of well construction, it may be necessary for the City of Colusa to perform work that will require the drilling crew and equipment to stand idle. In such event, the City of Colusa will request in writing the Contractor cease operations and will state the anticipated extent or duration of the idle period. The Contractor shall promptly cease operations.

B. Submittals

1. Daily log summarizing idle resources (description, basis of claim and hours).
2. Written claim for standby time.

C. Measurement and Payment

1. Payment for standby time shall be based upon the hourly rate bid and the number of hours approved by the City of Colusa.
2. As indicated in various sections of this detailed provision and in the provision supplement(s), idle periods associated with specific work items are known to be required and shall be incorporated in the unit prices bid for these items. Idle time incurred during these periods shall not be the basis for a claim of standby time.
3. Idle time in excess of the maximum period specified for a particular work item, shall accrue if specified Contractor obligations have been met and the City of Colusa exceeds the specified time period through no fault of the Contractor. Payment for this idle time shall be at the unit price bid for standby time.

PART 2 - MATERIAL (not

used) PART 3 - EXECUTION

(not used)

2.26 DESTRUCTION OF NEW WELL

PART 1 - GENERAL

A. Description

This item includes destruction of the borehole or casing for the new well. Destruction may be initiated due to actions of the Contractor or at the request of the City of Colusa.

B. Submittals

1. Daily activity log.
2. Final schedule of destruction.

C. Measurement and Payment

1. Payment for destruction at the request of the City of Colusa shall be at the unit price per foot bid (see Bidding Sheets).



2. No payment will be made for destruction required due to actions of the Contractor.

## PART 2 - MATERIALS

### A. Sealing Materials

Acceptable impervious sealing materials that may be employed in the destruction of the borehole or well include neat cement or sand-cement grout.

1. A neat cement mixture shall be composed of one 94-pound sack of Portland cement and 5 to 6 gallons of clean water. Bentonite may be used to a total of 5 percent of the volume of cement to make the mix more fluid and reduce shrinkage.
2. Sand-cement grout shall be composed of not more than 188 pounds of sand and one 94-pound sack of Portland cement (2 parts sand to 1 part cement by weight) to about 7 gallons of clean water. This is equivalent to a 10.3 sack mix. Bentonite, to make the mixture more fluid and reduce shrinkage, may be used to a total of 5 percent of the volume of cement.
3. Quick setting cement, retardants to setting, hydrated lime and additives to make the mix more fluid may be used up to a total of 10 percent of the volume of the cement. Bentonite, to make the mix more fluid and reduce shrinkage, may be used to a total of 5 percent of the volume of cement.

### B. Filler Material

Suitable filler materials include clay, silt, sand, gravel, crushed stone and those described in the previous section. Material containing organic matter shall not be used.

## PART 3 - EXECUTION

### A. Destruction Prior to Installation of Casing

1. Destruction Due to Actions of the Contractor. If destruction of the borehole is by reason of any actions of the Contractor, including but not limited to such causes as losing tools, damaging the well, misalignment, or any other cause attributed to careless or poor workmanship, the borehole shall be completely filled with bentonite, cement or other impervious earth materials in accordance with applicable State and City Standards. No payment will be made for drilling and filling the borehole so destroyed or for mobilization and demobilization of this procedure. The Contractor shall drill a new borehole as specified in the Plans within fifty (50) feet of the original location, or as specified by the City of Colusa.
2. Destruction at Request of the City of Colusa. If destruction of the drilled borehole is specifically requested by the City of Colusa in writing, including but not limited such causes a total lack of potential aquifers, insufficient number of potential aquifers, or unacceptable quality, the borehole shall be filled completely with bentonite, cement, or other impervious materials in accordance with applicable State and City Standards. In this event, the Contractor will be paid for mobilization and demobilization at the site, as well as for the footage of drilling completed. The Contractor may then be requested to re-mobilize at a second site selected by the City of Colusa. No payment for standby time will be made while awaiting a second site.

Destruction hereunder also shall include payment for destruction of any remaining or unused portion of the pilot borehole that is not being used for final well completion.

Payment for destruction of the borehole, if required and specifically requested by the City of Colusa as set forth above, shall be made on a unit price per foot and shall be considered full compensation for all time, materials, and equipment required to complete the destruction (see Bidding Sheets).

### B. Destruction During or After Installation of Casing and/or Well Screen

Necessity to destroy the cased borehole shall be deemed caused by the actions of the Contractor or the Contractor's negligence. In the event the borehole is destroyed after installation of casing or screen, the Contractor shall at their discretion, pull or leave the installed casing sections in place. In either case, the borehole shall be

destroyed in accordance with State law by backfilling the casing and/or borehole with bentonite, cement or other impervious material.

No payment shall be made for lost or damaged casings and/or their installation in a well destroyed by reason of any action of the Contractor. The Contractor shall be required to drill a new well as shown on the Plans within 50 feet of the original site.

END OF SECTION

VOLUME 3  
PROJECT SPECIFIC WELL REQUIREMENTS  
A PROVISION SUPPLEMENT TO  
VOL 3 TECHNICAL SPECIFICATIONS  
FOR WATER WELL DRILLING AND CASING

PART 1      GENERAL

1.1          SCOPE

1.2          PERMITS, CERTIFICATES, LAWS AND ORDINANCES

Contractor shall, as a part of his bid, procure all permits, certificates, and licenses required by law for execution of the work. Contractor shall comply with all State and local laws, ordinances, and rules and regulations relating to performance of work and shall file all reports as required by State and local agencies in connection with well drilling. Contractor shall be a licensed well contractor (C-57 license).

1.3          SUBMITTALS

The contractor shall submit the following information to substantiate compliance with this specification. The following specific information shall be required.

- A.      Drilling mud program. (If Mud Rotary is used)
- B.      Sieve Analyses from formation samples.
- C.      Drillers logs.
- D.      Electric logs (E-logs).
- E.      Zone Sampling Data
- F.      As-built diagrams for each of the two wells, including wellhead detail.

PART 2      PRODUCTS

2.1          GENERAL

All materials shall be furnished by an established and experienced manufacturer or supplier. All materials shall be new, of first-class materials, and guaranteed to perform the service required to condition the walls of the borehole to prevent caving of the formation and excessive loss of circulation, facilitate removal of the cuttings and produce an easily removed, thin filter cake. The Contractor shall consult with a qualified mud engineer and submit the mud program prior to construction for approval. The submittal shall include the mud engineer's recommendations for the makeup water conditioning, quantities of clay base and additives required to obtain a drilling fluid with the following mud properties:

- |    |                                    |              |
|----|------------------------------------|--------------|
| 1. | Maximum Weight                     | 9.0 lbs/gal  |
| 2. | Maximum Marsh Funnel Viscosity     | 40 s/qt      |
| 3. | Maximum API Cake Thickness         | 1/16 inch    |
| 4. | Maximum Sand Content of Return Mud | 2% by volume |

The clay base shall be Quik-Gel as manufactured by the Baroid Division of the National Lead Company, Well-Gel as supplied by Well-Tech, Inc., or equal.

## 2.2 CONDUCTOR CASING

The described conductor casing shall be set in the borehole not less than thirty-four (40") inches in diameter. The bore hole down to the first 50 ft shall be 52" diameter. The casing bottom should be set at fifty feet (50') below land surface or until competent Basalt is encountered. The City of Colusa reserves the right to require the conductor casing to be set at a lesser or greater depth depending on hydrogeologic conditions encountered during drilling. Fifty feet (50') of twenty-six inch (40") minimum nominal diameter, High Strength Low Alloy carbon steel or a City of Colusa approved equivalent, conductor casing shall be installed in the production well(s) and fabricated of a minimum of .375 inch thick steel plate conforming to the physical and chemical properties of the standard specifications for "Electric-Fusion (ARC) Welded Steel Pipe (NPS in four (4) inches and over)." Specification of steel casing manufactured per specification ASTM 139 must be provided to the City of Colusa for approval prior to installation. The sections of the conductor casing shall be welded longitudinally with automatic equipment by a process, which provides a ductile weld of the same strength as the parent material. The conductor casing shall be equipped with three (3) centralizers equally spaced circumferentially on the outside near the bottom and near the top to insure centering of the conductor casing in the borehole. The centralizers shall be fabricated of the same material as the conductor casing. The centralizers shall extend three (3) inches away from the outer face of the conductor casing. Centralizers shall be sufficiently strong and rigid so that they cannot become distorted as the casing is lowered into the borehole.

### 2.3 WELL CONSTRUCTION MATERIALS (WELL CASING AND SCREEN)

All physical tests on the blank casing and screen shall be performed, in accordance with the appropriate ASTM standard. The Contractor shall furnish the City of Colusa, without cost, three (3) copies of the laboratory analyses of its physical properties as tested by the manufacturer at said point of last loading. Specification of steel casing manufactured per specification ASTM 139 must be provided to the City of Colusa for approval prior to installation. The Contractor shall have on location at the well site, the required casing and screen prior to reaching the completion depth of the specified material. The casing sections will be placed on timbers for inspection and approval by the City of Colusa. All casing shall be manufactured in sections not less than twenty (20) feet in length containing only one longitudinal seam parallel to the casing axis and not more than one circumferential seam in four (4) feet. All longitudinal and circumferential seams shall be automatically welded by an approved shielded arc process which protects the weld metal from the atmosphere while cooling and which assures full fusion with the parent metal and complete penetration. Approved methods for welding shall be employed to insure complete penetration. Contractors may substitute treaded casing with approval from the City of Colusa. Any casing or screen that is bent, damaged or has been dropped will be rejected and removed from the site. Casing tallies of all pipe onsite will be recorded and delivered to the designated representative of the City of Colusa prior to installation. The described well casing shall be set in a 34" borehole not less than twenty-six (26") inches in diameter. Pump housing shall be 20" inside diameter (nominal bowl diameter 18" max), 5/16" wall thickness. Well screen shall be 18" inside diameter, 5/16" wall thickness, with louver type slots (aperture size design to coincide with aquifer material and gravel pack gradation). Screen slot pattern/open area percentage shall allow for a flow rate of 50 gallons per minute per foot of screen. Well casing shall be plugged at the bottom with a bullnose cap composed of the same material as the casing. For bidding purposes assume the completed well will be 500 ft deep.

### 2.4 SANITARY SEAL

Prior to grouting, the conductor casing shall be securely anchored to prevent rising under the Grouting pressure. The grouting shall completely seal the conductor casing against infiltration of all fluids. Grouting shall be completed within eight (8) hours to ensure a homogenous seal. After the grouting operation is completed, the grout shall be left undisturbed for a minimum of twenty-four (24) hours. The annular space between the conductor casing and the borehole shall be grouted under pressure. Grout

shall consist of a slurry of sand and Portland ASTM Type II cement mixed to a ratio of three parts sand to two parts cement. Water to cement ratio shall be 0.46 to 0.53. Grout shall not be more than one (1) hour old from time of on-site arrival until pumped into the annulus. Grout shall be pumped through a steel tremie line, placed in the annulus between the conductor casing and the borehole, extending at or near the bottom of the conductor casing.

Minimum diameter of the steel tremie line for grouting shall not be less than two (2) inch I.D. To insure no plugging exist the crew shall inspect the tremie line prior to installation. Grouting shall continue until the annular space between the conductor casing and borehole is filled to a minimum of fifty (50) feet below land surface.

## 2.5 BOREHOLE SEAL

Prior to grouting, the production casing shall be securely anchored to prevent rising under the Grouting pressure. The grouting shall completely seal the production casing against infiltration of all fluids. Grouting shall be completed within eight (8) hours to ensure a homogenous seal. After the grouting operation is completed, the grout shall be left undisturbed for a minimum of twenty-four (24) hours. The annular space between the production casing and the borehole shall be grouted under pressure. Grout shall consist of, a slurry of sand and Portland ASTM Type II cement. Grout shall not be more than one (1) hour old from time of on-site arrival until pumped into the annulus. Grout shall be pumped through a steel tremie line, placed in the annulus between the production casing and the borehole, extending at or near the bottom of the production casing.

Minimum diameter of the steel tremie line for grouting shall not be less than two (2) inch I.D. To insure no plugging exist the crew shall inspect the tremie line prior to installation. Grouting shall continue until the annular space between then production casing and borehole is filled to approximately five (5) feet below land surface, the bottom of the conductor casing, or as directed by the City of Colusa.

## 2.6 SOUNDING TUBE

The well shall be equipped with a sounding tube. The tube shall be Schedule 80 steel pipe conforming to ASTM A53 with a minimum nominal inside diameter of 3 inches and shall be installed from a minimum of 6 inches above the top of the well seal down to within 2 inches of the bottom of the filter pack in order to facilitate unobstructed measurement of the depth to the water surface. The bottom 10 feet of the sounding tube shall consist of a steel continuous slot well screen with No 60 slots. The bottom of the screen shall be capped. The exposed end of the casing shall be capped

immediately following the completion of the testing and removal of the Contractor's pumping equipment.

#### 2.7 AIR VENT TUBE

A screened and inverted casing vent, integrated with the above described sounding tube, shall be installed at a minimum of 36" above finish grade slab surface. The tube shall be Schedule 80 steel pipe conforming to ASTM A53 with a minimum nominal inside diameter of 3 inches.

#### 2.8 PERMANENT GRAVEL FEED TUBE

The well shall be equipped with a permanent gravel feed tube. The tube shall be Schedule 80 steel pipe conforming to ASTM A53 with a minimum nominal inside diameter of 4 inches and shall be installed integrally with the monolithic concrete pump pedestal and the top of the conductor casing. The exposed end of the feed tube shall be capped immediately following the completion of the testing and removal of the Contractor's pumping equipment.

#### 2.9 PUMP

A vertical turbine pump or submersible pump capable of flow rates of at least 2000 gallons per minute with approximately 350 feet of total dynamic head. For bid purposes the pump shall be a FlowServe or equivalent, and depth shall be set at approximately 225 feet. Pump shall be product (water) lubricated. Final pump depth design shall be determined by geophysical survey, zone testing, and final production well design.

#### 2.10 GRAVEL PACK

A properly graded gravel shall be utilized which will retain part of the aquifer material, and corresponding screen or perforation openings that will retain most of the gravel pack will ensure that the well will not continue to pump sand or gradually become plugged with fines filling the spaces in the screen of in the gravel pack.

Design gradation of gravel will be determined by geophysical survey, zone testing, and final production well design. As a guideline, particle size distribution curves for gravel pack and aquifer materials should be approximately parallel in order to minimize washing of the fine aquifer material into the gravel pack. For gravel pack stability, the 15-percent finer size of gravel pack aggregate divided by the 85-percent finer size of finest aquifer material shall be less than or equal to four. As well for maximum permeability, the 15-percent finer size of gravel pack aggregate divided by the 85-percent finer size of coarsest aquifer material shall be greater than or



equal to four. In addition; the 15-percent finer size of gravel pack aggregate divided by the 15-percent finer size of coarsest aquifer material shall be less than twenty, and the 50-percent finer size of gravel pack aggregate divided by the 50-percent finer size of aquifer material shall be less than twenty-five.

Gravel must be delivered and stockpiled on-site in such a way as remain free from outside or deleterious material, organics, or other native aggregates. Stockpiles shall remain tarped at all times other than for accessing gravel for placement into annular space of well.

Gravel shall be disinfected with a chlorine solution as it is being placed into the annulus. Either sodium hypochlorite or calcium hypochlorite may be used, provided that the wash solution contains a minimum of 4% available chlorine.

## 2.11 CHEMICAL DEVELOPMENT

A chlorine solution shall be used to disinfect the new well screened zones. Concentration shall be 5000 ppm.

For the purposes of dispersing drilling mud, fine sands, and clay from the gravel pack and well screens of the new production wells, NW-220 shall be used. It shall be mixed with water at a rate of 1 gallon per 500 gallons of water, and applied at a rate of 0.66 gallons dispersant (330 gallons solution) per 20 lineal feet of well screen.

## 2.12 TEST PUMP

The test pump shall employ a variable speed drive capable of producing flow rates from 200 to 1800 gallons per minute. Test pumping shall be capable of producing 4000 gpm at 300 TDH and shall run for 30 hours with 8 hrs of step testing and an additional 24 hrs at 2000 gpm. Contractor shall test final pumping analysis for sand @ 1 ppm @ 2000 gpm.

## PART 3 EXECUTION

### 3.1 GENERAL

The wells shall be drilled at the site, as located on the drawings to an estimated depth of 500 feet using the reverse circulation method. The diameter of the initial bore hole shall be 18". The initial bore hole shall provide a means for obtaining detailed geological and hydrological information including formation samples of the aquifers penetrated and an E-log and zone testing via the pull back method. A sieve analysis shall be conducted on formation samples as selected by the engineer. Once drilling

is completed, the bore hole will be filled with gravel to allow for final design details. The final product expands the well to 26" diameter and shall be cased and finished with screens, pumps, sounding tubes, air vent tubes, and gravel feed tubes to the specification of these provision supplements.

Information to be obtained from the well is summarized below.

A. Drilling Well

The flooded reverse-circulation method of construction will be the ONLY approved method for drilling the well. Use of any drilling fluids additives with the exception if water and drilling fluid will not be permitted unless otherwise submitted and allowed. For further specifications see Execution, Drilling Production Borehole, of the Water Well Specifications.

B. Pilot Borehole

A pilot borehole shall be drilled after the conductor borehole has been drilled. The pilot borehole shall be drilled to a diameter of 16 inches. The borehole shall be drilled to the expected full depth of the production well. Reaming of the pilot borehole to full production well depth shall only occur after the pilot borehole has been drilled to its full depth. All Lithologic and Geophysical logging, Sieve Analyses, Zone Sampling, and Gamma Ray E-logging shall be done at the time of Pilot Borehole drilling.

C. Samples

The Contractor shall be responsible for collecting and preserving all formation samples, and for recording all sample information.

The first sample shall be taken at 10 ft. below existing ground surface. At each change of formation, and at 10 ft. intervals between changes in formation, the Contractor shall take a large (at least 1 qt.), washed, representative sample of the material, and shall label and preserve each sample in a clear plastic container with a seal-tight lid. Containers and lids shall be furnished by the Contractor. Samples shall be made available to the Engineer upon request. Sieve analyses shall be performed on selected samples as directed by the Engineer.

Contractor shall store samples of all strata penetrated in containers. The depth of the strata and thickness of the strata shall be clearly marked on both containers and the lids. All samples shall be stored for a minimum of 20 working days after submitting sieve analyses results to the owner.

D. Drilling Logs

A log shall be kept by the Contractor to record the course of actual drilling; the general character type, and depths of the materials penetrated; the aquifer intervals; any pertinent observations on the depths of water-bearing horizons; or other data, such as caving, that may assist in the interpretation of the subsurface geology and may be useful in the final well design. As part of the formation log, the Contractor shall accurately determine the depth from which the cuttings and fluid samples are being taken for analysis. All depth measurements shall be referenced to ground surface.

E. Water Record

A record shall be maintained showing any variation in the amount of bentonite or water required to be added during drilling. The depths at which such changes are required shall be shown in the daily reports.

F. Geophysical Logs

Upon completion of the well, geophysical logs shall be made of the hole. The geophysical logs to be run in the borehole shall include: electrical resistivity log with spontaneous potential (SP), with 16-inch normal and 64-inch normal resistivity curves and natural gamma ray log.

The Owner shall be given at least 24 hour notice of date and time E-logging will commence so that the Engineer can be onsite to observe the logging.

The Contractor is responsible for the integrity of the borehole to assure that the geophysical logging can be successfully accomplished. The Contractor shall maintain circulation in the borehole with tools on the bottom of the hole until the logging equipment is on location and prepared to conduct the survey. The logging service company shall obtain a ditch sample of the circulating fluid for calibration of the logs prior to the securing of the mud circulating pump. Tools shall then be pulled by the Contractor and the logging services immediately commenced. If the logging probe fails to descend to the desired depth, the Contractor, at his own expense, shall rerun the drilling tools to recondition the hole.

The Contractor shall submit six copies of each E-log. The logging shall be equivalent to E-logs by Geo-Hydro-Data, Welenco, or approved equal.

G. Water Zone Sampling Data

Zone sampling and testing refers to the chemical analysis of groundwater in a small diameter test hole, prior to drilling large diameter boreholes and installing permanent casing. Analysis period for the City of Colusa to decide upon location of screens for final well construction shall be fifteen (15) working days.

Estimated range of test depths include:

270 to 300 feet  
320 to 340 feet  
400 to 425 feet

Execute the sampling as follows:

- A. The Contractor shall fill the well with native material and bentonite tablets to within five (5) feet of the depth of the bottom of the first (lowest) strata selected for testing. Bentonite and fill material shall be installed upward by tremie pipe from the bottom of the hole. The tremie pipe shall be initially located 20-feet from the well's bottom. The tremie pipe shall be removed in approximately 20-foot intervals as the bentonite and fill material reach the bottom of the tremie pipe. The depth shall be sounded to confirm the hole has been filled to the proper level.
- B. The Contractor shall then lower a 6-inch diameter, sampling string with a twenty-foot (20') perforated pipe to the proper depth for developing the test strata. After placement of the perforated pipe, the Contractor shall fill the well with the specified pea gravel or sand through the tremie pipe to a level twenty feet (20') above the top of the perforated piping. The volume of gravel or sand placed shall be measured and compared to the theoretical volume required. The well shall be sounded to measure the depth to the top of the gravel pack. The Contractor shall then place a twenty-foot (20') minimum, impervious layer of bentonite seal material on top of the gravel pack to isolate the test strata using a tremie pipe.
- C. The Contractor shall then develop the test strata by air lifting for a period of 24 hours or until the following conditions, as determined by the Owner's Representative, have been met:
  1. Water being pumped becomes clear to the eye.
  2. The electrical conductivity and pH of the water has stabilized.
- D. Once these conditions have been fulfilled, water samples of the isolated zone shall be taken as described below. The Contractor shall retain the services of a State-certified laboratory to collect, preserve, transport, and conduct water quality testing on the water sample obtained in accordance with Chapter 15 of the California

Code of Regulations, Title 22 “Domestic Water Quality and Monitoring” (Revised September, 1994).

1. Because chemical constituents with known volatility will be sampled and tested, a 4-inch submersible pump shall be used for obtaining the water sample.
2. The zone shall be pumped with the submersible pump for an additional 12 hours before a sample is taken. The submersible pump provided shall be capable of pumping up to 75 GPM against 1000 feet of total head.

The water quality testing shall include the following:

3. Inorganic Chemicals (Section 64431, Table 64431-A)
  4. Full Title 22 Organic Chemicals in accordance w/ 5/17/00 revision
  5. Chemicals with Secondary Maximum Contaminant Levels (Section 64449, Table 64449-A & Table 64449-B)
  6. General Minerals (Section 64449© (2))
  7. General Physical
  8. Dissolved Iron
  9. Dissolved Manganese
  10. Hardness
  11. Odor
  12. Dissolved Gasses
    - Methane
    - Hydrogen Sulfide
    - CO<sub>2</sub>
- E. Withdraw perforated pipe to the next sampling interval as determined by the Owner’s Representative and repeat Steps A through F.
- H. Sieve Analysis

Based upon AASHTO T 27, two sieve analyses shall be done for each sample, at a minimum. During drilling, soil samples shall be collected over a 10-foot interval and at each major change in formation from the ground surface to the full depth of the borehole. For delivered gravel pack material, four samples shall be taken, at random locations, for each dump truck load, or for every 10 to 12 yards of material.

#### SCOPE

The sieve analysis, commonly known as the gradation test, is a basic essential test for all aggregate technicians. The sieve analysis determines the gradation (the distribution of aggregate particles, by size, within a given sample) in order to determine compliance with design, production control requirements, and verification specifications. The gradation data may be used to calculate relationships between various aggregate or aggregate blends, to check compliance with such blends, and to predict trends during production by plotting gradation curves graphically, to name just a few uses. Used in conjunction with other tests, the sieve analysis is a very good quality control and quality acceptance tool. NOTE: Accurate determination of material passing the No. 200 (75  $\mu$  m) sieve cannot be made with this test alone. This test is recommended to be used in conjunction with AASHTO T 11 to determine the amount of material finer than the No. 200 (75  $\mu$  m) sieve.

#### SUMMARY OF TEST

A known weight of material, the amount being determined by the largest size of aggregate, is placed upon the top of a group of nested sieves (the top sieve has the largest screen openings and the screen opening sizes decrease with each sieve down to the bottom sieve which has the smallest opening size screen for the type of material specified) and shaken by mechanical means for a period of time. After shaking the material through the nested sieves, the material retained on each of the sieves is weighed. The cumulative method requires that each sieve beginning at the top be placed in a previously weighed pan (known as the tare weight), weighed, the next sieve's contents added to the pan, and the total weighed. This is repeated until all sieves and the bottom pan have been added and weighed.

#### **Apparatus**

Balance, general purpose class G<sub>2</sub> (AASHTO M231). Sieves, mounted on suitable frames, designed not to leak. Sieves shall conform to AASHTO M92. Mechanical sieve shaker, if used, must provide a vertical or lateral and vertical motion to the sieve, causing the particles thereon to bounce and turn so as to present different orientations to the sieving surface. Sieve shakers must provide sieving thoroughness within a reasonable time. 2 Oven, capable of maintaining 230  $\pm$  9°F (110  $\pm$  5°C). When tests are performed in the field where ovens are not available, test samples may be

dried in suitable containers over open flame or electric hot plates with sufficient stirring to prevent overheating. Sample Preparation Samples should be obtained in the field and reduced to test size in accordance with AASHTO T 248. Samples are dried to a constant weight in an oven set at  $230 \pm 9^{\circ}\text{F}$  ( $110 \pm 5^{\circ}\text{C}$ ), in an electric skillet, or over an open flame. The original sample must be reduced to a test sample size which falls within the minimum and maximum weight in the following table.

#### WEIGHT OF TEST SAMPLE

AGGREGATE SIZE	MINIMUM	MAXIMUM
No.1	68,000 g	90,700 g
No.2	11,300 g	---
No.5, No. 8, and No. 91	6000 g	8000 g
No. 9	4000 g	6000 g
No. 11	2000 g	---
No. 12	1000 g	--
No.53	6000 g	8000 g
No.73	5000 g	---
B-Borrow: 1/2 in. (12.5 mm), 1 in. (25.0 mm), 1½ in. (37.5 mm), & 2 in. (50 mm)	4000 g	6 000 g
B-Borrow: No. 4 (4.75 mm) & No. 30 (600 µm)	300 g	---
Fine Aggregate	300 g	---

#### Procedure

1. Weigh the sample to the nearest 0.1 g by total weight of sample. This weight will be used to check for any loss of material after the sample has been graded. Select suitable sieve sizes in accordance with the specifications.
2. Nest the sieves in order of decreasing size from top to bottom and begin agitating and shaking the sample for a sufficient amount of time.  
 For coarse aggregate, the large tray shaker is most commonly used. This device provides a clamping mechanism which holds the sieve in place during agitation. Shakers of this make need to be run 5 minutes for size 9 or larger and 10 minutes for sizes smaller than size 9. For fine aggregate, round 8" (203.2 mm) or 12" (304.8 mm) sieves are commonly used. These sieves are self-nesting and supported in a shaking mechanism at the top and bottom by a variety of clamping and/or holding mechanisms. Small shakers of this type require shaking times of 15 minutes to adequately grade the fine aggregate sample.

NOTE: Every effort should be made to avoid overloading the sieves. AASHTO defines overloading large sieves as weight retained in excess of 2.5 times the sieve opening in in. (mm), as expressed in gm/in.<sup>2</sup> (kg/m<sup>2</sup>). For fine aggregate, no weight shall be in excess of 4 gm/in.<sup>2</sup> (7 kg/m<sup>2</sup>).

3. Course Aggregates

After the material has been sieved, remove each tray, weigh each size, and record each weight to the nearest 0.1 g. Be sure to remove any aggregate trapped within the sieve openings by gently working from either or both sides with a trowel or piece of flat metal until the aggregate is freed. Banging the sieve on the floor or hitting the sieve with a hammer will damage the sieve. The final total of the weights retained on each sieve should be within 0.3% of the original weight of the sample prior to grading. Particles larger than 3 in. (75 mm) should be hand-sieved. When passing large stones through sieves, do not force the aggregate through the sieve openings.

4. Fine Aggregates

Weigh the material retained on each sieve size to the nearest 0.1 g. Ensure that all material entrapped within the openings of the sieve are cleaned out and included in the weight retained. This may be done using brushes to gently dislodge entrapped materials. The 8 in. (203 mm) or 12 in. (304.8 mm) round sieves need to be handled with special care due to the delicate nature of their screen sizes. As a general rule, use coarse wire brushes to clean the sieves down through the No. 50 (300 μ m) sieve. Any sieve with an opening size smaller than the No. 50 (300 μ m) should be cleaned with a softer cloth hair brush (Figure 4). The final total of the weights retained on each sieve should be within 0.3% of the original weight of the sample prior to grading.

I. Evaluation Period

Upon receipt of copies of geophysical surveys and results of sieve analysis, the City of Colusa may require an evaluation period up to ten (10) working days to interpret the data and prepare schedules for isolated aquifer zone testing or a final well design, as applicable.

3.2 DESTRUCTION OF THE WELL

If necessary, and at the direction of the City of Colusa, the Contractor shall destroy the well below the depth to be used for the production water well in accordance with these specifications.



Upon completion of all tests, the Contractor shall backfill the hole with bentonite clay from the bottom to a depth specified by the Engineer.

3.3 ABANDONMENT OF THE MUD PIT (Not Used)

3.4 CLEAN UP

Contractor shall fill all sumps and/or excavations made by him and restore the surface of the ground near the test well to the satisfaction of the Owner.

3.5 ENVIRONMENTAL CONTROL

A. Drilling Fluid Containment

If the mud-rotary drilling method is used, a solids control system shall be employed. Excavated mud pits will not be allowed. Portable mud tanks, with a minimum capacity of 4,000 gallons, are required which allow the drill cuttings to settle. The solids control system shall also be equipped with a shaker and desilter system. Desilters must clean down to 15 microns. The sand content of return fluids shall contain less than 1 percent sand at the mud pump suction.

100 percent of all drilling fluids re-entering the mud pump suction must have passed through the solids control equipment. The desilter cones and pump must be capable of cleaning 1.5 times the capacity of the mud pump or the entire capacity of the compressor air lift system. The mud pump must have a minimum capacity of 200 gallons per minute, and the air compressor of 750 cubic feet per minute.

B. Cuttings and Drilling Fluid Disposal

All fluids and cuttings shall be removed from the site and legally disposed of at the Contractor's expense.

C. Sound Control Requirements

The Contractor shall comply with all local sound control and noise level rules, regulations, and ordinances, which apply to any work performed pursuant to the contract. Internal combustion engines shall be operated only between the hours of 8:00 a.m. and 5:00 p.m. on Monday through Friday. Construction times shall be 24 hours a day during drilling only. The Contractor shall notify all adjacent property owners of the dates and times when drilling will occur at least 5 business days prior to beginning drilling operations.

Each internal combustion engine, used for any purpose on the job or related to the job, shall be equipped with a muffler of a type recommended by the manufacturer. No internal combustion engine shall be operated on the project without said muffler.

The Contractor shall submit a plan for abatement of the excessive noise at the well site during drilling operations. Noise level shall be sixty-five (65) decibel maximum at the property line of the residential apartments. See Special Provisions Section 7 for additional sound control requirements.

Sound Curtains shall be used for noise abatement.

\*\*\*END OF SECTION\*\*\*

# CITY OF COLUSA

## TECHNICAL SPECIFICATIONS



**FOR PUBLIC WORKS CONSTRUCTION**

November 2024

Modified for Well No. 6A Project

# **TECHNICAL SPECIFICATIONS**

## **FOR PUBLIC CONSTRUCTION**

**City of Colusa  
California**

Adopted by City Council

December 2024

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## Section 1

### DEFINITIONS AND TERMS

Unless expressly indicated otherwise, the following terms or abbreviations used in these Specifications, or in any other Contract Documents, are defined as follows:

- 1-1 “A.A.S.H.T.O.” The American Association of State Highway and Transportation Officials.
- 1-2 “Addendum” means a document issued prior to the execution of the Agreement, that modifies or interprets any of the Contract Documents, by additions, deletions, clarifications, or corrections.
- 1-3 “Agreement” means the written agreement executed by Contractor and City, that constitutes one of the Contract Documents.
- 1-4 “A.S.T.M.” The American Society for Testing Materials.
- 1-5 “A.W.W.A.” The American Water Works Association.
- 1-6 “Bid” means a response to a request or invitation for bids or proposals. A “formal” Bid means a Bid submitted for a Contract required to be awarded by the Colusa City Council pursuant to the Colusa City Code, and “formal” bidding means the bidding process used for such Contracts.
- 1-7 “Bid Form” means the approved form upon which the City requires formal Bids for the Work to be prepared and submitted.
- 1-8 “Bid Security” means the bid security furnished by the Bidder as a guarantee of good faith that it will enter into a Contract and execute the required Bonds covering the Work if awarded the Contract.
- 1-9 “Bidder” means any individual, partnership, corporation, or other entity or combination thereof, submitting a Bid, whether acting directly or through a duly authorized representative.
- 1-10 “Change Order” means an amendment to a Contract issued after the effective date of the Contract.
- 1-11 “City” means the municipal corporation known as the City of Colusa, in the State of California.

- 1-12 “City Council” means the City Council of the City of Colusa or any other board, body, official or officials, to which or to whom the power belonging to the City Council may pass.
- 1-13 “City Manager” means the City Manager of the City of Colusa acting either directly or through properly authorized representatives acting within the scope of their authorized duties.
- 1-14 “Completion Date” means the date for completion of the entire Work as defined in Section 9 of the Agreement.
- 1-15 “Contract” shall mean the written Contract Documents covering the performance of the Work including the furnishing of labor, materials, tools, and equipment.
- 1-16 “Contract Documents” means the various documents that make up the Contract, which are identified in Section 1 of the Agreement.
- 1-17 “Contract Price” means the total dollar amount of the Contract.
- 1-18 “Contractor” means the individual, partnership, corporation, or other entity or combination thereof, or its duly authorized representative, that has entered into a Contract with the City.
- 1-19 “Controlling Operation” means an item of Work on the project’s critical path whose duration time directly affects the date that the entire Work can be completed.
- 1-20 “Critical Path Method Schedule” or “CPM Schedule” means a schedule with a consecutive sequence for completion of the Work with the least amount of float period(s).
- 1-21 “Day” means a working day, unless otherwise expressly defined in the Special Provisions.
- 1-22 “Date of signing” means the date upon which the Contract, properly executed by Contractor and delivered to the City, was executed by the City.
- 1-23 “Director” means the Director of the City Department administering the Contract.
- 1-24 “Division Manager” means the Division Manager of the City department and division administering the Contract, or other City employee



designated by such Division Manager to perform any duties assigned to the Division Manager in these Specifications.

- 1-25 “Engineer” means the Director, the Director’s subordinates, or other City representative(s) who have been duly authorized to exercise control and supervision of the Work. The Engineer typically is, but is not required to be, either a professional engineer architect, or landscape architect, depending on the nature of the Work.
- 1-26 “Federal Specifications” means the Standard Specifications of the United States Government designated in the Contract Documents.
- 1-27 “Field Order” means a written instruction from the Engineer to Contractor made in the field.
- 1-28 “Finance Director” means the Director of the Department of Finance of the City of Colusa.
- 1-29 “Fixed cost” means a cost that remains constant regardless of the quantity of work done.
- 1-30 “Float period” means such period(s) of time as may be shown on Contractor’s schedule(s) that are not allocated to the performance and completion of the Controlling Operation(s) of the Work.
- 1-31 “Inspector” means an engineering or construction inspector acting within the authorized scope of the particular duties and authority delegated to such inspector by the City.
- 1-32 “Laws or Regulations” means any and all applicable laws, rules, regulations, ordinances, codes, resolutions, requirements and/or orders of any and all governmental bodies, agencies, authorities and courts, including but not limited to provisions of the Colusa City and City Code.
- 1-33 “Liquidated damages” means the sum or sums prescribed in the Contract Documents, pursuant to the authority of Government Code Section 53069.85, to be paid to the City or to be deducted from any payment due or to become due to Contractor for delay beyond the time allowed in the

Contract Documents for completing the whole, or any specified portion, of the Work.

- 1-34 “Landscape Architect” means a Landscape Architect of the City of Colusa assigned to the Work.
- 1-35 “Payment Bond” has the same meaning as in Section 3096 of the California Civil Code, and refers to the approved form of security furnished by Contractor and its Surety to guarantee the payment in full of all bills, accounts and related costs for labor and materials used in construction of the Work.
- 1-36 “Performance Bond” means the approved form of security furnished by Contractor and its Surety to guarantee Contractor’s performance and completion of the Work in accordance with the terms of the Contract.
- 1-37 “Plans” means the official Project Plans and Standard Drawings, profiles, typical cross sections, general cross sections, working drawings and supplemental drawings, or reproductions thereof, approved by the Director, that show the location, character, dimensions and details of the work to be performed. All such documents are part of the Plans whether or not reproduced in the Special Provisions. In this definition, the terms “Standard Drawings” and “Project Plans” mean:
- (1) “Standard Drawings”: The Standard Drawings or Standard Drawing as set forth in these Specifications. “Standard Drawing(s)” means “Standard Detail(s)”.
  - (2) “Project Plans”: The Project Plans or Plans include specific details and dimensions peculiar to the Work and that are supplemented by the Standard Drawings as they may apply.
- 1-38 “Project Estimate” means the list of estimated quantities of Work to be performed that is included in the Notice to Contractors
- 1-39 “Proposal” means the offer of the Bidder, including a Bid, for performance and completion of the Work when properly completed, executed, guaranteed and submitted on the Bid form.
- 1-40 “Special Provisions” means the specific clauses setting forth conditions or requirements peculiar to the Work and supplementary to these Specifications.
- 1-41 “Specifications” means the directions, provisions, and requirements contained herein. In the Contract Documents, including the Special

Provisions, these Specifications may also be referred to as the “Standard Specifications”.

- 1-42 “State Specifications” means the Standard Specifications of the State of California, Department of Transportation, as currently approved and in effect and as thereafter amended or renumbered.
- 1-43 “Subcontractor” means any person or firm of any tier directly or indirectly utilized by Contractor to perform any portion of the Work.
- 1-44 “Substantially complete” means that the Engineer has determined that all of the Work has been performed, but there are minor deficiencies, as determined by the Engineer, that do not prevent the Work from being fully functional nor pose any risk to the public health, safety or welfare or public or private property, as determined by the Engineer. The Work shall be considered substantially complete on the date that the Engineer issues a punch list to Contractor as specified in Section 8-4 of these Specifications.
- 1-45 “Supplier” means any person or firm directly or indirectly supplying any materials or equipment for performance of, or incorporation in, the Work.
- 1-46 “Work” means all actions and activities that Contractor is contractually required to undertake and perform as specified, indicated, shown, or implied in the Contract, including all duly authorized Change Orders.
- 1-47 “Working day” means any day, except for the following:
- (1) Saturdays, Sundays and legal holidays, unless otherwise indicated in the Special Provisions.
  - (2) Days on which Contractor is prevented from proceeding with the current Controlling Operation(s) of Work for at least (5) hours per day due to inclement weather, or conditions resulting immediately therefrom, as determined by the Engineer.
  - (3) Days on which Contractor is specifically required pursuant to the Contract Documents or by operation of law to suspend the Controlling Operation or Operations of Work, except in cases where such requirement applies due to the failure on the part of Contractor or any Subcontractor to carry out orders or to perform any provision of the Contract.

## Section 2

### BID/PROPOSAL REQUIREMENTS AND CONDITIONS

#### 2-1 NOTICE TO CONTRACTORS

“Notice to Contractors” is published by the City for formally bid contracts in accordance with Colusa City Municipal Code. Among other provisions, the Notice to Contractors makes reference to Section 1770 et seq. of the Labor Code relating to determinations regarding prevailing wages. Contractor shall pay prevailing wages according to the rates established by these determinations. Copies of these determinations are on file in the Office of the Director and shall be made available to any interested party on request, and also may be retrieved from the internet at [www.dir.ca.gov/dlsr](http://www.dir.ca.gov/dlsr).

A summary of the labor compliance requirements will be presented at the pre-construction meeting. Each contractor and subcontractor (at all levels/tiers) is required to submit certified payrolls and labor compliance documentation electronically at the discretion of and in the manner specified by, the City of Colusa.

Electronic submittal will be through a web-based system, accessed on the World Wide Web by a web browser.

Use of the system may entail additional data entry of weekly payroll information including; employee identification, labor classification, total hours worked and hours worked on this project, wage and benefit rates paid, etc. The contractor’s payroll and accounting software may be capable of generating a ‘comma delimited file’ that will interface with the software. If the ‘comma delimited file’ option does not work, it is still the responsibility of the contractor and subcontractors to manually enter their data into the system specified by City of Colusa, meeting the required deadlines for those documents.

Every lower-tier subcontractor and vendor is required to provide labor compliance documentation.

#### 2-2 BID FORM

A Bid Form shall be made available to each prospective Bidder.

### **2-3 PROJECT ESTIMATE**

The quantities included in the Project Estimate in the Notice to Contractors, Bid Form and Contract are approximate only, and are given as a basis for comparison of Bids. The City does not, expressly or by implication, represent or agree that the actual amount of Work will equal the approximate estimate. The City reserves the right to increase or decrease the amount of any class or portion of the Work, or to omit portions of the Work, as may be deemed necessary or advisable in the sole discretion of the Engineer, as provided in the Contract Documents.

### **2-4 EXAMINATION OF CONTRACT DOCUMENTS AND SITE OF WORK**

All Bidders shall carefully inspect the site of the contemplated Work, and carefully review the Plans, Specifications, the Proposal and the other Contract Documents. The submission of a Bid is conclusive evidence that the Bidder has investigated and is satisfied as to the conditions to be encountered, the character, quality, quantity and scope of Work to be performed, the quantities of materials to be furnished, and the requirements of the Contract Documents, and that the Bidder is aware of no material discrepancy between such conditions, the character, quality, quantity and scope of Work to be performed, the quantities of materials to be furnished, and the requirements of the Contract Documents. If the Engineer has made investigations of conditions in areas where the Work is to be performed or in other areas, some of which may constitute possible local material sources, such investigations are made only for the purpose of study and design. Subject to and upon the conditions set forth below, where such investigations have been made, prospective Bidders or Contractor may, upon written request, inspect the records of such investigations. Any inspection of the records shall be made at such place or places that may be specified in the Special Provisions or by the Engineer.

The records of such investigations are not part of the Contract and are shown solely for the convenience of prospective Bidders or Contractor. The Engineer and the City assume no responsibility whatsoever in respect to the sufficiency or accuracy of such investigations, the records of the investigation, or any interpretation in the investigation or made by the Engineer and that there is no representation, warranty or guarantee, either express or implied, that the conditions indicated by such investigations or records of the investigations are representative of those existing throughout such areas, or any part thereof, or that unanticipated developments may not occur, or that materials other than or in proportion different from those indicated, may not be encountered.

The availability for use of information described in this Section is not a waiver of the provisions of the first paragraph of this Section and all prospective Bidders and Contractor are cautioned to make such independent investigations

and examinations as each of them may consider necessary to sufficiently inform itself as to the conditions to be encountered in the performance of the Work, and, with respect to possible local material sources, the quality and quantity of material available from such sources and the type and extent of processing that may be required in order to produce material conforming to the requirements of the Contract. No information derived from such inspection of records of investigations or interpretations made by the Engineer relieves any prospective Bidder or Contractor from any risk or from properly fulfilling the terms of the Contract.

## **2-5 PREPARATION OF PROPOSAL**

Bid Forms and the plans and specifications are available on the City's website. Bids not presented on the Bid form shall be rejected.

Proposals must set forth in clearly legible figures, an item price and a total for each item in the respective spaces provided, and must be signed by the Bidder, who shall fill out all blanks in the Bid Form.

## **2-6 DETERMINATION OF AMOUNT BID - MATHEMATICAL ERROR**

In determining the amount bid by each Bidder, the City may disregard computations that contain obvious mathematical errors in addition, subtraction, multiplication, and division that appear on the face of the Proposal. When such a computational error appears on the face of the Proposal, the City may, but is not obligated to correct any such error and compute the total amount bid by said Bidder on the basis of the corrected figure or figures to determine which Bidder has submitted the lowest bid. However, the City has no responsibility or liability to any bidder if the City determines which Bidder has submitted the lowest bid without doing so.

When an item price is required to be set forth in the Proposal, and the total price for the item is not consistent with the figure that is derived by multiplying the item price by the Project Estimate of the quantity of work to be performed for said item, the item price shall prevail over the total price for the item. The total to be paid for each item shall be based upon the item price and not the total price for the item. If the Proposal contains only a total price for the item, and not the item price, the City shall determine the item price by dividing the total price for the item by the stated Project Estimate of the quantity of work to be performed for the item.

If the Proposal contains neither the item price nor the total price for the item, then it shall be deemed non-responsive and will be rejected.

## **2-7 REJECTION OF PROPOSALS**

Proposals may be rejected if they show any alteration of form, additions not called for, mathematical errors, conditional Bids, changes that make the Proposal illegible, or contain irregularities.

When Proposals are signed by an agent, other than an officer or officers of the corporation authorized to sign contracts on its behalf or a member of a partnership, a “power of attorney” must be filed with the City of Colusa prior to opening Bids or submitted with the Proposal; otherwise, the Proposal shall be rejected as non-responsive. The City reserves the right to waive any informalities or minor irregularities in the Bids.

## **2-8 BID SECURITY**

All Bids shall be accompanied by one of the following forms of Bidder’s security: Cashier’s check, a certified check, or a Bidder’s Bond executed by a surety insurer admitted and duly authorized to transact business in the State of California, made payable to the City.

No Bidder’s Bond shall be accepted unless it substantially conforms to the Bond form included in the Special Provisions. Bidder’s Bond forms may be obtained from the Engineer. The Engineer may waive the requirement to furnish Bid Security for Contracts that may be awarded without City Council approval pursuant to the Colusa City Code.

## **2-9 SUBCONTRACTORS**

Each contractor or subcontractor performing any work for the City of Colusa, must be currently registered with the California Department of Industrial Relations (DIR), as specified in Labor Code Section 1725.5. Labor Code Section 1771.1 (enacted by SB 854) provides that a Contractor or subcontractor is not qualified to bid on, or be listed in a Proposal (subject to the requirements of Section 4104 of the Public Contract Code), or engage in the performance of any Work, unless currently registered and qualified pursuant to Labor Code Section 1725.5.

In addition, each Bidder and each Contractor shall, to the extent required by law, comply with to the Subletting and Subcontracting Fair Practices Act of the State of California (Public Contract Code Sections 4100 et seq.) and shall, in the Bid, on a form provided by the City, set forth:

1. The name and location of the place of business and the California contractor license number for each proposed Subcontractor who shall perform work or labor or render service to the prime Contractor in or

about the construction of the Work, or a Subcontractor licensed by the State of California who, under a subcontract to the prime Contractor, specially fabricates and installs a portion of the Work or improvement according to detailed drawings contained in the Plans and Specifications, in an amount in excess of one-half of one percent of the prime Contractor's total bid or, in the case of bids for the construction of streets or highways, including bridges, in excess of one-half of one percent of the prime Contractor's total bid or \$10,000, whichever is greater.

2. The portion and dollar amount of the work that will be done by each such Subcontractor. The prime Contractor shall list only one Subcontractor for each such portion as is defined by the prime Contractor in the Bid.
3. Every Bidder shall list the Contractor's current DIR registration number and the current DIR registration number of all listed subcontractors, on the Subcontractor and Local Business Enterprise (LBE) Participation Verification Form included in the contractor's bid.

In addition to the above requirements, Contractor shall perform with its own organization and with the assistance of workers under its immediate superintendence, work of a value not less than twenty percent (20%) of the value of all Work in the Contract. The dollar amount of subcontracted work that is specifically indicated by the Bidder on the form provided by the City shall be used to determine the value of work being subcontracted, as well as the value of LBE Subcontractor participation for purposes of determining compliance with LBE participation requirements, unless the Engineer determines such value to be significantly misstated. The Bidder shall provide such bidding information as may be requested by the Engineer to make this determination.

## **2-10 SUBMISSION OF PROPOSAL**

The Proposal shall be submitted as directed in the Notice to Contractors in a sealed envelope provided by the City. The Bidder shall plainly mark the exterior of the envelope in which the Proposal is submitted to indicate that it contains a proposal for the project for which the proposal is submitted, and the date of the Bid opening therefor. Proposals submitted in envelopes that are not properly marked may be rejected. The Proposal cannot be withdrawn or modified after the time specified for opening of the Bids, except as may be authorized under Section 2-12 below.



## **2-11 PUBLIC OPENING OF PROPOSALS**

Proposals shall be opened and read publicly at the time and place indicated in the Notice to Contractors. Bidders or their authorized agents may be present.

## **2-12 RELIEF OF BIDDERS**

A Bidder may request relief from its Bid, pursuant to the provisions of Public Contract Code Section 5100 et seq.

## **2-13 DISQUALIFICATION OF BIDDERS**

City shall not consider more than one Proposal from an individual, partnership, corporation, or other entity or combination thereof, under the same or different names. If City has reasonable grounds to believe that any individual, partnership, corporation or combination thereof is interested in more than one Proposal as a prime Bidder for the work contemplated, City may reject all Proposals in which such individual, partnership, corporation or combination thereof is interested. If City has reason to believe that collusion exists among any Bidders, City may reject the Proposals. City may reject a Proposal in which the bid(s) submitted for one or more items are obviously unbalanced, as reasonably determined by City.

## **2-14 LICENSING OF BIDDERS**

All Bidders and Contractors shall be licensed in accordance with the laws of California and any Bidder or Contractor not so licensed is subject to the penalties imposed by such laws. The Bidder's or Contractor's license must be of a class that permits its holder to do the Work contemplated as of the date the Proposal is submitted and such license must be maintained for the duration of the work. The Bidder shall indicate its license number and class in the space provided for that purpose on the Bid Form.

The City shall specify the classification of license that a Contractor must possess at the time a Contract is awarded. This shall be included in the Plans and Notice to Contractors (Public Contract Code Section 3300).

## **2-15 PREQUALIFICATION OF BIDDERS**

The City may establish prequalification requirements for Bidders on one or more Contracts consistent with applicable provisions of the City Code, and other applicable laws or regulations. The City may establish prequalification requirements for Bidders on one or more Contracts consistent with applicable provisions of the City Code, and any other Laws or Regulations if applicable.

## **2-16 JOINT VENTURE BIDS**

If two or more prospective Bidders desire to bid as a joint venture on a project, the prospective Bidders must first file an affidavit of joint venture with the City on a form approved by the Engineer. The affidavit of joint venture is valid only for the specific project for which it is filed. If an affidavit of joint venture is not filed and approved by the Engineer prior to Bid opening, the joint bid shall be rejected. On projects for which pre-qualification is required, each party to the joint venture must separately pre-qualify in order to file a joint venture affidavit. Joint venture bidders must comply with the California Business and Professions Code, sections 7029 and 7029.1. A joint venture is not required to have a current DIR registration number until after contract award, so long as the prospective partners in the joint venture each have current DIR registration numbers at the time of Bid opening. And a joint venture shall not be qualified as a Local Business Entity unless the prospective partners in the joint venture would separately qualify as Local Business Entities at the time of bid opening.

## **2-17 AGREEMENT TO ASSIGN**

If a Bid is accepted, the Bidder will assign to City all rights, title, and interest in and to all causes of action it may have under Section 4 of the Clayton Act (15 U.S.C. Sec. 15) or under the Cartwright Act, Chapter 2 (commencing with Section 16700) of Part 2 of Division 7 of the Business and Professions Code), arising from purchases of goods, materials, or services by the Bidder pursuant to the Contract. The assignment is effective at the time the City tenders final payment to the Bidder without further acknowledgement by the parties (Cal. Govt. Code §4552).

### Section 3

#### AWARD AND EXECUTION OF CONTRACT

##### 3-1 AWARD OF CONTRACT

Unless otherwise provided in the Special Provisions, or otherwise authorized by the City Council in accordance with applicable provisions of the Colusa City Code, the award of a formally bid Contract, if it is awarded, will be to the lowest responsible Bidder (as defined in the Colusa City Municipal Code) whose Bid complies with the specific requirements of the Contract Documents. The City Council reserves the right to reject any and all Proposals.

##### 3-2 TIME OF AWARD

The award of a formally bid Contract, if made, will be made within sixty (60) calendar days after the opening of the Proposals.

If the lowest responsible Bidder refuses or fails to execute the Contract, the City Council may award the Contract to the second lowest responsible Bidder. Such award, if made, will be made within ninety (90) calendar days after the opening of Proposals.

If the second lowest responsible Bidder refuses or fails to execute the Contract, the City Council may award the Contract to the third lowest responsible Bidder. Such award, if made, will be made within one hundred and twenty (120) calendar days after the opening of the Proposals.

The periods of time specified above within which the award of the Contract may be made, may be extended by written agreement between the Engineer and the applicable Bidder.

##### 3-3 COMPARISON OF BIDS

All Bids shall be compared on the basis of the Project Estimate of quantities of Work to be done, with such corrections in mathematical errors appearing on the face of the Proposal as the City may choose to make pursuant to Section 2-6 of these Specifications.

##### 3-4 PERFORMANCE AND PAYMENT BONDS

The successful Bidder shall provide Performance and Bonds to the City, each for a sum equal to one hundred percent (100%) of the Contract Price. Each

Bond shall be executed by a surety insurer admitted and duly authorized to transact business in the State of California. If the Contract Price is increased by Change Order, Contractor shall increase the Performance and/or Payment Bond amount(s) if and to the extent required by the Engineer.

Notwithstanding the foregoing, for any Contract awarded for a Contract Price of \$25,000.00 or less, no Performance Bond or Payment Bond is required unless specifically required in the Special Provisions, except as otherwise required by any laws or regulations.

### **3-5 RETURN OF BID SECURITY**

After bids have been received and reviewed, Bid Security will be returned to the respective Bidders except those submitted by the three lowest responsible Bidders. The Bid Security of the three lowest responsible Bidders will be returned after the Contract is executed, subject to the provisions of Section 3-7 below.

### **3-6 EXECUTION OF CONTRACT**

The Contract shall be executed by the successful Bidder and returned to the City together with the Performance and Payment Bonds, not later than fifteen (15) calendar days after the date the Contract is awarded.

### **3-7 FAILURE TO EXECUTE CONTRACT**

Failure of the lowest responsible Bidder, the second lowest responsible Bidder, or the third lowest responsible Bidder to execute a formally bid Contract and file acceptable Bonds and insurance as provided in the Contract Documents shall be just cause for the City Council to void the Contract award to that Bidder and utilize that Bidder's Bid Security to recover the City's cost as provided below.

If the lowest responsible bidder refuses or fails to execute the Contract as required herein, the City Council may award the Contract to the second lowest responsible Bidder. If this occurs, the amount of the lowest responsible Bidder's Bid Security shall be applied by the City to the difference between the lowest Bid and the Bid of the second lowest responsible Bidder and the surplus, if any, shall be returned to the lowest responsible Bidder if a check is used, or shall be credited to the surety on the Bidder's Bond if a Bond is used.

On refusal or failure of the second lowest responsible Bidder to execute the Contract, the City Council may award the Contract to the third lowest responsible Bidder. If this occurs, in addition to application of the lowest Bidder's Bid Security as provided above, the amount of the second lowest responsible Bidder's Bid Security shall be applied by the City to the difference

between the second lowest Bid and the Bid of the third lowest responsible Bidder, and the surplus, if any, shall be returned to the second lowest responsible Bidder if a check is used, or credited to the surety on the second lowest Bidder's Bond if a Bond is used.

The successful Bidder may file with the Engineer a written notice, signed by the Bidder or its authorized representative, specifying that the Bidder will refuse to execute the Contract if presented. The filing of such notice shall immediately have the same force and effect as the failure or refusal of the Bidder to execute the Contract and furnish acceptable Bonds within the time prescribed above.

### **3-8 FORM OF AGREEMENT AND SURETY BONDS**

The form of the Agreement and the form of the Payment and Performance Bonds required to be executed by the successful Bidder shall be approved by the City Attorney.

## Section 4

### SCOPE OF WORK

#### 4-1 INTENT OF PLANS AND SPECIFICATIONS

The intent of the Plans and Specifications is to prescribe the details for the completion of the Work that Contractor undertakes to perform in accordance with the terms of the Contract. Where the Plans and Specifications describe portions of the Work in general terms, but not in complete detail, it is understood that only the best general practice is to prevail and that only materials and workmanship of the best quality shall be used. Unless otherwise specified, Contractor shall furnish all labor, materials, tools, equipment, and incidentals, and do all the Work involved in executing the Contract in a satisfactory and workmanlike manner.

#### 4-2 CLEANING UP

Contractor shall not allow the site of the Work to become littered with trash, debris, garbage or waste material, and shall maintain the site in a neat, orderly, safe and healthful condition until completion and acceptance of the Work. Before final inspection of the Work, Contractor shall clean the work site and all ground occupied by Contractor in connection with the Work of all rubbish, excess materials, falsework, temporary structures and equipment. All parts of the Work shall be left in a neat and presentable condition. Contractor shall implement a program of proper cleaning and “housekeeping” practices, employee training and other measures as needed to consistently maintain a clean Work site and shall at all times take all measures necessary to protect work in place and materials and equipment stored on site from contamination by dust, dirt, debris or mold. Full compensation for cleaning up and protection of work, materials and equipment is included in the prices paid for the various Contract items of work, and no separate or additional payment shall be made for cleaning up and protection of work, materials and equipment.

#### 4-3 LINES AND GRADES

All Work done under this Contract shall be done to the lines and grades shown on the drawings. Contractor shall keep the Engineer informed, at least 2 working days in advance, of the times and places at which Contractor wishes to do work, in order that lines and grades may be furnished and necessary measurements for record and payment made with the minimum of inconvenience to the Engineer and delay to Contractor.

The datum to which all elevations mentioned herein or shown on the drawings refer is the official datum of the City of Colusa, unless specifically shown or stated to be otherwise.

#### **4-4 CHANGES IN THE WORK**

The City reserves the right to make such alterations, deviations, additions to or deletions from the Work or any of the Contract Documents, including the right to increase or decrease the quantity of any item or portion of the Work or to eliminate any item or portion of the Work, as may be deemed necessary or advisable by the Engineer, and to require such extra work as may be determined by the Engineer to be necessary for the proper completion or construction of the whole Work.

Any such changes shall be set forth in a Change Order that shall specify, in addition to the work to be done or omitted in connection with the change made, the adjustment of Contract time, if any, and the increase or decrease in Contractor's compensation, if any, for that work. A Change Order issued by the Engineer shall not be deemed approved and effective until signed by Contractor (or otherwise deemed approved by Contractor as provided in this Section) and approved by the City in accordance with applicable approval requirements of the Colusa City Code. The City's payment in accordance with the provisions for compensation set forth in an approved Change Order shall constitute full compensation for all work included in or required by the Change Order, including all direct, indirect and consequential costs incurred or claimed by the Contractor.

Contractor may contest the terms or conditions of a Change Order issued by the Engineer by submitting a written protest to the Engineer within 15 calendar days after Contractor's receipt of such Change Order. The protest shall state the points of disagreement, the applicable Contract Document references, and the quantities and costs involved. If a written protest is not submitted within the 15 calendar day period; (1) payment shall be made as set forth in the Change Order, and Contractor shall not be entitled to any additional compensation for all work included therein or required thereby; and (2) the Change Order shall be deemed to have been approved and executed by Contractor.

Upon receipt of an approved Change Order, Contractor shall proceed with the ordered work. In those instances where the Work would be delayed by waiting for City to issue and/or approve a Change Order, the Engineer may direct work to be done by issuing a written Field Order, and Contractor shall proceed with the work so ordered prior to actual receipt of an approved Change Order. In those cases, the Engineer shall, as soon as practicable, issue a Change Order for the ordered work.

Increases or decreases in the quantity of a unit price bid item of Work shall be determined by comparing the total quantity of that item of Work with the bid quantity. If the total quantity of a unit price bid item of Work is increased, the Engineer shall determine in the Engineer's sole discretion whether to pay for the additional quantity of the item (i) at the Contract unit price for the item, (ii) at a different unit price or in a lump sum, if such price or sum is agreed to by Contractor, or (iii) by cost and percentage, as provided in Section 8-10 below. If the total quantity of any item of Work required under the Contract is decreased, the Engineer shall determine the reduction in compensation for the item based on the Contract unit price for the item; provided that if the compensation for any "major item" (defined below) is reduced by more than 20% of the cost bid for that item, the Engineer may agree to pay Contractor for lost overhead resulting from such reduction, if any, as determined by the Engineer in the Engineer's sole discretion; provided, further, that if the Engineer eliminates in its entirety an item of the Work, the reduction in compensation therefore shall be determined in accordance with Section 4-5 below.

As used in this Section and Section 4-5, "major item" means an item of the Work with a cost, computed on the basis of the bid quantity for the item, that exceeds the following percentages of the Contract price:

1. 10 % of the original Contract price, for Contracts originally awarded for a price of less than one million dollars.
2. 8 % of the original Contract price, for Contracts originally awarded for a price of at least one million dollars but less than five million dollars.
3. 6 % of the original Contract price, for Contracts originally awarded for a price of at least five million dollars but less than ten million dollars.
4. 5 % of the original Contract price, for Contracts originally awarded for a price of ten million dollars (\$10,000,000.00) or more.

For extra work that does not constitute an increase of a unit price bid item of the Work, the Engineer shall determine, in the Engineer's sole discretion, whether to pay for the extra work (i) at a unit price or lump sum agreed to by Contractor, or (ii) by cost and percentage, as provided in Section 8-10.

#### **4-5 ELIMINATED ITEMS**

Notwithstanding any other provision of the Contract Documents, the Engineer may at any time, in writing, entirely eliminate any item(s) of the Work if the Engineer determines, in the Engineer's sole discretion, that the item is



unnecessary to the project or will be performed by the City's own personnel. Any elimination of Work is not a waiver or invalidation of any of the conditions or provisions of the Contract. If any item of Work is entirely eliminated, Contractor shall not receive any compensation for the eliminated item, except for actual costs incurred in connection with the eliminated Contract item if reasonably incurred prior to the date of notification in writing by the Engineer of the elimination. The payment by City for actual costs reasonably incurred by Contractor, if any, prior to elimination of an item as provided in this Section shall be computed in the same manner as if the work were to be paid by cost and percentage as provided in Section 8-10 of these Specifications. In addition, if any major item is entirely eliminated, the Engineer may agree, in the Engineer's sole discretion, to pay Contractor for lost overhead resulting from the elimination.

If material acceptable to the City is ordered by Contractor for the eliminated item prior to the date of notification of the elimination by the Engineer, and if orders for that material cannot be canceled, the material shall be paid for at the actual cost to Contractor. If so, the material paid for shall become the property of the City. If the material is returnable to the vendor and if the Engineer so directs, the material shall be returned and Contractor shall be paid for the actual cost of charges made by the vendor for returning the material.

#### **4-6 EXTRA WORK**

Work is considered extra work only when the Engineer determines that the work is not covered by any of the various items for which there is a bid price or by combinations of those items. Contractor shall perform extra work and furnish labor, material and equipment for extra work upon receipt of a Change Order or other written order of the Engineer (including a Field Order) directing Contractor to perform such extra work, in accordance with the provisions of Section 4-4 above. Extra work must be authorized in writing by the Engineer before the work is started. No payment shall be made for extra work performed prior to Engineer's prior written authorization.

#### **4-7 GENERAL**

The parties intend that differences between the City and Contractor, arising under the Contract, be brought to the attention of the Engineer at the earliest possible time in order that such matters may be settled, if possible, or other appropriate action promptly taken. The City and Contractor agree to initially strive to resolve all disputes amicably and in an informal manner. Any dispute resolved informally shall be documented by the Engineer, and if the dispute resolution involves a change in the Contract Work, increase or decrease in the compensation due the Contractor, or adjustment in the time of completion

of the Work, then the informal dispute resolution shall be confirmed by a Change Order pursuant to the Contract and Section 4-4 above. Informal discussions or negotiations with the Engineer or other City representatives concerning informal resolution of a dispute shall not suspend the claim filing and other deadlines provided below, unless so provided by the Engineer in writing.

#### **4-8 COMPLIANCE REQUIRED**

Except as specifically otherwise provided in these Specifications, Contractor shall not be entitled to payment of any additional compensation or damages for any cause, including, but not limited to, any act or failure to act, by the Engineer or the City, or any officer, employee, agent or contractor of the City, the presence or discovery of any condition, or the happening of any event or occurrence, unless Contractor gives the Engineer timely written notice of and supporting data for any such potential claim and complies with the dispute procedure as specified below. If the Contractor fails to timely file a written Claim in accordance with Section 4-10 below, then the Contractor shall be deemed to have waived any right or remedy to thereafter pursue the claim against the City in any administrative, arbitration or litigation proceeding.

#### **4-9 DEFINITION OF CLAIM**

A “Claim” means a separate demand by the Contractor for: (a) a time extension (including a demand for relief from damages or penalties for delay assessed by the City under the Contract); (b) payment of money or damages arising from work done by, or on behalf of, the Contractor pursuant to the Contract and payment of which is not otherwise expressly provided for or the Contractor is not otherwise entitled to; or (c) payment of an amount that is disputed by the City.

The procedures and remedies set forth in sections 4.7-4.11 shall not apply to: (i) any claim by the City against the Contractor or its surety or sureties (unless the City, in its sole discretion, opts to proceed hereunder); (ii) any claim or dispute relating to stop notices; or (iii) any claim relating to the approval, refusal to approve or substitution of any subcontractor, regardless of tier, pursuant to Public Contract Code section 4700, et seq.

#### **4-10 REQUIREMENTS FOR FILING CONTRACT CLAIM; CONTENTS; FILING DEADLINE**

The Contractor may file a Claim with the Engineer. A Claim must: (a) be in writing; (b) be labeled or clearly indicated as a Claim under the Contract; (c) set forth in detail the reasons why the Contractor believes additional compensation or a time extension is or may be due, the nature of the costs involved, and, insofar as possible, the amount of the Claim; (d) include documents that support and substantiate the Claim; and (e) include the following

certification, properly completed and executed by Contractor or any officer of Contractor:

I, \_\_\_\_\_ BEING THE \_\_\_\_\_ (must be an owner or officer) OF \_\_\_\_\_ (CONTRACTOR), DECLARE UNDER PENALTY OF PERJURY UNDER THE LAWS OF THE STATE OF CALIFORNIA, AND I DO PERSONALLY CERTIFY AND ATTEST THAT: I HAVE THOROUGHLY REVIEWED THE ATTACHED CLAIM FOR ADDITIONAL COMPENSATION AND/OR EXTENSION OF TIME, AND KNOW ITS CONTENTS, AND THE CLAIM IS TRUTHFUL AND ACCURATE; THAT THE AMOUNT AND/OR CONTRACT TIME EXTENSION REQUESTED ACCURATELY REFLECTS THE CONTRACT ADJUSTMENT FOR WHICH THE OWNER IS LIABLE; AND FURTHER, THAT I AM FAMILIAR WITH CALIFORNIA PENAL CODE SECTION 72 AND CALIFORNIA GOVERNMENT CODE SECTION 12650, ET SEQ., PERTAINING TO FALSE CLAIMS, AND FURTHER KNOW AND UNDERSTAND THAT SUBMISSION OR CERTIFICATION OF A FALSE CLAIM MAY LEAD TO FINES, IMPRISONMENT, AND OTHER SEVERE LEGAL CONSEQUENCES.

A Claim must be submitted to the Engineer within the following claim filing deadlines: (a) if the Claim relates to extra, additional or unforeseen work for which the Contractor intends to demand additional compensation, a time extension, or both, notice shall be given to the Engineer prior to the time that the Contractor commences performance of the work giving rise to the potential claim for additional compensation or time extension, and Contractor shall not proceed with that work until so directed by the Engineer in writing; and (b) for all other Claims not included within (a) such as matters covered by the liquidated damages provisions of the Contract or a Claim that is based directly and solely on differences in measurements or errors in computation of Contract pay quantities, the claim must be filed on or before 15 days after the date of the occurrence, event or circumstance giving rise to the Claim. In no event shall a Claim be filed later than the date of final payment.

Any additional data supporting the Claim must be given to the Engineer not later than 30 days after the date of such written notice, unless the Engineer, in writing, allows an additional period of time to ascertain more accurate data supporting the claim. This data shall be accompanied by Contractor's written statement that the amount claimed covers all known amounts (direct, indirect, and consequential) to which Contractor is entitled as a result of such condition, act, failure to act, event, thing or occurrence.

**4-11 ALL CLAIMS SUBJECT TO PUBLIC CONTRACT CODE SECTION 9204; PROCEDURE**

This procedure applies to the handling and resolution of all Claims sent to the City, whether or not by registered mail or certified mail with return receipt

requested in accordance with Public Contract Code section 9204(c)(1). With respect to all Claims submitted to the City in accordance with this procedure, the provisions of Public Contract Code section 9204 shall apply. Pursuant to Public Contract Code section 9204(f), the City has prescribed reasonable change order, claim, and dispute resolution procedures and requirements in addition to the provisions of section 9204 that do not conflict with or otherwise impair section 9204's timeframes and procedures.

1. Upon receipt of a properly submitted Claim, the Engineer shall conduct a reasonable review of the Claim and, within a period of 45 calendar days, provide the Contractor a written statement identifying what portion of the claim is disputed and what portion is undisputed. Upon receipt of a Claim, the Engineer and Contractor may, by mutual agreement, extend the 45-calendar day time period.
2. The Contractor shall furnish reasonable documentation to support the claim consistent with the requirements of Section 4.10.
3. If the Contractor disputes the Engineer's written response, the Contractor may request in writing an informal conference to meet and confer for settlement of the issues in dispute. Such request by Contractor shall be made within 15 calendar days from the date of the written statement given by the Engineer. Upon receipt of a request in writing, the City shall schedule a conference within 30 calendar days for settlement of the dispute. The informal conference shall be conducted by the Division Manager for the purpose of resolving the dispute.
4. Written notice of the date, time and location of the conference shall be provided to Contractor not less than ten calendar days prior to the date of the conference. On such date, or such other date to which the parties may agree, Contractor shall be afforded a reasonable opportunity to present Contractor's position on and substantiation for the Claim. The conference shall be conducted in an informal manner, and no record shall be made of the proceedings, except that any written materials submitted by the City or Contractor shall be preserved by the Division Manager until the Work is finally accepted by the City.
5. Within ten days following the conclusion of the conference, if the Claim or any portion of the Claim remains in dispute, the Division Manager shall provide the Contractor a written decision identifying the portion of the Claim that remains in dispute and the portion that is undisputed. Any decision by the Division Manager to pay additional compensation to the Contractor shall be contingent upon approval of a change order authorizing such compensation by the Colusa City Council, unless City Council approval of the change order is not required under the

Colusa City Code. Payment due on an undisputed portion of the claim shall be processed and made within 60 calendar days after the Division Manager issues the written decision.

6. If the Contractor disagrees with the Division Manager decision, the Contractor shall, within 14 calendar days after the Contractor receives the Division Manager's decision, file a written request with the City to submit the disputed portion of the claim to nonbinding mediation, with the City and the Contractor sharing the associated costs equally. Contractor hereby expressly waives all Claims not timely submitted to mediation in accordance with this Section. The City and Contractor shall mutually agree to a mediator or mediators within 10 days after the disputed portion of the claim has been identified in writing. As part of the process of evaluating a proposed mediator, each party may request that the proposed mediator(s) disclose any prior or existing financial relationship with either party. If the parties cannot agree upon a mediator or mediators, each party shall select a mediator and those mediators shall select a qualified neutral third party or parties to mediate with regard to the disputed portion of the claim. Each party shall bear the fees and costs charged by its respective mediator in connection with the selection of the neutral mediator. If mediation is unsuccessful, the parts of the claim remaining in dispute shall be subject to applicable procedures set out in subsection 9 below.
7. The mediator, using advice and input from the parties, shall set the time of each mediation session, as well as the mediation protocol (i.e., submission of briefs, statement of damages, etc.). The mediation will be held at any convenient location agreeable to the mediator and the parties, as the mediator determines. All reasonable efforts will be made by the parties and the mediator to schedule the first session within 30 calendar days after selection of the mediator.
8. The mediation may be terminated: (a) by the execution of a settlement agreement by the parties; (b) by a written declaration of the mediator to the effect that further efforts at mediation are no longer worthwhile; or (c) by a writing on behalf of a party or parties to the effect that the mediation proceedings are terminated.
9. If, at the termination of the mediation proceedings pursuant to Section 4.11.8, the Claim(s), or any portion thereof, remain(s) in dispute, the City's position shall constitute its final decision with regard to the Claim(s). Any litigation arising out of the Claim(s) and the Contract Documents shall be brought in the Colusa County Superior Court, and Contractor expressly waives the removal provisions of California Code of Civil Procedure Section 394.

**4-12 CONTRACT WORK PENDING CLAIM RESOLUTION**

In the event of any dispute between the City and Contractor, or during the pendency of any Claim(s) or associated proceedings under this Section or the Contract Documents, Contractor shall not stop, or delay performance of, the Work, but shall prosecute the Work diligently to completion in the manner directed by the Engineer.

**4-13 DISPUTES INVOLVING DESIGN PROFESSIONALS**

If any Claim(s) asserted by the Contractor arise from or is/are related, in any manner, to conduct or actions for which a design professional may be responsible, the parties acknowledge and agree that the City may, in its sole discretion, require the participation the design professional in any dispute proceeding under this Section. This right shall remain solely within the discretion of the City, and Contractor shall have no rights under the Contract Documents to require or seek to compel the participation the design professional in any dispute proceeding under this Section or elsewhere under the Contract Documents.

**4-14 ATTEMPT TO COMPROMISE AND SETTLE**

All communications, statements, correspondence, information and other evidence, whether documentary or oral, made or presented at, or in anticipation of, the dispute resolution procedures set forth in sections 4.7-4.11 shall be deemed an attempt to compromise and settle the Contractor's claim under California Evidence Code section 1152, and as such will be inadmissible for any reason in any litigation that may arise pertaining to the Claim or the Contract.

## Section 5

### CONTROL OF WORK AND MATERIALS

#### 5-1 AUTHORITY OF ENGINEER

As defined in Section 1 of these Specifications, “Engineer” may mean either the Director or the representatives authorized by the Director to exercise control and supervision of the Work. Much of the actual supervision and control of the project may be by subordinate representatives designated as “Engineer.” However, whenever in these Specifications, Plans or Special Provisions, the Director is designated as the authority in any matter, it will mean only the Director and not subordinates working under the Director’s supervision. Whenever the word “Engineer” is used in these Specifications, Plans or Special Provisions, then either the Director’s subordinates assigned to the supervision and control of the Work or the Director will exercise such authority.

The Engineer will decide any and all questions as to the quality and acceptability of materials furnished, work performed, and rate of progress of the Work. The Engineer will decide all questions as to the interpretation of the Specifications, Plans or Special Provisions, the fulfillment of the Contract on the part of Contractor, and the rights of different contractors on the project. The Engineer will determine the amount and quality of the Work performed and materials furnished, for payment under the Contract.

Whenever, in these Specifications, or upon the Plans, the words “directed,” “required,” “permitted,” “ordered,” “designated,” “prescribed,” or words of like import are used, the direction, requirement, permission, order, designation, or prescription of the Engineer is intended. Similarly, the words “approved,” “acceptable,” “satisfactory,” or words of like import, mean approved by, or acceptable to, or satisfactory to the Engineer, subject in each case to the final determination of the Director or the City Council.

#### 5-2 CONFORMITY WITH PLANS AND ALLOWABLE DEVIATIONS

Finished surfaces shall conform to the lines, grades, cross-sections, and dimensions shown on the approved Plans and working drawings, unless a deviation from the Plans is authorized in writing by the Engineer.

#### 5-3 COORDINATION OF CONTRACT DOCUMENTS

These Specifications, the Plans, Special Provisions, and all supplementary Plans, drawings, and other Contract Documents are essential parts of the Contract, and a requirement occurring in one is just as binding as though occurring in all. These documents are intended to be integrated to describe and

provide for a complete Work. Whenever a reference is made in these Specifications to a Section or subsection of another agency's Specifications, such reference shall be deemed to include the General Provisions of such other Specifications of which the Section or subsection is a part, to the extent pertinent to the reference and not inconsistent with the other Contract Documents. In the event of a conflict in the Contract Documents, unless expressly indicated otherwise, the governing priorities are as follows:

1. A Change Order.
2. The Agreement.
3. Addenda. Subsequent addenda shall govern over prior addenda only to the extent specified.
4. In case of conflict between the Specifications and the Special Provisions, the Special Provisions shall govern.
5. In case of conflict between Plans and Specifications, the Plans shall govern in matters of quantity and the Specifications shall govern in matters of quality.
6. In case of conflict within the Plans involving quantities and quality, Contractor shall furnish the greater quantity and quality material and procedure.
7. In case of conflict within a plan sheet involving figured or numerical dimensions the profile shall govern over the layout.
8. In case of conflict within the Specifications involving quality of material or procedure, Contractor shall furnish the higher quality material and procedure.
9. Specific notes shall govern over other notes and other portions of the Plans except Schedules.
10. Larger scale drawings shall govern over smaller scale drawings.
11. Detail plans shall govern over standard plates bound within the Specifications.
12. Figured or numerical dimensions shall govern over dimensions obtained by scaling.
13. Where provisions of codes, safety orders, Contract Documents, referenced manufacturers' specifications or industry standards are in conflict, the more restrictive and higher quality shall govern.

Contractor shall not take advantage of any error, discrepancy or omission in any of the Contract Documents if such error, discrepancy or omission was or should have been apparent to Contractor. As soon as Contractor discovers any apparent error, discrepancy or omission, Contractor shall immediately notify the Engineer, so that the Engineer may make a determination on the matter, which determination shall be final, subject to Contractor's right to submit a claim in accordance with applicable provisions of the Contract Documents.



The Work shall be performed and completed according to the meaning and intent of the Contract Documents.

In addition to the drawings made a part of this Contract at time of signing, by incorporation or reference, the Engineer may furnish such additional drawings from time to time during the progress of the Work, as are necessary to make clear and to define in greater detail, as may be necessary, the intent of the Specifications, Plans, Special Provisions and other Contract Documents and Contractor shall make its Work conform to all such drawings.

Should it appear that the Work to be done or any of the matters related to the Work are not sufficiently detailed or explained in the Contract Documents, Contractor shall provide the Engineer with a request for information (RFI) requesting such information or explanations as may be necessary to complete the Work. The City shall respond to RFIs within 20 calendar days of receipt, unless the Engineer reasonably determines that a longer time period is necessary to provide the information requested by Contractor. The City response (but not Contractor's RFI) shall become part of the Contract, and Contractor shall be responsible for conforming its activities and operations, including the activities and operations of all subcontractors and suppliers, to all applicable requirements, terms and conditions of the City's response.

#### **5-4 COOPERATION OF CONTRACTOR**

After all necessary signatures by City, City will supply Contractor a copy of the Plans, Special Provisions, and the fully executed Agreement. City will also make available to Contractor at least five (5) copies of the Plans and Special Provisions for Contractor's use in prosecuting the Work. If Contractor requests additional copies of the Plans or Special Provisions, the City or its designated reprographics firm will supply such additional copies at Contractor's expense.

Contractor shall give the Work the constant attention necessary to facilitate the satisfactory progress of the Work. Contractor shall cooperate with the Engineer, inspectors and with other contractors in every way possible. Contractor shall at all times have a competent Superintendent at the site of the Work. Contractor's Superintendent shall be fully authorized as Contractor's agent on the Work. The Superintendent shall be capable of reading and understanding all of the Contract Documents. Unless otherwise approved by the Engineer, the Superintendent shall be an employee of Contractor responsible for providing continuous on-site supervision of the Work and shall be fully authorized to receive and follow any instruction given by the Engineer and to sign Change Orders on behalf of Contractor. Unless specifically called for by the Special Provisions, Contractor is not required to provide an office for use by the Engineer.

If requested by the Engineer, Contractor shall provide daily reports signed by Contractor's Superintendent indicating the location and description of operations and details of the equipment and labor used to perform the items of Work. Such details shall include the description of the items of Work, names and classifications of laborers, hours worked, description of equipment used, equipment numbers, and hours equipment are in use, and hours equipment may be idle.

#### **5-5 CONSTRUCTION STAKES**

The Engineer will furnish Contractor with all lines, grades and measurements necessary for the proper prosecution and control of the Work unless stated otherwise in the Special Provisions. Contractor shall provide the Engineer with the City's standard Survey Request Form at least three (3) working days before construction stakes are required. The Engineer may reject any unreasonable or incomplete Survey Request Form and require Contractor to resubmit. Contractor shall have no claim for any costs, damages or extensions of time arising from any delay caused by Contractor's submittal of an unreasonable or incomplete Survey Request Form.

Such stakes and markings as the Engineer may set for either the City's or Contractor's guidance shall be preserved by Contractor. In the event that the stakes or marks placed by the Engineer are destroyed through carelessness or negligence on the part of Contractor or any Subcontractor and the destruction of these stakes or marks causes a delay in the Work, Contractor shall have no claim for damages or extensions of time. Additionally, the City reserves the right to charge Contractor or deduct from the progress payments the costs to the City for any re-staking or remarking required as a result of carelessness or negligence on the part of Contractor or any Subcontractor.

#### **5-6 PERMANENT SURVEY MONUMENTS**

Contractor is responsible for verifying that the arrangements have been made for preserving and perpetuating all permanent survey monuments that will be affected by the Work. Contractor is responsible for preserving all permanent survey monuments that are not proposed to be disturbed. Contractor shall provide a minimum of ten (10) working day notice to Engineer prior to disturbance or removal of any permanent survey monument, and shall coordinate with the Engineer to reset monuments or provide permanent witness monuments and file the required documentation with the County Surveyor pursuant to Business and Professions Code Section 8771.

## 5-7 SUBMITTALS

Contractor shall supply all submittals required by the Special Provisions or the Engineer. Unless otherwise specified herein, Contractor shall deliver five (5) copies of the submittals to the Engineer when required by the Contract Documents or the Engineer. Within twenty (20) calendar days after receipt of a submittal, the Engineer will return two (2) marked copies of the submittal to Contractor indicating one of the following four (4) actions taken by the Engineer, in the Engineer's sole discretion:

1. If the Engineer's review indicates no exceptions, copies will be returned marked "NO EXCEPTIONS TAKEN." Contractor may immediately incorporate the material and equipment covered by the submittal into the Work.
2. If the Engineer's review indicates limited corrections are required, copies will be returned marked "MAKE CORRECTIONS NOTED." Contractor may immediately incorporate into the Work the material and equipment covered by the corrected submittal, with the corrections noted by the Engineer.
3. If the Engineer's review indicates insufficient or incorrect data has been submitted, copies will be returned marked "REVISE AND RESUBMIT." No work may begin on incorporating the material and equipment covered by this submittal into the Work until the submittal is revised, resubmitted, and returned marked either "NO EXCEPTIONS TAKEN" or "MAKE CORRECTIONS NOTED."
4. If the Engineer's review indicates the material and equipment submittal is unacceptable, copies will be returned marked "RESUBMIT." No work may begin on incorporating the material and equipment covered by this submittal into the Work until a new submittal is submitted and returned marked either "NO EXCEPTIONS TAKEN" or "MAKE CORRECTIONS NOTED."

After approval by the Engineer, submittals (including any corrections noted by the Engineer) shall become a part of the Contract, and the work shall be done in conformity with such approved submittals. No work shall be started or material or equipment purchased until the submittals have been approved. Submittals furnished to the Engineer shall include finished drawings, if required, that are neat, legible, to scale, and drawn to as large scale as reasonably possible.

## **5-8 RECORD DRAWINGS**

Contractor shall maintain a neatly and accurately marked set of record drawings showing the final locations and layout of all facilities as-built. Drawings shall be kept current weekly, with all work instructions and Change Orders, accommodations, and construction adjustments. Drawings are subject to the inspection by the Engineer at all times, and progress payments, or portions of progress payments, may be withheld if drawings are not accurate and current. Prior to City's acceptance of the Work, Contractor shall deliver to the Engineer one (1) set of neatly marked record drawings, accurately showing all the information required above. If the Engineer does not approve the record drawings, Contractor shall revise and resubmit the record drawings as necessary to obtain the Engineer's approval. If Contractor fails to comply with the requirements of this section, the City may deduct and retain the cost of preparing the record drawings from the Contract.

## **5-9 SUGGESTIONS TO CONTRACTOR ADOPTED AT CONTRACTOR'S OWN RISK**

Contractor is solely responsible for determining whether to follow or utilize any plan or method of work suggested by the Engineer to Contractor in whole or in part, and Contractor shall assume all risks for this determination. The Engineer and City will assume no responsibility or risk.

## **5-10 REQUEST FOR MODIFICATION OF WORK**

Should conditions occur during the progress of the Work that make it impossible for Contractor to comply strictly with the terms of the Contract with respect to a portion of the Work, Contractor shall make written request to the Engineer for a modification of such portion of the Work, provided that any modification is not detrimental to the Work or create any additional cost to the City. If the modification is acceptable to the Engineer, Contractor will be notified in writing, consistent with any conditions specified by the Engineer. If a modification is not acceptable to the Engineer, Contractor shall determine some other method of performing such portion of the Work that is acceptable to Engineer.

Such approved modifications do not affect or alter the application of any provision of the Contract to any portion of the Work for which no modification is approved by the Engineer.

## **5-11 RIGHT TO PERFORM EXTRA WORK**

In case of neglect or refusal by Contractor to perform any extra work as directed by the Engineer pursuant to Section 4-6 of these Specifications or to make satisfactory progress in the execution of extra work, the City may employ

any person or persons to perform such work, and Contractor shall not in any way interfere with the person or persons so employed.

#### **5-12 PROVISIONS FOR EMERGENCIES**

If, in the opinion of the Engineer, Contractor has not taken sufficient precautions for the safety of the public or the protection of the Work or adjacent structures or property and immediate action is necessary in order to protect the public, any person or any property or property interest (“emergency work”), the Engineer, with or without notice to Contractor, may, but is not obligated to, take such action or obtain or provide for such work and material as the Engineer may consider necessary and adequate to furnish such protection.

The City’s cost to perform, obtain or provide for such action, work and material shall be paid by Contractor, and may be deducted by City from any payment due or to become due to Contractor.

The performance of emergency work under the direction of the Engineer shall in no way relieve Contractor from its responsibility or liability for any damages that may occur while or after any actions are or have been taken by the Engineer.

#### **5-13 SUSPENSION OF WORK TO PROTECT HEALTH, SAFETY OR WELFARE OF PERSONS OR PROPERTY**

If the Engineer determines, in the Engineer’s sole discretion, that a situation exists where continuation of the Work is illegal or endanger the health, safety or welfare of persons or property on or affected by the Work, the Engineer may order Contractor in writing to delay or suspend the Work in whole or in part for a period of time equal to the period of time while such situation exists. Any order given to Contractor to suspend or delay the Work shall identify the situation that makes the suspension or delay necessary.

Such order of the Engineer does not modify or invalidate in any way any of the provisions of this Contract, and Contractor is not entitled to any damages or compensation from City on account of such delay or suspension.

#### **5-14 RIGHT TO RETAIN IMPERFECT WORK**

If any portion of the work done or material furnished under this Contract is defective and not in accordance with the Contract Documents, and if the defect is not of sufficient magnitude or importance to make the Work or any portion of the Work dangerous or undesirable, the Engineer may, but is not obligated to, retain the defective work instead of requiring the work to be removed and reconstructed. The Engineer may make such deduction from the

payments due or to become due to Contractor as determined appropriate by the Engineer to account for the defector pay the City's costs of removal and reconstruction.

#### **5-15 STORAGE OF MATERIALS AND EQUIPMENT**

Contractor is solely responsible for protecting work in place and materials and equipment stored on-site or off-site from contamination by dust, dirt, debris or mold. Materials and equipment shall be stored so as to ensure the preservation of their quality and fitness for the Work. Stores of equipment and materials shall be located to facilitate inspection by the City. Contractor is responsible for all damages that occur in connection with the care and protection of all materials and equipment to be incorporated in the Work until the completion and final acceptance of the Work by the City.

Prior to storing any materials or equipment on private property not owned by Contractor, Contractor shall obtain written permission from the property owner and, if different than the property owner, the occupant of the property. Contractor is solely responsible for obtaining such permission and complying with any and all conditions and requirements of the property owner or occupant.

Contractor is solely responsible for maintaining adequate security and warning signs and controlling dirt, debris and dust within the limits of Contractor's storage areas at all times. Contractor shall take all steps necessary or required by the Engineer to prevent and eliminate blowing dust.

Prior to commencing the Work, Contractor shall submit a written "Storage of Materials and Equipment Plan" for approval by the Engineer. The Plan shall specify the location, entry date and exit date for all locations where Contractor will store materials or equipment, and a site maintenance plan for all locations. Additionally, this Plan shall describe the measures that Contractor will undertake to minimize impacts to driveways, residents and the general public in the vicinity of such storage locations during work and non-work hours. If this Plan is not approved by the Engineer, Contractor shall revise and resubmit the Plan as necessary to obtain the Engineer's approval.

#### **5-16 MANUFACTURER'S DIRECTION**

Manufactured articles, material, and equipment shall be applied, installed, connected, erected, adjusted, tested, used, cleaned, maintained, and conditioned as recommended by the manufacturer. Copies of the manufacturer's installation instructions and procedures shall be submitted, in accordance with Section 5-7 of these Specifications.

## **5-17 QUALITY OF MATERIALS AND WORKMANSHIP**

If the Contract provides that Contractor shall furnish materials or manufactured articles or shall do work for which no detailed specifications are set forth, the materials or manufactured articles shall be of the best grade in quality and workmanship obtainable in the market from firms of established good reputation, or, if not ordinarily carried in stock, shall conform to the usual standards for first-class materials or articles of the kind required, with due consideration of their intended use. The work performed shall fully conform with the intent to secure the best standard of construction and equipment for the Work as a whole or in part.

## **5-18 TRADE NAMES AND ALTERNATIVES**

For convenience in designation, certain articles or materials to be incorporated in the Work may be designated under a trade name or the name of a manufacturer and its catalogue information. Unless the trade or manufacturer name is expressly designated as the only brand that will be accepted, for one or more of the purposes specified in Public Contract Code Section 3400(b), such designation is deemed to include the words “or equal,” so that the use of an alternative article or material of equal quality and possesses the required features and characteristics for the purpose intended will be permitted, subject to the following requirements:

The burden of proof as to the quality and suitability of alternatives is upon Contractor, who shall furnish all relevant information as required by the Engineer. The Engineer will be the sole judge as to the quality and suitability of alternative articles or materials. The Engineer’s decision will be final.

If the Contract Documents permit the substitution of a similar or equivalent material or article, no tests or action relating to the approval of the substitute material will be made until the request for substitution is made in writing by Contractor accompanied by complete data as to the equality of the material or article proposed. Such requests shall be made in ample time to permit approval without delaying the work, but need not be made within thirty (30) days after award of the Contract.

## **5-19 DUTIES AND POWERS OF INSPECTORS**

Inspectors are representatives of the City with respect to the duties and powers entrusted to them, subject to any limitations on their authority specified by contract or under any Laws or Regulations. Their duty is to inspect materials and workmanship of those portions of the Work to which they are assigned, either individually or collectively, under instructions of the Engineer, and to report any deviations from the Contract Documents. If an inspector deems it necessary, the

inspectors may order Contractor to stop the Work until the Engineer determines and orders that the Work may proceed.

## **5-20 INSPECTION**

All work and materials furnished pursuant to this Contract are subject to inspection and approval or rejection by the Engineer and such assistants as the Engineer deems necessary. Contractor shall notify the Engineer of the time and place of any factory tests required by the Contract, and the time and place of preparation, manufacture or construction of any material for the Work, or any part of the Work, that the Engineer notifies Contractor the Engineer wishes to inspect.

Contractor shall give notice not less than three (3) working days in advance of the beginning of the work on any such material or of the beginning of any such test to allow the Engineer to make arrangements for inspecting and testing or witnessing the inspection or testing, if such inspection and testing or witnessing are deemed beneficial by the Engineer or are required by the Contract.

If the Engineer considers it proper and practicable, the Engineer will, at the written request of Contractor, cause materials intended for use in the Work to be inspected at the point of production or manufacture. The Engineer may at any time cause such an inspection, however, it will not be undertaken until the Engineer is assured of the cooperation and assistance of both Contractor and the material producer. The Engineer or the Engineer's authorized representative(s) will have free entry at all times to such parts of the plant as concerns the manufacture or production of the materials. Adequate facilities shall be furnished free of charge to make the necessary inspection. Notwithstanding the foregoing, the City shall have no obligation to inspect materials at the source of supply.

Unless authorized by the Engineer, any work done in the absence of an inspector that is completed or in progress shall be subject to inspection. If required by the Engineer, Contractor shall furnish all tools, labor, materials, and other facilities necessary to make such inspection, even to the extent of uncovering or taking down portions of the finished work. Contractor shall pay the cost of such inspection and removing any defective work and performing any necessary reconstruction.

## **5-21 REMOVAL OF REJECTED MATERIALS AND STRUCTURES**

Contractor shall remove from the site of the Work, without delay, all rejected materials or structures brought to or incorporated in the Work. If Contractor fails to do so, or to make satisfactory progress in doing so within



forty-eight (48) hours after the service of a written notice from the Engineer, the rejected material or work may be removed by City and the City may deduct the cost of such removal from any payments that are due or may become due to Contractor. No such rejected material shall again be offered for use by Contractor under this Contract or any other contract with City. Contractor shall not use any such rejected material in the performance of the Contract.

#### **5-22 APPROVAL OF SOURCES OF SUPPLY OF MATERIALS**

The Engineer may require Contractor to provide information on the source of supply of materials for the Work and may require that the Engineer's approval be obtained prior to Contractor securing any or all materials. The Engineer may require Contractor to submit representative samples of materials for inspection and testing by City.

Even though a source of supply has been approved, the approval shall not prevent subsequent disapproval or rejection of materials, if the quality of the product or material is later determined to be below the standard or requirements set by any of the Contract Documents.

#### **5-23 PREPARATION FOR TESTING**

Contractor shall maintain proper facilities and provide safe access for inspection by City of all parts of the Work and of the shops or other locations where any portion of the Work is prepared. Where the Specifications or Special Provisions require work to be specially tested or approved, it shall not be tested or covered up without at least a 24 hour written notice to the Engineer of its readiness for inspection unless the written approval of the Engineer for such testing or covering is first obtained.

#### **5-24 METHODS OF SAMPLING AND TESTING**

Contractor shall furnish samples of materials for testing as required by the Engineer. Contractor shall furnish such samples without cost to City. Testing shall be done to such standards as may be set forth in the Contract Documents. References made in these documents to standard methods of testing materials shall by such reference make such standards a part of the Contract.

#### **5-25 REFERENCE TO STATE, FEDERAL OR NATIONAL SPECIFICATIONS**

Whenever a reference is made in the Contract Documents to a specification or test designation either of the A.S.T.M., the A.A.S.H.T.O., the A.W.W.A., the Federal Specifications, or any other recognized national organization or State of California agency, and the number or other identification representing the year of adoption or latest revision is omitted, it

shall mean the specification or test designation in effect on the day the Notice to Contractors for the Work was dated.

## Section 6

### LEGAL RELATIONS AND RESPONSIBILITIES TO THE PUBLIC

#### 6-1 LAWS TO BE OBSERVED

Contractor shall be familiar with all Federal, State, and local Laws or Regulations that affect those engaged or employed in the Work, or the material or equipment used in or upon the site of the Work, or the conduct of the Work. Any misunderstanding or ignorance on the part of Contractor of such Laws or Regulations shall not in any way relieve Contractor of any responsibility under the Laws or Regulations or the Contract or otherwise modify the Contract.

Contractor shall observe and comply with all Laws or Regulations affecting the conduct of the Work, and Contractor and its Sureties shall defend, indemnify and hold harmless City and all of its officers, agents, and employees against any claim for liability arising from, based upon, or resulting from a condition created as a result of, the violation of any such Law or Regulation, whether by Contractor or any Subcontractor or Supplier or any of their respective officers, employees or agents.

#### 6-2 CERTAIN LAWS AFFECTING THE WORK

This list is not a comprehensive inventory of applicable Laws and Regulations, but is a summary of a few selected State laws and City ordinances applicable to the Work.

##### 1. State Laws

###### a. Labor Discrimination

Contractor shall not discriminate in the employment of persons on any ground listed in Labor Code Section 1735. The penalty for any such discrimination will be as set forth in the Labor Code, Section 1735, and Chapter 1 of Part 7 of Division 2 of the Labor Code.

###### b. Fair Labor Standards Act

Contractors shall comply with the Fair Labor Standards Act of 1938 (52 Stat. 1060) as amended as it may be applicable.

###### c. Contractor Licensing

Bidders and Contractors shall maintain license as required by Chapter 9 of Division III of the Business and Professions Code.

**d. Subcontractors**

The rules concerning the use of Subcontractors have been discussed in Section 2-9 of these Specifications. Particular reference was made therein to Section 4101 to Section 4113, inclusive, of the Public Contract Code.

**e. Underground Service Alert**

Prior to conducting any excavation, Contractor shall contact the Underground Service Alert - Northern California as required by Government Code Section 4216.2, and shall take any and all other actions necessary to comply with and shall be subject to the provisions of Government Code Sections 4216.2 through 4216.9, inclusive.

**2. Local Ordinances**

**a. Prevailing Wages**

Pursuant to the Colusa City Municipal Code, Contractor shall pay not less than the prevailing rate of wages as determined by the Director of the California Department of Industrial Relations pursuant to Labor Code Section 1773. The wage rate determinations may be viewed on the Internet at <http://www.dir.ca.gov/dlsr/>. Withholdings and penalties shall be as set forth in the Colusa City Municipal Code and applicable Labor Code provisions.

For Federally funded projects, Contractor shall pay the higher of the Federal Davis Bacon Wage Rate, that is published with the Contract, or the rate specified herein for each trade or work classification employed. Contractor is responsible for submitting all required original signed payroll documents to the City for itself and all Subcontractors. The City shall not recognize any claim for additional compensation because of the payment by Contractor of any wage rate in excess of the prevailing wage rate required under the Contract.

The wage rates determined by the Director of the California Department of Industrial Relations refer to expiration dates. Prevailing wage determinations with a single asterisk (\*) after the expiration date apply to any contract advertised for bids prior to the expiration date and are good for the life of the contract. Prevailing wage determinations with double asterisks (\*\*) after the expiration date indicate that the wage rate to be paid for work performed after this date has been predetermined. If

Work under the Contract will extend past this date, Contractor and its Subcontractors will be required to pay the new rate after such expiration date.

Contractor should contact the Prevailing Wage Unit, Division of Labor Statistics and Research (DLSR), (415-703-4780), to obtain predetermined wage changes for rates designated by a double asterisk (\*\*) after the expiration date. The possibility of wage increases is one of the elements to be considered by Contractor in determining its bid, and shall not under any circumstances, be considered as the basis of a claim for additional compensation or damages against the City under the Contract.

**b. Hours of Labor**

Contractor shall comply with the provisions of the Colusa City Municipal Code and State Law regarding the maximum hours of labor. Withholdings and penalties shall be a set forth in the Colusa City Municipal Code and applicable Labor Code provisions.

**c. Apprentices**

Contractor shall comply with the provisions of the Colusa City Municipal Code, as well as any other applicable Laws or Regulations.

**d. Grading, Erosion, and Sediment Control**

Contractor shall be responsible for the implementation and maintenance of erosion, sediment and pollution control measures, otherwise known as Best Management Practices (BMPs) within the limits of the Work site and all areas impacted by the project at all times during the course of construction, including evenings, nights, weekends and holidays in addition to the normal working days in accordance with the provisions of the Colusa City Municipal Code.

**e. Storm Water Management and Discharge Control**

Contractor shall be responsible for the implementation and maintenance of all BMP measures necessary to effectively prevent the discharge of sediment, construction debris, trash, and all associated construction pollutants from discharging to a river, creek, roadside ditch, canal, basin and/or the storm water conveyance system in accordance with Colusa City Municipal Code and State Water Board Laws and Regulations.

**f. Work Affecting the Public Right-of-way**

Contractor shall be responsible for obtaining City approval of and complying with a traffic control plan, providing for the maintenance of construction areas affected by the Work, protecting existing facilities in the Work area, repairing any existing facilities damaged by Contractor's operations, and notifying the public prior to performing the Work in accordance with the provisions of Colusa City Code.

**g. Noise Regulations**

Contractor shall comply with the provisions of the Colusa City Municipal Code.

**h. Dust Regulations**

Contractor shall take reasonable cautions to prevent and control the movement of dust created by Contractor's Work activities in accordance with Colusa City Municipal Code. Proposed and implemented measures shall be in compliance with sections d and e. The Engineer may stop Work activities during conditions of high winds that may carry dust from the Work-site.

**3. Amendments and Ordinance Changes**

The statute and ordinance citations set forth above shall be deemed to refer to future amended or renumbered versions of the statute or ordinance cited.

**6-3 PERMITS, LICENSES AND FEES**

Unless otherwise indicated in the Special Provisions, Contractor shall at Contractor's sole expense obtain all necessary permits and licenses for the construction of the Work, give all necessary notices, pay all fees required by law, and comply with all Laws and Regulations relating to the Work and to the preservation of the public health and safety.

**6-4 PROTECTION OF CITY AGAINST PATENT CLAIMS**

Contractor shall assume all cost arising from the use of patented, copyrighted, trademarked or other similarly protected materials, equipment, devices, or processes used on or incorporated in the Work and shall defend, indemnify and hold harmless the City of Colusa together with all of its

officers and employees, and their duly authorized representatives, from any and all claims and actions, including claims and actions for violation of intellectual property rights, arising on account of the use of any such materials, equipment, devices, or processes by Contractor or any Subcontractor or Supplier. Before final payment is made on the Contract, if requested by Engineer, Contractor shall furnish acceptable proof of a proper release from all claims, costs, and liabilities arising from the use of such materials, equipment, devices, or processes used on or incorporated in the Work.

#### **6-5 SANITARY REGULATIONS**

Contractor shall comply with all Laws or Regulations governing sanitation and public health, and shall defend, indemnify and hold harmless the City of Colusa together with all of its officers and employees, and their duly authorized representatives, from any and all claims, actions or other liabilities arising on account of any failure to do so by Contractor or any Subcontractor or Supplier.

Contractor shall construct and maintain the necessary sanitary conveniences for the use of the workers in such a manner and at such points as shall be approved by the Engineer, and the use of these facilities shall be strictly enforced.

Contractor shall obey and enforce such sanitary regulations and orders and shall take such precautions against contagious or infectious diseases as required by any Laws or Regulations or as the Engineer may deem necessary.

#### **6-6 PUBLIC CONVENIENCE AND SAFETY**

Contractor shall protect and preserve the safety of the public during the progress of the Work. Contractor shall not unnecessarily cause inconvenience to the public during the progress of the Work and shall minimize the inconvenience caused by Contractor's operations. Such operations include, but are not limited to, work performed on or adjacent to the Work site, traffic lane and pedestrian closures and deliveries of material and equipment.

Materials shall be stored on the work site so that no hazard to the public and no damage to public property will result. Damage to property caused by Contractor shall be repaired at Contractor's expense to the satisfaction of the Engineer. Spills resulting from hauling operations along or across any public traveled way shall be removed immediately by Contractor at Contractor's expense. Water or dust palliative shall be applied as necessary or if ordered by the Engineer for the alleviation or prevention of dust. Contractor shall insure that all utility services to customers in the project area are maintained.

Applicable Public Utilities Commission regulations are in effect at railroad grade crossings. Contractor shall not interfere with or impair railroad operations. If the Work could affect railroad operations, Contractor shall contact the railroad prior to construction and comply with all requirements pertaining to railroad operations or facilities.

## **6-7 HOUSEKEEPING PRACTICES**

Contractor shall implement good housekeeping practices during all construction activities until completion and final acceptance of the Work. In addition to practices specified elsewhere in the Contract Documents, Contractor shall implement, at a minimum, the following housekeeping practices: solid waste management, material storage and delivery area, concrete waste management, trash management, and spill prevention and control.

**Solid Waste Management:** Contractor shall maintain a clean construction site and provide designated areas for waste collection. The waste collection areas shall contain leak-proof disposal containers with lids or covers. Site trash shall be collected daily and placed in the disposal containers. Contractor shall make arrangements for regular waste collection and regularly inspect the waste disposal areas to determine if potential pollutant discharges exist.

**Material Storage and Delivery Area:** Contractor shall provide one central material storage and delivery area (MSDA) for the duration of the Work. This area shall be fenced or otherwise protected such that runoff will not leave the MSDA site. Contractor shall regularly inspect the MSDA site to ensure that any hazardous or non-hazardous materials have not spilled.

**Concrete Waste Management:** Contractor shall arrange for off-site disposal of concrete wastes or disposed of in one designated area. Concrete wastes, including left-over concrete and material from washing out the concrete truck, shall not be disposed to the storm drain system via curb and gutter or otherwise. If a designated area is provided, the area shall be bermed and protected from the elements to allow the concrete to dry. The dried concrete waste shall be removed and disposed of properly by Contractor at Contractor's expense. Proof of proper disposal may be required by the City inspector or engineer.

**Spill Prevention and Control:** Contractor is responsible for instructing employees and Subcontractors about preventing spills of hazardous materials and controlling spills if they occur. Proper spill control and cleanup materials shall be kept on-site near the MSDA and updated as materials change on site. If a significant spill has entered the City's drainage system, Contractor shall contact the City's drainage maintenance supervisor to ensure the discharge has not impacted a body of water or drainage facility.



More information about required BMPs can be obtained by referring to the City of Colusa's Administrative and Technical Procedures Manual for Grading, Erosion and Sediment Control available online at: <https://www.cityofColusa.org/-/media/Corporate/Files/DOU/Specs-Drawings/Sediment-control-manual.pdf?la=en>

#### **6-8 TRENCH SAFETY PLANS**

Before beginning excavation for a trench five (5) feet or more in depth, Contractor shall secure a permit from the Division of Industrial Safety. A copy of this permit must be available at the construction site.

When required on the Plans or by the Engineer, Contractor shall submit to the Engineer a detailed Plan showing the design of shoring, bracing, sloping or other provisions to be made for worker protection from the hazard of caving ground. Such Plan shall be approved by the Engineer at least five (5) days before Contractor intends to begin work on the trench. If the Plan varies from the shoring system standards established by the Construction Safety Orders of the Division of Industrial Safety, the Plan shall be prepared by a registered civil or structural engineer. Nothing in this provision allows the use of shoring, sloping or protective systems less effective than that required by the Construction Safety Orders of the Division of Industrial Safety.

Contractor's bid for any item requiring excavation shall include all costs to furnish, install, maintain and remove adequate sheeting, shoring and bracing, and any other measures necessary to maintain adequate worker protection and conform to all applicable safety orders.

#### **6-9 COMPLIANCE WITH OSHA**

Contractor is responsible for strict compliance with applicable requirements of the California Occupational Safety and Health Act (Labor Code Sections 6500 et seq.). This includes, but is not limited to, all applicable Construction Safety Orders issued by the State of California, Division of Industrial Safety, under Title 8 of the California Code of Regulations.

#### **6-10 TRAFFIC CONTROL REQUIREMENTS**

Contractor is solely responsible for furnishing, installing and maintaining all warning signs and devices necessary to safeguard the public and the Work, and to provide for the proper and safe routing of vehicular, bicycle, and pedestrian traffic during the performance of the Work. This requirement is for the duration of the project, and is not limited to working hours. The use of

flagmen, barricades, and construction signing shall comply with the current edition of the California “Manual on Uniform Traffic Control Devices.”

Contractor shall submit a traffic control plan showing proposed traffic control measures and detours for vehicles and pedestrians a minimum of ten (10) working days prior to the start of any Work within or affecting the street right of way. The traffic control plan shall include the following information pursuant to City Code these standards and include the following:

1. The name and business address of the applicant.
2. Diagram showing:
  - a. The location of the proposed work area;
  - b. The location of areas where the public right-of-way will be closed or obstructed; and
  - c. The placement of traffic control devices necessary to perform the work.
3. The proposed phases of traffic control in a narrative format including a description and dates for the beginning and ending of each phase.
4. The time periods when the traffic control will be in effect.
5. A statement that the applicant will comply with the City’s noise ordinance during the performance of all work.
6. A statement that the applicant understands that the plan may be modified by the director at any time in order to eliminate or avoid traffic conditions that are hazardous to the safety of the public.

Contractor shall not work until a City-approved traffic control plan is on file with the Engineer. If the Engineer determines at any time that actual traffic conditions render the approved plan inadequate to ensure public safety, the Engineer may require the plan to be immediately modified. If a hazardous condition cannot be eliminated by plan modification the Engineer may require work under the plan to be stopped, and the plan suspended, until the safety hazard is remedied. Contractor is not entitled to any costs, damages or extension of Contract time arising from any stop work order issued by the Engineer under this Section.

Contractor shall provide safe pedestrian, bicycle, and disabled access through or around the construction area. If construction activities will block or limit access to a Class IV bikeway, as designated in the City Bicycle Master Plan, Contractor may be required to provide a minimum Class II bike lane as an alternative in the traffic control plan to provide continuity in the protected bicycle network. Sidewalk closure shall comply with the “Policy for Sidewalk Closures” established by the City of Colusa’s Department of Public Works pursuant to federal and state disability access laws and regulations. Contractor

shall provide access to all existing driveways, adjacent parking areas, and buildings at all times unless other arrangements are made with the property owner and approved by the Engineer. Access for emergency vehicles shall be clear at all times.

Contractor shall use skid resistant steel plates to cover all excavations permitted to remain open in the roadway during non-working hours. Steel plates shall be placed in a safe and proper manner that does not impede the passage of pedestrians, bicycles, and the disabled community.

All Work within public streets and right-of-way shall be done in an expeditious manner so as to cause as little inconvenience to the public as possible. Unless otherwise approved, Contractor shall maintain at least one travel lane in each direction at all times on two-way Primary Streets (defined below), and at least two travel lanes at all times on one-way Primary Streets.

On working days, between 7:00 a.m. and 8:30 a.m. and 4:00 p.m. to 6:00 p.m., Contractor shall maintain the number of lanes normally available on all Primary Streets unless otherwise approved in writing by the City Traffic Engineer. In addition to the foregoing, on working days, Contractor shall maintain the number of lanes normally available on J Street between Interstate 5 and 16<sup>th</sup> Street between the hours of 7:00 a.m. and 6:00 p.m. unless otherwise approved in writing by the City Traffic Engineer.

“Primary Streets” are defined as any one of the following streets and its adjacent public sidewalk:

- |   |  |
|---|--|
| 3rd St. between I St. & Broadway                              | G St. between 3rd St. & Alhambra Blvd.           |
| 5th St. between H St. & Broadway                              | Garden Highway                                   |
| 6th St. between H St. & Q St.                                 | Greenhaven Dr.                                   |
| 7th St. between G St. & T St.                                 | H St.  |
| 8th St. between G St. & Broadway                              | Heritage Lane                                    |
| 9th St. between G St. & Broadway                              | Hornet Dr.                                       |
| 10th St. between G St. & Broadway                             | Howe Ave.  |
| 11 th St. between G St. & Q St.                               | I St. between 3rd St. & 29th St.                 |
| 12th Ave. btwn Martin Luther King, Jr. Blvd. & Sutterville Rd | J St.  |
| 12th St. between N 12th St. & W St.                           | Jackson Road                                     |
| 13th St. between H St. & L St.                                | Jibboom St.                                      |
| 14th St. between G St. & L St.                                | K St. between 15th St. & Alhambra Blvd.          |
| 15th St. between F St. & Broadway                             | L St. between 3rd St. & Alhambra Blvd.           |
| 16th St. between N 16th St. & Broadway                        | La Mancha Way                                    |
| 19th St. between G St. & Broadway                             | La Riviera Dr.                                   |
| 21st St. between 4th Ave. & G St                              | Land Park Dr.                                    |
| 24th St btwn (Knight Way & Meadowview Rd, W St. & 2nd Ave)    | Mack Road  |
| 29th St. between D St. & W St.                                | Main Ave. west of Kelton Way                     |
| 30th St. between E St. & T St.                                | Marconi Ave.                                     |
| 34th St. between Folsom Blvd. & Broadway                      | Martin Luther King, Jr. Blvd.                    |
| 43rd Ave. west of South Land Park Dr.                         | Marysville Blvd. btwn Del Paso Blvd. & Bell Ave. |
| 47th Ave., city portions between 24th St. & Stockton Blvd.    | Meadowview Road                                  |

55th St.	Fruitridge Road
65th St. between Folsom Blvd. & Broadway	Munroe St.
65th St. Expressway between Elvas Ave. & south city boundary	N St. between 2nd St. & Alhambra Blvd.
North 12th St.	Natomas Blvd.
Alta Arden Expressway	N 16th St. Alhambra Blvd. btwn E. St & Broadway
Alta Valley Way	North B St. between N Th St. & 16th St.
American River Dr. between Howe Ave. & Munroe St.	Northgate Blvd.
Arcade Blvd. between Marysville Blvd. & Marconi Ave.	Norwood Ave.
Arden Way	P St. between 2nd St. & Stockton Blvd.
Arena Blvd	Pocket Road
Azevedo Dr.	Point West Way
Broadway	Power Inn Road
Bruceville Road	Q St. between 2nd St. & Alhambra Blvd.
Capitol Ave. between 15th St. & Folsom Blvd.	Raley Blvd.
Carlson Dr.	Response Road
Center Parkway	Richards Blvd.
Challenge Way	Rio Linda Blvd.
College Town Dr.	Riverside Blvd.
Connie Dr. between Roseville Road & Marconi Ave.	Roseville Road
Cosumnes River Blvd.	Royal Oaks Dr.
Del Paso Blvd. south of Marysville Blvd.	San Juan Road
Del Paso Rd.	Seamas Ave. east of Riverside Blvd.
E St. between 7th St. & Alhambra Blvd.	South Land Park Dr.
East Commerce Way	South Watt Ave.
El Camino Ave.	Sproule Ave.
Elder Creek Road	Stockton Blvd.
Elsie Ave.	Sunbeam Ave.
Elvas Ave. between 56th St. & 65th St.	Sutterville Road
Ethan Way	T St. between 34th St. & 39th St.
Evergreen St.	Truxel Road
Exposition Blvd.	University btwn Campus Commons & Fair Oaks.
Fair Oaks Blvd.	Valley Hi Dr. between Franklin Blvd. & Mack Road
Florin Perkins Road	W St. between 3rd St. & 29th St.
Florin Road	West El Camino Ave.
Folsom Blvd.	Windbridge Dr.
Franklin Blvd.	Winding Way
Freeport Blvd.	X St. btwn 3 rd St. & Alhambra Blvd

The above definition of “Primary Streets” may be modified at any time upon written notice to Contractor by City, as the City Traffic Engineer deems necessary.

## 6-11 HOLIDAY SEASON CONSTRUCTION MORATORIUM

During the holiday season, construction will be suspended on Holiday Season Moratorium Streets (defined below) unless otherwise approved in writing by the City Traffic Engineer. “Holiday season” means the period of time beginning on Thanksgiving Day and ending on the first regular working day following New Year’s Day.

No new work that would interfere with traffic during the holiday season shall begin on any Holiday Season Moratorium Streets after November 1. All existing conditions within any Holiday Season Moratorium Streets shall be restored to their original or better condition prior to the start of the holiday season, and all unauthorized steel plates, barricades, and barriers shall be removed from all traffic lanes.

Contractor may submit a written request to work within any Holiday Season Moratorium Streets during the holiday season. The request shall specify the time, date, and description of the work to be performed in the Holiday Season Moratorium Streets and the full extent of Contractor's proposed lane and sidewalk closure. The City Traffic Engineer will decide whether to approve, conditionally approve or deny such request, in whole or in part, in the City Traffic Engineer's sole discretion.

Emergency repairs to any Holiday Season Moratorium Streets are permitted during the holiday season, provided that Contractor notifies the Engineer at least one (1) hour in advance during working hours. If the emergency arises during non-working hours, Contractor shall notify the Engineer before 9:00 a.m. the following workday. Any emergency repairs performed by Contractor shall otherwise comply with the Contract Documents and all applicable Laws or Regulations.

“Holiday Season Moratorium Streets” are defined as follows:

12<sup>th</sup> Avenue between Martin Luther King, Jr. Boulevard and Sutterville Road  
21<sup>st</sup> Street between 4<sup>th</sup> Avenue and G Street  
24<sup>th</sup> Street, between (Knight Way and Meadowview Rd) and (W Street and 2<sup>nd</sup> Avenue)  
55<sup>th</sup> Street south of Fruitridge Road  
Alta Arden Expressway  
Arden Way  
Broadway  
Challenge Way  
Del Paso Boulevard south of Marysville Blvd  
El Camino Avenue  
Ethan Way  
Evergreen Street  
Exposition Boulevard  
Fair Oaks Boulevard  
Florin Boulevard  
Folsom Boulevard  
Franklin Boulevard  
Freeport Blvd, within one block of all its side streets between Broadway and Blair Ave  
Fruitridge Road between Rickey Dr and 59th Street  
Greenhaven Drive between Havenhurst Dr and Windbridge Dr  
H Street  
Heritage Lane  
Howe Avenue  
J Street

La Mancha Way  
Mack Road  
Marconi Avenue  
Marysville Boulevard between Del Paso Boulevard and Bell Avenue  
Meadowgate Dr between Munson Way and Franklin Boulevard  
Meadowview Road  
Munson Way  
Natomas Boulevard  
Northgate Boulevard  
Point West Way  
Power Inn Road  
Response Road  
Royal Oaks Drive  
San Juan Road  
Stockton Blvd, and w/in one block of all its side streets from Perry Ave to the south City limits  
Truxel Road  
Valley Hi Drive north of Wyndham Way  
West El Camino Avenue

The definition of “Holiday Season Moratorium Streets” may be modified at any time upon written notice to Contractor, as the City Traffic Engineer deems necessary.

In addition to the above listed streets, no work shall be performed during the holiday season on any street in the area bounded by the American River on the north, the Colusa River on the west, one block south of Broadway on the south, and 34<sup>th</sup> Street on the east, without obtaining permission in writing from the City Traffic Engineer.

#### **6-12 CONTRACTOR NOT AN AGENT OF CITY**

During the term of the Contract, Contractor shall be an independent contractor and shall not under any circumstances be considered an employee, agent, or other representative of the City. Contractor is not authorized to bind City to any obligation. Nothing in this Contract creates any relationship of joint venture, partnership or any other association of any nature whatsoever between City and Contractor other than that of owner and independent contractor. City has the right to control Contractor only insofar as provided in this Contract and only insofar as the results of Contractor’s work pursuant to the Contract. The City’s right of supervision does not reduce or abrogate Contractor’s liability for any and all damage or injury to persons, public property or private property that may arise directly or indirectly from Contractor’s performance of the Work.

#### **6-13 APPROVAL OF CONTRACTOR’S PLANS NO RELEASE FROM LIABILITY**

The approval by the Engineer of any drawing or any method of work proposed by Contractor does not relieve Contractor of responsibility for any errors and is not an assumption of risk or liability by City or any City officer or

employee. Contractor has no claim under the Contract on account of the failure or partial failure or inefficiency of any plan or method so approved. Such approval by the Engineer merely means that the Engineer has no objection to Contractor's using, at Contractor's sole responsibility and risk, the plan or method Contractor proposes.

#### **6-14 CONTRACTOR SHALL NOT MORTGAGE EQUIPMENT**

Contractor shall not mortgage or otherwise convey the title of the plant, machinery, tools, appliances, supplies, or materials that may at any time be in use, or further required or useful, in the performance of the Contract, without prior written consent of the Engineer.

#### **6-15 PROPERTY RIGHTS IN MATERIALS**

Contractor is not vested with any right of property in the materials used after they have been attached, or affixed to the Work, and on which partial payments have been made by City. All such materials shall be the property of Contractor and City jointly as their interests may appear, and may not be removed from the Work by Contractor without the consent of City.

#### **6-16 USE OF EXPLOSIVES**

Explosives shall not be used on the Work unless permission to use them is granted by the Engineer in writing, and only then under such conditions as may be prescribed by the Engineer and in compliance with all applicable Laws or Regulations.

#### **6-17 CONTRACTOR'S LEGAL ADDRESS**

At Contractor's on site office, Contractor shall provide a representative authorized to receive drawings, samples, notices, letters, instructions, explanation or other communications or articles from City. Drawings, samples, notices, letters, instructions, explanations, or other articles or communications may be mailed or personally delivered either to Contractor's address given in the Proposal, or to Contractor's representative at the site of the Work, or to Contractor's office at the site of the Work. The delivery at any of these places of any such item from City to Contractor shall be deemed sufficient service upon Contractor, and the date of such service shall be the date of mailing or personal delivery. The address given in the Proposal may be changed by notice in writing from Contractor to City. Nothing herein contained shall be deemed to preclude or render inoperative the service of any drawing, sample, notice, letter, instruction, explanation, article or communication to or upon any authorized representative of Contractor personally.

## 6-18 ON STREET PARKING REMOVAL

In performing the Work, Contractor shall minimize the inconvenience to the public and shall only place “No Parking” signs in areas where parking clearly needs to be removed to safely perform the Work. “No Parking” signs shall be 11” by 17” inches, with red letters on white construction paper or other material approved by the Engineer, and shall comply with all applicable Laws or Regulations. “No Parking” signs shall be neat and clean, and clearly indicate the specific times and dates when parking is to be prohibited. “No Parking” signs shall be securely fastened to barricades, and not placed on trees, utility poles, or other facilities not approved by the Engineer.

Contractor shall maintain the “No Parking” signs and barricades prior to and during the course of the Work. Contractor shall verify three days prior to commencing the Work, and continuously during the course of the Work, that the signs and barricades are adequately visible and properly placed.

The Engineer may arrange for vehicles that interfere with the Work to be towed. No vehicles parked in a “No Parking” area will be towed without acceptable documentation that the signs and barricades are properly placed, and no towing is allowed unless the Engineer determines that a reasonable person would have been able to determine that parking is not allowed. If Contractor requests towing of a vehicle, Contractor shall include in such request written documentation indicating that the “No Parking” barricades were placed at least seventy-two (72) hours in advance of the start of Work, and Contractor shall provide a photograph of the vehicle to be towed, showing the nearest “No Parking” sign. Contractor shall reimburse City for any payment of a claim filed against the City for the towing of any vehicle without the Engineer’s approval or acceptable documentation as provided herein.

### In Non-Metered Areas

Seventy-two (72) hours prior to the start of Work, Contractor shall place “No Parking” signs on approved barricades at fifty (50) to sixty (60) foot intervals.

### In Metered Parking Areas

Contractor shall obtain permission to remove parking stalls from the City Parking Division not less than three (3) working days before the start of construction and shall be responsible for the payment of parking removal fees pursuant to applicable provisions of the Colusa City Code. It is recommended that Contractor consult with the City’s Parking Division to obtain an estimate of the fees.

If Contractor pays the applicable fees and the removal of parking stalls is approved by City, seventy-two (72) hours prior to the start of Work, Contractor



shall place “No Parking” signs adjacent to every third parking stall to be removed, when an entire block of parking is to be removed. Contractor shall move these signs into every third parking stall at the beginning of the workday, in conjunction with the covering of parking meters for all stalls to be removed. If Contractor only needs to remove a portion of parking stalls on a block, every stall removed shall be barricaded with a “No Parking” sign in conjunction with the covering of parking meters for all stalls to be removed. Contractor shall comply with any other conditions specified by the City for such parking stall removals.

In addition to the foregoing, Contractor shall comply with all applicable requirements of the Colusa City Code pertaining to on-street parking removal.

## **6-19 MAIN AND TRUNKLINE UTILITIES**

The City is a member of the Underground Service Alert (U.S.A.) one-call program. Contractor or any Subcontractor must notify the U.S.A. at least two (2) working days, but not more than fourteen (14) calendar days, in advance of performing excavation work as provided in Government Code Section 4216.2, and Contractor shall comply with all other applicable requirements specified in Article 2 of Division 5 of the Government Code, commencing with Section 4216.

Contractor is responsible for the timely removal, relocation or protection of any existing main or trunkline utility facilities located on the Work site and identified on any of the Contract Documents in their approximate location (defined below). Subject to the provisions of this Section, City is responsible for the timely removal, relocation or protection of any existing main or trunkline utility facilities located on the Work site that are not identified in any Contract Documents in their approximate location. This does not require City to indicate the presence of existing service laterals or appurtenances whenever the presence of existing service laterals on the site can be inferred from the presence of other visible facilities, such as buildings, meter and junction boxes, valves, service facilities, identification markings and other indicators, on, or adjacent to, the Work site. Contractor is responsible for the timely removal, relocation or protection of such service laterals.

If existing main or trunk line utility facilities on the Work site need to be located or repaired, or removed and relocated, or protected, and the subsurface main or trunk line utility facilities were not identified in any of the Contract Documents at their approximate location, and any damage occurring to such main or trunk line facilities was not due to the failure of Contractor or any Subcontractor to use reasonable care, City shall pay for the cost of locating and repairing, or removing and relocating, or protecting such main or trunk line utility facilities. A subsurface main or facility is deemed to be in the “approximate location” shown on the Contract Documents if the main or facility or any portion of it is located within a strip of land extending twenty-four inches

(24”) on either side of the location for the exterior surface of the main or facility shown on any of the Contract Documents. “Approximate location” does not refer to the depth of the subsurface main or facility.

The City’s obligation to pay in instances of a discovery of main or trunk line facilities on site in the circumstances described above is limited strictly to the costs described above and for any equipment on the site of the Work necessarily idled as a result of such circumstances.

In the event the completion of the project is delayed by (1) City’s failure to provide for the repair, removal, relocation or protection of an existing main or trunk line utility facility not identified in its approximate location on any of the Contract Documents, or (2) failure by another owner of an existing main or trunk line utility facility to provide for the repair, removal, relocation or protection of such main or facility, except in cases where Contractor is responsible under the Contract for causing such repair, removal, relocation or protection to occur, then such delay shall be an Excusable Delay as that term is defined in the Contract Documents.

Nothing in this section relieves a utility from a contractual or legal obligation to pay the cost of removal or relocation of existing utility facilities. For facilities owned by a public utility, the public utility has the sole discretion to perform repairs or relocation work or permit Contractor to do such repairs or relocation work at a reasonable price. Nothing in this section precludes City from pursuing any appropriate remedy against the utility for delays that are the responsibility of the utility.

If, after commencing the Work, Contractor discovers existing main or trunk line utility facilities located on the site of the Work that were not identified on any of the Contract Documents in their approximate location, Contractor shall immediately notify the Engineer and the owner of the utility facility in writing by the most expeditious means available.

## **6-20 ITEMS CONTAINING TRADE SECRETS OR PROPRIETARY RIGHTS PROHIBITED**

Neither Contractor nor any Subcontractor shall furnish any item or combination of items to which, or in which, Contractor or any Subcontractor or Supplier claims any trade secret or proprietary right. City shall own without restriction all items furnished under this Contract. Such items shall include but not be limited to, any item assembly, combination of items, process, electrical or mechanical or electro-mechanical or microprocessor process or program, or any combination or sequence of these items. Neither Contractor nor any Subcontractor shall furnish any item or combination of items pursuant to this Contract containing any program or programmable item without first obtaining the written consent of the Engineer, that may be withheld or conditioned in any

manner determined to be in the best interest of the City by the Engineer in the Engineer's sole discretion.

## Section 7

### PROSECUTION AND PROGRESS

#### 7-1 ASSIGNMENT

The Contract may be assigned only upon written consent of the City, and also with the consent of Contractor's Sureties.

#### 7-2 WORK SCHEDULE AND ADEQUATE RESOURCES

Contractor shall perform the Work under this Contract with all materials, tools, machinery, apparatus, and labor necessary to the complete and timely execution of everything described, shown or reasonably implied under this Contract on or before the Contract Completion Date.

Contractor shall give full information to the Engineer as to Contractor's plans for carrying on any part of the Work before commencing that Work. Contractor shall submit to the Engineer prior to the pre-construction meeting or as otherwise required in the Special Provisions a detailed achievable schedule for the various items of Work and for completion of the Work as a whole, using the critical path method (CPM) or other format acceptable to the Engineer. If such schedule is not accepted in writing by the Engineer, Contractor shall revise and resubmit the schedule as necessary to obtain the Engineer's written acceptance. If at any time during performance of the Work the Engineer notifies Contractor that its latest accepted schedule is not reasonable or does not accurately reflect the current progress or sequence of Work, Contractor shall revise and resubmit an updated schedule within five (5) working days of the Engineer's notification. If such updated schedule is not accepted in writing by the Engineer, Contractor shall revise and resubmit the schedule as necessary to obtain the Engineer's written acceptance. Notwithstanding any contrary provision of the Contract Documents, Contractor is not entitled to claim any damages or compensation for any delay caused by the City unless Contractor's claim of City-caused delay is substantiated by an accurate CPM schedule accepted by the Engineer indicating the Controlling Operation(s) and sequence of Work, that Contractor submitted to the City prior to the occurrence of the delay.

The schedule(s) required by this section shall show the order in which Contractor proposes to carry out the Work, the total float period, the logical relationships between Work activities, the critical path, the dates on which Contractor will commence the different tasks comprising the Work (including procurement of materials, plant, and equipment), and the contemplated dates for completing such tasks.

The schedule(s) submitted shall be consistent in all respects with the completion time requirements and any order of work requirements indicated in the Contract.

Subsequent to the time that submittal of a schedule is required in accordance with these Specifications, no progress payments will be made for any Work until such schedule has been submitted to the Engineer.

If at any time before the beginning or during the progress of the Work, any part of Contractor's plant, or equipment, or any of Contractor's methods of execution of the Work, appear to the Engineer to be unsafe, inefficient, or inadequate to insure the required quality or rate of progress of the Work, the Engineer may order Contractor to increase or improve its facilities or methods, and Contractor shall promptly comply with such orders at no cost to the City; but neither compliance with such orders nor failure of the Engineer to issue such orders shall relieve Contractor from its obligation to secure the degree of safety, the quality of the Work, and the rate of progress required of Contractor under the Contract Documents. Contractor alone is responsible for the safety, adequacy, and efficiency of its plant, equipment, and methods.

### **7-3 WORK UNDER UNFAVORABLE WEATHER AND OTHER ADVERSE CONDITIONS**

During unfavorable weather and other adverse conditions, Contractor shall pursue only such portions of the Work as will not be damaged by the weather or other adverse conditions. If the quality or efficiency of any portions of the Work will be affected by any unfavorable conditions, such portions shall not be performed while those conditions exist, unless Contractor can overcome these conditions by special means or precautions approved by the Engineer.

### **7-4 SATURDAY, SUNDAY, HOLIDAY, AND NIGHT WORK**

No work shall be done between the hours of 6 p.m. and 7 a.m., nor on Saturdays, Sundays or legal holidays, except such work necessary for the proper care and protection of work already performed or except in case of emergency or special situation, and in any case only with the permission of the Engineer or as specified in the Special Provisions.

Notwithstanding the foregoing, if Contractor first requests and obtains the written permission of the Engineer, Contractor may establish different hours of work as a regular procedure, as specifically approved by the Engineer. However, the Engineer may revoke such permission at any time for any reason. If such off-period work is approved, Contractor shall comply with any and all conditions established for such work by the Engineer at Contractor's own cost and expense, and Contractor shall pay any and all costs incurred by the City in

connection with such off-period work, including but not limited to the City's costs to inspect such work.

#### **7-5 SEPARATE CONTRACTS**

City reserves the right to let other contracts in connection with the project. Contractor shall afford other contractors reasonable opportunity for the introduction and storage of their materials and the execution of their work and shall properly connect and coordinate Contractor's work with theirs.

If any part of Contractor's Work depends for proper execution or results upon the work of any other contractor, Contractor shall inspect and promptly report to the Engineer any defects in such work that render it unsuitable for such proper execution or results. Contractor's failure to inspect and report any defects in the work shall constitute an acceptance of the other contractor's work as fit and proper for the reception of Contractor's Work, except as to defects not arising from the Contractor's Work that may develop in the other contractor's work after the execution of Contractor's Work.

#### **7-6 REMOVAL OF UNSATISFACTORY EMPLOYEES**

Contractor and Contractor's Subcontractors shall, on the site of the Work, employ only competent persons skilled in their respective lines of work. Whenever the Engineer notifies Contractor that any person employed by or representing Contractor or any Subcontractor on the Work is, in the Engineer's opinion, incompetent, unfaithful or disorderly, or refuses to carry out the provisions of this Contract, or uses threatening or abusive language to or otherwise threatens or abuses any City employee or representative or any member of the public, or is otherwise unsatisfactory, Contractor shall remove or require its Subcontractor to remove the person from the Work and shall not return that person to the Work unless approved by the Engineer.

#### **7-7 PROTECTION OF WORK, PERSONS AND PROPERTY AGAINST DAMAGE**

Contractor shall protect the Work, all materials incorporated or to be incorporated in the Work and all equipment used in connection with the Work, whether located on or off the Work-site, and all public and private improvements and facilities within the site of the Work, from damage due to the nature of the Work, the action of the elements, trespassers, vandalism, fire or any other cause whatsoever, until the completion and City acceptance of the Work. The City does not have or assume any responsibility for collecting indemnity from any person or persons causing damage to the work or property of Contractor. Any and all costs incurred by Contractor to protect the Work, materials, equipment, improvements and facilities as provided above shall be included in Contractor's

Proposal and Contractor shall not be entitled to any additional compensation or damages from City.

Contractor shall furnish such guards, fences, warning signs, walks, and lights as is necessary, or as may be ordered by the Engineer, and shall take all other necessary precautions to prevent damage or injury to persons or property. Existing public and private improvements including utilities and adjacent properties shall be protected from potential damage resulting from the operations of Contractor or any Subcontractor. Typical improvements to be protected include, but are not limited to: trees, shrubbery, fences, walls, existing pavement, sidewalks, street improvements and underground utilities that are either to be, or not to be, removed under the Contract.

All existing street signage, markings and striping damaged as a result of construction shall be replaced in kind by Contractor, to the satisfaction of the Engineer. In the case of partial damage, the whole stripe or marking in its entirety shall be replaced. Temporary marking and striping shall be installed within 3 working days of any damage.

All painted or other markings, such as Underground Service Alert (USA) markings, on the pavement, sidewalk or gutters used for constructing the project shall be removed by Contractor before final acceptance of the Work.

If public or private improvements are damaged by the operations of Contractor or any Subcontractor, the damaged improvements shall be replaced or restored at Contractor's expense to pre-damage condition.

Any underground facility not shown on the Plans does not relieve Contractor of the responsibility to appropriately notify USA in order to determine the location of underground facilities, or to exercise sound judgment when working in the vicinity of known, visible or reasonably ascertainable underground facilities. It is Contractor's responsibility to ascertain the location of those underground facilities that may be subject to damage by reason of Contractor's operations.

## **7-8 TIME OF COMPLETION**

Contractor shall complete all Work within the time set forth in the Agreement.

Contractor shall not be charged for a working day on which the Engineer determines, that as a result of inclement weather or conditions resulting from the weather, Contractor is or was prevented from engaging in the current Controlling Operation or Operations of the Work with its normal labor and effort for at least five (5) hours of the day.

The current Controlling Operation or Operations mean any feature of the Work (e.g., an operation or activity, or a settlement or curing period) that, if delayed or prolonged, will necessarily delay the time of completion of the entire Work, as determined by the Engineer based on Contractor's most recent schedule that has been accepted by the Engineer.

The Engineer will furnish Contractor a weekly statement showing the number of working days charged to the Contract for the preceding week, the number of working days of time extensions being considered or approved, the number of working days originally specified for the completion of the Contract and the extended date for completion, if any, except when working days are not being charged in accordance with the provisions in Section 7-9 "Temporary Suspension of Work." Contractor is allowed 15 calendar days from the date of the Engineer's issuance of the weekly statement of working days in which to file a written protest of the Engineer's determination of working days; otherwise the weekly statement is deemed accepted by Contractor as correct.

#### **7-9 TEMPORARY SUSPENSION OF WORK**

The Engineer has the authority to suspend the performance of the Work wholly or in part, for such period as the Engineer deems necessary, due to unsuitable weather, or for such other conditions as are considered unfavorable for the suitable prosecution of the Work, or for such time as the Engineer may deem necessary due to the failure on the part of Contractor or any Subcontractor to carry out orders, or to satisfactorily perform any provision of the Contract. Contractor shall immediately comply with the written order of the Engineer to suspend the Work wholly or in part. The suspended Work shall be resumed when conditions are favorable or methods are corrected, as ordered or approved in writing by the Engineer.

If a suspension of Work or any portion of the Work is ordered by reason of the failure of Contractor or any Subcontractor to carry out orders or to satisfactorily perform any portion of the Contract, or by reason of weather conditions being unsuitable for performing any item or items of Work, which items, in the opinion of the Engineer, could have been performed prior to the occurrence of such unsuitable weather conditions had Contractor diligently prosecuted the Work in accordance with the Contract when weather conditions were suitable, Contractor shall perform at its own expense all the work necessary to (i) preserve and protect the Work and related facilities and improvements from weather and other environmental conditions during the period of suspension, (ii) repair any damage to the Work and/or related facilities and improvements occurring before, during or after the period of suspension, and (iii) provide a safe, smooth, and unobstructed passageway through construction for use by public traffic and any other public use during the period of suspension.



In the event Contractor fails to timely perform such Work, the City may perform such work and the cost of the Work will be paid by Contractor or will be deducted from moneys due or to become due Contractor under the Contract.

Except as may be provided otherwise in the Contract Documents, if the Engineer orders a suspension of all or a portion of the Work, or a portion of the Work that is the current Controlling Operation or Operations, by reason of unsuitable weather conditions, and in the opinion of the Engineer the suspension is not due to the failure of the Contractor or any Subcontractor to carry out orders or to satisfactorily perform any portion of the Contract nor due to the Contractor's failure to diligently prosecute the Work in accordance with the Contract prior to such suspension, Contractor shall perform all work necessary to (i) preserve and protect the Work and related facilities and improvements from weather and other environmental conditions during the period of suspension, and (ii) provide a safe, smooth, and unobstructed passageway through construction for use by public traffic and any other public use during the period of suspension, provided that the cost of such work shall, upon approval by the Engineer, be paid for as extra work as provided in Section 4-4 above, or, at the option of the Engineer, all or a portion of such work shall be performed by the City at no cost to Contractor.

If the Engineer orders a suspension of all of the Work, or a portion of the Work that is the current Controlling Operation or Operations, due to unsuitable weather or due to such other conditions that the Engineer considers unfavorable to the suitable prosecution of the Work, and in the opinion of the Engineer the suspension is not due to the failure of the Contractor or any Subcontractor to carry out orders or to satisfactorily perform any portion of the Contract nor due to the Contractor's failure to diligently prosecute the Work in accordance with the Contract prior to the suspension, the days on which the suspension is in effect shall not be considered working days. If a portion of Work at the time of such suspension is not a current Controlling Operation or Operations, but subsequently becomes the current Controlling Operation or Operations, the determination of working days will be made on the basis of the current Controlling Operation or Operations.

If a suspension of all or a portion of the Work is ordered by the Engineer, due to the failure on the part of Contractor or any Subcontractor to carry out orders given or to satisfactorily perform any provision of the Contract, or by reason of weather conditions being unsuitable for performing any item or items of Work, which items, in the opinion of the Engineer, could have been performed prior to the occurrence of such unsuitable weather conditions had Contractor diligently prosecuted the Work in accordance with the Contract when weather conditions were suitable, the days on which the suspension order is in effect shall be considered working days unless such days are not working days pursuant to Section 1-48(1) of these Specifications.

A suspension of Work under any of the conditions set forth in this Section shall not relieve Contractor of its responsibilities under the Contract Documents. This Section 7-9 does not apply to any suspension of work to protect the health, safety, welfare or condition of persons or property pursuant to Section 5-13 of these Specifications.

## **7-10 DETOURS**

Contractor shall construct and remove detours and detour bridges for the use of public traffic as provided in the Special Provisions, or as shown on the Plans, or as directed by the Engineer. Payment for such work shall be made as set forth in the Special Provisions, or, if not addressed there, at the Contract prices for the items of work involved if such prices are specified in the Contract. If not addressed in the Special Provisions and no such prices are specified in the Contract, all detours shall be constructed and removed at no additional charge by Contractor.

Contractor shall pay all costs of repairing damage to detours caused by public traffic.

When public traffic is routed through the Work, Contractor's obligation to provide for a safe passageway through construction operations shall not be considered to constitute construction or maintenance of a detour and Contractor shall not be entitled to any additional payment therefor, unless otherwise specified in the Special Provisions.

Detours constructed by Contractor exclusively for Contractor's or any Subcontractor's own use and convenience for hauling materials and equipment shall be constructed and maintained by Contractor at its own expense.

The failure or refusal of Contractor to construct and maintain adequate detours at the proper time and in satisfactory condition for use by public traffic shall be sufficient cause for closing down the Work until the Engineer determines that such detours have been constructed and are in satisfactory condition for use by public traffic. Contractor is solely responsible for all costs incurred to repair any damage to any detour caused by Contractor's or any Subcontractor's hauling or other activity.

## **Section 8**

### **MEASUREMENT AND PAYMENT**

#### **8-1 MEASUREMENT OF QUANTITIES**

The Engineer shall determine quantities of Work acceptably completed under the terms of the Contract, or as directed by the Engineer in writing, based on measurements taken by the Engineer or the Engineer's assistants. In computing quantities, the length, area, solid content, number, weight or time in standard units, as the case may be, shall be computed as specified in the Contract. All earth excavation shall be computed to the neat lines and grades as set and directed by the Engineer and shall be computed in relation to the original undisturbed condition.

#### **8-2 SCOPE OF PAYMENT**

The compensation provided by the Contract constitutes full payment for all materials, supplies, equipment, tools, labor, and all incidentals necessary to complete the Work; for performing all work and services contemplated and implied by the Contract; for loss or damage arising from the nature of the Work, or from action of the elements; from unforeseen difficulties that may be encountered during the performance of the Work; for all risks of every description connected with the performance of the Work, and for any infringement of patent, trademark, or copyright; and for completing the Work according to the Contract Documents.

For unit price items, payment for those items at the unit price bid by Contractor constitutes full payment for all work and services related to such items, except as otherwise specified in the Contract Documents. For any work or services required to perform the Work that are not specifically described in the Contract Documents, Contractor will include payment for such work and services under the bid of any item(s) that Contractor deems appropriate and City shall not pay additional compensation for any such work or services. No payment shall be made for materials stored on- or off-site until such materials are properly installed and incorporated in the Work.

#### **8-3 PAYMENT ON ENGINEER'S CERTIFICATE**

City shall make no payment pursuant to the Contract until the Engineer certifies that such payment is due on account of Work done and material furnished in accordance with the Contract.

## **8-4 COMPLETION OF WORK AND FINAL PAYMENT**

### **1. Issuance of Punchlist**

A punch list may be issued when the Engineer determines as provided below, that the work is “substantially complete” as that term is defined in Section 1 of these Specifications. The Engineer may issue a punch list on the Engineer’s own initiative or in response to Contractor’s request. If Contractor believes the Work is substantially complete and requests issuance of a punch list, the following provisions shall apply:

- a. Contractor shall submit to the Engineer a written request for issuance of a punch list. Contractor also shall provide any information relating to the Work that may be requested by the Engineer after receiving Contractor’s request. The Engineer shall request such information, if any, not later than five (5) working days after receiving Contractor’s request for issuance of a punch list.
- b. After reviewing the request and information and performing such other investigations, inspections or reviews necessary to ascertain the condition or status of the Work, the Engineer, in the Engineer’s sole discretion, shall either (1) issue a punch list, or (2) notify Contractor in writing that the Work is not yet substantially complete, and include a list of items of the Work that are not yet complete and have more than minor deficiencies. Unless otherwise agreed by the parties, the Engineer shall take one of the above actions within ten (10) working days after receiving Contractor’s request for issuance of a punch list, or, if the Engineer requests information, within ten (10) working days after the Engineer receives such information. Any subsequent requests by Contractor for issuance of a punch list shall be made in accordance with the provisions of this Section.

The City may issue one or more punch lists, as determined necessary or appropriate by the Engineer. The issuance of a punch list is solely for purposes of identifying items of the Work that have minor deficiencies, and shall not modify or otherwise affect the meaning, application or operation of any provision of the Contract Documents, including but not limited to any warranty, liquidated damages or termination provisions.

### **2. Final Acceptance of the Work**

Final acceptance occurs when the Engineer determines that the entire Work is complete. The Engineer may make this determination on the Engineer’s

own initiative or in response to Contractor's request. If Contractor believes the entire Work, including all punch list work, is complete and requests final acceptance, the following provisions shall apply:

- a. Contractor shall submit to the Engineer a written request for final acceptance. Contractor shall provide any information relating to the condition or status of the Work as requested by the Engineer. The Engineer shall request such information, if any, not later than five (5) working days after receiving Contractor's request for final acceptance.
- b. After reviewing such request and information and performing such other investigations, inspections or reviews as may be necessary to ascertain the condition or status of the Work, the Engineer, in the Engineer's sole discretion, shall either (1) issue final acceptance establishing the date of completion of the entire Work, or (2) notify Contractor in writing that the entire Work is not yet complete, and include a list of items of the Work that are deficient. Unless otherwise agreed by the parties, the Engineer shall take one of the above actions within ten (10) working days after receiving Contractor's request for final acceptance, or, if the Engineer requests information, within ten (10) working days after the Engineer receives such information. Any subsequent requests by Contractor for final acceptance shall be made in accordance with the provisions of this Section. The date of completion of the entire Work determined by the Engineer shall be specified in any Notice of Completion filed pursuant to Civil Code Section 3093.

Completion of the Work shall not be deemed to occur under the Contract for any purpose until the Engineer determines the date of completion as provided above.

### **3. Final Payment**

After determining the date of completion, the Engineer shall make a final estimate of the amount and value of Work performed under the Contract. If necessary, the Engineer shall prepare a balancing Change Order. The Engineer shall send the final estimate to Contractor with a balancing Change Order, if required, for Contractor's review and signature.

Not later than fifteen (15) calendar days after receiving the final estimate and balancing Change Order, if any, Contractor shall either (1) sign the final estimate and balancing Change Order, if any, and return them to the Engineer, or (2) notify the Engineer in writing of any disagreement with the final estimate. If Contractor fails within this time period to either return the signed

final estimate and balancing Change Order, if any, or notify the Engineer in writing of any disagreement with the final estimate, this is deemed acceptance by Contractor of the Engineer's final estimate and balancing Change Order (if any).

After Contractor's signature or acceptance of the final estimate and balancing Change Order, if any, the City may approve the final payment amount and execute the balancing Change Order, if any, in accordance with applicable approval requirements of the Colusa City Code. If Contractor timely notifies the Engineer in writing of a disagreement with the final estimate, if such disagreement is not resolved fifteen (15) calendar days after the Engineer receives such notification, the City may unilaterally approve a final payment amount and execute a balancing Change Order, if required, in accordance with applicable approval requirements of the Colusa City Code. The unilateral approval by the City does not affect Contractor's right to seek additional compensation, if any, but only to the extent authorized under other provision(s) of the Contract Documents.

The City's final payment consists of the entire sum found to be due by the Engineer after deducting all previous payments and all amounts charged against or withheld from Contractor under any provision of the Contract Documents or any Laws or Regulations, and all amounts retained under the provisions of the Contract. All prior partial estimates and payments are subject to correction in the final estimate and payment. The City's release of any amounts charged, withheld or retained at the time of final payment are not considered a "final payment" as the term is used herein.

No payment made under the Contract constitutes acceptance by City of any defective work or improper materials.

#### **8-5 ASSIGNMENT OF CLAIMS**

Contractor shall not assign any right to any portion of the moneys that may become due or may be claimed to become due to Contractor under the Contract without the written approval of the City. No person other than the party signing the Contract shall have any claim arising from the Contract, except as specifically provided in these Specifications.

#### **8-6 PAYMENTS BY CONTRACTOR**

1. Contractor shall provide all labor, services, materials, and equipment necessary to perform and complete the Work under the Contract. Except as otherwise approved by City, Contractor shall: (1) pay in full for transportation and utility services on or before the 20<sup>th</sup> day of the month following the calendar month in which such services are rendered; and,

(2) pay for at least 90% of the cost off all materials, tools, and other expendable equipment, on or before the 10<sup>th</sup> day after payment by City of any progress payment relating to those costs.

2. In the absence of other provisions in the Contract applicable to any Subcontractor, Contractor shall pay each Subcontractor, within ten (10) days after each payment City makes Contractor, the sum allowed in such payment for and on account of the Work performed by the Subcontractor, to the extent of the Subcontractor's interest therein, as required by Section 7108.5 of the California Business and Professions Code.
3. In addition to other responsibilities specified in the Contract Documents, Contractor is responsible for payment of:
  - a. Restaking costs resulting from loss of stakes and survey markers due to Contractor's or any Subcontractor's negligence;
  - b. Repeat testing of soils and materials when the previous testing results failed to meet the requirement(s) specified in the Contract Documents; and
  - c. Overtime inspection costs when the Engineer determines the overtime inspection was performed primarily to benefit Contractor.

#### **8-7 RELEASE AT TIME OF FINAL PAYMENT**

If requested by City, as a condition precedent to final payment, Contractor and each assignee under any assignment approved in accordance with the Contract Documents and in effect at the time of final payment, shall execute and deliver a release in form and substance satisfactory to City that discharges City, its officers, agents and employees of and from all liability, obligations and claims arising under the Contract, provided that disputed Contract claims in stated amounts may be specifically excluded by Contractor from the operation of the release pursuant to Public Contract Code Section 7100, but only to the extent that Contractor has complied with all procedures and requirements applicable to the presentation and processing of such claim(s) under the Contract Documents.

#### **8-8 EXTRA WORK A PART OF THE CONTRACT**

If extra work is ordered or authorized by the City in accordance with the Contract, such work is a part of the Contract and subject to each and all of its terms and conditions.

## 8-9 INSPECTION AND PAYMENTS NO WAIVER OF CONTRACT PROVISIONS

No inspection, order, measurement, approval, modification, certificate, payment, acceptance of work or material (including, but not limited to, acceptance of the entire Work), extension of time or possession of any part of or the entire Work shall operate as a waiver of any of the terms and conditions of the Contract, the powers reserved in the Contract to the City, or any right of City to damages or to reject work in whole or part. No waiver of any breach of the Contract constitutes a waiver of any other or subsequent breach. All remedies provided in the Contract are cumulative and in addition to all other rights and remedies that may exist at law or in equity.

## 8-10 PAYMENT BY COST AND PERCENTAGE

Payment by cost and percentage shall be made as follows:

1. For all materials purchased by Contractor and used in the specific portion of the Work, Contractor shall receive the actual cost of such materials including freight charges, as shown by original receipted bills for material and freight, to which shall be added an amount equal to fifteen percent (15%) of the sum.
2. For all labor of any class including foremen engaged in the specific portion of the Work, Contractor shall receive the prevailing wage and fringe benefits (not including payroll taxes) paid for each hour such labor is engaged in the specific work, in accordance with the following method of calculation:  
$$1.33 [(hourly\ wage + fringes) + 0.24 (hourly\ wage + fringes)]$$
3. For any Contractor-owned machine, power machinery and equipment deemed necessary and desirable to use on the specific portion of the Work, Contractor is allowed a rental price equivalent to the current Caltrans rental rate (less any state mark-ups) +15%. For machines and equipment rented by Contractor, a rental price, fully maintained, must be agreed upon by City and Contractor in writing before the specific work is begun, for each hour such machines and equipment are used, to which shall be added no percentage. If a rental price is not agreed to in writing as specified herein the current Caltrans rental rate shall be used.
4. Where extra work under cost and percentage is being performed by a Subcontractor, Contractor is allowed a five percent (5%) surcharge on the combined total of (1), (2), and (3) above for work performed by the Subcontractor. This surcharge is only allowed to Contractor and not to any Subcontractors.



Contractor shall keep and present to the City in such form as the Engineer may direct, complete and correct documentation of the net cost of all labor and materials subject to the provisions of this Section.

No claim for payment for extra work, whether done by cost and percentage or otherwise, can be honored unless the Engineer has given prior written authority and permission for such work.

**Section 9**  
**(RESERVED)**

## Section 10

### CONSTRUCTION MATERIALS

This Section describes various classes and types of materials used in public construction within the City of Colusa. Materials to be used for the work and not included in this section shall be described and specified in the Special Provisions.

#### 10-1 PORTLAND CEMENT

Unless otherwise specified in the Special Provisions, all cement used in concrete shall conform to ASTM C 150 and these Specifications, and shall be Type II, unless otherwise specified herein.

ASTM C 150, Type III, Portland cement shall be used for concrete requiring high early strength where specifically required by the Special Provisions.

Type II and Type III Portland cements shall be “low alkali” containing not more than 0.60 percent by weight of alkalies, calculated as the percentage of  $\text{Na}_2\text{O}$  plus 0.658 times the percentage of  $\text{K}_2\text{O}$ .

When directed by the Engineer, Contractor shall furnish certificates of compliance stating that the cement delivered to the work complies with these Specifications.

#### 10-2 CONCRETE AGGREGATES

Unless otherwise specified in the Special Provisions all concrete aggregates shall conform to ASTM C 33, except that grading requirements shall be as specified in Section 10-5 of these Specifications.

#### 10-3 WATER FOR CONCRETE

Water used for mixing concrete and water used for curing concrete shall be clean, free from oil, acid, alkalies, vegetable matter, or other deleterious matter. No water containing excessive amounts of salts, sulphates, or chlorides shall be used.

#### 10-4 PREFORMED EXPANSION JOINT FILLER

Unless otherwise specified in the Special Provisions, preformed expansion

joint filler material shall conform to ASTM D 1751.

## 10-5 PORTLAND CEMENT CONCRETE

### 1. Composition:

Portland cement concrete (referred to herein as concrete) shall be composed of Portland Cement, fine aggregate, coarse aggregate, admixtures if used, and water.

Concrete shall be designated as one of the following classes:

Class "A" Concrete shall contain six (6) sacks (564 pounds) of Portland cement per cubic yard and shall have a maximum size of coarse aggregate of one and one-half inches (1½").

Class "B" Concrete shall contain six (6) sacks (564 pounds) of Portland cement per cubic yard and shall have a maximum size of coarse aggregate of one inch (1").

Class "C" Concrete shall contain five (5) sacks (470 pounds) of Portland cement per cubic yard and shall have a maximum size of coarse aggregate of one inch (1").

Class "D" Concrete shall contain five (5) sacks (470 pounds) of Portland cement per cubic yard and shall have a maximum size of coarse aggregate of three-quarters inch (¾").

When approved by the Engineer, fly ash conforming to ASTM C 618 may be used to replace up to 20 percent of the Portland cement requirement for Class A and B concrete except that fly ash shall not replace Portland cement for concrete used to pave alleys.

Should the quantity of ingredients designed to produce a cubic yard of finished concrete result in a yield greater than one cubic yard, the relative proportions of fine and coarse aggregates shall be adjusted as necessary to maintain a constant quantity of Portland cement in each cubic yard of concrete.

Contractor shall determine the mix proportions for all concrete to be used in the work. A mix design for each class of concrete used in the work shall be submitted to the Engineer for approval at least five (5) working days prior to the proposed concrete being incorporated into the work.

**10-5 PORTLAND CEMENT CONCRETE (cont.)**

**2. Proportioning:**

The coarse and fine aggregates shall be combined in such proportions that the percentage composition by weight of the individual and primary sizes of aggregates and of the combined aggregates, as determined by laboratory screens and sieves, will be as follows:

**GRADING AND COMPOSITION REQUIREMENTS**

Sieve Size	Designation and Nominal Size					
	Percentage Passing Sieves					
	Primary Aggregate Sizes			Combined Aggregate Sizes		
	1½x	1" x	Fine	1½"	1"	¾"
¾"	No. 4	Max.		Max.	Max.	
2"	100	--	--	100	--	--
1½"	88-100	100	--	90-100	100	--
1"	1-59	88-100	--	50-86	90-100	100
¾"	0-17	37-100	--	45-75	55-100	90-100
⅜"	0-7	0-53	100	38-55	45-75	60-80
No. 4	--	0-16	95-100	30-45	35-60	40-60
No. 8	--	0-6	65-95	23-38	27-45	30-45
No. 16	--	--	45-85	17-33	20-35	20-35
No. 30	--	--	25-55	10-22	12-25	13-23
No. 50	--	--	10-35	4-9	5-15	5-15
No. 100	--	--	2-10	1-3	1-5	1-5
No. 200	0-2	0-2	0-5	0-2	0-2	0-2

In addition to the above required grading analysis in the primary aggregate size, the distribution of the fine aggregate sizes shall be such that the difference between the total percentage passing the No. 16 sieve and the total percentage passing the No. 30 sieve shall be between 10 and 40; and the difference between the percentage passing the No. 30 and No. 50 sieves shall be between 10 and 40.

Exact proportions of primary aggregate sizes used in the concrete mix shall be as designated and/or approved by the Engineer. The Engineer may adjust the mix to accommodate changes in aggregates and moisture contents, to improve mixing and placing characteristics and to secure maximum quality of the finished concrete.

## 10-5 PORTLAND CEMENT CONCRETE (cont.)

### 3. Mixing:

All concrete mixing shall be done in machine batch mixers of an approved type, having a capacity of not less than a full one-sack batch, unless the quantity to be mixed is, in the opinion of the Engineer, too small to justify the use of a batch mixer. Sacks of cement shall be completely emptied by dumping directly upon other materials previously measured into the mixer, and no splitting of sacks of cement will be allowed, except where Contractor provides suitable equipment approved by the Engineer, the cement may be weighed into the batch from bulk storage.

Mixing shall continue for not less than one (1) minute and in mixers larger than one cubic yard capacity this minimum shall be increased so that minimum mixing time shall not be less than one (1) minute for each cubic yard or part thereof of mixer capacity.

Where transit mixers are used, the mixing period shall conform to the requirements of ASTM C 94.

The total volume of material mixed per batch shall not exceed the rated capacity of the mixer as determined by the standard requirements of the Associated General Contractors of America. All mixing equipment shall be operated at the speeds recommended by the manufacturer, provided, however, that the revolving drum type, except on transit mixers, shall not make less than fourteen (14) or more than eighteen (18) revolutions per minute, and that the rotation rate of transit mixing drums be such as to produce a peripheral speed of approximately two hundred feet (200') per minute. Each paving mixer or stationary mixer shall be equipped with an acceptable timing device.

Should Contractor elect to utilize transit mixing equipment, he shall make adequate advance arrangements for preventing delays in delivery and placing of the concrete. An interval of more than forty-five (45) minutes between any two consecutive batches or loads, or a delivery and placing rate of less than eight (8) cubic yards of concrete per hour, shall constitute cause for shutting down the work for the remainder of the day, and if so ordered by the Engineer, Contractor shall make at his own expense, a construction joint at the location and of the type directed by the Engineer, in the concrete already placed.

Transit-mixed concrete shall be delivered to the site of the work and discharge shall be completed within ninety (90) minutes after the addition of the cement to the aggregates or before the drum has been revolved 250

## 10-5 PORTLAND CEMENT CONCRETE (cont.)

revolutions, whichever comes first. In hot weather or under conditions contributing to quick stiffening of the concrete or when the temperature of the concrete is 85 F. or above, the time between the introduction of the cement to the aggregates and discharge shall not exceed forty-five (45) minutes.

A ticket showing volume of concrete and the mix number shall accompany each batch of transit-mixed concrete delivered to the job site. The ticket shall also show the time of day at which the materials were batched.

### 4. **Placing:**

The placing of the concrete from a stationary or transit mixer must be done in such a manner as to avoid separation of constituent materials of the concrete. The Engineer shall have the right to stop concrete pouring if the placing of the concrete is improper in this respect.

### 5. **Water Control:**

Within the limits hereinafter specified, the amount of water required for the proper consistency of concrete shall be determined by the slump test in accordance with ASTM C 143, except that the ratio of weight of water (water cement ratio) shall not exceed 0.55 unless otherwise approved by the Engineer.

The allowance for slump, unless otherwise directed by the Engineer, shall be as follows:

- a. concrete paving and reinforced structures (heavy sections), not more than three inches (3");
  - b. reinforced structures (thin sections) and columns, not more than four inches (4");
- concrete placed under water, not less than six inches (6") nor more than eight inches (8").

No additional mixing water shall be incorporated into the concrete during hauling or after arrival at the delivery point, unless authorized by the Engineer. If the Engineer authorizes additional water to be incorporated into the concrete, the drum shall be revolved not less than 30 revolutions at mixing speed after the water is added and before discharge is commenced.

#### **10-5 PORTLAND CEMENT CONCRETE (cont.)**

If mixing in transit is allowed, the control equipment as above specified shall be at the proportioning plant and there shall be no water added after the mixture leaves the plant, unless directed by the Engineer.

Contractor shall furnish, without charge, such materials as may be required for making tests of concrete during the progress of the work. Such tests will be made at the expense of the City of Colusa, except that, if tested concrete does not meet required standards, the cost of additional testing shall be borne by Contractor.

No concrete shall be used which has partially set, and no concrete shall be re-tempered or remixed.

#### **10-6 CURING COMPOUNDS FOR CONCRETE**

Concrete curing compounds shall be used where specified in these Specifications and the Special Provisions. The compounds shall conform to the requirements of Section 90, "Concrete," of the State Specifications.

#### **10-7 AGGREGATE BASES**

Aggregate bases shall conform to the requirements of Section 26 of the State Specifications, except as modified herein.

The combined aggregate shall conform to the grading specified for the three-quarter inch ( $\frac{3}{4}$ " ) maximum aggregate for Class 2 aggregate base, unless otherwise specified in the Special Provisions. Aggregate may include material processed from reclaimed asphalt concrete, Portland cement concrete, lean concrete base, cement treated base or a combination of any of these materials. The amount of reclaimed material may constitute up to 100% of the total volume of the aggregate used.

Aggregate base will be paid for at the contract price bid per ton or per cubic yard delivered to the job and placed according to the Plans and Specifications. The method used on any work will be shown by the list of quantities on the Proposal and by the type of unit price requested in the Proposal.

The weight of material to be paid for will be determined by deducting from the weight of material delivered to the work, the weight of water in the material, at the time of weighing, as determined by California Test 226, in excess of one (1) percentage point more than the optimum moisture content as determined by ASTM D 1557. The weight of water deducted as provided in this Section will not be paid for.



Quantities of aggregate base to be paid for by the ton or cubic yard will be calculated on the basis of the dimensions shown on the plans adjusted by the amount of any change ordered by the Engineer. No allowance will be made for aggregate base placed outside said dimensions unless otherwise ordered by the Engineer.

The above prices and payment shall be full compensation for furnishing all labor, material, tools, equipment, water, and incidentals, and for all work involved in constructing aggregate base complete in place as shown on the Plans, and as specified in these Specifications and the Special Provisions or as directed by the Engineer.

#### **10-8 AGGREGATE SUBBASE (GRADED)**

Aggregate subbase shall conform to the requirements of Section 25 of the State specifications. Aggregate subbase shall be Class 1, unless otherwise approved by the Engineer.

Payment for aggregate subbase shall be per ton of material delivered to the job and placed in accordance with the Plans and Special Provisions. The weight of material to be paid for will be determined by deducting from the weight of material delivered to the work, the weight of water in the material, at the time of weighing, as determined by California Test 226, in excess of one (1) percentage point more than the optimum moisture content as determined by ASTM D 1557. The weight of water deducted as provided in this Section will not be paid for.

The compacting of the material shall be done in accordance with the requirements for placing aggregate bases, as provided in these Specifications.

Payment for the material at a price per ton or cubic yard shall constitute full compensation for furnishing, hauling, placing, compacting, and finishing the material including the furnishing of all labor, material, tools, equipment, water and incidentals.

#### **10-9 CEMENT TREATED BASES**

Road-mixed and plant-mixed cement treated bases shall conform to the requirements of Section 27 of the State Specifications.

Measurement and payment for cement treated bases shall be in accordance with the State Specifications or may be paid for at a price per ton or cubic yard of cement treated base complete in place as so indicated in the Special Provisions.

## **10-10 LIME STABILIZATION**

Lime stabilization shall conform to the requirements of Section 24 of the State Specifications, except as modified herein.

Unless otherwise specified in the Special Provisions or approved by the Engineer the amount of lime to be added shall constitute a minimum of four and one-half percent (4.5%) by unit weight of the material to be stabilized.

## **10-11 TREATED PERMEABLE BASES**

Treated permeable bases shall conform to the requirements of Section 29 of the State Specifications.

## **10-12 GEOGRID**

Geogrid may be used in areas requiring soil stabilization, such as unsuitable subgrade, or as specified in the Special Provisions, or as approved by the Engineer. Geogrid material shall conform to the following requirements unless otherwise specified in the Special Provisions.

The reinforcement material shall be biaxially oriented geogrid with high tensile modulus in relation to the material being reinforced, with large apertures, thick ribs and junctions to permit significant mechanical interlock with the material being reinforced, and with high continuity of tensile strength through all ribs of the structure.

The geogrid shall maintain its reinforcement and interlock under normal construction practices, and be resistant to both ultraviolet degradation and all forms of biological degradation normally encountered in the material being reinforced. Geotextiles shall not be accepted as reinforcing material. The geogrid shall be installed per the manufacturers recommendations and as specified in the Special Provisions. Grid ties shall be installed a maximum of twenty feet apart and overlaps shall be a minimum of two feet, unless otherwise approved by the Engineer.

The geogrid shall be a single-layer grid that meets the dimensions and properties outlined below. Multi-layered grids fastened together shall not be acceptable. The biaxial geogrids shall conform to the property requirements listed below:

Property	Test Method	Units	Value
Mass	ASTM D 5261-92	oz/sy	8.75 (nom)
Tensile			
Peak Tensile MD (a)	GRI GG1	lb/ft	1,200 (min)
Tensile at 5% MD	GRI GG1	lb/ft	810 (min)
Peak Tensile CMD (b)	GRI GG1	lb/ft	1,970 (min)
Tensile at 5% CMD	GRI GG1	lb/ft	1,340 (min)
Stiffness			
Torsional Stiffness	Corps of Engineers	cm-kg/deg	6.5 (min)
Flexural Stiffness True Initial	ASTM D 1388	mg-cm	750,000 (min)
Modulus in Use MD (c)	GRI GG1 (b)	lb/ft	20,500 (min)
True Initial Modulus in Use CMD (c)	GRI GG1	lb/ft	30,000 (min)
Interlock			
MD dimension	I. D. Calipered	in	0.75-1.50
CMD dimension	I. D. Calipered	in	0.75-1.50
Open area (d)	COE Method Modified	%	70 (min)
Junctions			
Efficiency	GRI GG2	%	90 (min)
Strength MD	GRI GG2	lb/ft	1,080 (min)
Strength CMD	GRI GG2	lb/ft	1,778 (min)

- (a) MD - Machine Direction which is along roll length  
CMD - Cross Machine Direction which is across the roll width.
- (b) Resistance to in-plane rotational movement measured by applying a 20 cm-kg moment to the central junction of a 9" x 9" specimen restrained at its perimeter. (U.S. Army Corps of Engineers Methodology).
- (c) True resistance to elongation when initially subjected to a load measured via GRI-GG1 without deforming test materials under load before measuring such resistance or employing "secant" or "offset" tangent methods of measurement so as to overstate tensile properties.
- (d) Percent open area measured without magnification by Corps of Engineers method as specified in CW 02215 Civil Works Construction Guide, November 1977.

Stress transfer capability through junctions (i.e. material overlaps). The value of the Peak Tensile Strength CMD multiplied by Junction Efficiency shall be greater than 1,080 lb/ft.

**10-13 BEDDING SAND**

Bedding Sand shall have a minimum sand equivalent of 50. Ninety to one hundred percent (90-100%) shall pass the #4 sieve and a maximum of fifteen percent (15%) shall pass the #200 sieve. Sand material shall be of a good quality with a minimum resistivity of 5,000 ohm-cm., a minimum pH of 6.0, a maximum chloride concentration of 300 ppm and a maximum sulfate concentration of 1,000 ppm.

<b>Chemical Analysis</b>	<b>ASTM Method</b>
Conductivity	D 1125
Sulfate	D 516A (SM 4500)
PH	D 2976/D 4972/G 51
Chlorides	D 512C

**10-14 CRUSHED SCREENINGS**

In these Specifications, in the Special Provisions, or on the Plans, the use of crushed screenings may be specified for certain purposes. When so specified this shall mean a uniformly graded material that is the product of crushing rock or gravel; free of organic matter, oil, alkali, or other deleterious substances and is hard, sound and durable.

Unless otherwise indicated in the Special Provisions, the crushed screenings shall conform to the requirements for Class 1 Permeable Material Type A as set forth in Section 68 of the State Specifications.

**10-15 SLURRY CEMENT BACKFILL**

Slurry Cement Backfill specified herein for use as trench backfill shall conform to the requirements of Section 19 of the State Specifications and must be a fluid workable mixture of aggregate, cement, and water.

Slurry cement backfill may be used as structure backfill only for pipe culverts.

## 10-16 CONTROL DENSITY FILL (CDF)

Control Density Fill (CDF), also known as Controlled Low Strength Material (CLSM) or Ready Mixed Flowable Fill (RFF) as processed and distributed by the National Ready Mixed Concrete Association and referred to herein as CDF type materials), may be used as an alternate initial backfill and/or trench backfill material, if approved by the Engineer, or if specified in the Special Provisions. CDF type materials may only be used as an alternate trench backfill material above the initial backfill material if approved in writing by the engineer and the material supplier submits strength tests performed in accordance with either ASTM C31 & C39 or ASTM D4832 that show the mix consistently has a 28-day compressive strength not exceeding 150 psi. Separate approval by the Engineer of CDF type materials as specified herein is not required for filling abandoned pipelines.

**Hand Excavatable:** Material shall be a hand excavatable mixture of cement, aggregate, entrained-air admixture, and water mixed in accordance with ASTM C 94. The 28-day compressive strength shall not exceed 150 psi unless otherwise directed or approved in writing by the Engineer when used for trench backfill above the initial backfill zone.

**Flowable:** Material shall be flowable with a high slump, non-segregating consistency that readily flows and fills voids, congested areas, difficult to reach places, and that may additionally be used for pipe abandonment, structure backfill, and structure cavity fill as directed.

**Rapid Set:** Material shall obtain early strength gain, to allow traffic load or other live loads on the fill in less than one (1) day after placing the material.

**Cement:** Shall be type I or II in accordance with ASTM C 150. Mix designs consisting of up to equal parts cement and Type F pozzolan conforming to ASTM C618 may be submitted for consideration.

**Pozzolan:** Shall be added to improve flowability and shall be type F in accordance with the requirements of ASTM C 618.

**Aggregate:** Coarse aggregate, if used, shall consist of well graded mixture of crushed rock with a maximum size aggregate of  $\frac{3}{8}$  inch. 100% shall pass the  $\frac{1}{2}$ -inch sieve. Not more than 30% shall be retained by the  $\frac{3}{8}$  inch sieve and not more than 12% shall pass the number 200 sieve. Mix designs consisting of sand only with no coarse aggregate may be submitted for consideration. All aggregate shall be free from organic matter and not contain more alkali, sulfates, or salts than the native materials at the site of work.

**Admixtures:** Air entrainment admixture shall be added (minimum of 8%, maximum of 20%) to improve workability in accordance with ASTM C 260.

Water: Shall be potable, clean, and free from silty organic matter, alkali, salts, or other impurities.

Compressive Strength: The minimum 28 day compressive strength shall be 20 psi and the maximum shall be 150 psi.

Mixing, transporting and placing CDF type materials shall be in accordance with ACI 304 and ACI 304.6R. Prior to placement, the trench shall be free of loose soil and the trench bottom shall be stable and non-yielding with no excess moisture. The pipe haunch areas shall be clear so that the CDF type material will readily flow around the pipe. Place CDF type material simultaneously on both sides of the pipe to minimize potential lateral displacement of the pipe. Also, pipe sections may need to be secured against floating during CDF type material placement, or place the material in lifts to reduce the potential for flotation. Commence placement of granular trench backfill above CDF type initial backfill only when overlying material placement and compaction will not cause deformation of the initial backfill.

#### **10-17 CLEAN CRUSHED ROCK**

In these Specifications, on the Plans, or in the Special Provisions, the use of clean crushed rock may be specified for certain purposes. When so indicated on the Plans or in the Special Provisions, a clean crushed rock of the type indicated shall be provided which is the product of crushing rock or gravel.

Clean crushed rock shall have a minimum Cleanliness Value of sixty (60) as determined by California Test 227, and the portion of the material which is retained on the  $\frac{3}{8}$ -inch sieve shall contain at least fifty percent (50%) of particles having three (3) or more fractured faces. The percentage composition by weight of clean crushed rock shall conform to the following gradations for the Type specified.

<b>% Passing Sieves</b>				
<b>Sieve Size</b>	<b>Type A</b>	<b>Type B</b>	<b>Type C</b>	<b>Type D</b>
2"	--	--	--	100
1½"	--	--	100	--
1"	--	100	90-100	--
¾"	100	70-100	30-60	0-17
½"	90-100	30-60	0-20	--
⅜"	20-60	0-20	0-6	0-7
No. 4	0-15	0-5	0-5	--
No. 200	0-2	0-2	--	0-2

**10-18 ASPHALT BINDERS AND ASPHALTIC EMULSIONS**

Asphalt binders and asphaltic emulsions as required by these Specifications or by the Special Provisions shall mean respectively the asphalt binders as specified in Section 92 of the State Specifications and asphaltic emulsions as specified in Section 94 of the State Specifications.

**10-19 SEWER AND DRAINAGE PIPE**

**1. Joints**

Unless otherwise specified herein, sewer and drain pipes shall have elastomeric gasket joints providing a water tight seal. An exception to this requirement is fusion welded solid wall HDPE. Any leakage in solid wall, fusion jointed HDPE means that a joint is faulty and must be repaired at the contractor’s expense.

**2. Manhole Connections**

Unless otherwise specified, connecting a 24 inch or smaller inside diameter pipe, not cast into the base of a manhole, shall be accomplished by using a coring machine. The annular space between the outside of the pipe and the manhole wall shall be sealed by using a flexible annular space filler such as "Kor-N-Seal Cavity O-Ring" by NPC Inc. or approved equal. Such connection shall be made in conformance with manufacturer’s recommendations.

Unless otherwise specified, connecting a pipe with an inside diameter greater than 24 inch to a manhole shall be accomplished by cutting a hole into

the manhole and grouting in the pipe. The hole shall be no more than the pipe outside diameter plus the thickness of the manhole wall. The annular space between the outside surface of the pipe and the hole in the wall shall be filled with non-shrink grout and the pipe shall be properly installed with an approved water stop.

In the connection of the pipe to a drop inlet, the use of a coring machine and flexible annular space filler are not required.

### **3. Deflection**

For all flexible pipe and fittings, the minimum pipe stiffness at 5% deflection shall be 46 PSI according to ASTM D 2412. All flexible conduits shall be tested with a mandrel 5% smaller than the average inside diameter of the pipe no sooner than 96 hours after placement of the backfill. Mandrel tests may be performed by the City after a 6 month period of time at which time a maximum deflection of 7-1/2% from the base I.D. will be allowed. The mandrel used shall be the PHOS PVC Sewer Pipe Deflection Gauge or other deflection gauge approved by the Engineer.

### **4. Drainage and Sewer Pipe Requirements**

The requirements for the various types of pipe are summarized in the following paragraphs:

#### **a. Acrylonitrile-Butadiene-Styrene (ABS)**

ABS gravity sewer pipe and fittings in sizes 4" & 6" shall conform to ASTM D 2661. Eight inch (8") and larger in diameter shall conform to either ASTM D 2751, SDR 23.5 or ASTM D 2680 (ABS composite pipe).

Joints shall be solvent cemented (SC). All Service connections shall be installed with "Tee" fittings. Saddles are not approved. When the sewer main is of a material other than ABS, the connection joint to the sewer main shall be made with a flexible adapter manufactured by FERNCO, or approved equal.

#### **b. Closed Profile Poly Vinyl Chloride (CPPVC)**

CPPVC pipe with integral bell and spigot joints shall conform to ASTM F 1803. Joints shall be of the bell and spigot type with elastomeric seals conforming to the requirements of ASTM D 3212. Gaskets shall be factory installed and chemically bonded to the bell end of the pipe. Gasket material shall conform to ASTM F 477 and shall be capable of the same water tightness requirements as smooth or solid wall PVC pipe.



**c. High Density Polyethylene (HDPE) Solid Wall Fusion Jointed**

HDPE pipe shall be as manufactured by Phillips Drisco pipe, a division of Phillips Petroleum company, or equal. The material shall be listed by PPI (Plastic Pipe Institute, a division of the Society of the Plastics Industry) in PPI TR-4 with a 73.4°F hydrostatic design basis of 800 psi. The PPI listing shall be in the name of the pipe manufacturer and shall be based on ASTM D 2837 and PPI TR-3 testing and validation of samples of the pipe manufacturer's production pipe.

Material Requirements - Pipe shall be high molecular weight, high density polyethylene pipe and shall have a standard dimension ratio of 32.5 (SDR 32.5). The material shall have a standard PE code designation of PE 3408 and have a cell classification of 345434C as described in ASTM D 3350. The pipe shall contain no recycled compound except that generated in the manufacturer's own plant from resin of the same specification from the same raw material pipe

The pipe shall be homogeneous throughout and free of visible cracks, bubbles, holes, foreign inclusions or other injurious defects. It shall be uniform in color, opacity, density, and other physical properties and produced to the dimensions and tolerances specified in ASTM F 714. The inside and outside surfaces shall be semi-matte or glossy in appearance. Any pipe not meeting these criteria shall be rejected.

The polyethylene pipe manufacturer shall provide certification that stress regression testing has been performed on the specific product. The said certification shall include a stress life curve per ASTM D 2837. The stress regression testing shall have been done in accordance with ASTM D 2837, and the manufacturer shall provide a product supplying a minimum Hydrostatic Design basis (HDR) of 1,600 psi, as determined in accordance with ASTM D 2837.

The manufacturer's certification shall state that the pipe was manufactured from one specific resin in compliance with these specifications. The certification shall state the specific resin used, its source, and list its compliance to these specifications.

Joints - All joints for the buried polyethylene pipe shall be of the thermal butt fusion type or bolted flanges reinforced with stainless steel.

Fittings - Polyethylene fittings shall be of the same material as the pipe and manufactured by the pipe manufacturer.

**d. Polyvinyl Chloride (PVC)**

PVC drain pipe and fittings, with at least eighteen inches (18”) of cover to sub-grade, shall conform to ASTM D 3034 and ASTM F 679 and shall be SDR 35 pipe with elastomeric gasket joints providing a watertight seal.

PVC drain pipe and fittings, with less than eighteen inches (18”) of cover to sub-grade, shall be class 100 SDR 25 or 26 pipe conforming to AWWA C 900.

All joints shall be integral wall bell and spigot configuration, factory formed. Pipes at joints are not to be inserted beyond “stop-mark” on spigot end. All service connections shall be installed with “Tee” fittings, gasketed “Tee” saddles with stainless steel bands, or other approved tapping devices. Solvent welded “Wye” saddles are not approved. All rubber rings shall conform to ASTM F 477.

**e. Reinforced Concrete Pipe (RCP)**

Reinforced concrete pipe shall conform to ASTM C 76 Class III, IV, or V. The class of pipe will be shown on the Plans or indicated in the Special Provisions. Sections of circular pipe with elliptical reinforcing shall have the location of the minor axis of the reinforcing indicated by three inch (3”) wide, waterproof, painted stripes on the inside and outside of the pipe at the top and bottom, at least twelve inches (12”) long at each end of the pipe section.

Joint materials for concrete pipe shall be rubber gasket joints conforming to the requirements of ASTM C 443 and shall be flexible and able to withstand expansion, contraction, and settlement. All rubber gaskets shall be stored in as cool a place as practicable, preferably at 70° F. or less, and in no case shall the rubber gaskets be exposed to the direct rays of the sun.

Rubber gaskets, of the type requiring lubrication, shall be lubricated with the lubricant recommended and supplied by the manufacturer of the pipe.

**f. Vitrified Clay Pipe (VCP)**

Vitrified clay pipe shall conform to the specifications for extra strength clay pipe as set forth in ASTM C 700.

Stoppers shall be used with branch pipes that are to be left unconnected. Stoppers for branch pipes having flexible compression joints may be either clay discs with flexible compression joints, factory

applied, that will mate with the branch joint; or a resilient material of controlled design and dimensions for mating with the branch pipe to which it is to be applied; or, of other material approved by the Engineer. Wooden stoppers will not be accepted.

Joint materials for vitrified clay pipe shall be an approved type of factory-made mechanical compression joint conforming to the requirements of ASTM C 425. Banded rubber couplings and sleeves conforming to ASTM C 425 are acceptable.

**g. Corrugated Metal Pipe**

Corrugated metal pipe may only be used for driveway culverts and shall conform to ASTM A 760, Type 1 or 1R. Minimum depth of cover shall be 6 inches.

**h. Corrugated HDPE Pipe**

Corrugated High Density Polyethylene (HDPE) pipe may only be used for driveway culverts. HDPE pipe shall have smooth interior and shall be Type S conforming to AASHTO M 252 for four inch (4”) through ten inch (10”) diameter pipe and to AASHTO M 294 for twelve inch (12”) and larger pipe. Provide Grade 2A2 gasketed joints in conformance with ASTM D 1056. Installation shall be in accordance with manufacturer’s standards and ASTM D 2321. Minimum depth of cover shall be 12 inches.

**i. Glass-Fiber-Reinforced Thermosetting-Resin Pipe**

Unless indicated otherwise in the Special Provisions, Glass-Fiber-Reinforced Thermosetting-Resin Pipe shall conform to the requirements of ASTM D 3262 with a pipe stiffness designation C (36 psi).

**10-20 SUBSURFACE DRAINS**

Subsurface drains shall comply with Section 68 of the State Specifications.

**10-21 RESERVED**

**10-22 FIELD ASSEMBLED PLATE CULVERT**

Field assembled plate culverts shall conform to Section 67 of the State Specifications.

### **10-23 REINFORCING STEEL**

Reinforcing steel shall conform to Section 52, “Reinforcement”, in the State Specifications. Unless otherwise provided by the Special Provisions, bar reinforcement shall be deformed Grade 60 conforming to ASTM A 615, “Deformed Billet-Steel Bars for Concrete Reinforcement”.

Welded steel wire fabric for concrete reinforcement shall conform to ASTM A 185. The gauge of the wire and the dimensions of the mesh will be as shown on the Plans or indicated in the Special Provisions.

### **10-24 CURB DOWEL AND TIE BARS**

Dowel and tie bars for curbs shall conform to ASTM A 615. Grade 60 or Grade 40 may be used at Contractor’s option.

### **10-25 CASTINGS FOR MANHOLES, COVERS, ETC.**

Casting for manhole heads, covers, and other purposes shall be tough gray iron, free from cracks, holes, swells and cold sheets, be of workmanlike finish, and conform to ASTM A 48/A 48M, Class 30. The quality shall be such that a blow from a hammer will produce an indentation on a rectangular edge of the casting, without flaking or cracking the metal.

All castings are to be manufactured true to pattern and with satisfactory fit of component parts. Round frames and covers shall have machined bearing surfaces. All manhole covers which do not fit neatly and bear firmly in the ring shall be rejected.

#### Alternate Castings for manhole covers

Where specified, casting shall be constructed of ductile iron in conformance with ASTM A536A, Class 60-45-12. Castings shall match the dimensions shown in City of Colusa Improvement and Design Standards Sections 7 & 9. Cover shall be hinged and may or may not be gasketed. Gasket shall be mechanically fitted to frame such that removal and attachment can be accomplished without the use of tools and glue, per manufacturer's instructions. Lid shall have a rated capacity in excess of H2O loading per AASHTO.

### **10-26 WATER PIPE - Distribution (12 inch diameter & smaller)**

Water Distribution System pipe shall be of the material type as indicated on the Plans or specified in the Special Provisions and shall comply with AWWA standards and NSF/ANSI Standard 61. All pipe shall be the regular product of a firm which has successfully manufactured comparable pipe for at least three (3) years.

Unless otherwise directed or approved:

- 12-inch diameter buried pipe shall be ductile iron only, and
- 12-inch diameter and smaller pipes placed on bridges shall be liquid-epoxy lined and coated welded steel per AWWA C200 and AWWA 210.

## 1. Ductile Iron Pipe

All ductile iron pipe shall conform to the following AWWA Standards as listed below:

- a. AWWA C 104 (ANSI A21.4), “Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water,” if cement-mortar lined.
- b. AWWA C 111 (ANSI A21.11), “Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.”
- c. AWWA C 150 (ANSI A21.50), “Thickness Design of Ductile-Iron Pipe.”
- d. AWWA C 151 (ANSI A21.51), “Ductile-Iron Pipe, Centrifugally Cast, for Water.”

Pipe shall comply with the following requirements:

- a. Size - 4, 6, 8, 12 inch diameter only
- b. Laying Condition - Type 5
- c. Minimum Depth of Cover - Three (3) feet for improved; four and one-half (4 -1/2) feet for unimproved
- d. Working Pressure-150psi
- e. Laying Length - Minimum eighteen (18) foot nominal lengths with allowable trim pipe lengths in accordance with AWWA C 151 and special shorter lengths provided as required by the drawings.
- f. Joints - Push on or mechanical
- g. Restrained Joints - Bolted flanged connections, push-on locking gasket such as “Field-Lok” gaskets as manufactured by U.S. Pipe, push-on joint restraint such as “TR-Flex” as manufactured by U.S. Pipe, wedge action joint mechanism such as “Megalug” as manufactured by EBAA Iron, Inc. or approved equal.
- h. Gasket Lubricant - Minimum required plus 10% additional

- i. Pressure Class-350
- j. Linings-Standard thickness of cement w/ asphalt seal coat.  
Coatings-Minimum one (1) mil thick petroleum asphaltic material.
- k. Certification by Manufacturer Required

## 2. Polyvinyl Chloride Pipe

All polyvinyl chloride pipe in sizes ranging from four through eight inch (4"-8") shall conform to AWWA C 900 "Polyvinyl Chloride (PVC) Pressure Pipe," or AWWA C 909 "Molecularly Oriented Polyvinyl Chloride (PVCO) Pressure Pipe". Pipe shall be manufactured with cast iron outside diameters (CIOD) for all sizes.

Pipe shall comply with the following requirements:

- a. Size - 4, 6, 8, 12 inch diameter only
- b. Class 150
- c. Dimension Ratio - 18
- d. Laying Length - 20 feet
- e. Joints - Integral bell and spigot joints conforming to the requirements ASTM D 3139 with factory supplied elastomeric gaskets meeting the requirements of ASTM F 477.
- f. Restrained Joints - Bolted flanged connections, Wedge action joint mechanism such as "Megalug" as manufactured by EBAA Iron, Inc. or approved equal.
- g. Gasket Lubricant-Minimum required plus 10% additional
- h. Each pipe length shall be marked showing the nominal pipe size and O.D. base, the AWWA pressure class, the AWWA specification designation, and the seal of the testing agency that verified the suitability of the material.

### 10-27 WATER PIPE FITTINGS - Distribution (12 inch diameter & smaller)

Water pipe fittings shall be of the material type as indicated on the Plans or specified in the Special Provisions and comply with AWWA standards and AWSI 61. All fittings shall be the regular product of a firm which has successfully manufactured comparable fittings for at least three (3) years.

All water pipe fittings shall be Ductile Iron and shall conform to the following AWWA Standards:

1. AWWA C 104 (ANSI A21.4), "Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water," if cement-mortar lined.
2. AWWA C 110 (ANSI A21.10), "Ductile-Iron and Gray-Iron Fittings for Water."
3. AWWA C 111 (ANSI A21.11), "Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings."
4. AWWA C 153 (ANSI A21.53) "Ductile-Iron Compact Fittings for Water Service."
5. AWWA C 116 (ANSI A21.16) "Protective Fusion-Bonded Epoxy Coatings for the Interior and Exterior surfaces of the Ductile-Iron and Gray-Iron Fittings for Water Supply Service," if fusion-bonded epoxy lined or coated.

Fittings shall comply with the following requirements:

1. Pressure Rating - 250 psi minimum.
2. Coatings - Exterior: Minimum one (1) mil thick petroleum asphaltic material coated. Interior: Lined with standard thickness cement and asphaltic seal coated. Or, exterior and interior: Minimum eight (8) mil thick fusion bonded epoxy coated.
3. Joints - Push-On, mechanical, or flange
4. Certification by manufacturer
5. Dimensions - AWWA C 153 Compact Fittings are approved.
6. Bolts shall be carbon steel ASTM A 307, Grade B. Nuts shall be heavy hex nuts conforming to ASTM A 563, Grade C3.
7. Rubber gaskets for flanged joints shall be full faced with a thickness of eight of an inch ( $\frac{1}{8}$ "). The material used for the rubber gaskets shall be hardness (Shore A) 70 to 85 suitable for a minimum of one hundred and fifty pounds per square inch (150 psi), cold water service.

## **10-28 WATER PIPE - Transmission (greater than 12 inch diameter)**

Water Transmission System pipe shall be of the material type as indicated on the Plans or specified in the Special Provisions and comply with AWWA standards and ANSI 61. All pipe shall be the regular product of a firm which has successfully manufactured comparable pipe for at least three (3) years. Pipe shall conform to the following requirements:

### **1. Welded Steel Pipe (WSP)**

All welded steel pipe shall conform to the following AWWA Standards:

- a. AWWA C 200, "Steel Water Pipe - 6 in. and larger."
- b. AWWA M 11, "Steel Pipe - A Guide for Design and Installation" except as modified herein.
- c. AWWA C 205, "Cement-Mortar Protective Lining and Coating for Steel Water Pipe - 4 in. and Larger - Shop Applied."

Pipe shall comply with the following requirements:

- a. Pipe shall be designed for one hundred and fifty pounds per square inch (150 psi) working pressure with an additional seventy-five pounds per square inch (75 psi) allowance for surge. Pipe design shall be in accordance with AWWA M 11 to withstand the simultaneous application of external earth loads , HS-20 live load and internal pressures. The minimum steel cylinder thickness shall be ten (10) gauge. Drawings shall be submitted to the Engineer for approval and shall include the following:
  - i. Pipeline layout showing stations and elevations;
  - ii. Details of standard pipe, joints, specials and fittings;
  - iii. Calculations for pipe design field welded joint restraint and fittings reinforcement;
  - iv. Details of joint bonding and field welded joint restraint calculations.
- b. The nominal diameter or inside diameter of the pipe and other fabricated steel sections as shown on the plans is the clear diameter of the lined pipe after the application of the interior mortar lining.



**10-28 WATER PIPE - Transmission (greater than 12 inch diameter) (cont.)**

- c. Each piece of pipe shall be hydrostatically tested and the stress in the pipe during testing shall not be less than seventy-five percent (75%) of the steel minimum yield strength.
- d. Minimum Depth of Cover shall be three feet (3') in improved and four and a half feet (4½') in unimproved areas.
- e. Laying Length - thirty-two to fifty feet (32'-50'), depending on the shop practice of the manufacturer or fabricator, unless otherwise required by the Contract Documents. Sufficient short pieces shall be provided to allow for two foot (2') adjustments within each one-half mile of straight pipe.
- f. Pipe End Finish - The end finish of individual lengths of pipe to be provided under these Special Provisions shall be one of the following types, unless otherwise indicated on the Plans:
  - i. Bell and spigot pipe ends for joints with rubber gaskets.
    - a. Bell and spigot pipe ends for field welded joints.
    - b. Plain-ends fitted for butt straps for field welded joints.
  - iv. Plain-ends fitted with flanges.
  - v. Plain-ends for mechanically coupled field joints.

The types of joints proposed to be used shall have been thoroughly tested for water leaks at the design pressures. The Engineer may require Contractor to furnish a record of experience in installing the types of joints for comparable sizes of pipe called for on the Plans. Details of the type of pipe joints proposed to be used shall be included with the shop drawings and lay sheets submitted for the pipe.

Cement mortar lining and coating for WSP shall conform to AWWA C 205. Field joints shall be lined and coated to match pipe in accordance with AWWA C 205.

Bell and Spigot Joints with Rubber Gaskets for WSP shall employ joint rings (Carnegie rings) and shall be designed and fabricated to accommodate a rubber O-ring gasket seal in accordance with AWWA C 303.

The field welding of WSP with bell and spigot joint rings (Carnegie rings) or lap joints shall conform to Standard Drawing 8-54. Lap joints shall conform to AWWA C 200.

## 10-28 WATER PIPE - Transmission (greater than 12 inch diameter) (cont.)

Field welded butt-strap joints shall typically only be used for closure pieces and shall conform to Standard Drawing 8-55. The ends of pipes to be fitted with butt straps for field welded joints shall conform to AWWA C 200.

When field conditions warrant and with the approval of the Engineer, straight butt strap welded joints may be used for directional changes in pipe alignment of up to five (5°) degrees.

WSP pipe flanges shall conform and be fitted to plain-end pipe in accordance with AWWA C 207, Class D, and AWWA C 200.

Rubber gaskets for flanged joints shall be full faced with a thickness of eight of an inch ( $\frac{1}{8}$ ""). The material used for the rubber gaskets shall be hardness

(Shore A) 70 to 85 suitable for a minimum of one hundred and fifty pounds per square inch (150 psi), cold water service.

Bolts shall be carbon steel ASTM A 307, Grade B. Nuts shall be heavy hex nuts conforming to ASTM A 563, Grade C3.

WSP ends for mechanically coupled field joints shall be plain and conform to AWWA C 200 and these Standards Specifications. Mechanically coupled joints shall conform to the material, dimensions, and tests of AWWA C 219.

All plain-end pipe joined by flexible couplings shall be fitted with stiffener rings welded to the exterior pipe surface in a plane perpendicular to the axis of the pipe.

Stiffener rings shall have minimum dimensions of three eights inch ( $\frac{3}{8}$ "") thick by three inches (3") in width. Stiffener rings that are to be integral with a joint harness shall be suitably increased in thickness and reinforced with plate gussets to adequately withstand the thrust from adjacent fittings. Stiffener rings and harness rings or lugs shall be installed at the pipe manufacturing or fabrication shop. Material for stiffener rings and plate gussets shall be carbon steel meeting the requirements of ASTM A 36 or ASTM A 283, Grade D.

All mechanically coupled field joints shall be encased with eight (8) mil minimum thickness polyethylene material.

Restrained Joints for WSP transmission lines shall conform to the requirements set forth in AWWA M 11, "Steel Pipe - A Guide for Design and Installation." Joints shall be one of the following types:

## 10-28 WATER PIPE - Transmission (greater than 12 inch diameter) (cont.)

- a. Lap welded slip joint - The joint shall conform to and be welded in accordance with Standard Drawings in City of Colusa Improvement and Design Standards.
- b. Double welded butt strap joint - Butt straps shall conform to and be welded in accordance with Standard Drawing 8-55 in City of Colusa Improvement and Design Standards.
- c. Flanged and bolted - Flanges shall be in accordance with AWWA C 207 Class D for operating pressures to one hundred and fifty pounds per square inch (150 psi) and surge pressures to two hundred and twenty five pounds per square inch (225 psi).
- d. Mechanical coupling - Mechanical couplings shall be as specified in section 10-29 of these Technical Specifications and shall be harnessed for the maximum pressure in accordance with AWWA M 11.
- e. Carnegie end rings restrained by means of welding the bell and spigot ring in accordance with Standard Drawing 8-54 in City of Colusa Improvement and Design Standards.

Dimensions for standard and special fittings including tees, wyes, crosses, bends and elbows, reducers, flanged side and bottom outlets, access manholes, etc. shall conform to AWWA C 208. Materials and fabrication of standard and special fittings shall conform to AWWA C 200. All fittings shall be designed to have a strength at least equal to that of the adjacent straight pipe. Flanged outlets shall be designed in accordance with the AWWA Design Manual M 11.

The required transverse steel area in all welded steel pipe fittings shall be provided by the steel cylinder. The length of reducers shall not be less than the diameter of the largest end.

Cement mortar lining and coating of fittings shall conform to the applicable sections of AWWA C 205 and these Technical Specifications.

### 2. Concrete Cylinder Pipe (CCP)

All concrete cylinder pipe shall conform to the following:

- a. AWWA C 303, "Concrete Pressure Pipe, Bar-Wrapped, Steel-Cylinder Type."

**10-28 WATER PIPE - Transmission (greater than 12 inch diameter) (cont.)**

- b. AWWA Manual M 9 “Concrete Pressure Pipe” except as modified herein.

Pipe shall comply with the following requirements:

- a. Pipe shall be designed for one hundred and fifty pounds per square inch (150 psi) working pressure with an additional seventy-five pounds per square inch (75 psi) allowance for surge. Pipe shall be designed in accordance with ANSI/AWWA C 303, and AWWA Manual M9 to withstand the simultaneous application of external earth loads, HS-20 live load and internal pressures. Drawings shall be submitted to the Engineer for approval and shall include the following:
  - i. Pipeline layout showing stations and elevations;
  - ii. Details of standard pipe, joints, specials and fittings;
  - iii. Calculations for pipe design field welded joint restraint and fittings reinforcement;
  - iii. Details of joint bonding and calculations.
- b. The cylinders shall be true right cylinders formed from one piece of sheet or coil steel. Field circumferential butt welds are not acceptable.
- c. Minimum steel cylinders shall be ten (10) gage.
- d. The nominal diameter or inside diameter of the pipe and other fabricated steel sections as shown on the plans is the clear diameter of the lined pipe after the application of the interior mortar lining
- e. Laying Length - thirty two to forty feet (32'- 40') for concrete cylinder pipe depending on the shop practice of the manufacturer or fabricator, unless otherwise required by the Contract Documents. Sufficient short pieces shall be provided to allow for two foot (2') adjustments within each one-half mile of straight pipe.

**10-28 WATER PIPE - Transmission (greater than 12 inch diameter) (cont.)**

- f. Pipe End Finish - The end finish of individual lengths of CCP to be provided under these Technical Specifications shall be one of the following types, unless otherwise indicated on the Plans:
  - i. Bell and spigot pipe ends for joints with rubber gaskets.
  - ii. Bell and spigot pipe ends for field welded joints.
  - iii. Plain-ends fitted for butt straps for field welded joints.
  - iv. Plain-ends fitted with flanges.
  - v. Plain-ends for mechanically coupled field joints.

The types of joints proposed to be used shall have been thoroughly tested for water leaks at the design pressures. The Engineer may require Contractor to furnish a record of experience in installing the types of joints for comparable sizes of pipe called for on the Plans. Details of the type of pipe joints proposed to be used shall be included with the shop drawings and lay sheets submitted for the pipe.

The exposed inside and outside surfaces of the joints, flanges, reinforcement lugs, and all other exposed steel shall be protected from the formation of rust with an AWWA approved coating applied at the time of manufacture or fabrication of the pipe.

The CCP ends shall employ joint rings (Carnegie rings) and shall be designed and fabricated to accommodate a rubber O-ring gasket seal in accordance with AWWA C 303.

The field welding of CCP with bell and spigot joint rings (Carnegie rings) or lap joints shall conform to the Drawing 8-54, City of Colusa Improvement and Design Standards. Lap joints shall conform to AWWA C 200.

Field welded butt-strap joints for CCP shall be typically used for closure pieces and shall conform to Standard Drawing 8-55. The ends of pipes to be fitted with butt straps for field welded joints shall conform to AWWA C 200.

When field conditions warrant and with the approval of the Engineer, straight butt-strap welded joints may be used for directional changes in pipe alignment of up to five degrees (5°).

## 10-28 WATER PIPE - Transmission (greater than 12 inch diameter) (cont.)

Steel pipe flanges for CCP shall conform and be fitted to plain-end pipe in accordance with AWWA C 207, Class D, and AWWA C 200.

Rubber gaskets for flanged joints shall be full faced with a thickness of eighth of an inch ( $\frac{1}{8}$ " ). The material used for the rubber gaskets shall be hardness (Shore A) 70 to 85 suitable for a minimum of one hundred and fifty pounds per square inch (150 psi), cold water service.

Bolts shall be carbon steel ASTM A 307, Grade B. Nuts shall be heavy hex nuts conforming to ASTM A 563, Grade C3.

CCP ends for mechanically coupled field joints shall be plain and conform to AWWA C 200 and these Technical Specifications. Mechanically coupled joints shall conform to the material, dimensions, and tests of AWWA C 219.

All plain-end pipe joined by flexible couplings shall be fitted with stiffener rings welded to the exterior pipe surface in a plane perpendicular to the axis of the pipe. Stiffener rings shall have minimum dimensions of three eighths inch ( $\frac{3}{8}$ " ) thick by three inches (3" ) in width.

Stiffener rings that are to be integral with a joint harness shall be suitably increased in thickness and reinforced with plate gussets to adequately withstand the thrust from adjacent fittings. Stiffener rings and harness rings or lugs shall be installed at the pipe manufacturing or fabrication shop. Material for stiffener rings and plate gussets shall be carbon steel meeting the requirements of ASTM A 36 or ASTM A 283, Grade D.

All mechanically coupled field joints shall be encased with eight (8) mil minimum thickness polyethylene material.

Restrained Joints for CCP transmission lines shall conform to the requirements set forth in AWWA M 9, "Concrete Pressure Pipe." Joints shall be one of the following types:

- a. Lap welded slip joint - The joint shall conform to and be welded in accordance with Standard Drawing 8-54 in City of Colusa Improvement and Design Standards.
- b. Double welded butt strap joint - Butt straps shall conform to and be welded in accordance with Standard Drawing 8-55 in City of Colusa Improvement and Design Standards.

### 10-28 WATER PIPE - Transmission (greater than 12 inch diameter) (cont.)

- c. Flanged and bolted - Flanges shall be in accordance with AWWA C 207 Class D for operating pressures to one hundred and fifty pounds per square inch (150 psi) and surge pressures to two hundred and twenty five pounds per square inch (225 psi).
- d. Mechanical coupling - Mechanical couplings shall be as specified in section 10-29 of these Technical Specifications and shall be harnessed for the maximum pressure in accordance with AWWA M 9.
- e. Carnegie end rings restrained by means of welding the bell and spigot ring in accordance with Standard Drawing 8-54 in City of Colusa Improvement and Design Standards.

Standard and special fittings for CCP shall include adapters, reducers, bends, tees, wyes, connections to mainline valves, closures, beveled pipe, restrained-joint pipe, short pipe, and pipe with outlets required for branches, access manholes, air valves, and blow-offs. The fabrication and manufacture of standard and special fittings shall conform to the requirements of Section 4 of AWWA C 303.

### 3. Ductile Iron Pipe (DIP)

All ductile iron pipe shall conform to the following:

- a. AWWA C 104 (ANSI A21.4), "Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water."
- b. AWWA C 110 (ANSI A21.10), "Ductile Iron and Gray Iron Fittings for Water."
- c. AWWA C 111(ANSI A21.11), "Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings."
- d. AWWA C 150 (ANSI A21.50), "Thickness Design of Ductile-Iron Pipe."
- e. AWWA C 151 (ANSI A21.51), "Ductile Iron Pipe, Centrifugally Cast, for Water."
- f. AWWA C 153 (ANSI A21.53), "Ductile-Iron Compact Fittings for Water Service."

**10-28 WATER PIPE - Transmission (greater than 12 inch diameter) (cont.)**

- g.** AWWA M41, "Ductile-Iron Pipe and Fittings."

DIP shall also comply with the following requirements:

- a.** The minimum wall thickness design shall be determined using AWWA C 150/A21.50.
- b.** The design working pressure shall be one hundred and fifty pounds per square inch (150 psi) minimum.
- c.** When determining the wall thickness of the pipe, the following shall be considered:
  - i.** internal pressure, including static and transient pressure;
  - ii.** external pressure, including trench loading and earth fill; and
  - iii.** practical considerations for handling, shipping, lining and coating, or similar operations.
- d.** Nominal inside diameter shall not be less than the design diameter or size specified.
- e.** Hydrostatic testing shall be made before the application of cement-mortar lining.
- f.** Ductile iron pipe laying lengths shall be furnished in standard lengths suited to the manufacturer's shop practice and in accordance with AWWA C 151/A21.51. Sufficient field pieces shall be provided to allow for a two foot (2') adjustment - within each one-half mile of straight pipe.

All DIP and fittings shall be cement-mortar lined in accordance with AWWA C 104/A21.4.

Pipe shall be lined by a centrifugal process. Fittings shall be lined by a projection method or by hand application.

The entire ductile iron pipeline including fittings, valves and appurtenances shall be encased in polyethylene material with a minimum thickness of eight (8) mil. The polyethylene shall conform to and be installed in accordance with AWWA C 105/A21.5.



## 10-28 WATER PIPE - Transmission (greater than 12 inch diameter) (cont.)

The end finish of individual lengths of DIP to be provided under these Technical Specifications shall be one of the following types, unless otherwise indicated on the Plans:

- a. Bell and spigot pipe ends for joints with rubber gaskets.
- b. Mechanically coupled field joints.
- c. Plain-ends fitted with threaded flanges.

The types of joints proposed to be used shall have been thoroughly tested for water leaks at the design pressures. The Engineer may require Contractor to furnish a record of experience in installing the types of joints for comparable sizes of pipe called for on the Plans. Details of the type of pipe joints proposed to be used shall be included with the shop drawings and lay sheets submitted for the pipe.

The exposed inside and outside surfaces of the pipe joints shall be protected from the formation of rust with an AWWA approved coating applied at the time of manufacture of the pipe.

Bell and spigot joints with rubber gaskets for DIP shall conform to the requirements of AWWA C 111/A21.11 regarding push-on joints.

Mechanically coupled field joints, bolts and nuts for DIP shall conform to the requirements of AWWA C 111/A21.11. All mechanically coupled field joints shall be encased with a minimum eight (8) mil thick polyethylene.

Bolts shall be carbon steel ASTM A 307, Grade B. Nuts shall be heavy hex nuts conforming to ASTM A 563, Grade C3.

Ends fitted with threaded flanges for DIP shall conform to the requirements of AWWA C 115/A21.15.

Pipe ends fitted with restraining rings for DIP shall receive approval by the Engineer prior to the installation of the pipe. It is suggested that test documents from the manufacturer's testing documentation be submitted with the required pipe lay sheet submittals.

Restrained Joints for Ductile Iron transmission mains shall be one of the following types:

- a. Flanged and bolted - Flanges shall be in accordance with AWWA C

## 10-28 WATER PIPE - Transmission (greater than 12 inch diameter) (cont.)

110 or AWWA C 153 for operating pressures to one hundred and fifty pounds per square inch (150 psi) and surge pressures to two hundred and twenty five pounds per square inch (225 psi).

- b. Push-on locking gasket such as "Field-Lok" gaskets as manufactured by U.S. Pipe.
- c. Push-on joint restraint such as "TR-Flex" as manufactured by U.S. Pipe.
- d. Wedge action joint mechanism such as "Megalug" as manufactured by EBAA Iron, Inc. or approved equal.
- e. Mechanical coupling - Mechanical couplings shall be as specified in section 10-29 of these Technical Specifications.

Fittings and openings for DIP shall conform to the requirements of AWWA C 110/A21.10. Where outlets are required, tees shall be used, with the outlet branch being flanged.

Bolts shall be carbon steel ASTM A 307, Grade B. Nuts shall be heavy hex nuts conforming to ASTM A 563, Grade C3.

## 10-29 BUTTERFLY VALVES & FLEXIBLE COUPLINGS (Transmission)

### 1. General

Butterfly valves shall be short bodied, tight closing, and rubber-seated with flanged ends. Butterfly valves shall comply with the requirements of AWWA C 504, Class 150B and these Technical Specifications. Valves shall be bubble-tight at rated pressures in either direction, and shall be satisfactory for

throttling service and/or operation and for valve operation after long periods of inactivity. All butterfly valves shall be Triton XR or Groundhog valves as manufactured by the Henry Pratt Company, Lineseal III valves as manufactured by Mueller Company, or approved equals.

Valve discs shall rotate ninety degrees (90°) from the full open position to the tight shut position. The valves shall allow for an angular mis-position of the disc up to one degree (1°) off center without leakage. The manufacturer shall have successfully manufactured tight-closing, rubber seated AWWA butterfly valves for a period of at least five (5) years with local installation list.

Butterfly valves shall be provided with manual actuators. The actuators shall provide sufficient output torque to operate the valves at a shutoff pressure of one hundred and fifty pounds per square inch (150 psi) and at a maximum flow velocity of sixteen feet per second (16 fps) when opening or closing. In no case shall the torque rating be less than required for Class 150B valves per AWWA C 504. The Engineer may request Contractor to provide torque and actuator calculations to verify compliance.

## 2. Butterfly Valve Materials and Construction

Materials for all parts and components shall be suitable for the intended use of the valve considering strength, ductility and corrosion protection. All materials shall conform to the requirements of AWWA C 504. Valves shall comply with NSF/ANSI 61.

**Valve Disc:** Valve discs shall be constructed from ductile iron ASTM A 536 for valve sizes thirty inches (30") and larger, from cast iron ASTM A 126, Class B for valve sizes less than twenty inches (20"), or from cast iron ASTM A 48/A48M

Class 40 for twenty-four inch (24") valves. Valve discs shall be furnished with 316 stainless steel seating edge, ground smooth and polished to mate with the rubber seat on the body. The disc shall not have any hollow chambers that can entrap water or ribs transverse to the flow stream. All surfaces shall be visually inspected and measured to assure all structural members are at full design parameters.

**Valve Seat:** All seats shall be Buna-N rubber in the body design. Valves twenty inches (20") and smaller shall have bonded seats that meet the test procedures of ASTM D 429 Method B. Seats for valve sizes twenty-four inches (24") and larger shall be retained in the valve body by mechanical means without retaining rings, segments, screws or hardware of any kind in the flow stream. Seats shall be a full three hundred and sixty degrees (360°) without interruption and have a plurality of grooves mating with a spherical disc edge

seating surface. Valve seats shall be field adjustable around the full three hundred and sixty degrees (360°) circumference and replaceable without dismantling operator, disc or shaft and without removing the valve from the line. Seats attached to the valve disc are not allowed.

**Valve Shaft:** All shafts shall be turned, ground and polished and constructed of 18-8 Type 304 stainless steel conforming to ASTM A 276. Valve shaft seals shall consist of self-adjusting "V" type packing capable of replacement without removal of the valve shaft.

## 10-29 BUTTERFLY VALVES & FLEXIBLE COUPLINGS (Transmission) (cont.)

**Valve Bearings:** All valves shall be fitted with non-metallic sleeve-type bearings. Bearings shall be corrosion resistant and self-lubricating. Bearing load shall not exceed one-fifth of the compressible strength of the bearing or shaft material. Non-adjustable thrust bearings designed to center the valve disc shall be furnished with the valve assembly and be preset at the factory.

**Manual Valve Actuator:** Manual valve actuators shall be of the traveling nut or permanently lubricated worm gear reducer type suitable for continuously buried and submerged use. All actuator gearing shall be totally enclosed in a rugged case that is both water tight and lubricant tight.

Actuators shall be fully grease packed and totally sealed by gaskets, O-rings, or similar means before shipment. A gasketed removable cover plate shall be provided for maintenance purposes. Actuators shall have a built in packing leak bypass to eliminate possible leakage into the actuator housing. Stuffing boxes are not acceptable.

Manual valve actuators shall be capable of withstanding an input torque of four hundred and fifty foot-pounds (450 ft-lbs) against the open and closed stops. The valve disc shall be moved through its full stroke with a minimum number of turns of the operating shaft consistent with the torque limitations.

The valve actuator mechanism shall be self-locking and shall hold the valve disc rigidly in any intermediate position between full open and fully closed without creeping or fluttering. Machining and fitting of all parts shall be held to close tolerances to reduce backlash and to keep lost motion to a minimum.

The actuator shall be equipped with a standard water works two inch (2") square wrench nut. The actuator shall open the valve left (counterclockwise), and shall be furnished with a position indicator if installed in a vault. Provide valve operating nut extensions in accordance with Standard Drawing 8-19 City of Colusa Improvement and Design Standards when installed valve operating nut is in excess of thirty inches (30") below finish grade.

**Valve Exterior Coating:** The exterior of the butterfly valves shall be shop coated with two part liquid epoxy per AWWA C550. The coating shall have a nominal thickness of eight (8) mils. Machine finished bearing surfaces shall not be painted. Exposed machined surfaces shall be covered with slush grease or other readily removable protective coating before shipment.

**Valve Interior Coating:** All interior ferrous surfaces of the butterfly valves, including the disc, which are exposed to fluid flow shall be factory coated

## 10-29 BUTTERFLY VALVES & FLEXIBLE COUPLINGS (Transmission) (cont.)

with a two part liquid epoxy coating conforming to AWWA C 550 for potable water. The coating shall have a nominal thickness of eight (8) mils.

With no exceptions, all damage to coating incurred during shipping shall be repaired with the original coating material only. The coating shall be NSF/ANSI 61 certified.

**Bolts and Nuts:** Bolts connecting valves to main shall be carbon steel ASTM A 307, Grade B. Nuts shall be heavy hex nuts conforming to ASTM A 563, Grade C3. Bolts that thread into the valve body shall have the same thread pitch as the valve body.

### 3. Flexible Couplings

Flexible couplings suitable for water main applications shall be as manufactured by Smith Blair, Inc., Series 411 or 413, or Dresser Industries, Inc., Style 38 or 162, or an approved equal. The steel middle ring of the flexible coupling shall be lined and coated with fusion bonded epoxy per AWWA C 213.

The flexible couplings shall be installed with provision for thrust restraint ties attached to the water main pipe. The thrust restraint ties on the pipe shall be welded lugs, lugs cast integrally with the pipe, or friction collars. Anchor studs placed perpendicular to the long axis of the pipe are unacceptable. Resistance to hydraulic thrust shall be adequate to sustain a force developed by a test pressure of two hundred and twenty five pounds per square inch (225 psi).

Flanged coupling adapters shall be Smith Blair 913, Romac Style FC400 or equal for steel piping with insulating gasket. Couplings shall be provided with thrust ties attached to the pipe with welding lugs, cast-in-place lugs, or friction collars. Lugs shall have a minimum thickness equal to that of adjacent flange and shall have holes the same size as those on the flange. Anchor studs placed perpendicular to the longitudinal axis of the pipe are unacceptable.

## 10-30 APPURTENANCES

### i. Air Vacuum and Release Valves

Combination air vacuum and release valves for water transmission mains shall be two (2") or four inches (4") in size. The air vacuum and release valves shall have cast iron bodies and be equal to APCO Valve and Primer Corporation, Model 145C for the two-inch (2") valve and Model 149C for the four-inch (4") valve.

**ii. Blind Flanges and Dished Heads**

Blind flanges and dished heads for water transmission mains shall conform to the requirements of AWWA C 207 and NSF/ANSI 61. Design pressure classification shall be equivalent to that of the immediately adjacent pipe, valve, or appurtenance. Blind flanges and dished heads shall be epoxy coated. The epoxy coating shall have a minimum thickness of eight (8) mils and shall conform to the requirements of AWWA C 213. Temporary blind flanges and dished heads that are used during construction of the transmission main do not need to be coated when approved by the Engineer.

**10-31 FIRE HYDRANTS**

All Standard (Low Risk) fire hydrants shall be as specified herein unless otherwise indicated on the Plans or Special Provisions.

1. All fire hydrants shall conform to AWWA C 502 for Dry-Barrel Fire Hydrants as currently in effect or amended and ANSI 61. An Affidavit of Compliance as per Section 1.7 of AWWA C 502. Standard shall be furnished with all hydrants or groups of hydrants. The Certificate of Compliance shall provide assurance that all material and manufacturing requirements have been met and head losses are within specified limits.
2. Table 3 of AWWA C 502 is amended to limit loss of head (drop in pressure) to a maximum of three pounds per square inch (3 psi) at a flow rate of one thousand gallons per minute (1000 gpm) through one four and one-half inch (4½") diameter pumper outlet nozzle.
3. Markings-All fire hydrants shall be clearly and permanently marked so as to be readily discernable and legible after hydrants have been installed. Such marking should include:
  - a. Name of manufacturer
  - b. Model name or number
  - c. Size of main valve opening
  - d. Date of manufacture
  - e. Direction of operation
  - f. Ground or bury line (mark to reflect point of bury to maximize breakaway features.)

## 10-31 FIRE HYDRANTS (cont.)

4. Two (2) copies of operating manuals and/or descriptive literature shall be furnished with all fire hydrants or groups of hydrants supplied by the same manufacturer. The manuals or literature shall include assembly drawings, schedule of parts, maintenance instructions, and complete tool kits.
5. A complete tool kit for those fire hydrants requiring special tools shall be provided.
6. In addition to the above, Standard fire hydrants shall meet the following requirements:
  - a. Size and Type of Inlet Connection:
    - i. Standard Hydrants-Dimension of the foot piece shall be as required to fit cast or ductile iron pipe of six inches (6") nominal inside diameter.
    - ii. Connection-Type of inlet connection for standard shall be either mechanical joint or "push-on" rubber ring. If the "push-on" rubber ring type is used the foot piece shall be provided with lugs for harnessing the hydrant to the branch or lead connection pipe or fitting.
  - b. Breakaway Features-A frangible section immediately above the ground or bury line is required. If breakable features depend upon bolts of reduced cross-section, hollowed out bolts will not be permitted.
  - c. Number and Size of Outlet Nozzles Standard Hydrants - Two (2) hose nozzles each with a nominal inside diameter of two and one-half inches (2½") and one (1) pumper nozzle with a nominal inside diameter of four and one-half inches (4½").
  - d. Outlet Nozzle Arrangement- Standard Hydrant-Nozzle arrangement requires that the two (2) two and one-half inch (2½") diameter hose nozzles be opposite (180°) of each other. The single four and one-half inch (4½") diameter pumper nozzle shall be at right angles (90°) to the hose nozzles. The horizontal centerline of all nozzles shall be on the same plane and not less than sixteen inches (16") above the hydrant ground flange or bury line.

## 10-31 FIRE HYDRANTS (cont.)

- e. Three hundred sixty Degree ( $360^{\circ}$ ) Nozzle Rotation-Nozzles, or the entire above ground section, shall allow three hundred sixty degree ( $360^{\circ}$ ) rotation to the exact desired position after installation.
- f. Outlet Hose Nozzles and Threads-Hose nozzles shall be made of Grade I, VII, or X bronze. The hose nozzles shall be fastened into the hydrant outlet tap by a thread of not less than seven and one half ( $7\frac{1}{2}$ ) threads per inch. A pin shall be employed to prevent the threaded outlet hose nozzle from turning or backing out. The cap or hose accepting end of the outlet nozzles shall be threaded with National (American) Standard Fire-Hose Coupling Screw Threads.
- g. Nozzle Cap Materials-Grey cast or ductile iron caps with a recess at the inner end of the thread to retain a gasket. Caps shall be securely chained to the hydrant barrel with a metal chain having links made from stock not less than one-eighth inch ( $\frac{1}{8}$ " ) in diameter. The attachment shall permit free rotation of the cap.
- h. Size of Hydrant- Nominal diameter of main valve shall be a minimum of five inches (5").
- i. Main Valve Seat and Seat Ring-Shall be bronze to bronze in hydrants which have the main valve assembly in the lower end of the barrel. Threads shall be isolated from the waterway by O-ring seals.
- j. Size and Shape of Operating Nut and Outlet Nozzle Cap Nuts shall be the National standard  $1\frac{1}{2}$ -inch pentagonal, full section without undercutting or hollowing out. A threaded hole not to exceed one-quarter inch ( $\frac{1}{4}$ " ) in diameter will be allowed in the operating nut for lubrication purposes. Any such hole shall be plugged flush with the top of the operating nut and be water tight.
- k. Operating Stem, Nut, and Lubricate Reservoir-The nut shall be made of bronze. Threads shall be lubricated by an oil or grease reservoir sealed by double O-rings, top and bottom to prevent intrusion of moisture and dirt. Length of operating stem surface in contact with O-ring seals shall be protected by a bronze sleeve.

A weather shield shall be provided to prevent dirt and moisture from entering between the sides of the operating nut and the hold down nut, or bonnet opening. Wet top hydrants are not acceptable.



### 10-31 FIRE HYDRANTS (cont.)

- l. Direction of Rotation: Hydrants shall open left (counter clockwise).
  - m. Stuffing boxes, if used, shall be provided with O-ring seals.
  - n. Barrel Drain Outlet-None required. If hydrant is provided with such an outlet, it must be plugged with a threaded bronze or cast iron plug.
  - o. Toggle Joint Hydrants-Shall be provided with bronze parts as follows: nozzles, lower threaded stem or spindle, stem nuts, seat ring, gate pins, cotter pins, main valve gate threaded stud, and nut.
  - p. All nozzles, caps, operating nuts, O-rings, friction bearing threaded surfaces, and grease fittings shall be lubricated with the appropriate factory recommended lubricating material. All reservoirs designed to hold a designated quantity of lubricant shall be filled to maximum capacity.
7. A coat of aluminum exterior paint shall be applied as a color or finish coat over the primer coat on the top (above ground) section. All hydrant bonnets shall be painted with OSHA approved safety paint. The color shall be based on the diameter of the main that the hydrant is connected to, as follows:
- Red:** for 6" and smaller mains
  - Yellow:** for 8" - 10" mains
  - Green:** for 12" and larger mains
8. Bolts shall be carbon steel ASTM A 307, Grade B. Nuts shall be heavy hex nuts conforming to ASTM A 563, Grade C3.

### 10-32 VALVES

- 1. Gate valves shall be cast iron, bronze disc, parallel seat, and non-rising stem with a two inch (2") square operating nut. Valves shall conform to AWWA C 500. All interior and exterior ferrous surfaces shall be and coated with factory applied epoxy in accordance with AWWA C 550. Minimum thickness shall be eight (8) mils.

2. Resilient - Seated gate valves shall be cast iron, non-rising stem with a two inch (2") square operating nut. Valves shall conform to AWWA C 509. All interior and exterior ferrous surfaces shall be and coated with factory applied epoxy in accordance with AWWA C 550. Minimum thickness shall be eight (8) mils.
3. Valves provided shall open left (counter clockwise), and shall have bonnet and valve body markings in accordance with the indicated AWWA standards. Unless otherwise directed, furnish valves with flange, mechanical, and/or push-on joints in accordance with the plans and special provisions. Provide valve operating nut extensions in accordance with Standard Drawing 8-19 in City of Colusa Improvement and Design Standards when installed valve operating nut is in excess of thirty inches (30") below finish grade.
4. Swing check valves are contained on an approved listing maintained by the Department of Utilities. Alternate swing check valves shall be added to this list upon review, test and acceptance by the Utility Department.
5. Bolts shall be carbon steel ASTM A 307, Grade B. Nuts shall be heavy hex nuts conforming to ASTM A 563, Grade C3.

#### **10-33 VALVE BOXES AND COVERS, DROP CAPS, AND SERVICE VALVE BOXES**

Valve boxes and valve box covers for streets and alleys, and drop caps in public utility easements shall conform to Standard Drawing 8-15. The castings shall be ductile iron with a minimum tensile strength of twenty five.

thousand pounds per square inch (25,000 psi). Riser sections shall be (8") diameter SDR 35 PVC pipe.

Service valve boxes shall be in conformance with Standard Drawings 8-16 and 8-18. The riser portion shall be as shown.

#### **10-34 WATER SERVICE CONNECTION MATERIALS**

Water service material shall be either copper or polyethylene tubing. The Department of Utilities maintains a listing of approved water service connection fittings which establish a standard of material quality. Fitting used shall be limited to those on the list. Alternate material may be added to this list upon review, testing and acceptance by the Department of Utilities.

Copper service tubing shall conform to ASTM B 88, Type K, soft tempered.

Polyethylene tubing shall be two hundred pounds per square inch (200 psi), SDR-9 conforming to ASTM D 2737 and AWWA C 901 standards. Tubing shall be copper tube size and shall be manufactured for use with compression or Mueller Insta-tite fittings. Stainless steel insert stiffeners shall be used at all compression joints. Insert stiffeners shall be flared at one end and beveled at the approximately forty five degrees (45°) at the other end. Stiffeners shall be supplied by the fitting manufacturer. Tubing shall be clearly marked showing manufacturer's trade name, nominal size, type of material, pressure rating, and the seal of approval of an accredited testing laboratory.

Threads for underground water service connection fittings shall conform to AWWA C 800 Threads for Underground Service Line Fittings.

#### **10-35 JOINT MATERIALS FOR CLAY PIPE**

Joint materials for vitrified clay pipe shall be an approved type of factory-made mechanical compression joint conforming to the requirements of ASTM C 425. Banded rubber couplings and sleeves conforming to ASTM C 425 are acceptable.

#### **10-36 JOINT MATERIALS FOR CONCRETE PIPE**

Joint materials for concrete pipe shall be rubber gasket joints conforming to the requirements of ASTM C 443 and shall be flexible and able to withstand expansion, contraction, and settlement. All rubber gaskets shall be stored in a cool a place as practicable, preferably at 70° F. or less, and in no case shall the rubber gaskets be exposed to the direct rays of the sun. Rubber gaskets, of the type requiring lubrication, shall be lubricated with the lubricant recommended and supplied by the manufacturer of the pipe.

#### **10-37 JOINT MATERIALS FOR MANHOLES**

Joint materials for precast reinforced concrete manhole sections shall conform to one of the following:

1. Mortar proportioned as one (1) cubic foot of Portland Cement to two (2) cubic feet of concrete sand. All mortar shall be used within thirty (30) minutes after the mixing water has been added.
2. Preformed plastic sealing compound shall conform to Type 1 - Rope Form, one and one-half inch (1½") diameter, Federal Specification SS-S-210A.

## 10-38 FENCING

### CHAIN LINK

1. All chain link fence and gates shall conform to the requirements set forth in Section 80-4 of the State Specifications and the Chain Link Fence Manufacturers Institute Product Manual (Standard Industrial), except as herein modified or as modified in the special provisions.
2. The carbon content of steel posts shall not exceed 0.82 percent (.82%).
3. The fence shall be constructed zinc coated fabric as shown on the Plans or specified in the Special Provisions.
4. Chain link fence fabric shall meet the requirements of zinc-coated steel chain link fence fabric, ASTM A 392 with Class I zinc coating. Unless otherwise indicated on the Plans or in the Special Provisions, the fabric shall be a two inch (2") mesh of nine (9) gauge wire, with a minimum breaking strength of twelve hundred and ninety (1,290) pounds. Selvage shall be twisted top and knuckled bottom.

FENCE MEMBER	DIMENSION O.D.	SECTION TYPE	MINIMALWEIGHT LBS./LINEAL FOOT
Line Post	2.375" 2.375"	Sch. 40 pipe Hi-strength tubing	3.65 3.12
Terminal, Corner, Latch Posts	2.875" 2.875"	Sch. 40 pipe Hi-strength tubing	5.79 4.64
Horizontal, Diagonal Braces, Top Rails	1.660" 1.660"	Sch. 40 pipe Hi-strength tubing	2.27 1.82
Gate Frames	2.375" 2.375"	Sch. 40 pipe Hi-strength tubing	3.65 3.12
Gate Posts: <u>Gate Width</u> Up thru 6'	2.875" 2.875"	Sch. 40 pipe Hi-strength tubing	5.79 4.64
Over 6' thru 12'	4.500" 4.000"	Sch. 40 pipe Hi-strength tubing	10.70 4.64
Over 12' thru 18'	5.563"	Sch. 40 pipe	14.62
Over 18' to 24' Max	6.625"	Sch. 40 pipe	18.97

**10-38 FENCING (cont.)**

5. Posts and rails shall be as specified above, unless otherwise indicated on the Plans or specified in the Special Provisions. Contractor shall have the option of section types to be used with the condition that the option exercised shall be uniform throughout the project.
6. Round posts, rails and /or braces shall be Schedule 40 pipe or high strength tubing as follows:
  - a. Schedule 40 sections shall be standard weight, hot dipped galvanized steel pipe in conformance with ASTM F 1083, with not less than 1.8 oz/sf Grade E zinc.
  - b. High strength tubing shall be steel pipe, cold-formed and welded per ASTM F 1043, Group 1C, minimum yield strength 50,000 psi steel. The external coating shall be Type B zinc, with a polymer film, 0.90 oz/sf minimum zinc, with a chromate conversion and verifiable polymer film. The internal coating shall be Type B, 0.90 oz/sf minimum zinc, or zinc pigmented 81% nominal coating with 0.30 mils minimum thickness.
  - c. Zinc weight shall be determined in accordance with ASTM A 90.
7. Fittings shall be hot-dip galvanized and shall be of malleable, cast iron, or pressed steel. Cap shall be hot dip galvanized steel sized to post dimension, and shall be retained to posts with powder actuated Hilti or comparable Zink coated fasteners.
8. Barbed wire shall be Class 3, zinc coated, 12.5 gage wire with four point round, 14 gage barbs at 5-inch spacing in accordance with ASTM A 121.
9. Fabric is to be fastened to line posts top and bottom rails with 9 gage galvanized tie wires spaced approximately fourteen inches (14") apart
10. Unless otherwise set forth in the Special Provisions all fence shall be constructed with a top rail, and a bottom tension wire.
11. A Certificate of Compliance shall be furnished to the Engineer prior to the installation of any chain link fencing, gates or components stating that the steel and protective coatings comply with the above requirements. Said Certification shall be in accordance with the provisions of Section 6, "Control of Materials", of the State Specifications.

## 10-38 FENCING (cont.)

### POST AND CABLE FENCE

1. Post shall be 6" X 6" x 6' Douglas fir post pressure treated for underground use. The post shall not have significant splintering. If the contractor cuts the Douglas fir post they must seal in all areas which have been cut with Thompson's Water Seal Advanced Clear Multi-Surface Waterproofer or approved equal.
2. Cable shall be galvanized barrier cable, steel strand, and zinc plated to protect it from corrosion per ASTM A475 sized as shown on the plans.
3. All bolts and cable clamps shall be galvanized steel to minimize rust.
4. Concrete Footing shall be Portland Cement Concrete Class "C", conforming to Section 10-1/5 of the Technical Specifications. Concrete footings shall be installed at all end posts, at bends or at the locations specified on the plans.

## 10-39 SOIL AMENDMENT

Soil amendment shall be of the type specified by the engineer, unless otherwise indicated in the Special Provisions. Soil amendments shall be installed per the soils analysis recommendations.

## 10-40 IRON SULFATE

Iron Sulfate shall be ferric sulfate in pelleted or granular form as need to correct any deficiencies that have been identified in a soil analysis for a site.

Iron Sulfate shall conform to the requirements of the Agricultural Code of the State of California unless otherwise indicated in the Special Provisions.

## 10-41 COMMERCIAL FERTILIZER

Commercial fertilizer shall be uniformly sized, homogenous pelleted form and shall be guaranteed to comply with recommendations to correct any deficiencies that have been identified in a soil analysis specified in the Special Provisions. Commercial fertilizer shall be as specified in the Special Provisions.

## 10-42 SEED

Seed shall be labeled in accordance with the California Department of Agriculture State Seed Law and Regulations effective on the date of invitation for bids. Seed which has become wet, moldy, or otherwise damaged in transit or in storage will be subject to test at the discretion of the Landscape Architect

or of the Engineer.

Seed shall be supplied in unopened containers by a commercial seed dealer. It may be either mixed or in separate containers for each lot. Seed shall be as specified in the Special Provisions.

#### **10-43 PLANTS**

Plants shall be the variety and sizes shown on the Plans and shall conform to the requirements of these Specifications.

Contractor shall place an order for the required number of plants including a reasonable number of replacement plants within ten (10) working days after they have received notice of award of the Contract. Contractor shall submit a copy of the order showing the number of plants ordered, from whom ordered and the anticipated delivery date, and request for substitutions for all plant materials that are unavailable to the Landscape Architect within fifteen (15) working days after award of the Contract. No substitutions will be made that are not requested as specified above.

All plants shall comply with Federal and State laws requiring inspection for plant diseases and infestations. Any inspection certificates required by law shall accompany each shipment of plants and certificates shall be delivered to the Landscape Architect.

Contractor shall obtain clearance from the County Agricultural Commissioner as required by law before planting plants delivered from outside the County. Evidence that such clearance has been obtained shall be filed with the Landscape Architect.

All plants furnished by Contractor shall be true to type or name as shown on the Plans and shall be tagged in accordance with the standard practice recommended by the American Association of Nurserymen.

Plants furnished by Contractor shall be healthy, shapely and well rooted. Roots shall show no evidence of having been restricted or deformed at any time. Plants shall be well grown, free from insects, disease or mechanical injury. No plants shall be transported to any planting area that is not thoroughly wet throughout the ball of earth surrounding the roots.

Plants shall be inspected by the Engineer prior to planting. Any plants rejected shall be removed from the site and replaced by Contractor, at his expense.

#### **10-44 PLASTIC IRRIGATION PIPE**

Plastic pipe for irrigation systems shall be polyvinyl chloride (PVC) plastic pipe extruded from one hundred percent (100%) virgin material and shall conform to ASTM D 2241.

Plastic pipe on the supply side of the irrigation control valve shall be one or more of the following types as indicated in the Special Provisions.

1. 2" or smaller shall be PVC-1120 Schedule 40 solvent weld pipe.
2. 2½" or larger shall be PVC-1120 Schedule 40 integrally molded ring-tite pipe, or
3. PVC-1120 Class 315.

Plastic pipe on the discharge side of the irrigation control valve shall be PVC-1120 Class 200 solvent weld pipe.

#### **10-45 PLASTIC POTABLE PIPE**

Plastic pipe for potable water systems within City parks and recreation areas and where designated on the Plans, shall be polyvinyl chloride (PVC) plastic pipe extruded from one hundred percent (100%) virgin material conforming to ASTM D 2241. Plastic potable pipe one and one-half inches (1½") and smaller shall be PVC Class 315 solvent weld; two inches (2") and larger shall be Schedule 40 PVC.

#### **10-46 PLASTIC IRRIGATION PIPE FITTINGS**

Fittings for PVC plastic pipe shall be rigid polyvinyl chloride, Schedule 80 high impact fittings upstream of the automatic control valve and Schedule 40 fitting downstream from the automatic control valve. Fitting 2" and less shall be solvent weld type fitting, fittings 2 ½" and larger shall be ring-tite fittings. Plastic fittings shall have a higher bursting pressure rating than the pipe which they join.

All joints utilizing ring-tite fittings and pipe shall be sealed with rubber rings. Fittings shall be of the joint design as recommended by the manufacturer. Ring type plastic pipe and fittings shall be assembled with a non-toxic lubricant as recommended by the manufacturer.

1. 2" or smaller shall be PVC-1120 Schedule 40 solvent weld pipe.



2. 2½" or larger shall be PVC-1120 Schedule integrally molded ring-tite pipe, or approved equal.

#### **10-47 ELECTRIC AUTOMATIC CONTROLLER**

The irrigation system controller shall be a microprocessor based/micro electronics solid-state type, capable of fully automatic or manual operation of the system. It shall be housed in a wall mountable, weatherproof, lockable steel cabinet.

The controller shall operate on a minimum of 117 volts A.C. power input and be capable of operating up to two 23 volt A.C. electric remote control valves per station. The controller shall have a reset circuit breaker to protect it from field wire short circuits entering the controller.

The controller shall be a State approved Water Wise Controller and it shall have a maximum of 24 stations. Each station of the 4 station and 6 station models shall have the capability of being programmed to operate for 0 to 60 minutes in 1 minute increments or 0 to 6 hours in 1 hour increments. Each station of the 8 station and 12 station models shall have the capability of being programmed to operate for 0 to 99 minutes in one minute increments or 0 to 9.9 hours in 0.1 hour increments. The controller shall have two independent programs with three automatic starts per day for each. Each station on the controller shall be assignable to either or both programs. The controller shall have 14-day programming for flexibility in programming day starts. During operation, the controller shall provide a monitoring readout indicating station in operation and time remaining. The controller shall have a 12-hour AM/PM clock.

The 6, 8, 12 and 24 station models shall have a master valve/remote pump start circuit for use with a mainline master valve to pressurize system when the irrigation cycle starts, or to activate a remote pump start relay to the pump during the irrigation cycle.

The controller shall be capable of being operated manually at any time. A manual "single station" operation for programmed time or new time setting shall be possible without affecting the original program.

The controller shall have a factory preset back-up program for standby operation in the event of a program loss and a battery back-up circuit to maintain program during power loss.

Electric Controller Enclosure Cabinet shall be fabricated from 12 gauge stainless steel. Joints shall be seam welded and external welds ground smooth to a minimum one-eighth inch (1/8") radius.

#### **10-48 IRRIGATION CONTROL CONDUCTORS**

Irrigation Control Conductors shall be underground feeder types (U.F.) with 4/64" minimum thickness of TW grade polyvinyl chloride insulation.

Control conductors shall be No. 14 AWG, unless otherwise indicated in the Special Provisions. Insulation shall be any color except white.

Neutral conductors shall be No.12 AWG, unless otherwise indicated in the Special Provisions. Insulation shall be white.

All irrigation control wires shall be installed in a minimum of a 9" round pull box or within the irrigation controller valve box. No splice will be allowed that are not placed in a pull box. Control wires splices shall have a direct bury splice kit installed at each splice. The splice kit shall consist of a high impact, UV-resistant polypropylene tube filled with moisture-resistant grease.

#### **10-49 BACKFLOW PREVENTION ASSEMBLY**

Backflow Devices are contained on a listing of approved backflow prevention devices. Backflow devices used shall be limited to those on the list. The list of approved backflow devices is available from the Engineer or from the Customer Service Office of the Utilities Department. Alternate backflow devices shall be subject to approval by the City Cross-connection Control Specialist.

Metal Backflow Enclosures shall be an insulated enclosure and lockable per Placer Waterworks, Inc. or approved equal.

#### **10-50 ELECTRIC REMOTE CONTROL VALVES-SIZES ¾" TO 2"**

Electric remote control valves shall have a brass or bronze body with straight or angle pattern. Valves shall be normally closed and shall be the same size as the pipeline which they control, unless otherwise indicated in the Special Provisions.

Electric remote control valves shall be capable of withstanding a working pressure of two hundred pounds per square inch (200 psi). Valves shall be completely serviceable from the top without removing the valve body from the system and shall have a wheel or nut type manual adjustment feature to regulate flow from fully open to closed. The adjustment shall remain in set position when the valve is operated manually or automatically. The adjustment feature shall regulate automatic closing time to not less than four (4) seconds. Each valve

solenoid shall be designed for operation on a 24 volt 60 cycle AC circuit at a 3.1 watt maximum. All valves shall have a shut off ball or gate valve on the mainline side of the water flow adjacent to each valve.

#### **10-51 MANUAL CONTROL VALVES**

Manual control valves shall be straight or angle pattern globe valves of brass or bronze construction with replaceable compression discs and shall be of the same size as the pipeline which said valve serves, unless otherwise shown on the Plans. Control valves shall be capable of withstanding a working pressure of two hundred pounds per square inch (200 psi).

#### **10-52 IRRIGATION VALVE BOXES**

Irrigation valve boxes shall be one of the following types; as indicated on the Plans or in the Special Provisions, or directed by the Engineer:

1. Portland cement concrete boxes with a one piece concrete or cast iron cover, rated for an H2O traffic loading.
2. Plastic boxes conforming to ASTM D 638, tensile strength 3400 psi and impact strength of 1.5 pounds per inch. All plastic valve box lids shall have a bolt to secure the lid to the box.

Valve box extensions shall be of the same type as the valve box and all covers shall be lockable and be legibly marked "Water or Irrigation."

#### **10-53 QUICK COUPLING VALVES**

Quick coupling valves shall be brass or bronze construction, single slot type with one inch (1") threaded pipe connection and one inch (1") key connection, guaranteed to withstand normal working pressure of one hundred and fifty pounds per square inch (150 psi) without leakage. Quick couplers shall be installed with swing joint assembly and shall be installed a minimum of one foot (1') from curbs and walks where applicable. Installed per the plans.

#### **10-54 ELECTRONIC MARKER SYSTEM (EMS)**

Electronic marker systems shall consist of a two-part system: Marker Locator and Markers.

Marker Locator: The EMS II shall consist of a CB-radio sized electronics package (4 lbs.) with a shoulder strap and a lightweight (1.5 lbs.) hand-held antenna probe. The electronics package shall produce an audible pulsating signal and have a meter indicating signal strength simultaneously. The probe shall

operate on eight (8) standard “C” cell alkaline batteries, produce a ticking sound when it is on, and transmit low frequency radio signals to the marker.

Markers: The EMS electronic markers shall be air core based and shall be reusable, with passive-tuned coil antennas encased in waterproof, high-stress, crack-resistant polyethylene, impervious to minerals, chemicals or temperature extremes. The markers shall be the mini-markers, approximately 8-¼” in diameter, color-coded and tuned to the frequency for water. The markers shall be buried approximately two inches (2”) above the valve cover.

**10-55 GROUT**

This section specifies grout for uses other than masonry.

1. All grouts shall conform to applicable portions of the following:

ASTM C 33	Concrete Aggregates
ASTM C 40	Organic Impurities in Fine Aggregates for Concrete
ASTM C 88	Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
ASTM C 117	Material Finer Than 75 um (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C 136	Sieve Analysis of Fine and Coarse Aggregates
ASTM C 150	Portland Cement
ASTM C 289	Potential Reactivity of Aggregates (Chemical Method)
ASTM C 494	Chemical Admixtures for Concrete
ASTM C 881	Epoxy-Resin-Base Bonding Systems for Concrete
ASTM D 2419	Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate
ASTM E 329	Inspection and Testing Agencies for Concrete, Steel, and Bituminous Materials as Used in Construction
CRD-C621	Corps of Engineers Specification for Nonshrink Grout

- a. These provisions shall pertain to dry pack, cement, non-shrink, pressure and epoxy grouts, including adhesive capsules and polymer concrete.
- b. Portland cement portion of grout shall be ASTM C 150 Type II or Type V, low alkali, containing less than 0.60 percent alkalis. Aggregate in grout shall be non-reactive and shall be washed before use. When sources of aggregate are changed, test reports shall be provided for the new material. The tests specified shall be performed prior to commencing grout work.

**10-55 GROUT (cont.)**

- c. The fine aggregate portion of grout shall be hard, dense, durable particles of either sand or crushed stone regularly graded from coarse to fine and shall conform to ASTM C 33 as modified herein. When tested in accordance with ASTM C 136, gradation shall be such that one hundred percent (100%) by weight will pass a standard No. 8 mesh sieve and no less than forty-five percent (45%) by weight will pass a standard No. 40 mesh sieve.
- d. Variation from the specified gradations in individual tests will be acceptable if the average of three consecutive tests is within the specified limits and the variation is within the permissible variation listed below:

U.S. standard sieve size	Permissible variation in individual tests, percent
30 or coarse	2
50 or finer	0.5

- e. Other tests shall be in accordance with the following specifications:

Test	Test Method	Requirements
Organic Impurities	ASTM C 40	Color lighter than standard
Amount of Material Passing No. 200 Sieve	ASTM C 117	3% maximum by weight
Soundness	ASTM C 88	10% maximum loss with sodium sulfate
Reactivity	ASTM C 289	Innocuous aggregate
Sand Equivalent	ASTM D 2419	Minimum 80

- 2. Grout admixtures shall conform to the following:
  - a. Admixtures shall be compatible with the grout. Calcium chloride or admixtures containing calcium chloride are not acceptable. Admixtures shall be used in accordance with the manufacturer's recommendations and shall be added separately to the grout mix.

### 10-55 GROUT (cont.)

Water reducing retarder shall be ASTM C 494 Type D and shall be Master Builders Pozzolith 300-R, Sika Corporation Plastiment, or equal. Lubricant additive for cement pressure grouting shall be Intrusion Prepakt Intrusion Aid, Sika Intraplast N, or equal.

- b. Water for washing aggregate, for mixing and for curing shall be free from oil and deleterious amounts of acids, alkalies, and organic materials; shall not contain more than 1000 mg/1 of chlorides as Cl, nor more than 1300 mg/1 of sulfates as SO<sub>4</sub>; and shall not contain an amount of impurities that may cause a change of more

than twenty-five percent (25%) in the setting time of the cement nor a reduction of more than five percent (5%) in the compressive strength of the grout at fourteen (14) days when compared with the result obtained with distilled water. Additionally, water used for curing shall not contain an amount of impurities sufficient to discolor the grout.

### 3. Drypack Grout

- a. Drypack grout shall be used for built-up surfaces, setting miscellaneous metal items and minor repairs and shall be a mixture of approximately one (1) part cement, 1-1/2 to two (2) parts sand, water reducing retarder, and sufficient water to make a stiff workable mix.
- b. Surfaces required to be built up with drypack grout shall be roughened with a wire brush, cleaned, and immediately coated with an acrylic bonding agent such as Burke Acrylic Bondcrete, or equal, at the rate of 200 sq. ft. per gallon. Follow with placement of the grout after a minimum of one hour and after the film is dry to the touch. Install bonding agent in strict accordance with manufacturer's instructions. The drypack grout shall be applied in bands or strips to form a covering of the required thickness. The covering shall be smooth. Construction joints in the grout shall be sloped and shall be cleaned and wetted before application is resumed.
- c. Drypack grout shall be cured as for Cast-In-Place Concrete. Grout shall not be placed during freezing weather unless adequate protection is provided.

## 10-55 GROUT (cont.)

### 4. Cement Grout

- a. Cement grout shall be used for filling nonbearing portions of equipment pads and pressure grouting and shall be a mixture of one (1) part cement, two (2) parts sand, proportioned by volume, admixtures for pressure grouting, and sufficient water to form a workable mix.
- b. Except for the specialized equipment for pressure grouting, mixing, and placing apparatus shall be similar to that normally used for cast-in-place concrete. Grout shall be mixed for a period of at least one (1) minute. Diluted grout shall be agitated to keep ingredients mixed.

### 5. Nonshrink Grout

- a. Nonshrink, nonmetallic aggregate grout shall be used for the bearing surfaces of machinery and equipment bases, column base plates and bearing plates. Nonshrink metallic aggregate grout shall be used for setting anchor bolts and grouting reinforcing steel holes. Nonmetallic aggregate grout shall be Five Star Products, Inc. Five Star Grout, Master Builders Masterflow 928, Burke Company Non-Ferrous, Non-Shrink Grout, or equal. Grout shall meet the requirements of ASTM C1107 and shall be placed in accordance with manufacturer's instructions.
- b. Holes required for grouting shall be blown clean with compressed air and left free of dust or standing water. Horizontal holes for grouting shall be drilled at a slight downward angle to facilitate holding the grout until setting is complete. Bolts or reinforcing steel installed in horizontal grout holes shall be bent slightly accordingly.

### 6. Epoxy Grout

- a. Epoxy grout shall be used for repairing cracks by pressure grouting or gravity flow, repairing structural concrete, and may be used for setting reinforcing dowels or anchor bolts into holes for grouting. Except as noted below, epoxy grout shall be a high modulus, two (2) component, moisture insensitive, one hundred percent (100%) solids, thermosetting modified polyamide epoxy compound. The consistency shall be a paste form capable of not sagging in

**10-55 GROUT (cont.)**

horizontal or overhead anchoring configurations. Material shall conform to ASTM C 881 Type 1, Grade 3, such as Master Builder Concrecive 1440 series, Sika Corporation Sikadur Hi-Mod Series, Adhesive Technology Corporation Solidbond 200 or equal, and shall have a heat deflection temperature in excess of 130 degrees F.

- b. Epoxy for pressure grouting/crack injection shall be a two (2) component, moisture insensitive, high modulus, injection grade, one hundred percent (100%) solids, blend of epoxy-resin compounds. The consistency shall be as required to achieve complete penetration in hairline cracks and larger. Material shall conform to ASTM C 881 Type 1 Grade 1, such as Sika Corporation Sikadur 52, Master Builders Concrecive LPL, Adhesive Technology Corporation SLV 300 series, or equal.
- c. Concrete shall be primed in accordance with the grout manufacturer's instructions.
- d. Use of epoxy grout for anchorage of bolts or reinforcing dowels shall be subject to the following conditions:
- e. Use shall be limited to locations where exposure, on an intermittent or continuous basis, to acid concentrations higher than ten percent (10%), to chlorine gas, or to machine or diesel oils, is extremely unlikely.
- f. Use shall be limited to applications where exposure to fire or exposure to concrete or rod temperature above the product's heat deflection temperature or 120 degrees F (whichever is less) is extremely unlikely. Overhead applications (such as pipe supports) because of the above concerns, shall be disallowed.
- g. Approval from Engineer for specific application and from supplier of equipment to be anchored, if applicable.
- h. Anchor diameter and grade of steel shall be per contract documents or per equipment supplier specifications. Anchor shall be threaded or deformed full length of embedment and shall be free of rust, scale, grease, and oils. Embedment depth and hole diameter shall be as specified. Holes shall have rough surfaces, such as can be achieved using a rotary percussion drill. Holes shall be blown clean with compressed air and be free of dust or standing water prior to application of grout. Anchor shall be left undisturbed and unloaded



for full curing period. Anchors shall not be placed in concrete below twenty-five degrees (25°) F.

#### **10-56 POLYMER CONCRETE (FOR RESURFACING OR PATCHING)**

Polymer concrete (for resurfacing or patching) shall consist of a liquid binder and dry aggregate mixed together to make a mortar or grout of a consistency as required for the application. The liquid binder shall be a chemical and oil resistant, stress relieved, low modulus, moisture insensitive, two-component epoxy-resin compound. The consistency shall be similar to lightweight oil for proper mixing with aggregate. Material shall conform to ASTM C 881 Type 3 Grade 1, such as Sika Corporation Sikadur Lo-Mod series, Adhesive Engineering Concrete 1470, Adhesive Technology Corporation 400 series, or equal.

The aggregate shall be oven dry in sealed packages until time of mixing and shall be of size and consistency compatible with recommendations of manufacturer of liquid binder for intended application.

Primer, if required for polymer concrete, shall be provided per manufacturer's recommendation.

#### **10-57 ADHESIVE CAPSULES FOR DOWEL ANCHORAGE**

Adhesive resin capsules may be used for setting and anchoring reinforcing dowels or anchor bolts into predrilled holes in concrete.

Adhesive resin capsules shall consist of sealed glass capsules containing pre-measured amounts of a polyester or vinylester resin, quartz sand aggregate and a hardener contained in a separate vial within the capsule. Adhesive capsules shall be Hilti HVA Capsules, Molly Parabond Capsules, or equal.

#### **10-58 PRESSURE GROUTING**

Pressure grouting equipment shall include a mixer and holdover agitator tanks and shall be designed to place grout at pressures up to fifty (50) psi. Gauges shall be provided to indicate pressure used. The mixer shall be provided with a meter capable of indicating to 1/10 of a cubic foot the volume of grout used.

Grouting, once commenced, shall be completed without stoppage. In case of breakdown of equipment, the Contractor shall wash out the grouting system sufficiently to ensure fresh grout and adequate bond and penetration will occur upon restarting the grouting operation. Grout pressure shall be maintained until grout has set.

## Section 11

### PRECONSTRUCTION PHOTOGRAPHS

#### 11-1 REQUIREMENT

Preconstruction photographs are required when specifically called for in the special provisions or on the plans.

#### 11-2 SPECIFICATION

When pre-construction photographs are required, Contractor shall provide the Engineer in an email, cloud share file, thumb drive, or other approved method and the photo shall be a jpg or pdf format. The photographs shall be taken at one hundred foot (100') intervals, or closer as necessary to document existing conditions, along the route of the project before any work is started. Each view shall contain the date, project name, lateral or street, and station. This data shall not block the important areas of the picture and should be of the smallest size possible consistent with legible presentation of the required information when a 4" X 6" print is viewed.

All prints shall show good details in both shaded and sunlit areas. Digital photos are used a minimum resolution of 4 mega pixels is required.

At the option of Contractor, a video recording in an acceptable digital format may be submitted in lieu of pre-construction photographs. All essential features of the project area are to be recorded and all orientations of the view recorded in an accurate manner satisfactory to the Engineer.

Contractor shall submit the pre-construction photographs or digital video recording to the Engineer for review and approval prior to the starting of work.

#### 11-3 PAYMENT

Payment for preconstruction photographs shall be at the lump sum price bid and shall include full compensation for providing all labor, materials, tools, and equipment necessary to furnish the required products.

## Section 12

### CLEARING AND GRUBBING, AND TREE REMOVAL

#### 12-1 TREES

Unless specifically indicated on the Plans or set forth in the Special Provisions no trees may be removed without direct authority of the Engineer.

For the purposes of this section trees shall be considered as those having a trunk diameter of four inches (4") and greater measured at a height of four and a half feet (4'-6") above the ground.

In cases where tree removal is shown on the Plans or is called for by the Special Provisions the Contract may either require a lump sum price for removal of all trees or a unit price per each tree.

#### 12-2 CLEARING AND GRUBBING

##### 1. General

Clearing and grubbing shall consist of removing all objectionable material from within the rights-of-way, construction areas, or other areas that may be specified in the Special Provisions or as indicated on the plans which interferes with the work.

##### 2. Vegetation and Debris

All vegetation such as weeds, grass, shrubbery, roots, and stumps and debris such as broken concrete and trash shall be removed. Tree branches which extend over roadways shall be trimmed to provide a minimum vertical clearance of fourteen feet (14'). Contractor shall have a California, C61 license, allowing him/her to perform D49 tree work and an arborist certified by the International Society of Arboriculture (ISA) on staff. All work shall be supervised by an ISA Certified Arborist and shall comply with the American National Standards Institute (ANSI) Standard Practices for Tree Care Operations (ANSI A300), the American National Standards Institute (ANSI) Safety Requirements for Arboriculture Operations (ANSI z133) and the City of Colusa Tree Ordinance Title 12.56-12.. Trees, shrubbery, lawns, and other vegetation adjacent to the work that is not to be removed shall be protected from injury or damage resulting from Contractor's operations.

### **3. Existing Facilities**

Existing facilities such as pavements, curbs, gutters, sidewalks, lawn sprinklers, mailboxes, fences, pipes, and culverts that interfere with the work shall be removed under the item of clearing and grubbing unless the Plans or Special Provisions provide for separate items.

The methods of removing existing facilities shall conform to Section 13 of these Specifications.

### **4. Disposal**

Materials resulting from clearing and grubbing operations and that are not to be salvaged or otherwise used shall be disposed of outside the project limits at an appropriate site and at the expense of Contractor.

## **12-3 PAYMENT**

In a lump sum contract, all clearing and grubbing is included in the lump sum bid. In unit price contracts, payment for clearing or for clearing and grubbing shall be at the lump sum price bid and shall include full compensation for all work required to complete this item. Payment for tree removal will be either at the lump sum price bid or at the price bid per each tree to remove as indicated in the Contract Documents. Where no separate bid item is included for tree removal, tree removal shall be included in "clearing" or "clearing and grubbing".

## Section 13

### EXISTING FACILITIES

#### 13-1 PROTECTION

Existing facilities within the rights-of-way and construction areas that do not interfere with the work shall be protected from damage. Existing improvements, utilities, and adjacent property shall be protected from damage resulting from Contractor's operations. All trees, lawn, shrubbery, fences, walls, irrigation systems, and other improvements including, but not limited to, existing pavements, sidewalks, street improvements and underground utilities and other improvements not to be removed shall be protected from damage by Contractor throughout the construction period.

Contractor shall be responsible for repairing damage to existing improvements or replacing in kind at the Engineer's option.

All signs and street marking damage due to Contractor's operation shall be replaced in kind by Contractor. In the case of partial damage to lane stripes and traffic lettering the whole stripe or letter shall be replaced. Temporary markings and striping shall be installed within three (3) working days of damage. All painted or other disfiguring marks on the pavement, sidewalk or gutters shall be removed by Contractor before the work has been accepted.

#### 13-2 MAINTAINING WATER, SEWER, AND DRAINAGE FLOWS

Contractor shall be responsible for maintaining all existing water, sewer, and drainage facilities within the limits of the project until new improvements are complete and functioning.

Contractor may elect to cut existing water service laterals and/or sewer services or tunnel beneath them. All water service laterals or sewer services cut by trench excavation or other construction activities shall become the responsibility of Contractor to repair. Maximum time of interruption of water service to any residence or business shall be four (4) hours. Any cut sewer services shall be replaced or repaired by nightfall of the same day per Standard Drawings 7-24, 7-26, and 7-28 of City of Colusa Improvement and Design Standards.

Should Contractor choose to cut existing water service laterals or sewer services, Contractor shall notify the Engineer at least three (3) working days in advance and shall give residences and businesses twenty-four (24) hour notice of interruption of service.

Should Contractor desire City forces to cut and repair existing water, sewer, or drain services, Contractor shall contact the Engineer at least three (3) working days in advance to schedule and coordinate the work. No compensation will be paid to Contractor for the repair by City crews of any water service laterals or sewer services accidentally or purposely cut by Contractor and all such work performed by City crews at the request of Contractor shall be at Contractor's expense. Any work performed or materials provided by City crews to repair and maintain existing drainage systems shall be at Contractor's expense or shall be deducted from amounts owed to Contractor.

Whenever, in the opinion of the Engineer, there arises an emergency situation within the limits of the project that involves maintenance of water, sewer, or drainage, or a situation that poses a danger to the public safety, or inconvenience and/or unreasonable nuisance to the general public, City's forces may be called upon to perform any work necessary to relieve the emergency. Contractor's attention is directed to Section 5-12 "Provisions for Emergencies."

If such emergency is the result of negligence by Contractor, the cost of any corrective measures taken or work performed by City crews shall be billed directly to Contractor or may be deducted from any payments owed to Contractor. The performance of such emergency work by the City forces shall not relieve Contractor of any responsibilities, obligations, or liabilities under the contract for the project.

Should it become necessary for Contractor to temporarily divert or convey flows carried by existing water, sewer, or drainage systems (which include, but are not necessarily limited to, pipelines, channels and pump stations), Contractor shall prepare a detailed, effective plan including, at minimum, the quantity of flow to be conveyed and/or the volume to be impounded, the number, size, and material type of any pipes, the size and configuration of any channel, the size and configuration of any impoundment basin, all pumping information (if applicable), the point of discharge and discharge details.

The plan shall be submitted to the Engineer for approval a minimum of ten (10) working days prior to the start of any work affected thereby and Contractor shall not begin such work until the plan is approved and is on file with the Engineer.

No separate payment will be paid to Contractor for maintenance of existing facilities; the cost of this work shall be included in the various contract items of work.

### **13-3 REMOVING/RELOCATING**

Existing facilities that interfere with the work shall be removed, reset, relocated, adjusted, or otherwise worked on as specified herein, on the Plans, or as directed by the Engineer. Removed facilities that are not to be salvaged or otherwise used shall be disposed of away from the project. Holes or depressions resulting from the removed facilities shall be filled, compacted, and brought to grade at the direction of the Engineer.

#### **1. Asphalt and Concrete**

Asphalt and concrete such as pavements, curbs, gutters, and sidewalks that are to be removed shall be cut to neat, straight lines with an approved saw or other means acceptable to the Engineer. Where the edge of the pavement removal is within two (2) feet of existing building, curb and gutter, or existing pavement edge, the remaining pavement shall also be removed and replaced. The exact limit of the asphalt and concrete to be removed shall be determined in the field by the Engineer. Any temporary surface placed shall be marked with the Contractor's name until such time as final restoration has been placed to the City's satisfaction.

#### **2. Mailboxes**

Existing mailboxes and supports shall be removed and reset where shown on the Plans or as directed by the Engineer. Existing posts shall be removed and transported from the job site and replaced with 4 X 4 pressure treated Douglas fir posts conforming to the provisions of Section 82, "Signs and Markers" of the State Specifications. The mailboxes shall be suitably mounted on a platform which shall be set three and one-half feet (3½') to four feet (4') above the ground. Posts shall be set at least two feet (2') in the ground and firmly positioned by tamping. Existing newspaper receptacles shall be attached to new posts.

Existing mailbox supports constructed of material other than normal 4 X 4 wooden posts shall be stacked in the owner's yard for his recovery. Contractor shall replace with 4 X 4 wooden posts as described above.

#### **3. Fences**

Fences shall be relocated where shown on the Plans or as directed by the Engineer. Fence shall be relocated to provide three foot

(3') minimum clearance from relocated or new fire hydrants. Replace only deteriorated fence parts.

The intent of this specification is for Contractor to relocate the fence in a more suitable location without completely rebuilding it and with an absolute minimum of effort and expense. It may not be known how much of any type of fencing Contractor will be required to replace. Contractor shall submit a unit price per lineal foot of fence to replace regardless of type or quantity.

**4. Sprinklers and lights**

Lawn sprinkler system pipes, heads, and yard lighting systems shall be relocated and re-plumbed to insure continued operation to an equal or better condition.

**5. Pipes and Culverts**

Pipes and culverts that are no longer to be used shall be removed if they are within two feet (2') of sub-grade. Such pipes that are lower than the aforementioned, shall be removed or the ends shall be plugged with concrete at the option of Contractor. Concrete plugs installed in the ends of abandoned sewer or storm drain lines shall be Class "C" or "D" concrete that extends at least two feet (2') into the pipe from the exposed end. Refer to Section 27-3 for capping the ends of water mains.

**6. Abandonment of water service**

Abandon the water service by closing corporation stop and crimping and cutting water service adjacent to the distribution main.

**7. Existing Utilities**

Unless otherwise noted, the location, alignment, and depth of existing underground utilities as shown on the Plans is taken from public records and no responsibility is assumed for the accuracy thereof. For the most part, underground utility services are not shown on the Plans. Attention is directed to the provisions in Section 6-19, "Main and Trunk line Utilities." The cost of relocating existing overhead and/or underground utilities not specified on the plans to be relocated, but which Contractor elects to relocate or cut and reconnect at his/her own convenience shall be borne by Contractor.



#### **13-4 PAVEMENT FOR TRENCH SURFACE RESTORATION**

Contractor shall restore surfaces in kind (using the same material as existing) unless otherwise noted on the Plans or Special Provisions.

Any temporary surface placed shall be marked with the Contractor's name until such time as final restoration has been placed to the City's satisfaction.

Asphalt pavement surface restoration for trenches shall conform to the applicable provisions of Sections 10, 22, 26 and 27.

Restoration of existing concrete pavement shall consist of a minimum of six (6) inches of Portland cement concrete. Portland cement concrete pavement and its placement shall conform to the requirements of Sections 10 and 19.

#### **13-5 PAYMENT**

There will be no separate payment for existing utilities work as described in this section, but full compensation will be considered as included in the bid for items of work Contractor deems appropriate.

## Section 14

### EARTHWORK, EXCAVATION, EMBANKMENT AND SUBGRADE

#### 14-1 ROADWAY EXCAVATION AND BACKFILL

In the Contract this item shall consist of excavating, removing, and satisfactory disposal of all material within the limits of the work for roadways, drainage channels, ditches, and any other work as may be specified in the Special Provisions or shown on the Plans. Suitable excavated material may be used for embankment and for backfilling. The rough excavation shall be carried to such depths that sufficient material will be left above the finished grade to allow for compaction to the required grade. Should Contractor excavate below the designated lines he will be required to replace the material with suitably compacted import material or Class "D" Concrete as determined by the Engineer, without cost to the City.

No excavation shall be started on a project until approval has been given by the Engineer. This approval is to assure all necessary surveys, cross sections, and measurements which may be required for determining the quantities removed are performed.

If all or part of the excavated material is to be used as fill, and preparation for the fill placement has not been made, the Engineer may require the stockpiling of this material. The Engineer shall have the right to select excavated material to be used in fill.

Payment for excavation shall be based on cross section measurements taken prior to the beginning of work and the final lines and grades of the finished section. Payment shall be made per cubic yard of material excavated in accordance with the Plans.

#### 14-2 STRUCTURE EXCAVATION AND BACKFILL

All compaction test results and test agent information shall be submitted to the Engineer for review and approval. Placement of forms, foundations, or footings shall not begin until the City has received written verification that the compaction test results meet the requirements of this specification.

Structure excavation shall consist of excavation performed to place structures such as footings, walls, manholes, junction boxes, etc.

Payment for structure excavation and backfilling shall be considered as included in the prices paid for the various items of work involved and no separate payment will be made therefore.

Excavation for placement of manholes will be paid for under the price bid for manholes, complete in place.

Backfill material shall be specified in the Special Provisions or indicated on the Plans. The backfill material shall be compacted by mechanically tamping in maximum eight-inch (8") layers so as to achieve a minimum relative compaction of ninety-five percent (95%).

Material excavated in excess of that required for backfilling will be disposed of away from the site of the work, unless otherwise permitted by the Engineer.

### **14-3 TRENCH EXCAVATION AND BACKFILL**

Trench excavation shall consist of the excavation required to install pipelines **and** its cost will not be paid for separately but compensation will be included in the price bid for placing pipe.

Before excavation of the pipe trench in fill areas of roadway embankments, the fill area or embankment shall be completed to a height above the pipe invert grade line of not less than twice the internal pipe diameter or to final fill or embankment subgrade, whichever is lower, but in no case less than twelve inches (12") above the top of the pipe. Such embankment shall be compacted to a minimum relative compaction of ninety percent (90%) for a distance on each side of the pipe equal to a least two (2) pipe diameters. The remainder embankment shall be compacted as specified elsewhere in these Specifications for the type of construction being pre-formed, or as specified in the Special Provisions or the Plans.

Backfill shall be placed as shown on Standard Drawing 4-20, shall be provided by Contractor and shall be placed in accordance with these Technical Specifications and the pipe manufacturer's recommendations. Initial backfill shall be the material between the top of the bedding material and six inches (6") above the top of the bell or barrel if the pipe does not have a bell.

Initial backfill shall be placed immediately after pipe joints have been completed, inspected, and passed by the Engineer. The material shall be carefully placed so as not to disturb or damage the pipe and shall be brought up evenly on both sides. Initial backfill material shall be placed in layers not exceeding eight inches (8") in depth before compaction at or near optimum moisture content. Contractor shall place initial backfill—by shovel slicing, tamping, and/or vibratory compaction in order to produce firmly compacted material under the haunches of the pipe. Compaction shall be by mechanical pneumatic or vibratory compaction equipment approved by the Engineer. Care shall be used to avoid dislodging the pipe. No wedging or blocking of the pipe shall be permitted. Ponding and jetting methods of achieving compaction shall

not be allowed. The compacted material must achieve a relative compaction of at least ninety percent (90%) as determined by ASTM D 698.

When the bedding material for the pipe consists of crushed rock, sand shall not be used as initial backfill material.

Unless otherwise approved by Engineer, trench backfill, as shown on Standard Drawing 4-20, shall be provided, and placed to grade by Contractor, in accordance with these Technical Specifications and the pipe manufacturer's recommendations. Trench backfill shall be the material between the initial backfill and the top of trench or sub-grade. The material for trench backfill may be of job excavated, native material provided that such material is free of organic materials or other unsuitable materials as determined by the Engineer that may cause voids or depressions to develop during or after placement of the backfill. Rocks, stones, and solid earth chunks exceeding three inches (3") in greatest dimension shall be removed from the trench backfill material.

Unless otherwise indicated on the Plans or specified in the Special Provisions, trench backfill material shall be placed in layers not exceeding eight inches (8") in depth before compaction at or near optimum moisture content. Until the total backfill above the top of the pipe exceeds three feet (3'), machine-placed backfill material shall not be allowed to "freefall" more than two feet (2').

Unless otherwise shown on the Plans or specified in the Special Provisions, compaction of trench backfill material shall be by mechanical pneumatic or vibratory compaction equipment. Minimum relative compaction of trench backfill material shall be ninety percent (90%) when tested according to ASTM D 1557, except that the top six inches (6") below the subgrade shall be compacted to a relative compaction of ninety-five percent (95%). Trenches in easements outside the street rights-of-way may be compacted to ninety percent (90%) relative compaction throughout the depth. Compaction testing will be performed by the Engineer and the cost thereof will be borne by the City, except that retests of areas which fail to meet the required compaction will be charged to Contractor and deducted from any payment due Contractor for work performed under the terms of the Proposal.

Ponding and jetting methods of achieving compaction are not allowed.

Refer to Section 10-16 Controlled Density Fill (CDF) regarding approval and mix design requirements for use of CDF, CLSM, and/or RFF as an alternate to granular material for initial backfill and trench backfill materials.

#### **14-4 TEMPORARY PAVING**

Unless stated otherwise in Contract documents, at the end of the day and

prior to opening to traffic, trenches shall be temporarily paved to provide a smooth riding surface. The paving material may be asphalt concrete or temporary paving, "cut back" or other Engineer approved material. Contractor may use non-skid plates to cover trenching when approved by the Engineer. Contractor shall nail down plates, and at edges Contractor shall create and maintain a uniform taper using temporary paving to ensure a smooth traveling surface over the plate.

Cutback shall be placed on the completed aggregate base course, constructed per the Plans and Special Provisions and shall be placed so that the compacted thickness is not less than two inches (2").

Compaction of temporary paving shall be performed using steel wheel rollers or mechanical equipment approved by the Engineer. Compaction by wheel rolling with backhoes or other rubber tire construction equipment shall not be allowed. The temporary paving shall be placed and maintained so that the maximum deviation does not exceed one-half inch ( $\frac{1}{2}$ " ) using a ten (10) foot straight edge placed in any direction. If, in the opinion of the Engineer, the temporary paving is not properly maintained, Engineer may direct Contractor to install permanent asphalt concrete pavement at no additional cost to the City of Colusa.

#### **14-5 EMBANKMENT AND FILL**

Fill on a roadway will normally be made with material excavated on the same work unless otherwise indicated by the Special Provisions or Plans.

Fill will be paid for per cubic yard measured in place by computing the yardage between the original ground elevation and the final grades as shown on the Plans.

Tests performed to determine relative compaction shall be performed using the following methods:

1. ASTM D 1557 laboratory test for maximum dry density at optimum moisture
2. ASTM D 2922 field test for in-place wet density by nuclear methods.
3. ASTM D 3017 field test for in-place moisture content by nuclear methods.

Relative compaction shall mean the ratio of the field dry density to the laboratory maximum dry density expressed as a percentage.

In general, construction of fill shall be in accordance with the methods set forth in the State Specifications. The relative compaction shall be at least ninety percent (90%), unless otherwise indicated.

#### **14-6 LANDSCAPE FILL**

**The contractor shall provide the engineer a soil analysis report for proposed landscape fill material.** Landscape fill shall consist of fertile, friable soil of loamy character. It shall be obtained from well-drained arable land outside of the project limits and shall be free from subsoil, refuse, roots, heavy or stiff clay, stones larger than one inch (1”) in size, coarse sand, noxious weeds, such as Bermuda, Nut Grass and Morning Glory, sticks, brush, litter and other deleterious substances. Topsoil shall be capable of sustaining healthy plant life.

Landscape fill will be paid for per cubic yard, measured in place by computing the yardage between the original ground elevation and the final grades as shown on the Plans; which price shall include full compensation for all labor, equipment and materials necessary for placement of landscape fill. The relative compaction shall be eighty-five percent (85%), unless otherwise indicated.

#### **14-7 SUBGRADE**

Sub-grades for pavement, curb and gutter, sidewalk, lined channels and ditches, or for rock base under pavements shall be finished accurately and true to the lines and sections shown on the Plans, within a tolerance of  $\pm .05$  feet. The top six inches (6”) of sub-grade immediately prior to placing subsequent material thereon shall have a relative compaction of not less than ninety-five percent (95%). The sub-grade shall be free of segregated material and shall be smooth and true to the required grade and cross section. Contractor shall repair, at his expense, any damage to a prepared sub-grade caused by his operations or by use of public traffic. No material shall be placed upon the prepared sub-grade until it is in a condition meeting the requirements specified. Unless otherwise provided by the Special Provisions, the finishing of sub-grade will not be paid for as a separate item but this work will be included by Contractor under such items as Contractor deems appropriate.

#### **14-8 UNSUITABLE MATERIAL/IMPORT**

##### **1. Definition**

Unsuitable Material for roadway sub-base and trench backfill is defined as soil the Engineer determines to be:

- a. Loose, unstable or yielding, or

- b. Unable to be compacted to specified density using ordinary methods at optimum moisture content, or
- c. Contains visible or excessive deleterious material as determined by the Engineer, or
- d. Too wet to be properly compacted and circumstances prevent processing suitable in-place drying prior to being used as backfill; or
- e. Otherwise unsuitable for planned use.

## **2. Handling Trench Unsuitable Material**

Whenever the bottom of the trench is soft or rocky, or rendered not suitable by the Engineer for pipe bedding, the unsuitable material shall be removed to a minimum depth of six inches (6”), or deeper as determined by the Engineer, for pipelines or twelve inches (12”) for manholes or appurtenant structures. Whenever excavated native soil is rendered by the Engineer to be unsuitable for trench strata backfill, Contractor shall remove and replace with import material approved by the Engineer.

For drainage, sewer and water pipelines the unsuitable material shall be replaced with Class 2 aggregate base or approved equal and shall be compacted to 90% relative compaction. For manholes and appurtenant structures, the unsuitable material shall be replaced with material subject to the approval of the Engineer. The Engineer may direct the Contractor to furnish and place geotextile fabric below the bedding materials. The geotextile material shall be a non-woven fabric equal to or exceeding the properties listed in the table below.

<b>REQUIRED NONWOVEN GEOTEXTILE PROPERTIES</b>		
<b>Physical Property</b>	<b>Test Method</b>	<b>Acceptable Minimum Test Results</b>
Tensile strength, lb	ASTM D 4632	200 lbs.
Elongation, %	ASTM D 4632	50%
Permittivity, sec-1	ASTM D 4491	1.5 sec <sup>-1</sup>
Puncture strength, lb	ASTM D 4833	120 lbs.
Mullen Burst strength, psi	ASTM D 3786	380 psi

The cost to remove and replace unsuitable bedding material to the above specified depths shall be included in the specific bid item cost. Excavation of unsuitable material beyond these depths, so ordered removed by the Engineer, will be paid as extra work as provided in Section 4 unless otherwise specified in the Special Provisions.

The cost to haul and replace native soil that is unsuitable for trench strata backfill shall be a separate bid item that includes the import material price and the transporting expenses for both unsuitable and the import material. The cost to replace unsuitable material rendered unsuitable due to any act or omission of Contractor or due to inclement weather shall be borne by Contractor and there will be no compensation therefore.

Excavated unsuitable material shall be the property of Contractor and shall be disposed of away from the project site. For off site disposal, Contractor shall have written permission from the owner upon whose property the disposal is to be made before any material is deposited thereon.

The quantity of unsuitable material/import for trenches shown on the Proposal is for bidding purposes only. The unit price indicated will not be adjusted because the actual quantity varies from the quantity shown on the Proposal.



Payment for handling Unsuitable Material/Import shall be at the contract unit price bid per tonnage of import.

### **3. Handling Roadway Unsuitable Material**

For road sub-grades unsuitable material shall be replaced with pit run base, aggregate base Class II, cement treated bases, lime treated bases, and with geogrid.

Payment for handling Roadway Unsuitable Material/Import shall be at the contract unit price bid per ton, shall be based solely on the tonnage of import, and shall include full compensation for furnishing all labor, materials, tools and equipment, and for performing all work necessary to complete this item in place.

As an alternate the Engineer may direct Contractor to furnish and place geotextile fabric below the bedding materials. The geotextile material shall be a high modulus woven fabric, and shall be inert to commonly encountered chemicals, rot-proof, and resistant to ultraviolet light, insects, and rodents. The geotextile fabric shall have a minimum grab tensile strength of two hundred pounds (200 lbs.) in any direction as measured in accordance with ASTM D 4632, a Mullen burst strength of at least four hundred pounds per square inch (400 psi) per ASTM D 3786, and an Equivalent Opening Size no larger than the U.S. Standard Sieve Number 50 as determined by ASTM D 4751. Geotextile fabric shall be Mirafi 600X or equal. Each roll of fabric shall be handled and placed in accordance with the manufacturer's recommendations. Furnishing and placing of geotextile fabric will be paid for as extra work as defined in 4-6, "Extra Work Force Account" unless otherwise indicated.

Where geogrid is utilized Contractor shall furnish equipment required for satisfactory progress and completion of the project. Before placement of the geogrid, the site shall be cleared of all topsoil, trees, stumps, rocks, and other debris. The grade shall be reasonably smoothed, minimizing all ruts, depressions, and other distortions that would inhibit smooth and proper placement of the geogrid. Geogrid shall be placed in accordance with the suppliers installation recommendations, but in no case shall grid ties be placed less than twenty feet apart or grid overlaps be less than two feet.

Geogrid shall be laid either at the elevation and alignment as shown on the Plans or to the limits approved by the Engineer in the field and shall be oriented such that the roll length runs parallel to the roadway. When geogrid rolls are placed side-by-side, or end-to-end, they shall be overlapped a minimum of two feet or a greater distance recommended by the supplier and approved by the Engineer. Overlap geogrid in the direction that fill will be spread. Geogrid material shall be tensioned by hand and secured to the ground surface.

Care shall be taken to ensure that geogrid sections do not separate at overlaps during construction. Placement of geogrids around corners may require

cutting of geogrid product and diagonal overlapping to ensure that excessive buckling of grid material does not occur. No more than two layers of geogrid are to be placed in direct contact with one another.

When very soft subgrade soils are encountered, fill material placed over the geogrid shall be back dumped from trucks and bladed onto the geogrid in such a manner that the fill rolls onto the geogrid ahead (e.g. by gradually raising the dozer blade while moving forward), Geogrid installation procedures shall be performed so that the geogrid does not “roll” or substantially deflect ahead of the operation and possibly fold over onto itself as this undermines the structural integrity of the geogrid. Care shall be taken during the initial lifts to avoid failing the weak structure of the subgrade by preventing heavy equipment from placing the initial lifts. On firmer but still structurally unsuitable subgrades, pneumatic tired vehicles may operate directly upon the geogrid at slow speeds, less than 5 MPH, provided the geogrid does not require a protective coating.

Tracked construction equipment shall not operate directly on the geogrid. A minimum fill thickness of 6 inches is required prior to operation of tracked vehicles over the geogrid. Care shall be taken by the operators to avoid sudden sharp turning. Fill material shall be placed over the geogrid to depth and dimensions shown on the plans or as approved by the Engineer. The backfill material placed in contact with the geogrid will be the approved aggregate base material or a material with a maximum aggregate size of one and one-half inches (1 ½”) and approved by the Engineer. For damaged or torn geogrids, or for geogrids with protective coatings, any damage to the coating incurred during transportation, storage or installation shall be repaired or replaced to the satisfaction of the Engineer by Contractor at their expense. The coating shall be restored to its original condition.

#### **14-9 PAYMENT**

Payment shall be at the unit price per cubic yard and shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all work involved in the installation, and all other necessary work as directed by the Engineer to conform with this item.

## Section 15

### WATER USED IN CONSTRUCTION

#### 15-1 WATER USED IN CONSTRUCTION

Elsewhere in these Specifications there is specified the quality of water used for concrete. This paragraph is intended to cover only water used in construction.

The application of water shall be under the control of the Engineer at all times and shall be applied in the amounts and at the locations designated by the Engineer or as specified.

At the option of Contractor, excavation areas may be watered prior to excavating the material.

All equipment used for the application of water shall be equipped with a positive means of shut off.

Unless otherwise permitted by the Engineer, at least one mobile unit with a minimum capacity of 1,000 gallons shall be available for applying water on the project at all times.

Water for compacting embankment material, sub-base, base and surfacing material, and for controlling dust shall be applied by means of pressure-type distributors that will insure a uniform application of water.

If Contractor elects to do so, he may use chemical additives in water used for compaction. If such additives are used, furnishing and applying the additives shall be at Contractor's expense. The right is reserved by the Engineer to prohibit the use of a particular type of additive, to designate the locations where a particular type of additive is to be used, if the Engineer has reasonable grounds for believing that such use will be in any way detrimental to the work.

Arrangements for obtaining water needed for construction purposes must be made with the supplying agency. Proof of such arrangement, including method of reimbursement, shall be subject to inspection and approval by the Engineer.

Unless otherwise approved by the Department of Utilities, connections to the City's water distribution system used to fill tank trucks or other such equipment, shall include an air gap to separate the water supply from the equipment to be filled. The Air-gap separation shall be at least double the diameter of the supply pipe, measured vertically from the flood rim of the receiving vessel to the supply pipe; however, in no case shall this separation be less than one inch (1"). In no case will a direct connection to the City's water supply be allowed.

Water used in construction, including compacting fill, preparing sub-grade, dust control, mixing concrete, concrete curing, laying and compacting any type of base material, settling backfill in trenches or at structures, or water used for any other purpose shall be provided and paid for in accordance with the Department of Utilities "Water Hydrant Policy". A copy of said policy is available at Customer Services, 1395-35<sup>th</sup> Avenue.

## **15-2 PAYMENT**

There will be no separate payment for water used during construction, but the price therefore shall be considered included in whatever items Contractor deems appropriate.

## Section 16

### STORMWATER QUALITY CONTROL

#### 16-1 WASTEWATER AND GROUND WATER DISCHARGES

Contractor shall be responsible for the control, removal, and disposal of any groundwater that may be encountered in the course of excavating and backfilling trenches, placing pipe, or constructing any other improvements associated with the project. Unless approved in writing by the Engineer, groundwater and/or water from trench dewatering shall be free of sediment and other construction materials before entering the City sewer or storm drain system. Approval from the City's Department of Utilities will need to be obtained prior to any pumping or discharging of water to the City storm drain or sewer system.

Issues which require the regulation of groundwater discharges include: influence on existing or unknown contaminate plumes, exceeding sewer and drainage capacity, excessive demands on facility infrastructure, pumping costs, and maintenance worker safety.

It is the responsibility of the contractor to verify that groundwater is free of contamination through a regular monitoring program.

All Groundwater discharges within the City of Colusa must be arranged through the Department of Utilities, (916)808-1400, 1395 35<sup>th</sup> Avenue, Colusa CA 95822.

#### **DISCHARGE TO SEWER SYSTEM**

If 25,000 gallons of water per day, or more, is discharged to the City's Sewer System, Contractor will be required to obtain a discharge permit from the State Water Board. The City will reimburse Contractor for fees paid to the State to obtain a discharge permit, but Contractor shall be responsible to pay any fines levied if Contractor does not comply with the permit requirements.

All new discharges to the City of Colusa's sewer system must be regulated and monitored by the City Utilities Department. No Groundwater discharges are allowed to the City's sewer system

#### **DISCHARGES TO THE STORM DRAINAGE SYSTEM**

Any discharges to the storm drainage system must be secured with an individual National Pollutant Discharge Elimination System (NPDES) permit from the Central Valley Regional Water Quality Control Board (Water Board) and an

MOU from the City. The NPDES permit must be received prior to the City issuing an MOU to discharge to the City's storm drainage system.

## **16-2 STORMWATER QUALITY**

These requirements consist of regulations contained in the National Pollution Discharge Elimination System (NPDES) Municipal Stormwater Permit issued to the City and the City's Stormwater Management and Discharge Control Ordinance.

Contractor shall comply with all City and County of Colusa air pollution control rules, regulations, ordinances, and statutes which apply to any work performed pursuant to the contract, including any air pollution control rules, regulations, ordinances, and statutes, specified in the Government Code. Contractor shall be responsible for the control of dust within the limits of the project at all times including weekends and holidays in addition to normal working days. Contractor shall take whatever steps are necessary or required by the Engineer to eliminate the nuisance of blowing dust to prevent sediment, debris, or litter from entering the City storm drain system.

### **16-3 EROSION, SEDIMENT, AND POLLUTION CONTROL**

Contractor shall be responsible for the implementation and maintenance of erosion, sediment and, pollution control measures, otherwise known as Best Management Practices (BMPs), within the limits of the Work site and all areas impacted by the project at all times during the course of construction, including evenings, nights, weekends and holidays in addition to the normal working days, in accordance with the provisions of Colusa City Municipal Code.

Contractor shall provide the following erosion, sediment, and pollution control Best Management Practices (BMPs) when and where applicable:

Contractor shall place Filter Bags in and Gravel bags around any storm drain inlets which receive runoff from the limits of the construction zone, including storage and staging areas. Alternative storm drain inlet protection BMPs may be used with approval of the Engineer. (City of Colusa Improvement and Design Standards, drawings 11-2 and 11-9)

Contractor shall cover all stockpiles prior to a forecasted rain event and/or place gravel berms (or approved equal) around material piles as required to prevent migration of material to gutters or storm drains.

Contractor shall keep gutter flowlines unimpeded and free of soil, debris, and construction materials at all times.

Contractor shall install and maintain an effective construction entrance at any soil to concrete/asphalt interface used by Contractor vehicles and equipment in accordance with City of Colusa Improvement and Design Standards, drawing 11-1.

Contractor shall place silt fences, fiber rolls or approved equal at any soil to concrete/asphalt interface at which soil may be washed onto the concrete/asphalt in accordance with City of Colusa Improvement and Design Standards, drawings 11-3 and 11-4.

Wash water, slurry and sediment from concrete or asphalt saw-cutting operations shall not be allowed to enter the City storm drain system, but instead must be collected and disposed of, by Contractor, in a manner approved by the Engineer.

Contractor is required to implement, at a minimum, the following housekeeping practices:

### **Site Cleanup:**

Contractor shall be responsible for the control of dust, mud and debris resulting from Contractor's operations within the limits of the project at all times including weekends and holidays in addition to normal working hours. Contractor shall take whatever steps are necessary or required by the Engineer and daily clean up throughout the project shall be required as Contractor progresses with the work.

Daily or as needed, all paved areas within the limits of the project shall be cleaned and free of sediments, asphalt, concrete and any other construction debris. Contractor shall not clean sediment and debris from the street by using water to wash down streets.

Spillage of earth, gravel, concrete, asphalt, or other materials resulting from hauling operations along or across any public traveled way shall be removed immediately by Contractor at their expense. If site is not kept sufficiently clean, the City will take measures to clean it and subtract the cost thereof from payments owing the Contractor.

### **Solid Waste Management:**

Contractor shall maintain a clean construction site. Contractor shall provide designated areas for waste collection. The waste collection areas shall be leak-proof containers with lids or covers. Site trash shall be collected daily and placed in the disposal containers. Contractor shall make arrangements for regular waste collection. Contractor shall also regularly inspect the waste disposal areas to determine if potential pollutant discharges exist.

### **Hazardous Material Storage and Delivery Area:**

Contractor shall provide one central hazardous material storage and delivery area (HMSDA) for the duration of the project. Examples of hazardous materials include pesticides and herbicides; fertilizers; detergents; petroleum products; acids; lime; glues; paint; solvents and curing compounds. This area shall be protected such that polluted runoff will not be allowed to leave the HMSDA site. Contractor shall regularly inspect the HMSDA site to ensure that any hazardous or non-hazardous materials have not spilled.

### **Concrete Waste Management:**

Contractor shall arrange for concrete wastes to be disposed of off-site or in one designated on-site area. Concrete wastes, including left-over concrete and material from washing out the concrete truck, shall not be disposed or washed into the storm drain system. A designated on-site concrete waste



containment area shall be provided. The site shall be bermed and lined to keep concrete waste from leaving the containment area. The dried concrete waste shall be removed and disposed of properly by Contractor at their expense.

### **Spill Prevention and Control:**

Contractor shall be responsible for instructing employees and sub-contractors about preventing spills of hazardous materials such as equipment fuel, and about controlling spills if they occur. Proper spill control and cleanup materials and procedures shall be kept on site near the storage and equipment fueling areas and updated as materials change on site. Contractor is strictly responsible for the prevention, clean-up and consequences of any hazardous materials spills.

Throughout the duration of the project, Contractor shall inspect and maintain, in effective condition, all erosion, sediment, and pollution control BMPs before and after each storm event and as needed. Contractor shall immediately correct or replace any ineffective BMPs.

More information about required Best Management Practices and proper Housekeeping Practices can be obtained by referring to the City of Colusa's Administrative and Technical Procedures Manual for Grading, Erosion and Sediment Control available at <https://www.cityofcolusa.org/-/media/Corporate/Files/DOU/Specs-Drawings/Sediment-control-manual.pdf?la=en>

Contractor shall prepare and submit an erosion, sediment and pollution control plan (ESC Plan) to the Engineer for review. The submittal shall include a description of all pollutants to be managed during construction, and all activities that could potentially impact a waterway. Detail plan of areas to be disturbed and staging areas. All proposed BMP measures to be implemented to mitigate pollutants and activities listed. The ESC Plan shall be submitted a minimum of 48 hours prior to start of the work. **Contractor shall not begin work until an accepted ESC Plan is on file with the Engineer.** The erosion, sediment and pollution control plan shall be updated as necessary and re-submitted to the Engineer.

#### **16-4 ENFORCEMENT**

Per City Code, Contractor shall be subject to Notice of Violations (NOVs) resulting in possible Stop Work Orders and Administrative Penalties for non-compliance of this section of the Special Provisions.

Per the State's Porter Cologne Water Quality Act, Contractor shall also be subject to inspection by Staff from the Central Valley Regional Water Quality Control Board who have the authority to issue Notices of Violation (NOVs) and Penalties of up to \$10,000 per day for non-compliance. Contractor shall be liable for any fines issued to the project by the State or Federal Government for NPDES non-compliance due to Contractor negligence.

The City reserves the right to take corrective action and withhold the City's costs for corrective action from progress payments or final payment in accordance with Section 7, Retention of Sums Charged against Contractor, of the Agreement. Any fines, including third-party claims, levied against the Agency as a result of Contractor's non-compliance are Contractor's sole responsibility and will be withheld from progress payments or final payment in accordance with Section 7, Retention of Sums Charged against Contractor, of the Agreement.

#### **16-5 PAYMENT**

There will be no separate payment for Water Quality Control and the cost therefore shall be considered included in whatever item Contractor deems appropriate.



## Section 27

### WATER DISTRIBUTION SYSTEMS

#### 27-1 GENERAL

All water pipe, fittings, valves, fire hydrants, blow-offs, air release valves and other appurtenances shall be installed in accordance with the requirements of the project Plans and Special Provisions, these Technical Specifications, the American Water Works Association (AWWA), ANSI-61, the City's Cross Connection Control Policy, and the manufacturer's recommendations. Materials shall be as specified in Section 10 "Construction Materials" of these Technical Specifications.

During construction, **Contractor shall not operate any valves in the City's distribution system** and must request that City Utilities Department Personnel operate them. Contractor shall request the Engineer to notify the City Utility Department Personnel as specified in Section 27-11 of these Technical Specifications.

If shown on the Plans or specified in the Special Provisions, Contractor shall pay all fees for taps, tie-in connections, and meters in advance at the Department of Utilities Customer Service Office, 1395 35<sup>th</sup> Avenue. Fees shall be paid after the "Notice to Proceed" has been issued, and prior to the work being performed by the Department of Utilities. For current fee information, contact Customer Service at 264-5371.

#### 27-2 WATER PIPE

**1. General** - All water pipes shall be designed to withstand the external earth load and the AASHTO H-20 vehicle live load. The pipe shall also be designed to withstand an internal working pressure of one hundred and fifty pounds per square inch (150 psi).

**2. Water Services** - Pipe used for water services two inches (2") in diameter or less shall be copper or polyethylene tubing as specified in Section 10 of these Technical Specifications. Pipe used for water services four inches (4") in diameter or large shall be the same as specified for distribution mains.

Polyethylene services shall be a single piece of tubing (no joints allowed including butt welds) and shall have a locating wire attached with ten (10) mil tape at three foot (3') spacing. The minimum allowable radius shall be thirty (30) times the tubing diameter.

**3. Distribution Mains (4" to 12")** - Unless otherwise specified on the Plans or Special Provisions, water mains four inches (4") through twelve inches (12") diameter in water distribution systems shall be made of ductile iron pipe (DIP),

or polyvinyl chloride pipe (PVC) meeting the applicable requirements of Section 10 of these Technical Specifications.

**4. Transmission Mains (greater than 12")** - Water mains greater than twelve inches (12") in diameter shall be ductile iron pipe (DIP), concrete cylinder pipe (CCP) or welded steel pipe (WSP) meeting the applicable requirements of Section 10 of these Technical Specifications.

### **27-3 TRENCHING FOR WATER PIPE**

Trenches for water pipe including water transmission mains, water distribution mains, fire hydrants branch leads, and water services shall be as specified herein unless otherwise indicated on the Plans or in the Special Provisions.

Prior to cutting pavement Contractor shall notify Underground Service Alert (USA) per Section 6-19 of these Technical Specifications and shall bring to the Engineer's attention any possible conflicts.

Existing pavement to be removed shall be saw cut the full depth to provide a neat straight pavement break along both sides of the pipe trench as shown on Standard Drawing 4-20. Contractor shall perform the pavement cutting operation by saw cutting.

Trenches for water main pipe shall be excavated to the lines and grades indicated on the Plans and as detailed by Standard Drawing 4-20 in City of Colusa Improvement and Design Standards. Contractor shall furnish, install, and maintain a trench shoring system in compliance with Section 6-8 of these Technical Specifications.

Water distribution mains constructed in fully improved streets with curb, gutter, and sidewalk shall be installed with a minimum of thirty-six inches (36") of cover and a maximum of fifty-four inches (54") of cover measured from the top of the pipe to pavement surface.

Water distribution mains in unimproved areas or in existing streets lacking curb, gutter, and sidewalk shall be installed with a minimum cover of fifty-four inches (54") and a maximum cover of sixty inches (60") measured from the top of the pipe to the existing ground or pavement surface.

In order to avoid conflicts with other utilities, particularly at street intersections, it may be necessary to deviate from the above-specified minimum and maximum cover requirements. At locations where the crossing of water mains with other underground utilities results in grade conflicts, adjustment to the vertical alignment of the water main may be required. Adjustments over or

under the conflicting utility line shall be made as detailed in Standard Drawing 8-5 in City of Colusa Improvement and Design Standards. The cost to make these adjustments shall be included in the bid price to install the pipe when the conflicts are shown on the Plans.

In designing the distribution system, it was intended that ten feet (10') be the minimum horizontal distance between parallel water and sanitary sewer lines and services, and that the water main be at least twelve inches (12") higher. No field changes shall be made that conflict with the requirement without prior approval of the Engineer. When crossing a sanitary sewer force main, the water main shall be a minimum of three feet (3') above the sewer line and no fittings within ten feet (10') of the crossing.

The bottom of the excavated trench shall be cleared of rocks and clay lumps larger than two inches (2") in size. All grade stakes, wood, cut and abandoned pipe, or other material shall be removed from the trench. The bottom of the trench shall be smoothed and compacted to provide uniform support of the pipe between the joints. The bottom of the trench shall be compacted to a minimum of ninety percent (90%) of maximum dry density as determined by ASTM Test Designation D698.

Whenever the bottom of the trench is soft or rocky, or, in the opinion of the Engineer, otherwise unsuitable as a foundation for pipe bedding, the unsuitable material shall be removed per Section 14-8 of these Technical Specifications.

Unsuitable material encountered during excavation of the trench shall be excavated and disposed of as directed by the Engineer. Contractor shall excavate unsuitable material and the resulting space shall be filled per Section 14-8 of these Technical Specifications.

At the end of each working day, the maximum amount of trench open on any portion of the project shall not exceed the length of open trench necessary for placing pipe the next working day. This open trench shall be bridged. Open trench exceeding the length necessary for placing the pipe the next day shall be backfilled, compacted, and temporarily paved. Within the traveled way in a direction crossing traffic flow, the open trench shall either be bridged or shall be backfilled, compacted, and temporarily repaved. Temporary paving shall be installed in accordance with the requirements of Section 14-4 of these Technical Specifications.

Temporary bridges placed over excavated trenches at street intersections, pedestrian crosswalks, driveways, and private roadways shall be provided by Contractor for the safe passage of pedestrian and vehicular traffic in accordance with Section 6-10 of these Technical Specifications.

Footbridges adequate for pedestrians shall have a minimum width of five feet (5'). The footbridges shall be designed and constructed to withstand a minimum uniform load of one hundred and fifty pounds per square foot (150 psf). Handrails and support posts shall be made with dressed lumber.

Bridges for vehicle traffic shall be a minimum of twelve feet (12') in width, skid resistant and structurally able to withstand an AASHTO H-20 vehicle load. Temporary bridges shall be installed over the trenches at all intersections whenever excavation is in excess of one-half the street width. Bridges shall also be provided at residential and commercial driveways for the safe access of vehicle traffic onto public streets.

All temporary bridges over excavated trenches shall remain in place for public safety and convenience during the duration of the work. At Contractor's risk, the bridges may be temporarily removed or relocated to accommodate the work as approved by the Engineer.

Unless directed or indicated otherwise, plug or seal the ends of existing pipes cut to install new pipe. As a minimum, provide temporary end covers to prevent dirt from entering pipes that are to be reconnected. The cut ends of abandoned pipes made of plastic, clay, Transite, concrete, or similar materials shall be permanently sealed with a concrete plug extending at least two feet (2') into the cut pipe. Use Class "C" or Class "D" concrete per Technical Specifications Section 10-5. Cut ends of abandoned steel pipes may either be plugged with concrete as above, or sealed by welding quarter inch ( $\frac{1}{4}$ " ) thick steel plates onto each end. Cut ends of abandoned pipe that will be removed do not require permanent seals.

When active water mains must be cut, Contractor shall anticipate that existing water system valves do not seal drip tight, and thus pipes downstream of existing valves may become pressurized. Seal the cut ends of active water mains with watertight 150 psi pressure rated end caps suitable for potable water use. Pressure rated end caps shall be left in-place until the cut pipe is restored, or the Engineer determines that the cut pipe is fully isolated and thus is no longer an active main. If end caps are removed from water mains to be abandoned, plug the exposed ends as described above.

Contractor shall be responsible for the control, removal, and disposal of any groundwater that may be encountered in the course of excavating and backfilling trenches or placing pipe. Whenever water or over-saturated soil conditions exist which may interfere with proper installation, trenches shall be dewatered before placement of any pipe or material. Unless approved in writing by the Engineer, groundwater and/or water from trench dewatering shall be free of sediment and other construction materials before entering the City storm

drain system. A dewatering plan, including a water de-sedimentation plan, shall comply with Section 16-1 of these Technical Specifications and be approved by the Engineer prior to any discharge of water to the City's storm drain system.

## **27-4 LAYING WATER PIPES**

### **1. General**

Contractor shall take all appropriate measures to prevent any type of foreign material or animals from entering the pipe while the water pipe is being placed. Contractor shall clean the inside of the pipe as directed by the Engineer.

Pipe for water mains shall not be placed during inclement weather or when the conditions in the trench will interfere with proper jointing of the pipe as determined by the Engineer. Whenever the work of placing the water main is discontinued and at the end of each workday, all open ends of water main pipe, fittings and valves at the pipe end shall be sealed. The seal shall be water tight and shall be easily installed and removed. The trench shall be temporarily backfilled to completely cover the seal.

All metallic pipe and fittings shall be wrapped with eight (8) mil polyethylene material in accordance with AWWA Standard C105/A21.5. Polyethylene shall be installed in accordance with the requirements of Section 27-17 "Corrosion Monitoring" in these Technical Specifications.

Pipe for the project shall not be stockpiled within public street right-of-way along the alignment of the water transmission main in excess of an amount representing a five (5) day supply at current rates of pipe laying, and shall never exceed a maximum length of five hundred feet (500') unless otherwise indicated in the Special Provisions. Stockpiling of pipe on the opposite side of the street from construction shall not be allowed without the approval of the Engineer.

Each section of pipe and each fitting shall be thoroughly cleaned before it is installed. All pipes, valves, fittings, and appurtenances shall be lowered into the trench in such a manner as to prevent any damage, particularly to the pipe lining and coating. Under no circumstance shall pipe or appurtenances be dropped into the trench.

The pipe shall be laid true and uniform to line and grade, with no visible change in alignment at any joint unless a curved alignment is shown on the Plans, in which case the maximum deflection at any joint shall not exceed two-thirds ( $\frac{2}{3}$ ) the manufacturer's recommendation for the type of pipe and joint being used.



All pipe jointing, including the deflection at joints in curved alignments, shall be in accord with accepted best practice and as detailed herein and in the manufacturer's installation manual. Both joint surfaces shall be clean before joints are made. Materials used to join the pipe shall only be that furnished with the pipe or recommended by the manufacturer.

When field cutting pipe, the cut ends shall be cut square and all burrs removed from the pipe interior. The beveling of the pipe ends shall be as specified by the manufacturer. Guide marks for jointing the pipe, after cutting, shall be made on the pipe in accordance with the manufacturer's recommendations.

Contractor shall prevent undue pipe deflection and/or unit loading during pipe handling. Damage to the pipe lining or coating shall be repaired by Contractor in accordance with the manufacture's recommendations as directed by the Engineer

## **2. Rubber Gasket Joints**

The joining of lengths of pipe with rubber gasket joints shall be performed in the following sequence and in accordance with the pipe manufacturer's recommendations:

- a. The spigot groove, inside bell sealing surface and rubber O-ring gasket shall be thoroughly cleaned.
- b. The above-cleaned surfaces shall be thoroughly lubricated with a soft, vegetable soap compound.
- c. The gasket shall be uniformly stretched while placing it in the spigot groove to assure a consistent volume of rubber distributed uniformly around the circumference.
- d. The pipe shall be joined by a firm horizontal push without binding.
- e. A feeler gauge shall be inserted between the bell and spigot to check the position of the rubber gasket around its periphery. If the gasket is in an improper position, it shall be removed, inspected, reassembled, and rechecked.

## **3. Field Welding of Pipe Joints**

Field welding of pipe joints for welded steel pipe and concrete cylinder pipe shall be performed in accordance with the requirements of AWWA C206,

AWSD 7.0 “Field Welding of Steel Water Pipe Joints” and Standard Drawings 8-54 and 8-55 in City of Colusa Improvement and Design Standards.

All welding, whether done in the shop or in the field, shall be performed by experienced and skilled operators familiar with the methods and materials to be used. Welding operators and welding procedures for all manual welding of joints and fittings shall be qualified in accordance with the standard qualifications procedure of Section IX of the ASME Boiler and Pressure Vessel Code. Welder operators shall be certified for three position welding in accordance with AWWA, ASME or other similar three position root bend test method of qualification.

All shop and field welding shall be performed by the submerged or shielded electric arc method unless specified in the Special Provisions. The minimum number of passes for welded joints shall be as follows:

<b>Steel Cylinder Thickness (inches)</b>	<b>Minimum Number of Passes for Welds</b>
Less than 0.25	2
Equal to or greater than 0.25	3

Welds shall be full circumferential and shall be done in passes no more than one-quarter inch (¼") in thickness. Welding electrodes shall comply with the requirements of American Welding Society A5.1 or A5.5. Size and type of electrodes and the magnitude of the voltages and currents used shall be consistent with methods, materials, and loads to be resisted.

Artificial cooling of the weld area during welding or quenching the completed weld is not permitted. The Engineer will have the option of requesting welding sample coupons for testing. The tests shall show the weld strength to be at least equal to the strength of the plates being welded to be acceptable.

Particular attention shall be given to the alignment of edges to be joined to allow complete penetration and fusion throughout the full depth of the weld. Welds shall contain no undercuts or valleys in the center or at the edges of the weld. Each weld pass shall be thoroughly cleaned of dirt, slag, and flux before each succeeding weld bead is applied.

Completed field welds of pipe joints shall be cleaned of dirt, slag and flux, and then visually inspected. Subject to the approval of the Engineer, all porosity and cracks, trapped flux, or other defects in the welds, discovered during inspection, shall be completely chipped out in a manner that shall allow proper

and complete repair by re-welding. Under no circumstances shall caulking of defective welds be permitted.

#### **4. Cement Mortar Joint Finish**

Following satisfactory testing of the welds, the interior of all joints shall be cement mortar lined and the exterior of the joints shall be cement mortar coated in accordance with AWWA C205 for welded steel pipe and AWWA C303 for concrete cylinder pipe.

The application of cement mortar to the joints on the exterior of the pipe shall be made after the pipe is adequately bedded. Interior joints shall be mortared after initial backfill is in place or after pipe is secured in or on a structure.

To minimize annular shrinkage cracks due to temperature change, exterior joints shall be poured when the pipe is cool. Water jetting to cool the pipe shall be done when the joint mortar is still in a plastic state and is protected from washing by canvas or impervious joint wrapping.

Cracks occurring in interior or exterior joint mortar shall not exceed four hundredths of an inch (0.04"). Where cracks exceed this limit, they shall be removed to the metal to a width of at least three eighths inch ( $\frac{3}{8}$ ") and new mortar set in.

##### **a. Exterior Joints**

After cleaning, a sail cloth band with three eighths inch ( $\frac{3}{8}$ ") wide steel box strapping attached to the two long ends shall be placed around the pipe outside and centered over the joint with the band, opening for grout on the pipe top. The strapping band shall fit snugly around the pipe.

The cement mortar shall consist of one (1) part Portland Cement to two (2) parts sand mixed to a consistency of thick fluid cream. After the joint is moistened, the cement mortar shall be poured into the joint recess on one side, rodded, if necessary, until it appears on the opposite side, then the remainder shall be poured. Portland Cement shall meet the requirements of Section 10 of these Technical Specifications.

The cement mortar shall completely fill the outside joint exposed metal annular space. Upon completion, the joint cover shall be placed over the opening and the mortar allowed to set.

**b. Interior Joints**

The cement mortar shall consist of one (1) part Portland Cement and one and one-half (1½) parts sand, dry mixed and wetted with sufficient water to permit caulking and troweling without crumbling or sloughing. Sufficient time shall be allowed for curing prior to use. Portland Cement shall meet the requirements of Section 10 of these Technical Specifications.

For pipe less than twenty-two inches (22”) in diameter cement mortar shall be placed in the inside recess prior to joining the pipe. After each new length of pipe has been placed in final position, a ball shall be pulled through the joint in order to smooth the mortar at the joint. This procedure is not necessary if a hand hole is used to mortar the joint.

For pipes greater than or equal to twenty-two inches (22”) in diameter, cement mortar shall be placed in the inside of recess while working inside the pipe. Foreign substances which adhere to the steel joint rings shall be removed, the surface cleaned, and stiff cement mortar packed into each joint. The mortar shall be finished with a steel trowel to match the lining in the adjoining pipes. Excess mortar and other construction debris shall be removed from the pipe interior.

Closure assemblies shall be cement-mortar lines to a mortar thickness at least equal to the adjoining standard pipe sections. The steel shall be cleaned with wire brushes and a cement and water wash coat applied prior to applying the cement mortar. Where more than a 4-inch joint strip of mortar is required, welded wire mesh reinforcement having a 2-inch by 4-inch pattern of No. 13 gage shall be placed over the exposed steel. The mesh shall be installed so that the wires on the 2-inch spacing run circumferentially around the pipe. The wires on the 4-inch spacing shall be crimped to support the mesh 3/8 inch from the metal surface. The interior mortar shall have a steel-troweled finish to match adjoining mortar lined pipe sections.

**5. Cleanup-Up Behind Pipe Laying Operations**

Contractor shall maintain cleanup operations in pace with pipe laying. Concurrently with or immediately after placing a temporary bituminous surface within paved areas, or the placing of backfill in unpaved locations, all areas affected by Contractor’s operations shall be restored to their original conditions (except for final repaved surfacing) and left in a neat and orderly condition.

Paved areas shall be swept with a power broom and then flushed with water.

Excavations at locations of valves, blow-offs, air relief valves, and tie-in connections shall not be left open without the Engineer's written permission.

Replacement of removed improvements or repairs to damaged or disturbed real property or improvements shall be performed concurrently with the cleanup work.

Failure to perform the above work in pace with the forward trenching progress shall be sufficient cause for the Engineer to order Contractor to stop trenching until the Engineer has determined that the work has been caught up.

## **27-5 PLACING LOCATING WIRE WITH DISTRIBUTION MAINS**

All runs of distribution mains (4" to 12") including metal and plastic shall have a locating wire taped to the top of the pipe to facilitate location after installation, as shown on Standard Drawing 8-1 in City of Colusa Improvement and Design Standards. The locating wire shall be a No. 10 gauge copper wire insulated with high molecular weight polyethylene (HMWPE), blue in color, and suitable for direct burial.

## **27-6 THRUST BLOCKING AND RESTRAINED JOINTS**

### **1. Distribution Main (4"-12")**

All plugs, caps, tees, or bends with a deflection greater than eleven and a quarter degrees ( $11\frac{1}{4}^\circ$ ) shall be provided with concrete thrust blocks installed as detailed on Standard Drawing 8-2. Nuts or bolt heads of bolted connections shall not be covered by concrete or form materials. The thrust block shall extend from the fitting to undisturbed soil.

Deadman thrust assemblies shall not be allowed without prior approval from the Engineer.

Mechanically restrained joints may be used in lieu of concrete thrust blocks when approved by the Engineer and shall be the type recommended by the manufacturer of the pipe.

### **2. Transmission Mains (Greater than 12")**

Contractor shall submit to the Engineer for approval, calculations for minimum lengths of restrained pipe where there is unbalanced hydraulic thrust, such as at abrupt changes in horizontal and/or vertical alignment, at tees, valves and caps. Thrust restraint calculations shall be based on an internal test pressure of two hundred and twenty-five pounds per square inch (225 psi). Any

demarcations of restrained joint requirements on the Plans indicate only possible segments for restrained pipe joints. Contractor is responsible for verifying the necessity of and minimum lengths for restrained joints. Concrete thrust blocking is not allowed.

Joints shall be restrained when deflection of the pipe at the joint exceeds two-thirds ( $\frac{2}{3}$ ) manufacturer's recommendation. Transmission mains constructed of welded steel pipe or concrete cylinder pipe shall be restrained by field welding the joints. Ductile iron pipe shall be restrained with Field Lok Gaskets, TR Flex, or an approved equal.

Thrust restraints for fittings, elbows, reducers, in-line valves, appurtenances, etc., shall be provided by means of restrained pipe joints, utilizing pipe skin friction for horizontal restraint, and dead load for vertical restraint (uplift). In-line valves shall be considered as a dead end main for thrust restraint calculations. Thrust forces shall be calculated using the internal diameter of the pipeline. Skin friction shall be calculated with allowance for pipe dead and live load. Earth load above the pipe when backfilling prior to testing, and a friction coefficient incorporating the properties of the actual backfill materials shall be used.

The friction coefficient shall not exceed 0.25 for C200 and C303 unless a geotechnical evaluation is submitted. In no case shall the friction coefficient exceed 0.30. For polyethylene encased ductile iron pipe, only skin friction between the encasement and the pipe shall be considered with no allowance for soil cohesion or the internal friction angle of the soil. The skin friction for polyethylene wrapped ductile iron pipe shall be reduced thirty percent (30%) to a maximum of 0.17 unless Contractor submits a geotechnical evaluation.

## **27-7 APPURTENANCES**

### **1. General**

Appurtenances shall comply with the material requirements of Section 10 of these Technical Specifications and shall be installed per the manufacture's recommendations. All new valves and hydrants to open counter-clockwise.

Appurtenances shall be installed at elevations and locations as shown on the Plans. The joints between the main pipe and side fittings shall be restrained in compliance with the Plans, Special Provisions, and these Technical Specifications. The trench bottom shall be graded uniformly to provide a level base for the fittings and minimize torsional strain when the backfill is placed.

On transmission mains, insulated flanged joints shall be provided at every butterfly valve, gate valve, flanged outlet, at each tie-in connection, at fire hydrant connections, at air release valves, at blow-off connections, at intervals of two thousand five hundred feet (2,500') along the water main pipe, and/or as

otherwise indicated on the Plans. Insulated joints shall be installed in accordance with the requirements of Section 27-17, "Corrosion Monitoring", and Standard Drawings 8-53 and 8-68 in City of Colusa Improvement and Design Standards.

Polyethylene material with a minimum thickness of eight (8) mil shall be placed around the exterior of the appurtenances in accordance with AWWA Standard C105/A21.5. Polyethylene shall be installed in accordance with the requirements of Section 27-17, "Corrosion Monitoring".

## **2. Fire Hydrants**

In no case shall a fire hydrant be installed within three feet (3') of a building or any other structure that would limit access. All hydrants shall be set plumb and installed and located in accordance with Standard Drawing 8-8 in City of Colusa Improvement and Design Standards.

Only ductile iron or polyvinyl chloride pipe shall be used as branch leads that connect fire hydrants to water mains.

Where the Plans indicate that existing fire hydrants are to be removed and salvaged, the salvaged hydrants shall be removed intact and delivered undamaged to the Corporation Yard as directed by the Engineer.

Fire hydrants placed at street intersections shall be installed at the beginning or end of round corners (curb returns) and not be positioned along the arc of the round corner.

Only one six inch (6') or twelve inch (12') fire hydrant extension kit per hydrant shall be allowed. Contractor shall meet the bury depth requirements by use of forty five degree (45°) fittings.

## **3. Gate Valves**

All gate valves shall be restrained in both directions.

Value operating nut extensions are required in accordance with Standard Drawing 8-19 in City of Colusa Improvement and Design Standards when valve nut is in excess of thirty inches (30") below finished grade.

Contractor shall carefully place valve into position, avoiding contact or impact with other equipment, or trench walls. The pipe ends shall be prepared in accordance with the manufacturer's instructions. The water main shall be properly supported to avoid line stress on valve. The pipe/valve joint shall not be deflected nor shall the valve be used as a jack to pull the pipe into alignment.

#### **4. Backflow Prevention Assemblies and Swing Check Valves**

The City maintains a backflow prevention and cross-connection control program in accordance with the requirements of Title 17 of the California Administrative Code. Backflow prevention assemblies shall be installed in accordance with the appropriate Standard Drawings in City of Colusa Improvement and Design Standards (Drawing Numbers 8-27 thru 8-37 and 8-34 thru 8-39). The backflow prevention assembly must be installed such that the device is readily accessible for testing and maintenance, and shall be located as close as practical to the point of service delivery (meter).

The City of Colusa Department of Utilities maintains a list of approved assemblies. Only assemblies that appear on this list are acceptable for installation. Assemblies shall be shipped from the manufacturers in the fully assembled configuration. This includes bypass arrangements and shutoff valves. Assemblies received for installation not completely assembled are not approved. Field conversions of double check assemblies to a detector assembly, or vice versa, are not permitted.

The City of Colusa's requirements for designing, constructing, installing, and maintaining backflow prevention assemblies is found in the Cross Connection Control Policy of Department of Utilities. Copies of the "Cross Connection Control Policy" are available from the Department of Utilities Customer Service at 1395 35th Avenue. Following acceptance of the installation, the device must be performance tested at the owner's expense by a certified tester selected from the City approved list.

All assemblies shall be installed to provide protection from vandalism and freezing. Cages must be installed so that adequate clearance is available for maintenance and testing or it should be completely removable and allow for any discharge from the relief valve to fully drain from the protective cage or cover.

As a minimum, backflow prevention assemblies shall be sized equivalent to the diameter of the service connection. The installation of backflow prevention assemblies shall be aboveground.

#### **5. Blow-Offs**

##### **a. Distribution Mains**

Standard two inch (2") and four inch (4") blow-offs shall conform to and be installed in accordance with Standard Drawing 8-13 in City of Colusa Improvement and Design Standards.

##### **b. Transmission Mains**



Blow-offs shall be six inches (6") in size and shall conform to and be installed in accordance with Standard Drawings 8-50 or 8-51 in City of Colusa Improvement and Design Standards.

**6. Butterfly Valves**

Butterfly valves shall conform to and be installed in accordance with Standard Drawing 8-42 in City of Colusa Improvement and Design Standards.

Value operating nut extensions are required in accordance with Standard Drawing 8-19 in City of Colusa Improvement and Design Standards when valve nut is in excess of thirty inches (30") below finished grade.

Contractor shall carefully place valve into position, avoiding contact or impact with other equipment, or trench walls. The pipe ends shall be prepared in accordance with the manufacturer's instructions. The water main shall be properly supported to avoid line stress on valve. The pipe/valve joint shall not be deflected nor shall the valve be used as a jack to pull the pipe into alignment.

**7. Combination Air Vacuum and Release Valves**

Combination air vacuum and release valves shall be two inches (2") or four inches (4") in size, as indicated on the Plans. Installation of air vacuum and release valves shall conform to and be installed in accordance with Standard Drawings 8-43 thru 8-48 in City of Colusa Improvement and Design Standards.

**8. Flexible Couplings and Flanged Coupling Adaptors**

**a. Transmission Mains**

The flexible couplings shall be installed with provision for thrust restraint ties attached to the water main pipe. The thrust restraint ties on the pipe shall be welded lugs, lugs cast integrally with the pipe, or friction collars. Anchor studs placed perpendicular to the long axis of the pipe are unacceptable. Resistance to hydraulic thrust shall be adequate to sustain a force developed by a test pressure of two hundred and twenty-five pounds per square inch (225 psi).

Flanged coupling adaptors shall be provided with thrust ties attached to the pipe with welding lugs, cast-in-place lugs, or friction collars. Lugs shall have a minimum thickness equal to that of adjacent flange and shall have holes the same size as those on the flange. Anchor studs placed perpendicular to the longitudinal axis of the pipe are unacceptable.

Contractor shall ensure that the pipe is in proper alignment. Contractor shall clean all dirt, rust, oil or loose scale from pipe ends for a distance of two inch (2") greater than the length of the flanged coupling. Contractor shall check area where gaskets will seat on pipe and flange faces to make sure there are no dents, projections, gouges, etc. that will interfere with the gasket seals. Welds must be ground flush. Bolt tightening should be done evenly, alternating to diametrically opposite positions to bring bolts to recommended tightness.

**b. Distribution Mains:**

Flexible couplings shall be installed with provisions for thrust restraint.

**9. Mechanical Joints**

Contractor shall thoroughly clean socket and plain end of all rust or foreign material. The socket, gasket and plain end shall be lubricated with soapy water or an approved pipe lubricant meeting requirements of AWWA C111. The bolts shall be tightened to draw gland toward the pipe flange evenly, maintaining approximately the same distance between the gland and the face of the flange at all points around the joint using torque-measuring wrenches.

**10. Valve Boxes**

Valve boxes shall be furnished and installed in accordance with Standard Drawings 8-15, 8-16, and 8-17 in City of Colusa Improvement and Design Standards.

**11. Access Manholes**

Installation of access manholes shall conform to and be installed in accordance with Section 25 and Standard Drawing 8-40 in City of Colusa Improvement and Design Standards.

**27-8 PIPE BEDDING AND BACKFILLING OF TRENCHES**

Pipe bedding and initial backfill for water mains, fire hydrant branch leads, and water services shall be furnished and placed according to the requirements contained herein and as detailed on Standard Drawing 4-20 in City of Colusa Improvement and Design Standards. The pipe bedding and initial backfill material shall consist of sand meeting the requirements as given in Section 10-13 of these Technical Specifications unless otherwise specified in the Special Provisions.

Bedding material shall be placed and compacted along the bottom of the trench to provide uniform support for the water main pipe at every point between the joints. Support of the pipe by wedging or blocking shall not be permitted. At the location of each joint, holes of adequate size shall be provided in the bottom and sides of the trench to permit easy joint preparation, pipe assembly, and visual inspection of the entire joint.

Initial backfill shall be placed immediately after pipe joints have been completed, inspected, and passed by the Engineer. Trench backfill shall be earth material, unless otherwise specified in the Special Provisions, placed and compacted above the granular bedding and initial backfill material to the level of the subgrade in paved areas or to the top of the trench in unpaved areas. Backfill shall be provided by Contractor and shall be placed in accordance with Section 14-3 of these Technical Specifications and the pipe manufacturer's recommendations.

Imported granular material may be used to backfill pipe trenches in place of job excavated native material. The imported granular material placed above the initial backfill shall be uniformly graded Class 2 aggregate base, meeting the requirements of Section 10-7 of these Technical Specifications. Compaction and placement requirements for imported granular material shall be the same as required for compaction of job excavated native material.

Full depth select or imported backfill will be required under the following circumstances:

1. At locations where over excavation is required, i.e., butterfly valves, blow-offs, system tie-in connections, insulated joints, etc.
2. At locations where pipes for sewage or drainage cross above the water transmission main pipe.
3. In areas where the trench section is of unusual configuration.
4. Jacking and receiving pits for the boring and jacking of pipe casings.

Full depth select backfill shall be placed in layers not exceeding eight inches (8") in depth and shall extend to the level of subgrade road subbase and to undisturbed earth on the sides. Compaction and placement requirements for full depth select backfill shall be the same as required for compaction of job excavated native material. Unless otherwise specified on the Plans or Special

Provisions, full depth select backfill material shall consist of sand, Class 2 aggregate base or controlled density fill (CDF) meeting the requirements of Section 10 of these Technical Specifications.

## **27-9 REPAVING WATER PIPE TRENCHES**

Repaving of trenches for water mains, fire hydrant branch leads, and water services shall be as specified in this Section of these Technical Specifications unless otherwise indicated on the Plans or in the Special Provisions

Contractor shall restore all surfaces, which have been removed or damaged by Contractor in kind, using the same material as existing, unless otherwise noted on the Plans or in the Special Provisions. The repaving is to be done in such a manner to, as closely as possible, replace the cut pavement with a similar type and an equal or greater structural section.

Upon completion of trench backfill, existing pavement as well as any curbs, gutters and sidewalks that have been cut or damaged as a result of the construction activities shall be replaced. The replacement of pavement, curb, gutter or other improvements shall match that of the original as close as practical unless otherwise indicated on the Plans. Segments of pavement that were damaged during construction shall be cut to a neat straight line. To form the required "T" trench, the existing pavement shall be ground or saw cut an additional six inches (6") outside the excavated area prior to paving. The minimum pavement section within public street right-of-way shall be four inches (4") of asphaltic concrete over twelve inches (12") of Class 2 aggregate base unless otherwise noted on the Plans or in the Special Provisions.

Aggregate base for repair and/or replacement of existing pavement shall meet the requirements for Class 2 aggregate base as contained in Section 10 of these Technical Specifications. Aggregate base shall be placed and compacted in accordance with Section 14 of these Technical Specifications, except that it shall be compacted to a relative compaction of not less than ninety-five percent (95%) as measured by tests specified in Section 14 of these Technical Specifications.

Asphaltic concrete pavement and its placement shall conform to the requirements of Section 22 of these Technical Specifications.

Restoration of existing concrete pavement shall consist of at least six inches (6") of concrete and shall conform to the requirements of Section 19. Concrete surfaces to be replaced shall be colorized, as necessary, to match existing adjacent concrete color by the addition of Lamp Black coloring agent. Contractor shall submit concrete mix design for approval including a proposed proportion of coloring agent appropriate to the shade of adjacent concrete.

Where entire alley requires replacement, concrete shall not include coloring agent, unless directed by the Engineer.

Concrete used in the repair and/or replacement of curb, gutter, or sidewalk shall conform to Section 24-1 of these Technical Specifications. Concrete used in the replacement of existing concrete "V" gutter or pavement shall be Class "A" concrete in accordance with Section 10 of these Technical Specifications. Placement of concrete shall conform to the requirements of Section 24 of these Technical Specifications.

Where less than two feet (2') of existing pavement is left between the edge of the trench and the lip of concrete gutter or pavement edge, the narrow strip of existing pavement shall be removed and the area repaved along with the area overlying the trench. All existing asphaltic concrete or concrete pavement adjacent to the pipe trench that has been loosened, cracked, or damaged as a result of Contractor's operations shall be removed and replaced.

Unless otherwise provided on the Plans or in the Special Provisions, pipeline trenches in unpaved portions of street rights-of-way shall have the top twelve inches (12") filled with aggregate base Class 2, conforming to Section 10 of these Specifications and compacted to ninety-five percent (95%) relative compaction as determined by ASTM Designation D1557.

All pavement debris and other excavated material not destined to be used for backfill shall be removed and disposed of outside the limits of the project at Contractor's expense.

## **27-10 WATER SERVICES**

Materials for services shall meet the requirements specified in Section 10 and shall be installed in accordance with the Standard Drawings. All new and reconnected services shall be metered.

The location of water services extending beneath curbs, gutters and sidewalks shall be denoted by imprinting a two inch (2") size Gothic letter "W" on the upper face of the curb, unless otherwise directed by the Engineer.

Service saddles for one inch (1"), one and a half inch (1½") and two inch (2") services shall be installed in accordance with Standard Drawing 8-23 in City of Colusa Improvement and Design Standards. Three inch (3") services are not allowed. A three inch (3") meter shall be installed on a four inch (4") tap. Tapping sleeves for services four inch (4") and larger shall have a stainless steel sleeve and stainless steel flange.

Gate valves for water services four inches (4") and larger in diameter shall be installed at the main with a flanged connection and shall include a valve box and riser. Boxes and risers shall be as specified in and installed in accordance with Standard Drawing 8-15 in City of Colusa Improvement and Design Standards.

No hydrant branch lead, services or fitting (tee, ell, etc.) shall be tapped to accommodate any service.

## **27-11 WATER TAPS TO NEW AND EXISTING MAINS**

Prior to scheduling taps on new or existing water mains, Contractor shall provide the Engineer a copy of a bacteriological report showing that all piping including on-site fire services, private fire hydrants, and domestic services meet the requirements of these Technical Specifications.

Water taps on new mains prior to being accepted by the City shall be made by Contractor. Water taps on existing City mains shall only be made by City crews at Contractor's expense.

For any given project, a maximum of two (2) water main shutdowns, water main tie-in connections (tap or "cut-in"), or combination thereof directly involving work by the City crews, shall be scheduled per day. Such work performed by City crews will be between 9:00 am and 3:00 pm. Modification to this procedure may be requested by Contractor and will be considered on a case-by-case basis with the final determination to be made by the Engineer.

Contractor shall notify the Engineer that a shutdown is required and the City will schedule the shutdown within five (5) working days of notification. The Engineer will notify Contractor of the time of shutdown at least two (2) working days prior to the shutdown. Contractor shall excavate around the water main, per Standard Drawing 8-24, twenty-four (24) hours prior to the City tapping the water main.

Any change made to the vertical and horizontal alignment of water services shall be made behind the sidewalk and outside the City right-of-way. Within the City right-of-way the water services shall be installed perpendicular to the main.

## **27-12 DISINFECTION OF WATER MAINS**

### **1. General**

The intent of this section is to present procedures essential for the disinfection of newly constructed water mains and appurtenances. No new mains shall be connected to existing mains until they have been disinfected in

accordance with this section, and pressure tested in accordance with Section 27-13 in these Technical Specifications. All disinfection and testing shall be made in the presence of the Engineer. The basic procedure consists of the following:

- a. Preventing contaminating materials from entering the water mains during construction.
- b. Disinfecting any residual contamination that may remain.
- c. Determining the bacteriological quality by laboratory testing after disinfection.

Contractor shall furnish all hoses, pumps, gauges, connections, valves, other necessary apparatus, and personnel required for disinfecting, flushing, and disposal of chlorinated water.

Precautions shall be taken to protect pipe interiors, fittings, and valves against contamination during the construction of the water system.

Chlorination and testing of the pipeline shall be in accordance with AWWA C 651 with the following exception: the first bacteria sample after flushing the main is not required. Water distribution mains up to and including twelve inches (12") in diameter shall be disinfected using the Tablet Method or Continuous-feed Method described in AWWA C 651. Water transmission mains eighteen inches (18") in diameter and greater shall be disinfected using the Continuous-feed Method described in AWWA C 651.

Disinfecting the pipeline may be performed concurrently with the hydrostatic testing in accordance with Section 27-13. In the event repairs are necessary, as indicated by the hydrostatic test, additional disinfecting may be required as directed by the Engineer.

## **2. Tablet Method**

The Tablet Method shall employ the use of a sufficient number of calcium hypochlorite tablets as a disinfectant to yield an average chlorine dose of approximately twenty-five milligrams per liter (25 mg/l). The five-gram (5g) calcium hypochlorite tablets shall contain at least sixty-five percent (65%) available chlorine by weight. These tablets shall meet the requirements of AWWA B 300, standard for hypochlorites.

Because preliminary flushing cannot be performed when tablets are used, cleanliness must be exercised during construction of the water main.

The calcium hypochlorite tablets shall be placed in each section of pipe and also in hydrants, hydrant branches and other appurtenances. They shall be attached by an adhesive at the top of the pipe to prevent washing to the pipe end. If the tablets are fastened before the pipe section is placed in the trench, their position shall be marked on the section to assist in keeping the tablet's position at the top of the pipe.

Number of 5 Gram Calcium Hypochlorite Tablets*					
Pipe Diameter (Inches)	Length of pipe section (feet)				
	13 or less	18	20	30	40
4	1	1	1	1	1
6	1	1	1	2	2
8	1	2	2	3	4
10	2	3	3	4	5
12	3	4	4	6	7

\*Based on 3.25 grams of available grams of chlorine per tablet. Any portion of tablet rounded to next highest number.

The adhesive shall be Permatex No. 1, or approved equal. There shall be no adhesive on the tablet except on the broad side next to the surface to which the tablet is attached. The number of calcium hypochlorite tablets required for main disinfections shown by the table above.

**3. Continuous Feed Method**

The continuous feed method consists of completely filling the main to remove all air pockets, flushing the completed main to remove particulates, and filling the main with chlorinated potable water so that after a twenty four (24) hour holding period in the main there will be a free chlorine residual of not less than ten milligrams per liter (10mg/l) at all locations in the main.

Prior to being chlorinated the main shall be filled to eliminate air pockets and shall be flushed to remove particulates. The Flushing velocity in the main shall be not less than two and a half feet per second (2.5fps) unless otherwise directed by the Engineer.

A chlorine-water solution shall be applied by means of a solution feed chlorinating device. Care shall be taken to prevent the highly chlorinated water in the pipeline being treated from flowing back into the pipeline supplying the water. At a point not more than ten feet (10') downstream from the beginning of a new main, the concentrated chlorine solution shall be pumped into the main



at a uniform feed rate until the desired chlorine residual (at least 25mg/l) is measured in the flushed water at the terminal outlet. Chlorine application shall not cease until the entire main is filled with chlorinated water. If at any time the application of chlorine is interrupted, the flow of water shall be stopped until chlorine application is resumed.

#### **4. Pipeline Filling**

Before filling the pipeline, Contractor shall:

- a. Remove any and all residual water from the entire pipeline to be tested.
- b. Open all air vents.
- c. Furnish a double check valve assembly to make a single supply connection for testing. Installation of the double check valve assembly shall be in accordance with Standard Drawing 8-6 in City of Colusa Improvement and Design Standards. A double check valve assembly hook-up to the City water system must be approved by the Engineer prior to water use. The double check valve assembly shall be approved by a certified tester. The certification tags shall be displayed on the double check valve assembly after approval.

Each section of the pipe to be disinfected shall be slowly filled with water at a velocity of less than one foot per second (1fps), and all air shall be expelled from the pipe. The release of the air can be accomplished by opening fire hydrants and service line cocks at the high points of the system and blow-offs at all dead ends. If required, Contractor shall provide a corporation stop at high points to provide air vents and insure that all air is released. The valve controlling the admission of water into the section of pipe to be disinfected should be opened wide before shutting the hydrants or blow-offs. After the system has been filled with water and all the air expelled, all the valves controlling the section to be tested shall be closed.

#### **5. Disinfection, Flushing and Testing**

The disinfection, flushing and testing sequence shall be as follows:

- a. Chlorination and testing of the pipeline shall be in accordance with AWWA Standard C651 with the following exception: the first bacteria sample after flushing the main is not required.
- b. The heavily chlorinated water shall be retained in the main for at least twenty-four (24) hours, during which time all valves and

hydrants shall be operated to ensure disinfection of the appurtenances. At the end of the twenty-four (24) hour period, the main shall have a residual of not less than ten milligrams per liter (10 mg/L) of free chlorine or the disinfection procedure shall be repeated using the continuous-feed or other method described in AWWA C651 as directed by the Engineer.

- c. Contractor shall flush the main until the chlorine residual is less than one part per million (1.0 ppm) or matches distribution system chlorine residual level and turbidity is less than one nephelometric turbidity unit (1.0 NTU). The chlorinated water shall be flushed from the system at its extremities and at each appurtenance, using potable water from a source designated by the Engineer. The minimum water velocity during flushing shall be two and a half feet per second (2.5 fps) or as directed by the Engineer. Temporary inlets/outlets shall be sized to provide adequate velocity to flush the main. The minimum inlet/outlet size shall be two inches (2") in diameter.
- d. Samples will be collected at locations along the pipeline identified by the Engineer. Contractor shall notify the Engineer at least twenty-four (24) hours in advance of the time that the bacteriological samples are to be drawn for testing. Contractor shall furnish and install temporary sampling devices in accordance with Standard Drawing 8-14 in City of Colusa Improvement and Design Standards at the locations indicated by the Engineer spaced no greater than twelve hundred feet (1200') apart.
- e. Twenty-four (24) hours after flushing the chlorinated water from the main the Engineer will collect samples for testing.
- f. Bacteriological examination of the samples shall meet the following criteria:
  - i. Total Coliform absent
  - ii. Total Plate Count less than five hundred (500) colony forming units per milliliter

Re-disinfection, if required due to test failure, shall be performed by Contractor at Contractor's expense. Cost to retest the water will be at Contractor's expense.

The water shall meet State and Federal drinking water standards; Title 22, California Administrative Code and the Safe Drinking Water Act of 1974, as amended.

#### **6. Disposal of Chlorinated Water**

After disinfection of the system and prior to coliform bacteria and turbidity testing, chlorinated water shall be disposed of such that water does not flood, inundate or damage property. Contractor shall dechlorinate the water by use of apparatus that injects or mixes EPA approved chemicals with the water to neutralize the chlorine before it is hard piped to a manhole on the nearest storm or sanitary sewer system. Residual chlorine levels shall be reduced and maintained to a maximum of one hundredth of a milligram per liter (0.01 mg/l). Contractor shall test the discharge at fifteen minute (15) intervals to insure that acceptable levels of neutralization are maintained. Discharge shall be stopped if chlorine levels exceed one hundredth of a milligram per liter (0.01 mg/l).

Dechlorinating apparatus shall be the de-chlorinator by Romac Industries or approved equal. All procedures shall be in accordance with manufacturer's recommendations and as approved by the Engineer.

### **27-13 PRESSURE TESTING WATER MAIN INSTALLATIONS**

Following disinfection, Contractor may use the chlorinated water to perform a hydrostatic pressure test of the system. Prior to making final tie-in connections, the entire system shall be pressure tested by Contractor independent of the existing system or systems to be connected.

Contractor shall furnish all hoses, pumps, pressure gauges, leakage measuring devices, connections, relief valves, temporary pressure heads, other necessary apparatus, and personnel required for hydrostatic pressure and leakage testing. Pressure gauges shall register pressure in pounds per square inch gauge (psig). The range of the gauge shall be from zero to two hundred and seventy-five pounds per square inch gauge (0-275 psig). The gauge readings shall have a five (5) psig incremental tick marks. The gauge shall be calibrated within forty-five (45) days of the hydrostatic test and the calibration tag affixed to the gauge.

In no case shall there be placement of permanent pavement prior to successful completion of the test. Joints and fittings must be backfilled to the springline of the pipe and the pipe between joints backfilled to a depth necessary to hold the line securely during the test, but in no case less than eighteen inches (18") above pipe. Thrust blocks shall have been in place for at least thirty-six (36) hours if high-early-strength concrete was used or at least seven (7) days if standard concrete was utilized.

A hydrostatic test pressure of one hundred fifty pounds per square inch gauge (150 psig) shall be maintained for 60 minutes. The allowable leakage criterion is “zero”. No leakage, as represented by a measurable drop in pressure below the starting test pressure, is allowed.

Contractor shall determine the cause of unacceptable leakage results, take corrective measures, and conduct subsequent tests until the pipeline meets the allowable leakage criteria. Contractor shall perform any excavation required to locate and repair leaks or other defects that may develop during the test, including removing backfill that has been already placed. The Engineer shall witness the test and Contractor shall provide the Engineer a forty-eight (48) hour notice prior to the test.

Contractor at his expense shall repair any leaks detected by visual inspection regardless whether test results are acceptable.

Contractor shall take all necessary precautions to prevent joints from drawing while the pipelines and their appurtenances are being tested. Any damage to the pipes and their appurtenances, or any other structures, resulting from or caused by these tests, shall be repaired by Contractor at Contractor’s expense.

#### **27-14 “CUT-IN” CONNECTION TO EXISTING WATER MAINS**

Connection of new water mains to existing mains shall be made only after the newly constructed water mains have been successfully disinfected and pressure tested including onsite fire systems and domestic services.

Contractor shall furnish and install all pipe, fittings, and valve boxes necessary to complete the “cut-in” as shown on Standard Drawing 8-4 in City of Colusa Improvement and Design Standards.

City crews shall perform all shutdowns of existing water mains. See Section 27-11 for water main shut down procedure.

Contractor shall expose the existing water main at the “cut-in” locations per Standard Drawing 8-24 and shall have all material necessary to complete work onsite at least one day prior to the scheduled “cut-in” to the satisfaction of the Engineer. Contractor shall have all necessary manpower and equipment ready at the time of the scheduled “cut-in” necessary to be able to complete the “cut-in” within four (4) hours of the shutdown to the satisfaction of the Engineer. Failure to comply with above-specified requirements shall result in the cancellation of the scheduled shutdown.

New pipe, fittings and valves required for connection but not included in the hydrostatic pressure testing and disinfection procedures shall be disinfected prior to connection in accordance with AWWA Standard C651 relating to “Connections Equal To or Less Than One Pipe Length”.

In the connection of new water mains to existing mains, any offset in horizontal or vertical alignment between the exposed ends of new and existing water main pipes that is six inches (6”) or greater shall be taken up by the use of elbow fittings. Ninety degree (90°) elbows shall be used only with the Engineer’s approval. Deflection of the pipe joints or the use of flexible couplings shall not be permitted.

### **27-15 SETTING, ADJUSTING AND LOCATING VALVE BOXES**

For all new water valves installed, Contractor shall furnish and install valve box-es, covers, drop caps, and steel risers in accordance with Standard Drawings and 8-16 in City of Colusa Improvement and Design Standards. Unless otherwise shown on the Plans, or specified in the Special Provisions, in construction areas involving elevation changes or where existing valve boxes or risers are disturbed, or as indicated on the Plans, Contractor shall furnish and adjust to final grade all existing valve boxes in accordance with Standard Drawings 8-15, 8-16 and 8-17 in City of Colusa Improvement and Design Standards. All non-steel risers shall be replaced with steel risers in accordance with Standard Drawings 8-15 and 8-17 in City of Colusa Improvement and Design Standards. When approved by the Engineer, Contractor may reuse existing valve boxes that meet these Standards Specifications and are in an undamaged condition.

All water valve boxes removed for subsequent reinstallation to allow reconstruction of existing streets shall be temporarily replaced with a protective metal container. The temporary container shall cover the riser over the valve and will assist in keeping the location of the valve visible during street reconstruction activities, the risers at each valve shall be kept free of debris and the valve operating nut left exposed.

Prior to construction Contractor shall furnish locations or swing ties to all existing valves within the streets to be resurfaced. A copy of the valve location measurements shall be provided for the Engineer prior to any street construction or resurfacing.

### **27-16 ADJUSTING AIR RELEASE VALVES**

Contractor shall install new or adjust existing air valve box or manhole head and cover in accordance with Standard Drawing 8-43 thru 8-46 in City of Colusa Improvement and Design Standards.

All precast concrete sections used to construct the vaults or manholes for air release valves shall be set in Portland Cement mortar or preformed plastic sealing compound. The preformed plastic sealing compound and the mixing of the mortar shall meet the requirements specified in Section 10-37 of these Technical Specifications.

The interior and exterior surfaces of the joints of the precast concrete sections shall be coated with Portland Cement mortar. The precast sections shall be cleaned and moistened immediately prior to setting the sections in the mortar. A moistened brush shall be used to apply and smooth the mortar to the interior and exterior joint surfaces of the precast concrete sections.

## **27-17 CORROSION MONITORING**

### **1. General**

All metallic pipe and appurtenances larger than 12” in diameter shall be bonded such that all joints and fittings are electrically continuous, except across insulated joints. Contractor shall furnish and install the corrosion monitoring system components as indicated on the Plans and these Technical Specifications. Material shall be as specified in Section 10 and this section of these Technical Specifications. All corrosion monitoring equipment shall be supplied by a manufacturer regularly engaged in the production of such equipment. Equipment shall not be installed without prior review and approval by the Engineer.

Contractor shall install each system component in a workmanlike manner and in strict conformance with the latest edition of the following standards.

NEC - NATIONAL ELECTRICAL CODE  
NEMA - NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION  
ASTM - AMERICAN SOCIETY FOR TESTING AND MATERIALS  
IEEE - INSTITUTE OF ELECTRICAL AND ELECTRONIC ENGINEERS  
ANSI - AMERICAN NATIONAL STANDARD INSTITUTE  
IPCEA - INSULATED POWER CABLE ENGINEERS ASSOCIATION  
OSHA - OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION  
NACE - NATIONAL ASSOCIATION OF CORROSION ENGINEERS  
UL - UNDERWRITERS LABORATORIES

All electrical equipment and materials and the design, construction and installation thereof shall comply with all applicable provisions of the National Electric Code (NEC) and applicable local codes and regulations.

Corrosion Specialist shall refer to a California registered Corrosion Engineer or NACE certified Corrosion Protection Specialist.

The system shall be complete and in a satisfactory operating condition at the time of acceptance of the work.

## 2. Equipment Locations

The locations of corrosion monitoring equipment, devices, outlets, and appurtenances as indicated on the Plans are approximate only. Exact locations shall be per these Specifications, unless otherwise determined by the Engineer.

Contractor shall verify in the field, all data and final locations of work done under other sections of these Technical Specifications required for placing of the electrical work.

## 3. Test Stations/Traffic Valve Boxes

Test stations shall be provided where shown on the Plans, and shall conform to the Standard Drawing 8-57 in City of Colusa Improvement and Design Standards. Test stations for insulated joints shall conform to the Standard Drawing 8-56 in City of Colusa Improvement and Design Standards. Test stations for anodes shall conform to the Standard Drawing 8-64 in City of Colusa Improvement and Design Standards. Test station junction boxes shall conform to the Standard Drawing 8-58 in City of Colusa Improvement and Design Standards.

Attachment of wire identification tags, split bolts and shunts shall be made as stated in these Technical Specifications.

At a minimum, test stations shall be installed as follows:

- **Insulated Joint Test Stations (IJTS)** - Shall be installed at all isolation points (such as isolation gaskets) on pipelines larger than 12” in diameter.
- **Corrosion Monitoring Test Stations (CMTS)** - Shall be installed on transmission mains every 1000-ft at readily identifiable locations (such as hydrants, air-vacs, or tie-in points). Corrosion Test Stations are not required if another test station is connected to the pipe addressing the 1000-ft spacing.
- **Foreign Pipe Test Stations (FPTS)** - Shall be required where high voltage power, or high pressure metallic gas pipelines, cross within 2-feet from a new transmission main, unless otherwise directed by Engineer.
- **Anode Test Station (ATS)** - Shall be installed where foreign pipe test stations are not permitted by the foreign pipeline owner to be installed (in order to negate possible stray current impacts).
- **Casing Test Stations (CTS)** - Shall be installed where transmission mains are encased within a metallic casing. Casing Test Stations shall be installed on both the entry and exit points of the casing, unless the casing is less than 30-feet in length at which time only one Casing Test Station is required.

Anodes and grounding beds shall be installed at test stations as required by the Engineer.

Junction boxes for test stations shall be B9X Utility Boxes, as manufactured by Christy Products Inc., or 36 Box as manufactured by Brooks Products or equal. Junction boxes covers shall be steel checker plates with welded bead legend "Test Station" and shall be installed out of traffic lanes.

#### **4. Test Boards**

Panel boards for test stations shall be made of phenolic plastic one-quarter inch ( $\frac{1}{4}$ " ) thick and sized as shown on Standard Drawings 8-59, 8-60, and 8-65 in City of Colusa Improvement and Design Standards. Solderless copper lugs and capacitors shall be installed on the panel boards as shown on the Details. Shunts for the anode junction boxes shall be one-hundredth (0.01) ohm, eight (8) ampere, manganin wire type, as indicated. Shunts shall be as manufactured by Holloway or equal.

#### **5. Wire**

Conductors shall consist of solid or stranded copper of the gage as shown on the Standard Drawings in City of Colusa Improvement and Design Standards. Wire sizes shall be based on American Wire Gage (AWG). Copper wire shall be in conformance with ASTM Designations B3 and B8.

Wires buried in the ground shall be laid straight, without kinks and shall have a minimum cover of twenty-four inches (24"). The bottom of the finished trench shall be free from stones, roots or other materials that may damage the wire during or after installation.

Each wire run shall be continuous in length and free of joints or splices. Care shall be taken during installation to avoid punctures, cuts, or other damage to the wire insulation. Damage to insulation will require replacement of the entire length of wire.

At least eighteen inches (18") of slack shall be left for each conductor at each test station housing. Slack in the wire shall be sufficient to allow removal of wire extension for testing. Wire shall not be bent into a radius of less than eight (8) times the diameter of the wire.

The wire attached to the anodes shall be (AWG) stranded, single conductor, copper and insulated for six hundred (600) volts. Wire size shall be minimum No. 10 AWG THWN and conform to the requirements of ASTM D 2220 and NEMA WC-5. Connection of wire to the anode shall have a pulling strength,



which shall exceed the tensile strength of the wire. Any damage to the wire insulation or anode shall require complete replacement of the wire and anode.

The anode manufacturer shall conduct and report resistance tests performed on each anode wire connection to assure the finished connection does not exceed four-thousandths (0.004) ohms. These resistance tests shall be performed with a Kelvin bridge circuit or equal. All anode wire connections that have a resistance value of greater than four-thousandths (0.004) ohms shall require replacement by the anode supplier prior to shipment. An accurate record of tests shall be submitted by the anode supplier to the Engineer.

Anode wires shall be of one continuous length without splices from the anode connection to the respective Junction Box. Anode wires with the attached anode shall be shipped to the job site with the wire wound on a reel. The minimum core diameter of the reel shall be five and a half inches (5½”).

Wire identifiers shall be installed in conformance with Standard Drawing 8-66 in City of Colusa Improvement and Design Standards. Wire identifiers for anodes shall be the wrap around type with a high resistance to oils, solvents, and mild acids. Marker shall fully encircle wire with imprinted alphanumeric characters for pipe identification. Wire identifiers shall be placed on the wires prior to backfill, using nylon straps.

Red caution tape three inches (3”) in width shall be installed above buried wire and conduits at a maximum depth of eighteen inches (18”) below grade over the wire and conduit location.

Unless otherwise permitted by the Engineer, wire colors shall be as follows:

- White - new pipe or valve
- Red - existing pipe or insulated pipe
- Yellow - permanent reference electrode
- Black - anode
- Green - casing or foreign pipe

## **6. Exothermic Welds**

Exothermic welds shall be provided for cable to structure connections in strict accordance with the manufacturer’s recommendations. Connections shall be made in accordance with Standard Drawing 8-62 in City of Colusa Improvement and Design Standards.

The shape and charge of the exothermic weld shall be chosen based on the following parameters:

- Pipe material
- Pipe size
- Wire material
- Number of strands to be welded
- Orientation of weld (vertical or horizontal)

Type of exothermic weld to be used shall be submitted to the Engineer for approval. Exothermic weld connections shall be installed in the manner and at the locations shown on the plans. Coating materials shall be removed from the surface over an area of sufficient size to make the connection. The steel surface shall be cleaned to white metal by grinding or filing prior to welding the conductor. The use of resin impregnated grinding wheels will not be allowed. The conductor shall be welded to the pipe by the exothermic welding process with a copper sleeve fitted over the conductor. Only enough insulation shall be removed such that the copper conductor can be placed in the welding mold. After the weld has cooled, all slag shall be removed and the metallurgical bond shall be tested for adherence to the pipe or casing. All defective welds shall be removed and replaced. Connections to the piping shall not be buried prior to inspection and approval by the Engineer.

Exothermic welds shall be tested by Contractor for adherence to the pipe or casing and for electrical continuity between the pipe or casing and wires. A twenty-two ounce (22oz.) hammer shall be used for adherence testing by striking a blow to the weld. Care shall be taken to avoid hitting the wires.

## **7. Field Repair of Coatings**

After installation of coated items, contractor shall repair damaged shop-applied coatings and coat field welds with the coating manufacturer's recommended repair material. Contractor shall furnish all materials, clean surfaces, and repair any damage to protective coatings and linings damaged as a result of the welding. This shall be done in accordance with these specifications.

For ductile iron or dielectrically coated steel, the coating shall be a bitumastic coating as listed in these specifications. All surfaces must be clean and dry and free of oil, dirt, loose particles, and all other foreign materials prior to application of the coating. Exothermic welds shall be coated and then covered with a plastic weld cap.

For cement mortar lined and coated pipe or concrete cylinder pipe, the coating shall match the exterior mortar.

For epoxy-coated appurtenances, Contractor shall use an epoxy-coating touch-up kit. Prior to coating, surfaces shall be cleaned and ground to bare metal. Apply one or two coats as required to obtain a dry film thickness of eight (8) mils minimum using brush or spray. Brush shall be used for touch-up work of

less than three square feet (3 sf). Field repairs shall comply with the recommendations of the coating manufacturer.

#### **8. Bitumastic Coating**

Bitumastic coating shall be TC Mastic, as manufactured by Tapecoat Company, Bitumastic 505 as manufactured by Koppers Company, Inc. or approved equal.

Contractor shall furnish all materials, clean surfaces, and repair any damage to protective coatings and linings damaged as a result of the welding. This shall be done in accordance with these specifications.

#### **9. Weld Caps**

Weld caps shall be Royston Handy Cap, as manufactured by Royston Laboratories, Incorporated, Thermite Weld Cap, as manufactured by Phillips Petroleum Company, or an approved equal.

#### **10. Insulating Flange Kits**

Insulating flange kits shall be installed to effectively isolate metallic piping from foreign metallic structures. Flange insulators shall be installed as shown on Standard Drawings 8-53 and 8-68 in City of Colusa Improvement and Design Standards.

Insulating flange gaskets shall include full-faced gaskets, insulating washers and sleeves, and steel washers. The complete assembly shall have a pressure rating equal to that of the flanges between which it is installed. Gaskets shall be neoprene faced phenolic, 1/8-inch thick having a high dielectric constant. Insulating sleeves shall be fabric reinforced resin, 1/32-inch thick. Insulating washers shall consist of two sets of 1/8-inch thick neoprene faced phenolic, having a high dielectric constant.

The central gasket shall have a minimum electrical resistance of eighteen thousand megohms (18,000mΩ) for flanged joints larger than twelve inches (12”) in diameter and sixteen thousand megohms (16,000mΩ) for flanged joints twelve inches (12”) in diameter and smaller, be temperature rated to one hundred and fifty degrees Fahrenheit (150°F), and possess a water absorbency of no more than five (5) percent when tested in accordance with ASTM D 229.

Steel washers shall be stainless steel (Type 316) and fit well within the bolt facing on the flange. Insulating washers shall fit within the bolt facing the flange over the outside diameter of the sleeve.

Bolts and nuts used for insulated flanged joints shall be stainless steel (Type 304) and shall conform to ASTM F593, Group 1, and ASTM F594, Group 1, respectively.

Insulating flange kits shall be installed to effectively isolate metallic piping from foreign metallic structures. Contractor shall test the performance of these insulating flange kits prior to backfill. An electric resistance test of at least fifty thousand ohms (50,000Ω) shall be performed on all insulated joints after each joint installation has been completed. If the results of the test for electrical resistance are less than fifty thousand ohms (50,000Ω), the joint shall be inspected for damage, repaired, as needed, and retested.

## **11. Joint Bonds**

Bond cables or clips shall be provided across flexible couplings on steel pipe, cement mortar coated steel cylinder pipe joints, and ductile iron pipe joints as necessary to ensure electrical continuity. Joint bonds shall be installed as shown on Standard Drawings 8-61, 8-62, and 8-63 in City of Colusa Improvement and Design Standards. Bond wires shall have minimal slack in the wire at each weld but otherwise be as short as possible.

After installation, all joint bonds shall be tested for effectiveness. The testing shall be performed prior to backfill of the pipe and shall be verified upon completion of backfilling operations. Prior to backfilling, current shall be circulated through the pipe and the measured resistance shall be compared to the theoretical resistance of the pipe and bond cables. The resistance measured shall not exceed one hundred and twenty percent (120%) of the theoretical resistance.

## **12. Polyethylene Encasement**

Polyethylene encasement shall completely encase and cover all metal surfaces to form a continuous and all-encompassing layer of polyethylene between the iron and the surrounding earth or backfill material. Polyethylene encasement material shall conform to AWWA C 105.

Pipe: All ductile-iron pipe shall be encased with polyethylene sleeves in accordance with Method A described in AWWA C 105, or with polyethylene wrap in accordance with Method C described in AWWA C 105.

Fittings: Fittings such as tees, bends, reducers, and flanged outlets shall be encased with polyethylene wrap in accordance with AWWA C 105.

Valves: Valves shall have only the stem and operating nut exposed and the wrap shall be attached so that valve operation will not disturb the wrapping or break the seal.

Polyethylene sleeves shall be secured with polyethylene or vinyl adhesive tape or plastic tie straps at the ends and quarter points along the sleeve in a manner that will hold the sleeve securely in place during backfill. Polyethylene wrap shall be secured with polyethylene or vinyl adhesive tape in a manner that will hold the wrap securely in place during backfill.

### **13. Magnesium Anodes**

Magnesium anodes shall be “High Potential” magnesium anodes of the following composition, percent by weight:

- Aluminum 0.01% max
- Manganese 0.50 - 1.30%
- Copper 0.02% max
- Nickel 0.001%max
- Iron 0.03% max
- Other 0.05% each or 0.30% max total
- Magnesium Remainder

The anodes shall be prepackaged in a cloth bag containing backfill of the following composition; seventy-five percent (75%) gypsum, twenty percent (20%) bentonite and five percent (5%) sodium sulfate. The magnesium anodes shall be of the size indicated and placed where indicated. Cable for the anodes shall be black, No. 10 AWG THWN, stranded, and of sufficient length to extend to the junction box without splicing.

Anodes shall be cast with a galvanized steel core strap. One end of the anode shall be recessed to provide access to the rod for connection of the lead wire. The lead wire shall be silver brazed to the rod, making a mechanically secure connection. The connection shall be insulated to a six hundred volt (600v) rating by filling the recess with asphaltic concrete. The asphaltic concrete material shall be extended over the lead wire insulation by not less than one half inch ( $\frac{1}{2}$ ”). Contractor shall repair all damaged lead wire insulation as directed by the Engineer and at no additional cost to the City.

Prepackaged anodes shall be installed at the locations indicated. Plastic or paper wrap shall be removed from the anode prior to lowering the anode into the hole. Anodes shall not be suspended by the lead wires. When compacted soil is required and has been placed to the top of the anode and prior to the filling of the hole with soil, a minimum of 10 gallons of water shall be poured into the hole to saturate the anode backfill and surrounding soil.

Backfilling with native soil shall proceed in six inch (6”) lifts, compacting the soil around the anode during each lift until the backfill has reached grade.

Damage to the canvas bag, anode to wire connection, copper wire or wire insulation will require replacement of entire assembly.

Anodes shall not be backfilled prior to inspection and approval of the Engineer.

#### **14. Zinc Grounding Mats**

Zinc grounding mats shall be installed when pipelines are exposed to high voltage and stray current impacts are possible.

Where installed, zinc anodes shall be 99.99 % zinc bars, conforming to ASTM B-418, zinc grounding mat shall be 5/8 inch x 7/8 inch and 180 feet long zinc ribbon anode. Cable for the grounding mat shall be Black, No. 8 AWG HMWPE, stranded, and of sufficient length to extend to the test station without splicing.

The wire attached to the grounding mat shall be (AWG) stranded, single conductor, copper and insulated for 600 volts. Wire size shall be minimum #8 AWG HMWPE and conform with the requirements of ASTM D-1248, Type 1, Class C, Grade 5, and IPCEA-NEMA S-61-402. Connection of wire to the grounding mat shall have a pulling strength which shall exceed the tensile strength of the wire. Any damage to the wire insulation or grounding mat will require complete replacement of the wire and grounding mat.

The grounding mat supplier shall conduct and report resistance tests performed on each wire connection to assure the finished connection does not exceed 0.004 ohms. These resistance tests shall be performed with a Kelvin bridge circuit or equal. All wire connections that have a resistance value of greater than 0.004 ohms shall require replacement by the supplier prior to shipment. An accurate record of tests shall be submitted by the grounding mat supplier to the Engineer. The records shall include, as a minimum, six (6) copies of the following information:

- Grounding mat numbering system to identify anode under test
- Grounding mat wire length
- Resistance value as indicated by test
- Test equipment
- Test method

The supplier shall mark the reel holding the wire for shipment to the job site with the same numbering system used on the test records and the total length of attached grounding mat wire.

Grounding mat wires shall be of one continuous length without splices from the connection to the respective test station as shown on the Plans. Grounding mat wires with the attached mat shall be shipped to the job site with the wire wound on a reel. The minimum core diameter of the reel shall be 5- 1/2 inches. The anode wire insulation shall be free of surface damage such as nicks, abrasions, scratches, etc. in all respects throughout the entire length of the wire. Precaution shall be taken during fabrication, transportation and installation of the anodes to see that the wire is not kinked or sharply bent. Bends sharper than 2-1/2 inches in radius are not permissible.

## **15. System Check-Out**

Upon completion of the installation, Contractor shall provide testing of the system by a qualified Corrosion Specialist, approved by the Engineer, to ensure compliance with the Plans and these Technical Specifications. The testing by the Corrosion Specialist shall be in addition to, and not a substitution for, any required testing of individual items at the manufacturer's plant or in the field by Contractor.

### **a. Testing**

The following test results shall be submitted to the Engineer:

- i. Continuity test report
- ii. Insulator test results
- iii. Initial pipe-to-soil potential survey
- iv. On-off potential survey (when sacrificial or impress current cathodic protection systems are in place)

The assembled flange shall be tested with a Gas Electronics Model 601 Insulator Checker or equivalent instrument that is specifically designed for the testing of insulating flanges. The testing shall be done in accordance with NACE RP0286-97. If a short is indicated, each bolt shall be tested to verify the integrity of each insulating sleeve before the flange is disassembled. Contractor shall provide assistance in finding any and all shorts or shorted bolts.

Contractor shall locate and repair any defects that may become apparent during testing. All efforts by Contractor to test and repair defects, including excavation and replacement of backfill that has been already placed, will be at Contractor's expense. The system will not be considered free from defects until the Corrosion Specialist retests and confirms that all defects have been eliminated.

**b. Written Report:**

The Corrosion Specialist retained by Contractor shall prepare a final report that contains the following:

- i. Verification that all test stations have been installed properly.
- ii. Verification that all insulating flanges have been tested with an approved test instrument and that all have passed. If the pipe-to-soil potential on each side of the insulating flange has less than 10-mV difference between them, additional testing with a temporary impressed current system shall be conducted to confirm insulation.
- iii. Field continuity test data, calculations of actual (measured) pipe resistance from the data and calculations of the theoretical resistance for each section of pipe tested. The report shall include a statement that each section of pipe that contains a bonded or mechanical joint was tested and that the resistance of each section tested was less than or equal to one hundred and twenty percent (120%) of the theoretical resistance.
- iv. Verification that all casings are isolated from the pipe.
- v. Tabulation of all pipe-to-soil potential survey data.
- vi. Verification that all anodes are “high potential” anodes.
- vii. Other information that the Corrosion Engineer believes is pertinent with respect to the corrosion status or long-term performance of the pipeline or structure installed.

**27-18 PAYMENT FOR FURNISHING AND INSTALLING WATER DISTRIBUTION SYSTEMS**

Unless unit bid prices are required by the Special Provisions, payment for the item “Water Distribution System to construct” shall be made at the lump sum price. Such payment shall be full compensation for furnishing all labor, material, tools, and equipment and doing all work involved in cutting, trenching, laying, blocking, making connections, disinfecting, testing, backfilling, and paving or repaving, as required herein, on the Plans or in the Special Provisions.



additional compensation will be allowed for rebound.

## **Section 34**

### **ELECTRICAL**

#### **34-1 GENERAL**

The electrical work to be done consists of furnishing all labor, materials, transportation, tools, equipment and appurtenances required for the complete installation and testing of all electrical systems shown on the Plans, and as specified in these Technical Specifications and Special Provisions.

All equipment, materials and supplies shall be new and currently manufactured unless otherwise specified. All equipment shall be complete and in operation to the satisfaction of the Engineer at the time of acceptance of the work.

All incidental parts which are not shown on the Plans or specified herein and which are necessary to complete the traffic signal and street lighting systems shall be furnished and installed as though such parts were shown on the Plans or specified herein.

For specifications not covered by these Technical Specifications, the latest State of California Transportation Plans and Specifications shall apply.

#### **34-2 RULES AND REGULATIONS**

Electrical equipment furnished shall conform to the standards of the National Electrical Manufacturers Association, the Underwriters' Laboratories, Inc., or the Electronic Industries Association, wherever applicable. All material and work shall conform, where applicable, to the requirements of the National Electrical Code; Title 8, California Administrative Code, Electrical Safety Orders; Rules for Over Head Electrical Line Construction, General Order No. 95 of the Public Utilities Commission; Standards of the American Society for Testing and Materials (ASTM); American National Standards Institute (ANSI); and City of Colusa ordinances governing such types of construction.

#### **34-3 EQUIPMENT LIST AND DRAWINGS**

Unless otherwise permitted in writing by the Engineer, Contractor shall, within twenty (20) days following notification of award of the Contract, submit to the Engineer for approval a listing of equipment and material which he proposes to furnish and install. The list shall be complete as to name of manufacturer, size and catalog number of units, and shall be supplemented by

other data, including detailed scale drawings and wiring diagrams. All data shall be submitted to the Engineer for review and approval.

Contractor shall submit to the Engineer a statement from each vendor supplying electrical equipment, including but not limited to, traffic signal controllers and cabinets, signal and pedestrian displays, pedestrian pushbuttons, traffic signal standards, streetlight standards, luminaires, service pedestals, conduits, conductors, pull boxes and all other electrical equipment indicating that the orders for the materials required for this contract have been received and accepted by said vendor. The confirmed date of delivery to Contractor shall be indicated on the statement.

Prior to acceptance of the work, Contractor shall submit to the Engineer a "Record Drawing" showing in detail all construction changes, especially location and depth of conduit and completed schematic circuit diagram. All construction changes, if any, shall be entered onto the Record Drawing by Contractor at the end of each work day and the plan shall be available for inspection by the Engineer at any time.

#### **34-4 SCHEDULING OF WORK**

Contractor shall submit a schedule of work to the Engineer or Inspector at the pre-construction meeting and within 5 days of the Engineer's written request at any other time. The schedule shall show the order of work in which the Contractor proposes to carry out the work, and the schedule shall show the proposed dates of work.

Contractor shall not perform electrical work above ground at any location until all electrical materials have been received by Contractor. Contractor may place electrical service pedestals and underground infrastructure such as conduit, pull boxes and foundations prior to receiving all electrical materials, upon approval of the Engineer.

#### **34-5 MAINTENANCE OF TRAFFIC AND PUBLIC SAFETY**

Contractor shall have an approved traffic control plan showing proposed traffic control measures and detours for vehicles and pedestrians prior to starting any construction work. Contractor shall submit a proposed plan for review, comments, and approval approximately ten (10) working days prior to the start of any work.

Contractor shall furnish all labor, materials, tools, equipment, and incidentals required for the maintenance of traffic and public safety to adequately safeguard the general public and the work in accordance with the requirements of Traffic Control Requirements of these Specifications.

### **34-6 EQUIPMENT TO BE SUPPLIED**

All equipment, material and supplies called for in the Special Provisions shall be new, free of defects, and currently manufactured items, unless otherwise specified. All equipment shall be complete and in operation to the satisfaction of the Engineer at the time of acceptance of the work.

All incidental parts which are not shown on the Plans or specified herein and which are necessary to complete the project shall be furnished and installed as though such parts were shown on the Plans or specified herein.

For Capital Improvement Projects, all equipment, materials, or supplies to be considered as an approved equal must be submitted to the City for approval no less than ten (10) calendar days prior to the bid opening date. If the City finds said equipment, materials, or supplies to be acceptable, an addendum will be issued notifying all bidders by the close of business on Friday before the bid opening date. If there is no addendum accepting an approved equal, bidders shall submit bids based on the original specified equipment, materials, or supplies.

### **34-7 PROTECTION OF EXISTING IMPROVEMENTS**

Existing improvements, utility and adjacent property shall be protected from damage resulting from Contractor's operations. All trees, shrubbery, fences, walls, and other improvements including existing pavements, sidewalks, street improvements and underground utilities and other improvements not to be removed under this contract shall be protected from damage by Contractor throughout the construction period.

Contractor shall notify the Traffic Signal Maintenance Section of the Department of Transportation two (2) days prior to key cutting or planing within three hundred feet (300') of any signalized intersection to enable location of buried detector or signal interconnect wiring to be identified.

All painted or other disfiguring markings on the pavement, sidewalk or gutters shall be removed by Contractor before acceptance of the work.

Contractor shall be liable for costs or repairing damage to existing improvements.

The contractor will ensure that utility services to customers in the project area are maintained.

The Contractor is responsible for the protection of and for damage to

existing overhead and underground utility lines and services encountered during the course of construction. The Contractor shall notify the respective utility owner prior to any interruption of service.

The Contractor is expected to "pothole" existing underground utilities a minimum of ten (10) working days in advance at any location where an existing utility may be in conflict with the proposed work.

The cost of relocating existing overhead or underground utilities not specified on Plans to be relocated, but which the Contractor elects to relocate or cut and reconnect for his/her own convenience, shall be borne by the Contractor.

### **34-8 MAINTAINING EXISTING ELECTRICAL FACILITIES**

All existing streetlights and traffic signals shall be maintained in operation until replacement standards are energized, as directed by the Engineer or Inspector.

All new traffic signal heads and pedestrian signal heads installed but not operational shall be entirely covered with burlap and securely tied to prevent exposure of signal head face to vehicular or pedestrian traffic.

The modification of existing traffic signal intersections may require the temporary shutdown of the traffic signals. Contractor shall take all steps necessary to keep traffic signal intersection downtime to a minimum. The work shall be scheduled so that the downtime of each intersection shall be four (4) hours maximum and shall occur during the hours of 9 A.M. and 3 P.M. or as directed by the Engineer. Contractor shall notify the Engineer five (5) working days prior to a traffic signal intersection shutdown.

### **34-9 FOUNDATIONS**

Concrete Foundations for ornamental streetlights shall conform to the latest Caltrans Standard Specifications, Section 49 Cast-In-Place Concrete Piling, unless otherwise specified.

Concrete Foundations for traffic signal standards shall conform to the latest Caltrans Standard Specifications, Section 49 Cast-In-Place Concrete Piling for Cast In Drilled Hole Concrete Piling, unless otherwise specified.

Concrete Foundations for service pedestal pads shall use the latest Caltrans Standard Specifications, Section 87 for Concrete Pads, Foundations, and Pedestals and Section 90 Minor Concrete, unless otherwise specified.

Foundations for traffic signal and streetlight standards shall be poured monolithically. Grout shall be placed from the top of the foundation to the bottom of the traffic signal standard. The exposed portion of the foundation shall be formed to present a neat appearance. Tops of foundations for standards shall be finished to curb or sidewalk grade as shown on the Plan or as directed by the Engineer.

When a foundation is to be abandoned in place, the top of foundation, anchor bolts and conduits shall be removed to a depth of two feet (2') below the surface of sidewalk or unimproved ground. The resulting hole shall be backfilled with material equivalent to the surrounding material.

### **34-10 EXCAVATING AND BACKFILING**

The excavations required for the installation of conduit, foundations and other appurtenances shall be performed in such a manner as to cause the least possible injury to the streets, sidewalks, and other improvements. All lawns or improvements disturbed in excavating shall be replaced or reconstructed with the same kind of material as found on the work or with materials of equal quality.

The trenches shall not be excavated wider than necessary for the proper installation of the electrical appurtenances and foundations. Excavating shall be performed immediately before installation of conduit.

The material from the excavation shall be placed in a position that will not cause damage or obstruction to vehicular and pedestrian traffic nor interfere with surface drainage.

Permission to cut or disturb the pavement in any street must be obtained from the Engineer.

Whenever a part of a square or slab of existing concrete sidewalk or driveway is broken or damaged or removed, the entire square or slab shall be removed and replaced to the nearest score mark or joint.

For trenching in dirt, backfill material shall be placed in six inch (6") layers. Each layer of backfill shall be moistened as directed by the Engineer and thoroughly tamped, rolled or otherwise compacted until the relative compaction is not less than ninety-five percent (95%). Compacting of backfill material by pounding or jetting will not be permitted.

The type of concrete used and its color shall match the adjacent concrete construction. The cost of said concrete work will be at the expense of Contractor. Concrete sidewalks shall have a minimum thickness of three and

one-half inches (3½”) and the minimum thickness of concrete driveways shall be six inches (6”).

All surplus excavated material shall be removed and disposed of within the same day of work. All sidewalks and gutters shall be washed down and swept clean.

### **34-11 CONDUITS**

Conduits to be installed shall be either rigid mild steel, hot dipped galvanized conduits or Schedule 40 polyvinyl chloride conduit. The same type of conduit shall be used for the entire system.

#### **1. Requirement for Rigid Galvanized Steel Conduit**

The rigid steel conduit and fittings shall be hot-dipped galvanized inside and outside for corrosion resistance and shall be non-combustible and specifically designed for underground, exposed outside use.

The rigid galvanized steel and fittings shall be thoroughly cleaned and all burrs removed. The use of thin-wall conduit is specifically prohibited for underground installation.

Exterior and interior surfaces of all conduit and fittings shall be uniformly and adequately zinc coated by the hot-dipped galvanizing process.

The interior of the conduit shall have a continuous coating of lacquer or enamel. Each length shall bear the label of Underwriters' Laboratories, Inc. and manufactured in accordance with ANSI. Installation shall conform to appropriate articles of the Code.

Rigid steel conduits shall be a minimum of one and one-half inches (1½”) in diameter. It will be the privilege of Contractor, at his own expense, to use larger size conduit if desired. Where larger size conduit is used, it shall be for the entire length of the run from pull box to pull box. No reducing couplings will be permitted in any run. All conduit bends, except factory bends, shall have a radius of not less than six (6) times the inside diameter of the conduit.

Where factory bends are not used, conduit shall be bent, with approved hydraulic bender, without crimping or flattening, using the longest radius practicable. All conduit ends shall be threaded and capped until wiring is started. When caps are removed, conduit ends shall be provided with approved grounding conduit bushings.

Conduit stubs, caps, exposed threads, and all standard screw joints shall be painted with zinc rich paint or an equal rust preventive paint.

## **2. Requirements for Schedule 40 Polyvinyl Chloride Conduit**

Polyvinyl chloride conduit (PVC) shall be ninety degrees (90°) C rated and listed by the Underwriters Laboratories. Conduit shall be fabricated from polyvinyl chloride and shall conform to NEMA Standards. It shall be in conformance with Article 347 of the National Electrical Code. Conduit, fittings, and cement shall be produced by the same manufacturer. Conduit shall meet the crush rating listed in UL651 Standards. Schedule 40 conduit shall be rated for use with 90 degree conductors.

All PVC conduits shall be a minimum of one and one-half inches (1½”) in diameter. Where larger size conduit is used, it shall be for the entire length of the run from pull box to pull box. No reducing couplings will be permitted in any run. All conduit ends shall have the appropriate conduit bushing and shall be sealed in an approved manner until wiring is started. Unless otherwise specified, all PVC conduits shall contain a minimum of one No. 10 green ground conductor.

Duct seal shall be installed on all conduits. All new conduits starting and terminating in pull boxes shall have end bells.

High Density Polyethylene (HDPE) Conduit shall be manufactured to UL 651A specifications, compliant with NEC Article 353, and be of Schedule 40. HDPE shall have high tensile strength to weight ratio, crush resistance, low coefficient of friction for directional drilling.

## **3. Requirements for Conduit Installation**

The installation of conduit in paved streets shall be accomplished by directional drilling method or by trenching.

In sidewalk areas, conduit shall be laid to a depth of not less than eighteen inches (18”) below the sidewalk grade. In all other areas, conduit shall be laid to a depth of not less than thirty inches (30”) below the finished grade.

Conduit runs shown on the Plans to be located in the street, under street pavement, shall be installed in the street within a minimum of twelve inches (12”).

When a conduit is shown on the Plans as lying in a straight line parallel to the curb line, sidewalk, or pavement edge, it shall not deviate more than six inches (6”) to either side of the designated straight parallel line.



In order to determine that conduit is laid to the correct depth and in as straight a line as possible, Contractor shall cause test or pilot holes to be dug at a spacing of not over seventy-five feet (75') and no such hole shall be backfilled until approved by the Engineer or his representative.

The bending of PVC conduit shall be by a hot box bender, and in lieu of jacking or boring, PVC conduit shall be installed by the drill rod method in which a drill rod is first installed and the PVC is pulled into the cavity made by the drilling rod as the rod is removed. At locations where conduit is not installed by the said trenching method, the conduit shall be installed by the drill rod method.

Before any wire is pulled in the conduit system, all conduit shall be free of any foreign material that is in the conduit. The removal of foreign material from the conduit with compressed air is approved.

Conduit entering controller cabinet or service cabinet shall be sealed by the use of a sealing compound approved by the Engineer.

Conduits terminating in pull boxes, standards, pedestals, and cabinets shall rise vertically and shall not slope in any direction. Conduits terminating in standards, pedestals, and cabinets shall terminate one and one-half inches (1½") above finished grade. Conduits shown on the Plans to be adjacent and parallel to each other shall be installed in the same trench or drill hole unless otherwise specified or directed by the Engineer.

Contractor shall replace roadway striping and markings with same material if damaged by directional drilling, bore pits, potholes, or trenching. Replacement striping and markings shall be thermoplastic or paint, per the City of Colusa Standards.

The installation of conduit in lawn areas shall be done by approved boring method or by trenching. If trenching is used, Contractor shall first remove the sod before trenching. All sod removed shall be replaced within forty-eight (48) hours.

#### **4. Trenching Installation of Conduit in Paved Streets**

For trenching in roadway, the Contractor shall use the City of Colusa "T"-trench method.

Trenches shall be backfilled or covered at the end of each work day. All conduit installed by trenching shall be anchored every 10 feet to the bottom of the trench, with an approved method, to prevent the conduit from floating when the concrete is backfilled into the trench.

Trenches in reconstructed roadways shall be backfilled with Slurry Cement Backfill as defined in Section 10 of these Technical Specifications. A red oxide in the amount of 5 lbs. per cubic yard shall be mixed uniformly throughout the slurry cement.

Trenches in existing roadways shall use the “T-Trench” method. The portion over the trench shall be paved with City Standard asphalt concrete, per Section 22 of the City Technical Specifications. Trenches shall be backfilled with Slurry Cement Backfill as defined in Section 10 of these Technical Specifications. A red oxide in the amount of 5 lbs. per cubic yard shall be mixed uniformly throughout the slurry cement.

Trench shall not exceed six inches (6”) in width. The top of the installed conduit shall be a minimum of twenty-four inches (24”) below finish grade.

The outline of all areas of pavement to be removed shall be cut to a minimum depth of four inches (4”) with an abrasive type saw or with a rock cutting excavator specifically designed for this purpose. The outline area shall extend 6” beyond both sides of the conduit trench (6” in maximum).

Cuts shall be neat and true with no shatter outside the removal area. Contractor shall not cut with saw or rock cutting excavators within 24 inches of either side of located or marked buried electrical conduit. At these locations Contractor shall daylight or pothole to continuing a saw cut.

The trenching machine shall be shielded to prevent loose material from being thrown away from the machine. Loose material deposited on the pavement behind the cutting machine shall be removed from the pavement immediately and the pavement cleared to allow the passage of traffic. Only those traffic lanes occupied by the cutting machine and the cleanup operation shall be closed and they shall be opened as soon as the work has moved sufficiently to clear them.

Spreading and compacting of asphalt concrete shall be performed by any method which will produce an asphalt concrete surfacing of uniform smoothness, texture, and density.

Excavation, installation of conduit and concrete backfill shall be completed within the same working day. Asphalt concrete backfill shall be completed within twenty-four (24) hours after excavation of trench.

Upon completion of all contract work, the trenches cut through existing pavement will be inspected and, if found necessary by the Engineer, they will be brought to grade with an appropriate asphaltic concrete mix. In addition to

bringing the trenches to grade, the Engineer may require a twelve inch (12”) wide fog seal centered over the trench pavement or between the trench pavement and the existing street pavement.

## **5. Directional Drilling Method of Conduit in Paved Streets**

Conduits shall be installed such that the top of the conduit(s) are not less than eighteen inches (18”) below the finished grade in sidewalk areas and not less than thirty inches (30”) in all other areas except as otherwise specified or directed by the Engineer.

Prior to the start of directional drilling, the Contractor shall submit a plan which identifies location and size of proposed drill holes, describes process for identifying/locating existing utility services and other underground utilities or obstructions, identifies a proposed “drilling corridor” to avoid conflicts with existing utilities, services and other facilities. This plan shall be submitted to the Engineer a minimum of ten (10) working days prior to the start of work. The Contractor will not be allowed to directional drill until an approved plan is on file with the Engineer

Directional drilling shall be performed by the technique of creating and directing a bore hole along a predetermined path to a specified targeted location where indicated on the plans to install conduits. The technique shall involve the use of mechanical and hydraulic equipment to change the boring course and shall use instrumentation to monitor the location and orientation of the boring head assembly along the predetermined course. Drilling shall be accomplished with fluid-assisted mechanical cutting. Unless otherwise approved, boring fluids shall be a mixture of bentonite and water or polymers and additives. Bentonite sealants and water will be used to lubricate the drilling head. It is mandatory that minimum pressures and flow rates be used during drilling operations so as not to fracture the subgrade material around and/or above the bore. Uncontrolled jetting (where the primary purpose is to use fluid force to erode soil for creation of the final bore hold diameter) is prohibited. The drilling system shall utilize small-diameter fluid jets to fracture, and mechanical cutters to cut and excavate the soil as the head advances forward.

All drilling shall be located a minimum of three feet (3’) from the center of all existing maintenance holes. Drilling that run parallel to any sanitary sewer or storm drainage lines shall maintain a minimum clearance of three feet (3’) measured from the centerline of the sewer or drainage line to the adjacent side of the drill hole. Drilling that crosses any sewer or drainage line shall cross at 90 degrees to the line or at a minimum of 45 degrees if a 90 degree crossing is not possible.

Each bore pit shall be restored to original roadway conditions.

### **34-12 PULL BOXES**

Pull boxes shall be installed in the sidewalk at the locations shown on the Plans or at locations designated by the Engineer at site of work. When pull boxes are shown on the plans or designated by the Engineer to be in the sidewalk the entire square or slab shall be replaced as specified in section 34-9 of these specifications. Contractor shall cut, remove, and replace the concrete to the nearest joint when installing new pull boxes. For pull boxes to be removed, holes or depressions resulting from the removed pull box shall be filled, compacted, brought to grade, and filled to match surrounding materials.

Pull boxes shall be precast reinforced concrete boxes, unless otherwise noted. Each box shall be set in concrete with a minimum of six inches (6") of concrete on all four sides. The six inch (6") thick sides shall be a minimum of twelve inches (12") deep. The pull box shall rest on crushed rock foundation. The crushed rock foundation shall have a minimum of 12" of depth and extend a minimum of 6" beyond the outside edge of the pull box. Compact crushed rock while maintaining integrity of conduit. Conduit and pull box shall not be damaged nor cracked.

All new pull boxes shall be set in place prior to pouring any new sidewalk.

Concrete pull box covers shall be protected during construction. Damaged covers must be replaced with new covers by the Contractor.

Existing pull boxes damaged by the installation of new conduits shall be removed and replaced at the Contractor's expense as directed by the Engineer

For traffic signal systems, pull boxes shall have reinforced concrete covers and shall be inscribed "Traffic Signals". Locking pull box lids are not permitted to be used for traffic signal systems, unless otherwise specified by the Engineer or shown in the Plans.

For street lighting systems, pull boxes shall have galvanized steel locking security lids, unless otherwise specified by the Engineer or shown in the Plans.

Pull boxes shall not be set in driveways, vehicular traveled lanes or in any part of a new sidewalk curb ramp area including the sidewalk ramp area of ADA compliant driveways.

Where SMUD service points are designated on the plans, pull boxes for SMUD service conductors shall meet SMUD specifications.

Unless otherwise specified, all pull boxes for street lighting systems shall be CALTRANS Standard No. 5 size, and all pull boxes for traffic signal systems shall be CALTRANS Standard No. 6, unless otherwise specified in the Plans. Pull box extension shall be furnished and installed where called for on the Plan. Where a pull box extension is to be installed over the ends of existing conduits, the conduit ends shall be raised or lowered so they will be a minimum of five inches (5") and a maximum of seven inches (7") below the underside of the pull box cover. No more than two (2) extensions may be used.

### **34-13 CONDUCTORS**

Unless otherwise specified, conductors shall be single conductor, solid or stranded copper of the gauge shown on the Plans. Wire sizes shall be based on American Wire Gauge (AWG). Copper wire shall conform to the applicable portions of ASTMs B3 and B8. Contractor shall use color coded wires, using a different color for each circuit with continuous color maintained throughout each circuit. Color coding shall be as required by the Engineer or as detailed on the Plans or Special Provisions. Where permitted by the Engineer, conductor of the same color may be used on different circuits. These conductors shall be identified with approved metal tags.

Traffic signal and multiple circuit lighting conductors shall be rated for 600 volt operation. The insulation for the conductors shall be Type THW. Insulation types THHN and THWN are not approved for installation.

All conductors of AWG #10 or larger (such as #1, #6, #8, #10) shall be identified by printed and embossed labels, unless otherwise specified in the Plans or by the Engineer. Both printed and embossed labels shall clearly identify the UL listing, insulation type, voltage rating, AWG number, and the City of Colusa. The printed label and the embossed label shall be placed at approximately 90 degrees separation around the center of the conductors. Labels shall appear every one foot interval. Embossed labels shall be between 0.002" to 0.003" in depth and shall not damage the conductors. Label heights shall be no less than 3/32" for AWG #8 or larger, and shall be no less than 2/32" for AWG #10.

Three feet of slack conductors shall be provided in pull box.

### **34-14 DETECTOR LOOP AND HANDHOLE**

Detector loop installation includes installing conductors, sealant, conduit, detector handholes, and pull boxes.

## **1. Detector Loop Conductors**

Each loop conductor shall be continuous, un-spliced, RHW-USE neoprene jacketed or Type USE cross-linked polyethylene insulated No. 12 stranded copper wire. Conductor insulation thickness shall be 40 mils minimum.

## **2. Detector Loop Conductor installation**

Loop Conductor installation shall conform to the Caltrans Standard Plans. Detector loops shall be installed in the center of traffic lanes. Splices are not permitted in the detector loop.

Each loop shall have three (3) turns of conductors for each detector loop. Unless otherwise shown or noted on the Plans, each new detector loop shall be centered in the travel lane.

Slots cut in the pavement shall be blown out with compressed air and dried and inspected for any sharp objects or corners which shall be removed prior to installation of loop conductors.

Test each loop for continuity, circuit resistance, and insulation resistance before filling the slots with sealant.

Remove excess sealant from the adjacent road surface before it sets. Do not use solvents to remove the excess.

Loop conductors shall be installed without splices and shall terminate in the nearest pull box. The detector loops shall be joined in the nearest pull box. Final splices between loops and lead-in cable shall not be made until the operation of the loops under actual traffic conditions is approved by the Engineer. Each detector loop shall be identified and tagged by loop number, start (S), and finish (F). For example: Phase 4D1-1S & Phase 4D1-1F; Phase 4D1-2S & Phase 4D1-2F.

All loop conductors for each direction of travel for the same phase of a traffic signal system in the same pull box, shall be spliced to a cable which shall be run from the pull box adjacent to the loop detector to the input panel mounted in the controller cabinet. Splices between loop conductors and lead-in cable shall be made in pull boxes only. All splices to the lead in cable and between loops and the lead in cable shall be soldered.

Each detector loop circuit shall be tested for continuity, circuit resistance, and insulation resistance at the controller location. The loop circuit resistance shall not exceed 0.50 ohms plus 0.35 ohms per 100 feet of lead-in cable. The insulation resistance shall be performed between each

circuit conductor and ground. The megger resistance shall not be less than 200 megohms. The Contractor shall replace any detector loop that fails this requirement at the Contractor's expense.

All conductors and conductor loops installed in the traveled way shall be installed so that the top of the conductor is a minimum of one-inch (1") below the surface grade of the street.

Asphaltic Emulsion Sealant shall be used immediately after the loop wires have been installed that conforms to Caltrans Standard Specifications. Dry 20 mesh sandblasting sand shall then be poured in and around the slot. A suitable and approved tool shall then be used to work the asphaltic emulsion up through the dry sand. The slot will then be inspected for any dry spots in the sand fill. Any dry sand spots will then be wetted with more asphaltic emulsion. More dry sandblasting sand shall then be added to the slot and the asphalt emulsion will again be worked up through the sand until a uniform mix of asphaltic emulsion and sand with no voids completely fills the slot to the level of the surrounding road surface. A final thin layer of sand will then be added to surrounding surface to absorb the excess asphaltic emulsion. The traveled way may be opened to vehicular traffic immediately after installation of the asphaltic emulsion and sand loop sealant.

Hot Melt Rubberized Asphalt Sealant shall conform to and installed in accordance with Caltrans Standard Specifications.

### **3. Detector Lead-In Cable**

Detector lead-in cable shall consist of four (4) No. 18 A.W.G. stranded copper conductors insulated with nine (9) mils minimum of polypropylene, color coded, parallel laid, twisted together with four to six turns per foot. An amorphous interior moisture penetration barrier shall be provided to prevent hosing, siphoning, or capillary absorption of water along cable interstices. The outer jacket shall be thirty (30) mils minimum in thickness, high density polyethylene conforming to ASTM Designation: D-1248, 65T for Dielectric Material, Type I, Class C, Grade 5, J3. The diameter of the cable shall be approximately .25 inch. Aluminum-polyester shielding shall be applied around the conductors. The detector lead-in cable shall be continuous from the pull box adjacent to the conductor loops to the controller unless otherwise shown on the Plans.

Splices between lead-in cable and loop cable shall be made in pull boxes only. All splices to the lead in cable shall be soldered. The ends of the splice shall then be inserted into an approved insulated spring type connector of the correct size. When detector cables and detector loops are initially installed, precautions shall be taken to ensure the cables and loops remain water tight

prior to splicing. If splicing is not to be done immediately after installation, the ends of the conductors and cables shall be dipped in electrical insulating liquid which shall render them water tight. The insulating liquid shall be fast drying, resistant to oils, acids, alkalies and corrosive atmospheric conditions and shall be compatible with the insulations used in the conductors and cables. All conductors and cables shall be installed and splices shall be made in a dry environment.

#### **4. Detector Handholes**

Detector loops shall be sawcut into detector handholes. Detector handholes shall be Caltrans Type B. No splicing will be allowed in the detector handholes. For detector handholes to be removed, holes or depressions resulting from the removed handhole shall be filled, compacted, brought to grade, and filled to match surrounding materials.

#### **5. Abandonment of Loop Conductors.**

Each detector loop shall be saw-cut in a minimum of two places.

### **34-15 WIRING**

Pulling wires shall be accomplished with special care to avoid damage to the insulation. Hand power only shall be employed in pulling wire. Only lubricant shall be used. Loops or bends in wires in the base of standards and pull boxes shall have a minimum radius of five (5) times its diameter, to ensure the safety of the insulation.

A minimum of thirty-six inches (36”) of slack in each wire shall be left in each standard base and pull box.

Conductor splices in the pull box shall be joined by a pigtail splice using a wire nut. All splices shall be taped in a manner approved by the Engineer. After the splice is taped, it shall be dipped in a moisture and corrosion resistant outer seal. All splices shall be left with ends pointed up to allow water to run off of splice.

Soldering of pressure connectors may be omitted provided the connectors are applied with a ratchet type crimping tool which will not release the connector until the crimping operation is completed. The sleeve shall be compressed on each end.



### **34-16 BONDING AND GROUNDING**

All metal conduit systems, standards, pedestals, ballast and transformer cases, service equipment, anchor bolts, etc., shall be made mechanically and electrically secure to form a continuous system and shall be effectively grounded. Grounding shall be in accordance with all applicable codes and regulations. Bonding and grounding jumpers shall be copper wire or copper strap with a minimum cross sectional area equivalent to a No. 8 AWG.

Bonding wire or strap shall be secured to the lower section of metal standard by brass or bronze bolts three-sixteenths inch (3/16") or larger.

In conduit systems where rigid steel conduit and PVC conduits are mixed, the following requirements apply:

1. The rigid steel conduit shall have an approved grounding bushing installed at the conduit end(s).
2. The green No. 10 grounding conductors in the PVC conduit shall be attached to a grounding bushing which shall be attached to the rigid steel conduit.

### **34-17 ELECTRIC SERVICE**

The locations of service points shown on the Plans are approximate only. Contractor shall determine the exact locations from the Colusa Municipal Utility District (SMUD). Service conduits, service conductors, service grounds, metering and transformer pads where required shall be installed in accordance with the SMUD requirements. Service equipment and enclosure shall be furnished and installed as detailed on the Plans and/or specified in the Special Provisions.

### **34-18 SERVICE PEDESTALS**

Service Pedestals shall be of the type called for on the Plans. Pedestal shall be fabricated from 14 gauge stainless steel and 14 gauge cold rolled steel electrically welded and reinforced. Construction will be Type 3R, raintight. All nuts, bolts, and screws shall be stainless steel. Enclosure will be factory wired and conform to NEMA and UL Standards. Each circuit breaker shall be permanently marked with its trip rating. Multipole breakers shall be of the common trip with single handle. Unless otherwise specified, each circuit breaker shall be equipped with a device for padlocking the breaker in the "on" or "off" position.

Unless otherwise specified, enclosures of service pedestals shall be fabricated from code gauge stainless steel or powder coated steel. Enclosures shall be stainless steel.

### **34-19 STANDARDS**

All traffic signal standards and pedestrian push button assembly posts shall be manufactured to the latest Caltrans Specifications, unless otherwise specified in the Plans.

The locations of standards for traffic signals and street lights shown on the Plan are approximate only. The exact location of each standard will be determined by the Engineer prior to installation. Each standard shall be anchored to the concrete foundation by galvanized steel anchor bolts, nuts, leveling nuts and washers in accordance with the Plans and the standards shall be installed in a true vertical position.

### **34-20 FIELD TEST OF STREETLIGHTS**

Prior to acceptance of the work, Contractor shall perform the following tests to be made:

1. For continuity of each circuit.
2. For grounds in each circuit.
3. A megger test on each circuit.
4. A functional test in which it is demonstrated that each and every part of the system functions as specified or intended herein.
5. Contractor shall supply the temporary power source necessary to facilitate the functional test as specified above.

### **34-21 INTERCONNECT**

Traffic signal interconnect cable shall be fiber optic cable. The size, type, and termination type of fiber optic cable shall be per Plan, comply with the latest City of Colusa Standards, department policies and City of Colusa Standard drawings.

All fiber optic splices shall be in splice boxes, maintenance holes or signal cabinets. Fiber optic splices in #5 or smaller pull boxes will not be allowed. All fiber optic cable shall be terminated in a signal cabinet, communication hub or splice case or as noted on plans

When a contractor damages the existing traffic signal interconnect cable, the interconnect shall be replaced with fiber optic cable to latest City of Colusa Standards, department policies and City of Colusa Standard

drawings. In-kind replacement of legacy (copper) traffic signal interconnect systems will not be allowed. Contractor is responsible to provide necessary materials to terminate the replaced cable to a panel in the signal cabinet, commination hub or in a splice case to existing cable.

When a contractor damages existing copper interconnect in a corridor where a parallel fiber optic path exists, contractor shall abandon existing copper interconnect cable and establish communication on the existing fiber optic cable at all locations affected by the damaged copper interconnect. Work included in establishing fiber optic communication may include, but not limited to, splicing a 12 strand fiber optic drop into existing fiber optic cable, providing fiber patch panel equipment in existing cabinet or terminating additional fiber optic strands on existing fiber optic patch panel.

### **34-22 TRAFFIC SIGNAL HARDWARE**

All vehicle signal displays, pedestrian displays, backplates, and framework shall be powder coated black. All vehicle signal displays shall be aluminum and 12” diameter sections. Signal visors shall be aluminum and tunnel. All backplates shall be aluminum and louvered. Pedestrian displays shall be aluminum and 16” housing. The modules of the signal and pedestrian display shall conform to the latest City of Colusa Standards and Special Provisions.

### **34-23 VEHICLE AND BICYCLE DETECTION**

Vehicle and bicycle detection is required at all intersections per the latest edition of the California Manual on Uniform Traffic Control Devices or as directed by the City Traffic Engineer and shall comply with the latest City of Colusa Standards, department Policies and City of Colusa Standard drawings. Presence detection shall be non-intrusive unless approved by the City traffic engineer. For approaches with speeds of 30 mph or higher, advance detection systems shall be provided per the latest City of Colusa Standards.

When construction activities disturb or damages existing in-pavement vehicle and bicycle detection systems, the detection shall be replaced and installed per current Colusa Standards, department Policies and City of Colusa Standard drawings. New or temporary detection shall be in-place and functional prior to construction activities that will damage existing detection systems. In-kind replacement of legacy vehicle and bicycle detection systems will not be allowed.

### **34-24 TRAFFIC SIGNAL CONTROLLER ASSEMBLY TESTING AND INSPECTION**

Traffic signal controller assembly is defined as a fully wired traffic signal cabinet with traffic signal controller and conflict monitor installed and

programmed. All equipment as shown on the Plans or called for under the special provision and these specifications shall be installed and operable, including, but not limited to, Emergency Vehicle Preemption, fiber optic, network switch, and CCTV equipment. All cabinet wiring and input/outputs shall be clearly and neatly labeled.

All new traffic signal controller assemblies must be on the City of Colusa approved product list. For products not on the approved product list, it must be submitted to the City of Colusa for testing and approval prior to be added to the approved products list. Test cabinets must be delivered to City of Colusa Corporate Center South 5730 24<sup>th</sup> Street Colusa, CA. 95822 approximately 6 months prior to installation in the field.

For all new traffic signal controller assemblies installed on new foundations, the contractor shall install a fully tested controller assembly. The controller assembly shall be tested for full operation (full I/O) and running approved signal timing. The controller assembly shall be configured per the intersection plans or as directed by City Traffic Engineer. Once installed the assembly shall be energized and input wiring terminated and labeled. The Traffic Controller shall have the latest firmware installed and registered to City of Colusa. City will perform a functional test on the controller assembly per the intersection plan. Contractor shall schedule the test upon the approval of the Engineer. Included as a part of the functional test is the continuous operation of the controller assembly for a minimum of five (5) working days. Any part of the controller assembly that does not operate properly shall be repaired and retested by the contractor. Contractor shall schedule a retest upon the approval of the Engineer.

For all traffic signal controller assemblies installed on existing foundations, the traffic signal controller assemblies shall be tested by the City prior to installation in the field. Traffic signal controller assembly shall be delivered to City of Colusa Corporate Center South 5730 24<sup>th</sup> Street Colusa, CA. 95822 approximately 30 days prior to installation in the field. Contractor shall request controller timing 10 days prior to controller assembly being delivered to City of Colusa Corporate Center. Controller shall have the latest firmware installed and registered to City of Colusa. City will perform a functional test on the cabinet assembly per the intersection plan. Contractor shall schedule the test upon the approval of the Engineer. Included as a part of the functional test is the continuous satisfactory operation of the controller assembly for a minimum of five (5) working days. Any part of the controller assembly that does not operate properly shall be repaired and re- tested by the contractor. Contractor is responsible for retrieving the traffic

signal controller assembly, repairing and delivering the repaired assembly to City of Colusa Corporate Center. Contractor shall schedule a retest upon the approval of the Engineer.

### **34-25 TRAFFIC SIGNAL PRE-TURN ON**

A Minimum Five (5) working days prior to the final traffic signal intersection turn on, Contractor shall complete the City's Traffic Signal turn-on checklist. The Contractor shall be prepared to complete turn-on checklist in the presence of City Engineer or Inspector. After Completion of checklist the contractor shall schedule the traffic signal pre-turn on meeting to ensure project readiness. During the traffic signal pre-turn on meeting the contractor shall perform functional test of all applicable items on the checklist, including but not limited to:

1. All vehicular and pedestrian displays shall be flashed out (individually turned on momentarily) and proper operation and phasing shall be checked. All vehicular and pedestrian signal heads shall be properly adjusted and covered.
2. The controller shall be turned on with the vehicle and pedestrian indications turned off, all pedestrian pushbuttons, vehicle and bicycle detector inputs shall be checked for proper operation and per phasing shown on the plans.
3. Controller shall have latest software version, registered to City of Colusa, installed and operating per City Standards and the Engineer.
4. Conflict monitor is operational and programmed correctly per the intersection plan.
5. All termination, communication, preemption and CCTV equipment has been provided per special provisions and plans and is installed and is powered on.
6. Verify all input/output are fully functional, labeled and complete.

If any system component, circuit or communication device does not operate properly, it shall be repaired and retested prior to final traffic signal intersection turn on. After the successful completion of all pre-turn on tests,

Contractor shall request through the City Traffic Engineer, a time and date for final turn on.

### **34-26 TRAFFIC SIGNAL FINAL TURN ON**

The traffic signal final turn on can only occur between the hours of 9 A.M. and 3 P.M. on Tuesday, Wednesday or Thursday and during a week without holidays. Contractor shall give the Engineer at least five (5) working day notice prior to the traffic signal final turn on. Final traffic signal turn on shall not be scheduled until the City Traffic Engineer has accepted the pre-turn on checklist.

The final traffic signal turn on date shall be subject to the approval of the City Traffic Engineer. Contractor shall make arrangements to have a City signal technician and a technician from the controller manufacturer, or his representative, qualified to work on the controller, present at the time of traffic signal intersection turn on.

Final signing, striping and stop bar shall be installed no earlier than one business day prior to turn-on date. All traffic signal and pedestrian displays shall remain bagged until day of final turn on.

Contractor shall provide sufficient personnel and equipment for the timely completion of the traffic signal intersection turn on. If the Contractor does not provided sufficient personnel and equipment, the Engineer may postpone the traffic signal turn on until sufficient personnel and equipment are provided by the Contractor.

If any system component, circuit or communication device is determined to be non-compliant, it shall be resolved by the contractor to meet City of Colusa Standards. All non-compliance items must be resolved within 5 working days.

### **34-27 SALVAGE**

The Contractor shall schedule the delivery of salvaged equipment with the City Inspector. Equipment drop-off shall be done in the presence of the City Inspector or designated representative.

All salvageable material and equipment removed from present installation which is not to be re-installed shall be delivered in good condition to the City Corporation Yard at 5730 24<sup>th</sup> Street, Colusa, California or the City Corporate Center North 918 Del Paso Road, Colusa, California as directed by the Engineer. Contractor is responsible to provide machinery and manpower

to unload and load all salvaged equipment and materials. Loading, unloading, pick-up and delivery of these items shall be included in the price bid for various items and no additional compensation will be allowed therefore.

Contractor shall remove all signal heads, mounting brackets, luminaires, mast arms and appurtenances from all salvaged traffic signal and street lighting standards prior to delivery to the City Corporation Yard.

Contractor shall provide for the safe transfer with no damage to the salvaged equipment. Any equipment broken or lost by the Contractor shall be replaced with equipment of equal quality at the expense of the Contractor.

on.



## Section 38

### CLARIFICATION/DEVIATION

#### 38-1 REQUESTS FOR CLARIFICATION

- A. Contractor requests for clarification of the plans and/or specifications shall be directed to the ENGINEER in writing. Such requests shall not be received directly from a Subcontractor or Supplier.
- B. Normally, a separate form shall be used for each specific item for which a clarification is required. Requests for clarification for more than one item using a single transmittal form will be permitted only when the items are so functionally related that expediency indicates review of the group of items as a whole.
- C. The ENGINEER will reply to Contractor's request for clarification within fifteen (15) working days following receipt by the ENGINEER.

#### 38-2 DEVIATION REQUESTS

- A. Contractor requests for deviation from the plans and/or specifications shall be directed to the ENGINEER in writing. Such requests shall not be received directly from a subcontractor or Supplier.
- B. The ENGINEER will reply to Contractor's request for deviation from the plans within fifteen (15) working days following receipt by theENGINEER.

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