

TECHNICAL MEMORANDUM

March 3, 2016

Project: Cities of Lathrop and Manteca
Urban Levee Design Criteria (ULDC) Evaluation

Subject: Identify Necessary Improvements and Cost Estimate

Prepared by: Erik E. Almaas, P.E.

Reviewed by: Christopher H. Neudeck, P.E.
David A. Peterson, P.E.

1.0 PURPOSE

Detailed analyses and documentation have been performed and developed of the existing levee system of Reclamation District No. 17 (RD17) in order to determine the extent of Urban Levee Design Criteria (ULDC) compliance. The purpose of this technical memorandum is to identify improvements that are necessary to bring ULDC deficiencies into compliance and to determine the costs associated with said improvements. The team responsible for undertaking this effort consists of Peterson, Brustad, Inc. (PBI), Kjeldsen, Sinnock and Neudeck, Inc. (KSN), and ENGE0, Inc.

2.0 PROJECT BACKGROUND

Legislation passed in 2007 substantially limits the ability of urban communities to approve residential, commercial and industrial development after July 2016 unless they have an Urban Level of Flood Protection (ULOP) or are making adequate progress toward achieving ULOP 200-year flood protection. Background on this mandate was summarized in "*Position Paper for City of Lathrop, Compliance with SB5: ULOP 200-Year Flood Protection for Lathrop (RD 17)*" dated February 3, 2014, by Glenn Gebhardt, City Engineer for the City of Lathrop.

In April 2014, PBI prepared a Strategic Plan for ULOP Compliance for RD17 communities, which outlined a strategic plan for complying with SB5 for the area protected by RD17 levees on a schedule that will meet the requirements of the law. The main component of this Strategic Plan was to perform a comprehensive ULDC analysis and identify areas of deficiencies for each of the ULDC criteria. The identified improvements presented in this technical memorandum are intended to address these areas of deficiencies.

3.0 LEVEE ASSESSMENT AND PROPOSED IMPROVEMENTS

The analyses described in this technical memorandum have been developed at a detailed level using an assessment of the existing levee system to determine the extent of ULDC deficiencies. Individual analyses were performed for each of the ULDC criteria for this overall evaluation and compiled to identify necessary improvements.

Each ULDC criteria is included in Table 1 below and is denoted with the following attributes.

- **Analysis Only** includes ULDC items in which improvements are not needed resulting directly from the analysis. Instead, these items are utilized to consider necessary improvement in other ULDC items.
- **Long-Term Plan Required** includes ULDC items in which a long-term remediation plan is required or already currently exists.
- **Improvements Required** includes ULDC items in which remediation improvements have been identified.

Table 1 - ULDC Criteria

ULDC Criteria	Analysis Only	Long-Term Plan Required	Improvements Required
7.1 Design Water Surface Elevation	x		
7.2 Minimum Top of Levee			
7.3 Soil Sampling, Testing, and Logging	x		
7.4 Slope Stability for Intermittently Loaded Levees			x
7.5 Underseepage for Intermittently Loaded Levees			x
7.6 Frequently Loaded Levees			
7.7 Seismic Vulnerability		x	
7.8 Levee Geometry			x
7.9 Interfaces and Transitions			
7.10 Erosion			x
7.11 Right-of-Way		x	x
7.12 Encroachments		x	x
7.13 Penetrations		x	x
7.14 Floodwalls, Retaining Walls, and Closure Structures			
7.15 Animal Burrows ¹			
7.16 Levee Vegetation ¹			
7.17 Wind Setup and Wave Runup	x		
7.18 Security		x	
7.19 Sea Level Rise	x		
7.20 Emergency Actions		x	

Identified improvements consist of two categories: construction improvements and real estate improvements.

¹ 7.15 Animal Burrows and 7.16 Levee Vegetation do not require improvements but instead only require a more focused effort in identified reaches during normal operations and maintenance procedures.

3.1 Construction Improvements

Identified construction improvement projects are required as follows:

Project No. 2.1 – Dryland Levee Reconstruction and Seepage Berm:

Levee reconstruction and seepage berm improvements are necessary from Sta. 853+50 to Sta. 972+25. The improvements consist of widening the levee and constructing a drained seepage berm. They also include reconstructing pipe penetrations that cross the levee. Existing ULDC deficiencies that are addressed resulting from these improvements include 7.5 Underseepage for Intermittently Loaded Levees, 7.8 Levee Geometry, and 7.13 Penetrations.

Project No. 5.1 – Cutoff Wall:

Cutoff wall improvements are necessary from Sta. 119+50 to Sta. 192+00. The improvements consist of constructing a mix-in-place cutoff wall of varying depth. They also include reconstructing pipe penetrations that cross the levee. Existing ULDC deficiencies that are addressed resulting from these improvements include 7.4 Slope Stability for Intermittently Loaded Levees, 7.5 Underseepage for Intermittently Loaded Levees, and 7.13 Penetrations.

Project No. 5.2 – Seepage Berm:

Seepage berm improvements are necessary from Sta. 190+50 to Sta. 297+75. The improvements consist of constructing a drained seepage berm of varying width. They also include reconstructing pipe penetrations that cross the levee. Existing ULDC deficiencies that are addressed resulting from these improvements include 7.4 Slope Stability for Intermittently Loaded Levees, 7.5 Underseepage for Intermittently Loaded Levees, and 7.13 Penetrations.

Project No. 5.3 – Cutoff Wall:

Cutoff wall improvements are necessary from Sta. 311+00 to Sta. 518+50. The improvements consist of constructing a traditional cement/bentonite slurry cutoff wall of varying depth. They also include reconstructing pipe penetrations that cross the levee. Existing ULDC deficiencies that are addressed resulting from these improvements include 7.4 Slope Stability for Intermittently Loaded Levees, 7.5 Underseepage for Intermittently Loaded Levees, and 7.13 Penetrations.

Project No. 10.1 – Erosion Repairs:

Erosion repairs are necessary from Sta. 114+00 to Sta. 972+25. The improvements consist of supplementing riprap rock slope protections at varying application rates. Existing ULDC deficiencies that are addressed resulting from these improvements include 7.10 Erosion.

Project No. 12.1 – Encroachment Remediation:

Encroachment remediation is necessary at various locations from Sta. 112+73 to Sta. 815+40. The improvements consist of removing high hazard encroachments. Existing ULDC deficiencies that are addressed resulting from these improvements include 7.12 Encroachments.

Project No. 13.1 – Pipe Penetrations Rehabilitation:

Pipe penetration rehabilitation is necessary at various locations from Sta. 571+35 to Sta. 801+00. The improvements consist of reconstructing pipe penetrations that cross the levee. Existing ULDC deficiencies that are addressed resulting from these improvements include 7.13 Penetrations.

A summary of deficiencies and the proposed construction improvements to address said deficiencies is presented below in Figure 1. The green bars indicate compliant levee reaches, whereas the red bars indicate deficient levee reaches.

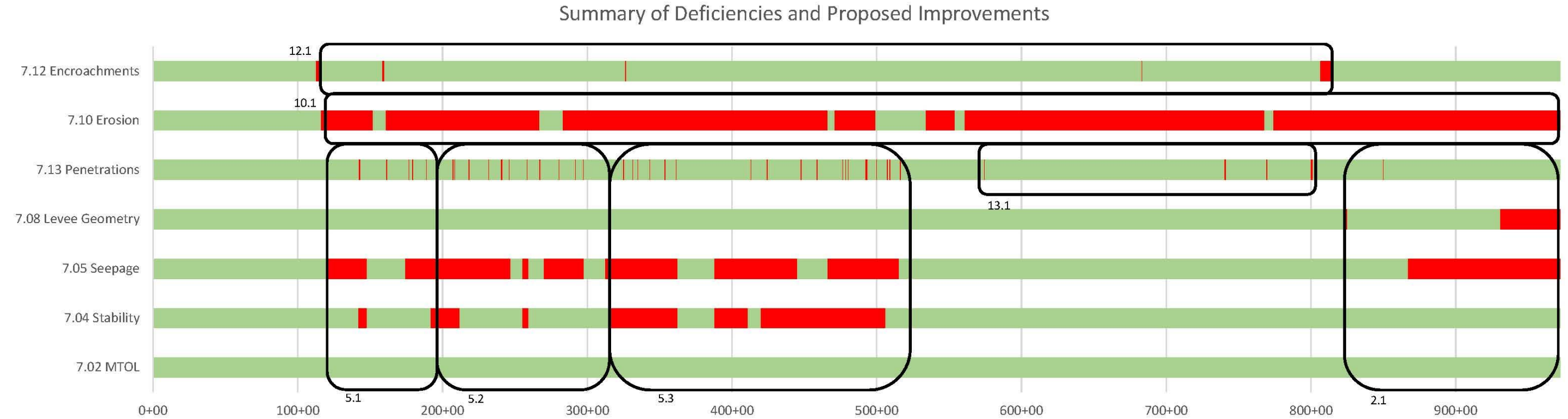


Figure 1 - Deficiencies and Proposed Construction Improvements

A tabulation of proposed construction improvements is shown below in Table 1. Conceptual level improvement plans have been prepared and are included in **EXHIBIT 1**.

Table 2 - Proposed Construction Improvements

Project No.	Project Name	7.2 MTOL	7.4 Stability	7.5 Seepage	7.8 Geometry	7.10 Erosion	7.12 Encroachments	7.13 Penetrations
2.1	Dryland Levee Reconstruction and Seepage Berm			X	X			X
5.1	Cutoff Wall		X	X				X
5.2	Seepage Berm		X	X				X
5.3	Cutoff Wall		X	X				X
10.1	Erosion Repairs					X		
12.1	Encroachment Remediation						X	
13.1	Pipe Penetration Rehabilitation							X

3.2 Real Estate Improvements

Identified real estate improvements are required as follows.

- Additional right-of-way acquisition is needed resulting from existing levee reaches that are currently deficient.
- Additional right-of-way acquisition is needed resulting from additional levee footprint for the proposed construction improvement projects as described above, where applicable.

4.0 COST ESTIMATE

The overall estimated cost to obtain full ULDC compliance for the RD17 levee system is summarized in Table 2 below.

Table 3 - Summary of Proposed Improvement Costs

Project No.	Sta. from	Sta. to	Project Name	Cost
<i>Construction Improvements</i>				
2.1	822+80	972+25	Dryland Levee Reconstruction and Seepage Berm	\$27,765,000
5.1	119+50	192+00	Cutoff Wall	\$10,224,000
5.2	190+50	297+75	Seepage Berm	\$19,501,000
5.3	311+00	518+50	Cutoff Wall	\$35,050,000
10.1	114+00	972+25	Erosion Repairs	\$9,386,000
12.1	112+73	815+40	Encroachment Remediation	\$678,000
13.1	571+35	801+00	Pipe Penetration Rehabilitation	\$2,128,000
<i>Subtotal:</i>				<i>\$104,732,000</i>
<i>Real Estate Improvements</i>				
11.1			Right-of-Way Acquisition (existing deficiencies)	\$12,381,000
11.2			Right-of-Way Acquisition (new construction improvements)	\$3,900,000
<i>Subtotal:</i>				<i>\$16,281,000</i>
Subtotal:				\$121,013,000
Dryland Levee Extension Alternative:				\$15,872,000
TOTAL:				\$136,885,000

A detailed breakdown of the individual improvement projects that comprise this cost estimate is included in **EXHIBIT 2**. The costs for the construction improvement projects include soft costs (i.e. management, environmental, engineering, etc.). A basis for quantity calculations for the construction improvement projects is included in **EXHIBIT 3**. All costs include a contingency factor.

Cities of Lathrop and Manteca
ULDC Evaluation
Identified Improvements

EXHIBIT 1
Improvement Plans

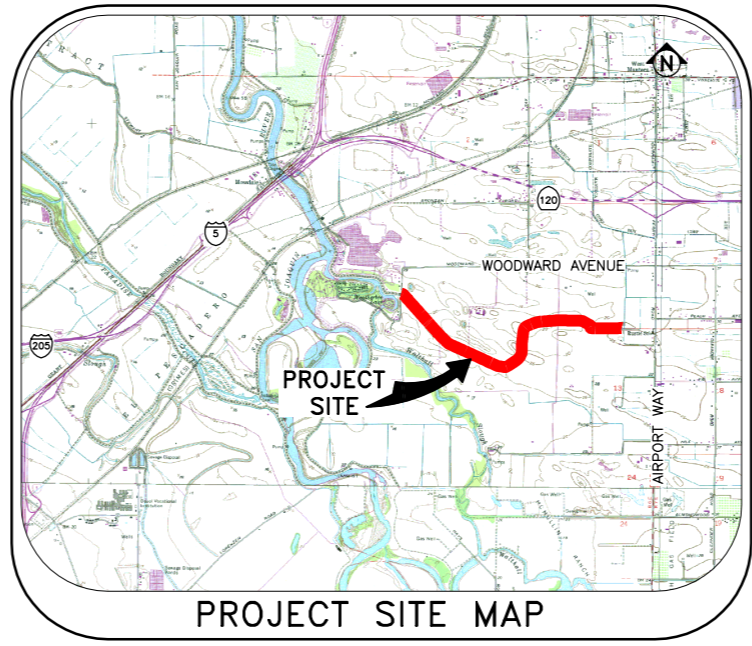
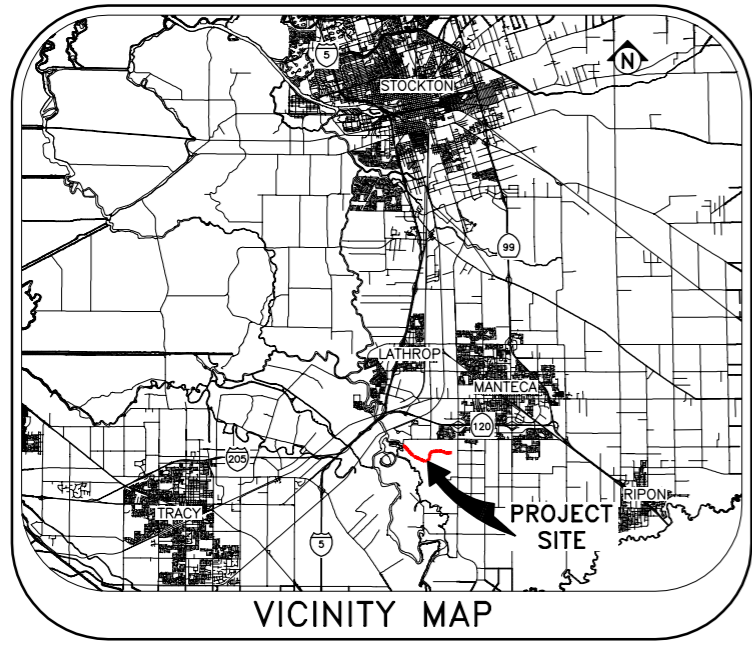
RECLAMATION DISTRICT NO. 17

MOSSDALE TRACT

SAN JOAQUIN COUNTY, CALIFORNIA

URBAN LEVEE DESIGN CRITERIA, PROJECT NO. 2.1
DRYLAND LEVEE IMPROVEMENTS

AT
 VARIOUS LOCATION BETWEEN
 STATION 853+50 AND STATION 972+25



SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	BASE MAP
3	DETAILS

SHEET INDEX

FILE SPEC: P:\2255_Lathrop_Manteca_ULDC_Evaluation\0030_ULDC_Analyze and Identify Deficiencies\05_Civil\CAD\Improvements\02.1_Sht 01_Title Sheet.dwg
 PLOT DATE: Mar 04, 2016 - 11:40am

	Submittal	
	%	Date
	10%	11/20/2015

K S N INC. **KJELDEN SINNOCK NEUDECK**
 Civil Engineers and Land Surveyors
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CITIES OF LATHROP AND MANTECA
 ULDC PROJECT 2.1 - DRYLAND LEVEE
 SAN JOAQUIN COUNTY, CALIFORNIA

TITLE SHEET

Revisions		Date	By	Appr'd. By	Design EEA
No.	Description				
					Drawn EEA
					Check CHN

Scale	Date
AS SHOWN	NOVEMBER 2015
Original Drawing Scale	Sheet Number
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	Project File No.
	2255-0030

C-001

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C-101



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**CITIES OF LATHROP AND MANTECA
 ULDC PROJECT 2.1 - DRYLAND LEVEE
 SAN JOAQUIN COUNTY, CALIFORNIA**

BASE MAP

Revisions				
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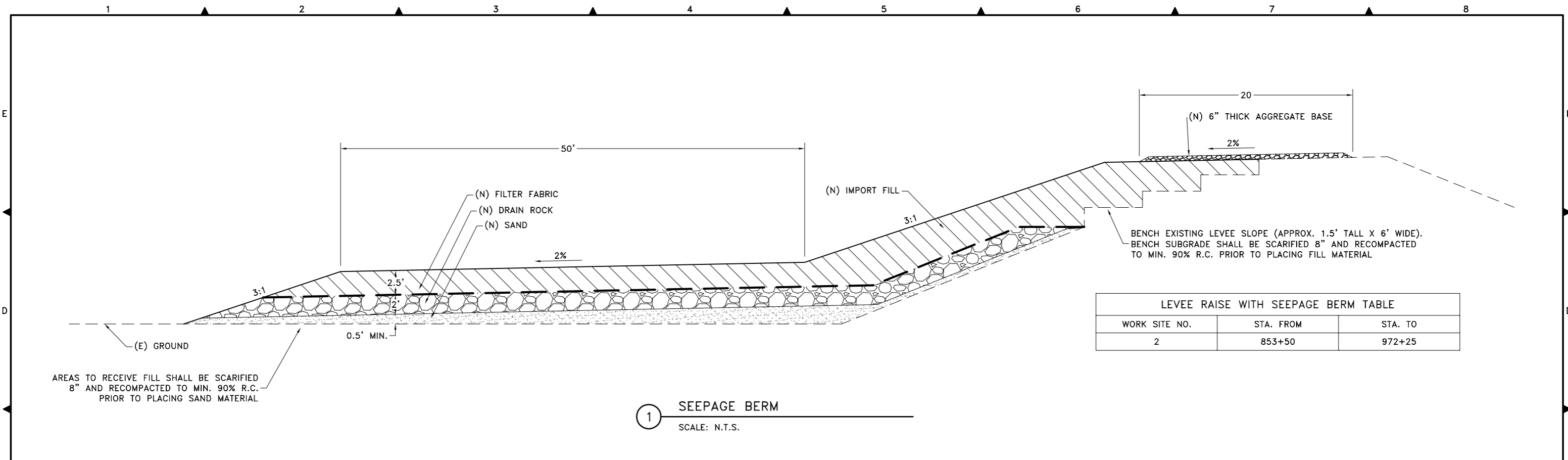
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Date
NOVEMBER 2015

Sheet Number
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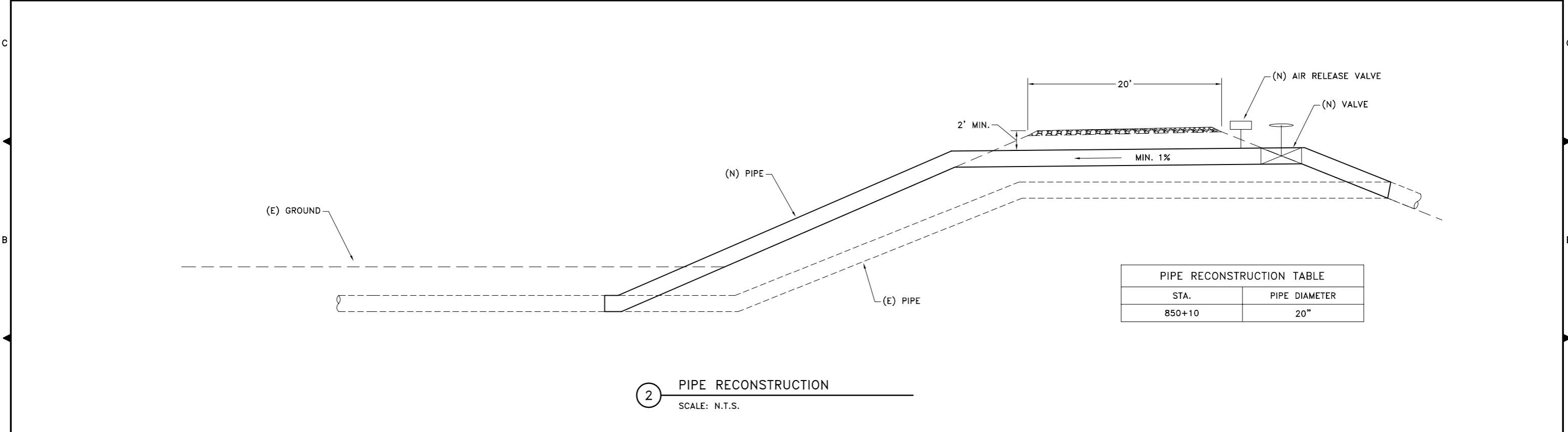
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LEVEE RAISE WITH SEEPAGE BERM TABLE		
WORK SITE NO.	STA. FROM	STA. TO
2	853+50	972+25

1 SEEPAGE BERM
SCALE: N.T.S.



PIPE RECONSTRUCTION TABLE	
STA.	PIPE DIAMETER
850+10	20"

2 PIPE RECONSTRUCTION
SCALE: N.T.S.

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CITIES OF LATHROP AND MANTECA
ULDC PROJECT 2.1 - DRYLAND LEVEE
 SAN JOAQUIN COUNTY, CALIFORNIA

DETAILS

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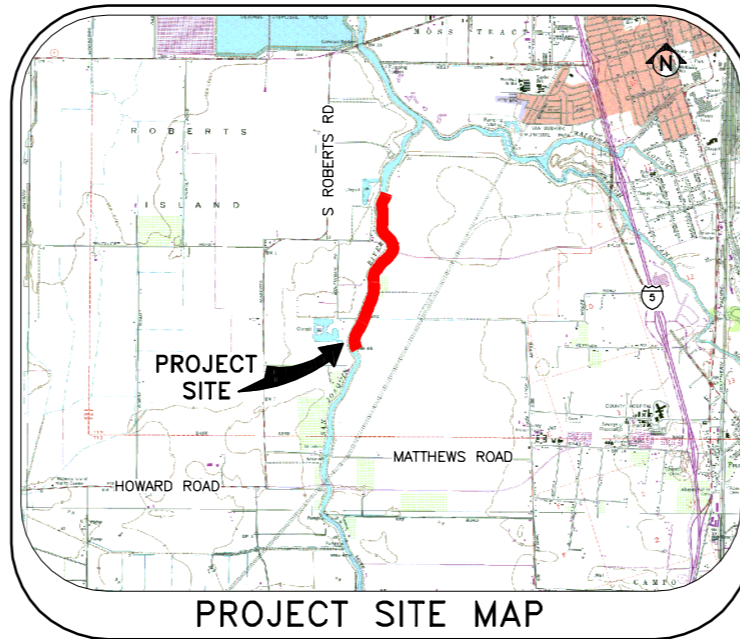
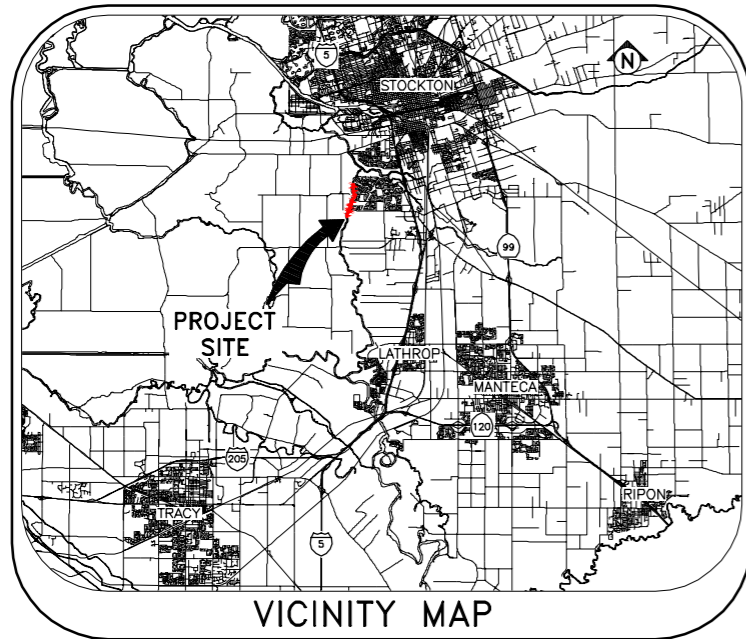
RECLAMATION DISTRICT NO. 17

MOSSDALE TRACT

SAN JOAQUIN COUNTY, CALIFORNIA

URBAN LEVEE DESIGN CRITERIA, PROJECT NO. 5.1 CUTOFF WALL IMPROVEMENTS

AT
VARIOUS LOCATION BETWEEN
STATION 119+50 AND STATION 192+00



SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	BASE MAP
3-4	DETAILS

SHEET INDEX

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PLOT DATE: Dec 04, 2015 - 3:00pm



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10%	12/2/2015

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CITIES OF LATHROP AND MANTECA
ULDC PROJECT 5.1 - CUTOFF WALL
SAN JOAQUIN COUNTY, CALIFORNIA

TITLE SHEET

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No.	Description	Date	By			
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C-001

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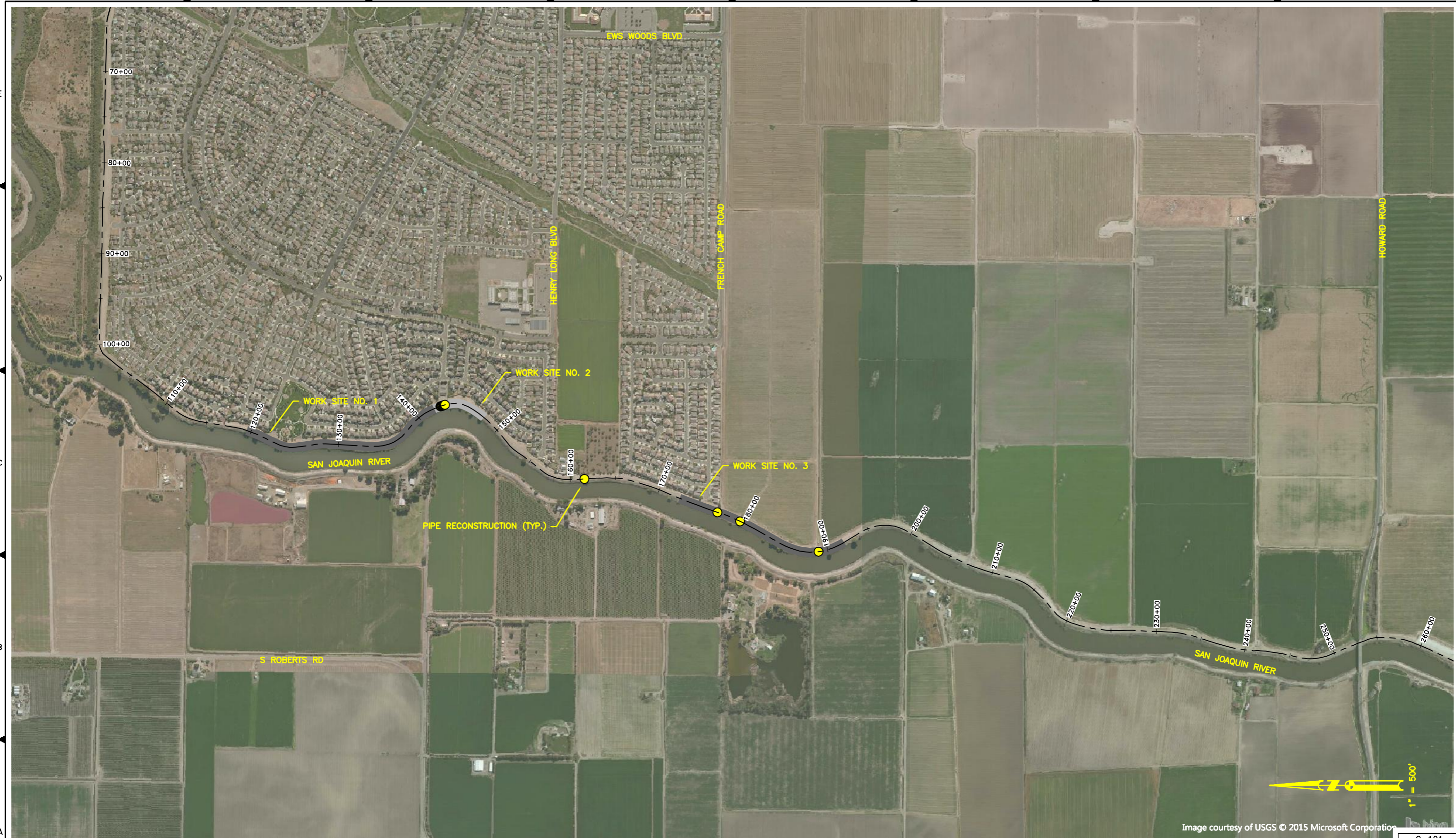


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CITIES OF LATHROP AND MANTECA
ULDC PROJECT 5.1 - CUTOFF WALL
SAN JOAQUIN COUNTY, CALIFORNIA

BASE MAP

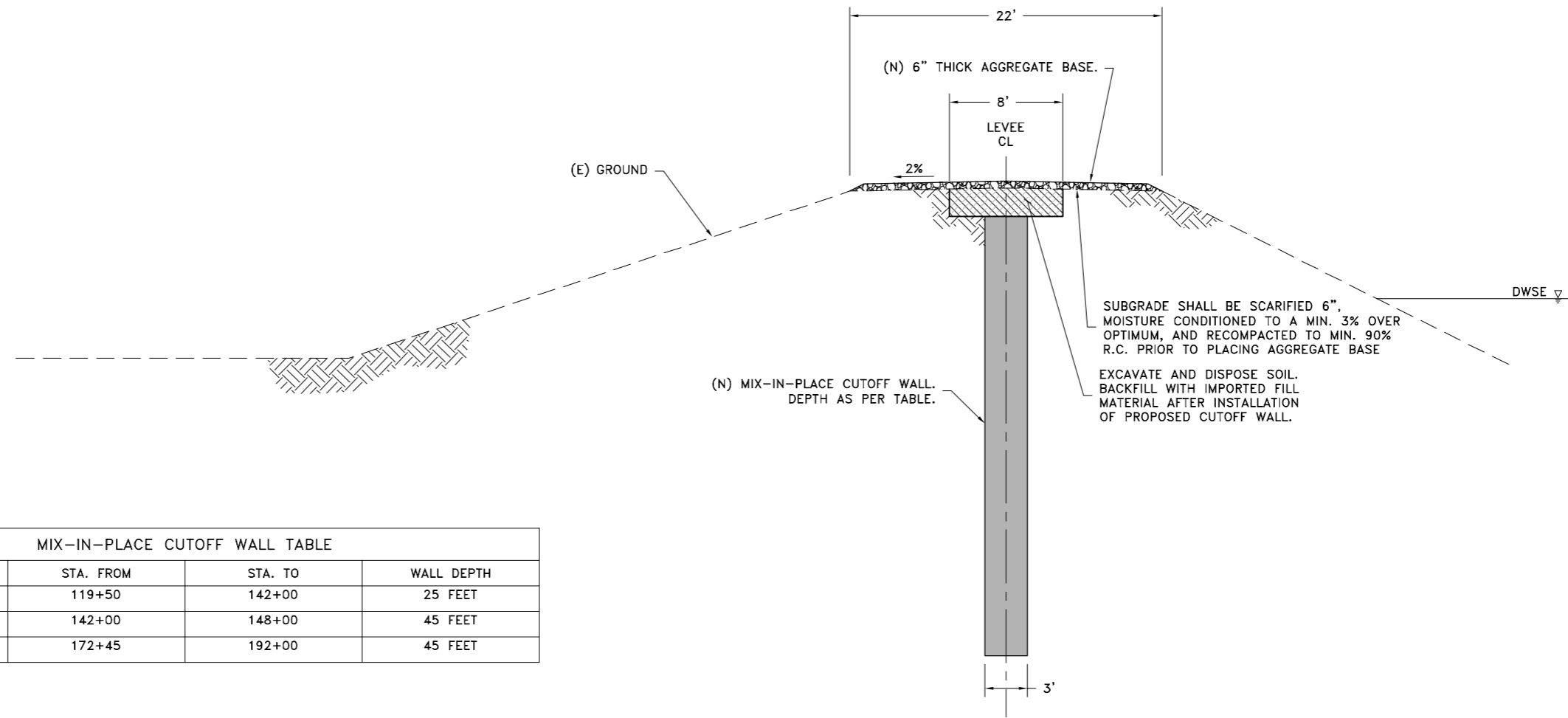
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Date
NOVEMBER 2015
 Sheet Number
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 Project File No.
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MIX-IN-PLACE CUTOFF WALL TABLE			
WORK SITE NO.	STA. FROM	STA. TO	WALL DEPTH
1	119+50	142+00	25 FEET
2	142+00	148+00	45 FEET
3	172+45	192+00	45 FEET

1 CUTOFF WALL (MIX-IN-PLACE WALL)
 SCALE: N.T.S.



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10%	12/2/2015

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CITIES OF LATHROP AND MANTECA
 ULDC PROJECT 5.1 - CUTOFF WALL
 SAN JOAQUIN COUNTY, CALIFORNIA

DETAILS

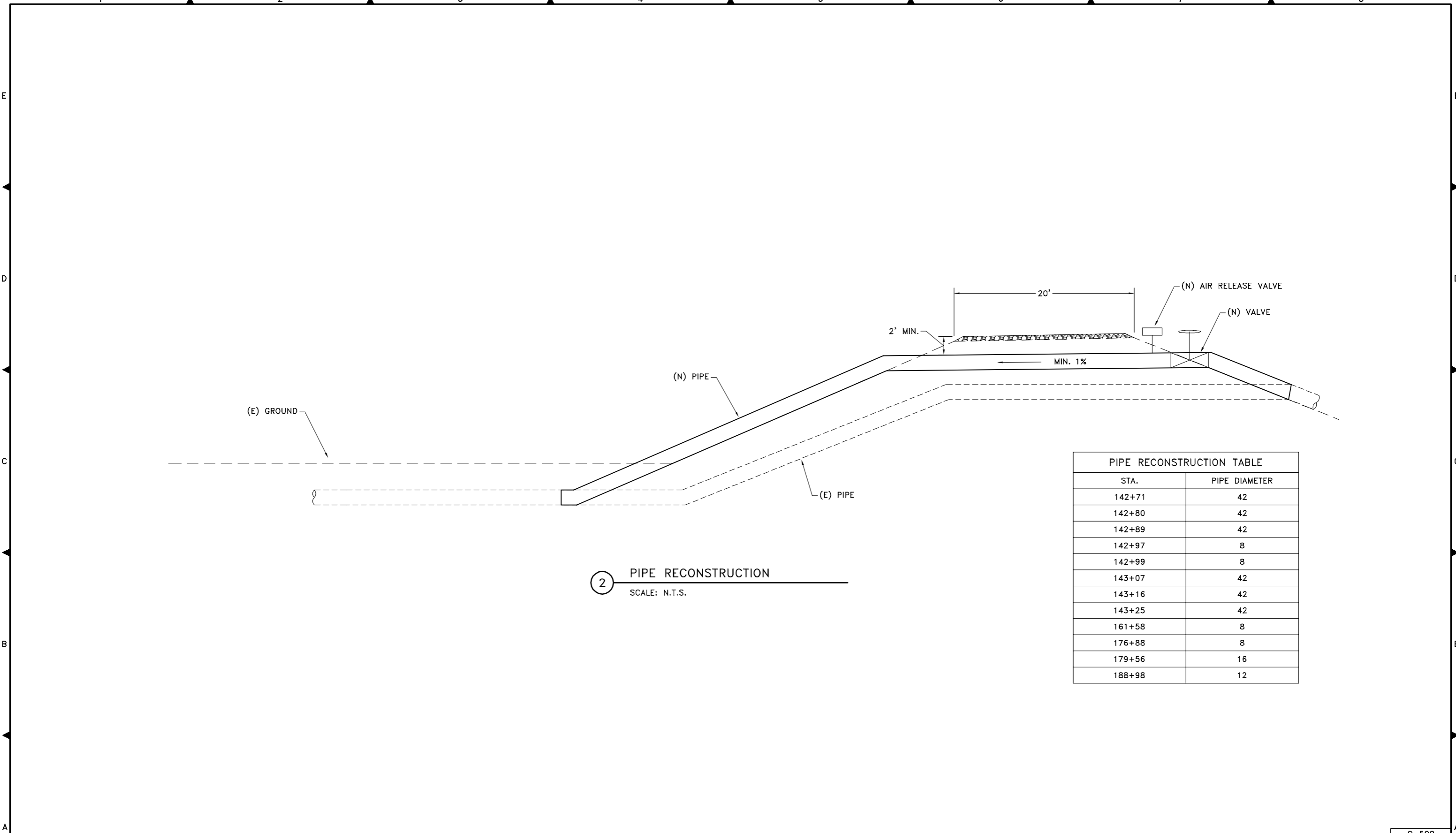
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Date: NOVEMBER 2015
 Sheet Number: 3 Of 4
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C-501

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PIPE RECONSTRUCTION TABLE	
STA.	PIPE DIAMETER
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142+80	42
142+89	42
142+97	8
142+99	8
143+07	42
143+16	42
143+25	42
161+58	8
176+88	8
179+56	16
188+98	12

② PIPE RECONSTRUCTION
 SCALE: N.T.S.

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	%	Date
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CITIES OF LATHROP AND MANTECA
ULDC PROJECT 5.1 - CUTOFF WALL
SAN JOAQUIN COUNTY, CALIFORNIA

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DETAILS

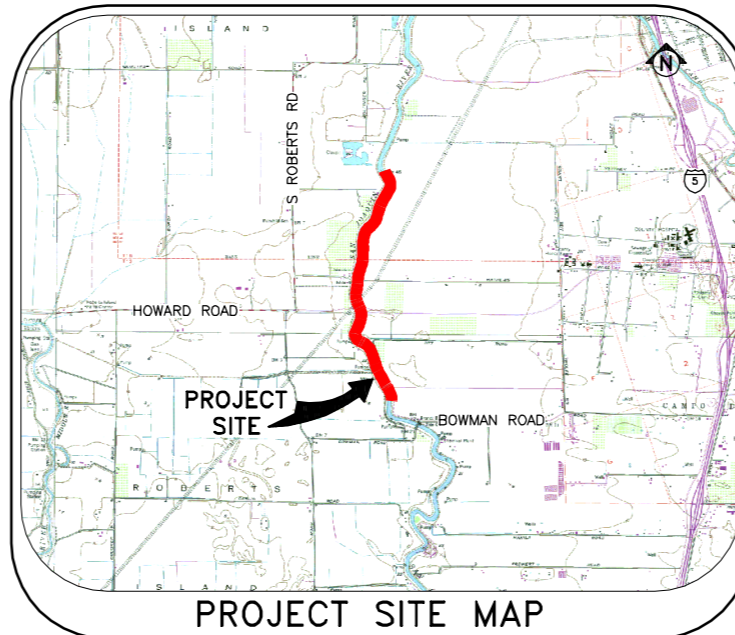
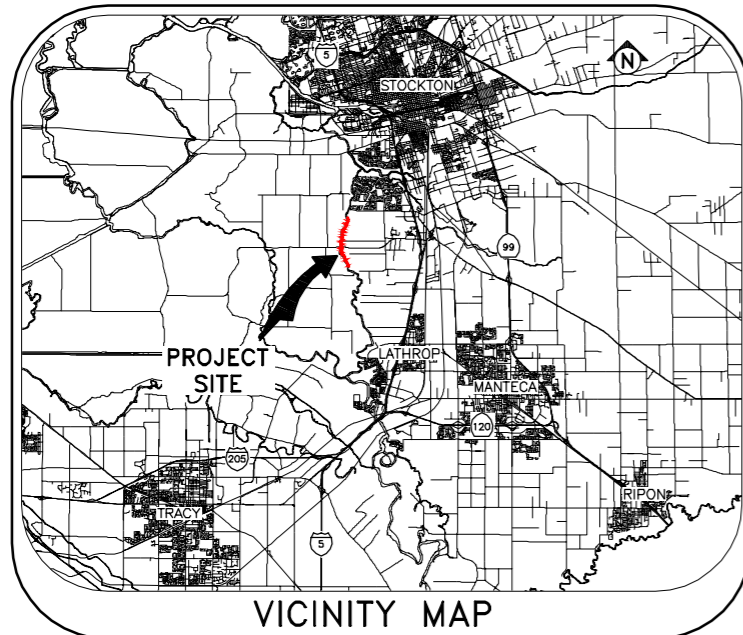
RECLAMATION DISTRICT NO. 17

MOSSDALE TRACT

SAN JOAQUIN COUNTY, CALIFORNIA

URBAN LEVEE DESIGN CRITERIA, PROJECT NO. 5.2
SEEPAGE BERM IMPROVEMENTS

AT
 VARIOUS LOCATION BETWEEN
 STATION 190+50 AND STATION 297+75



SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	BASE MAP
3-4	DETAILS

SHEET INDEX

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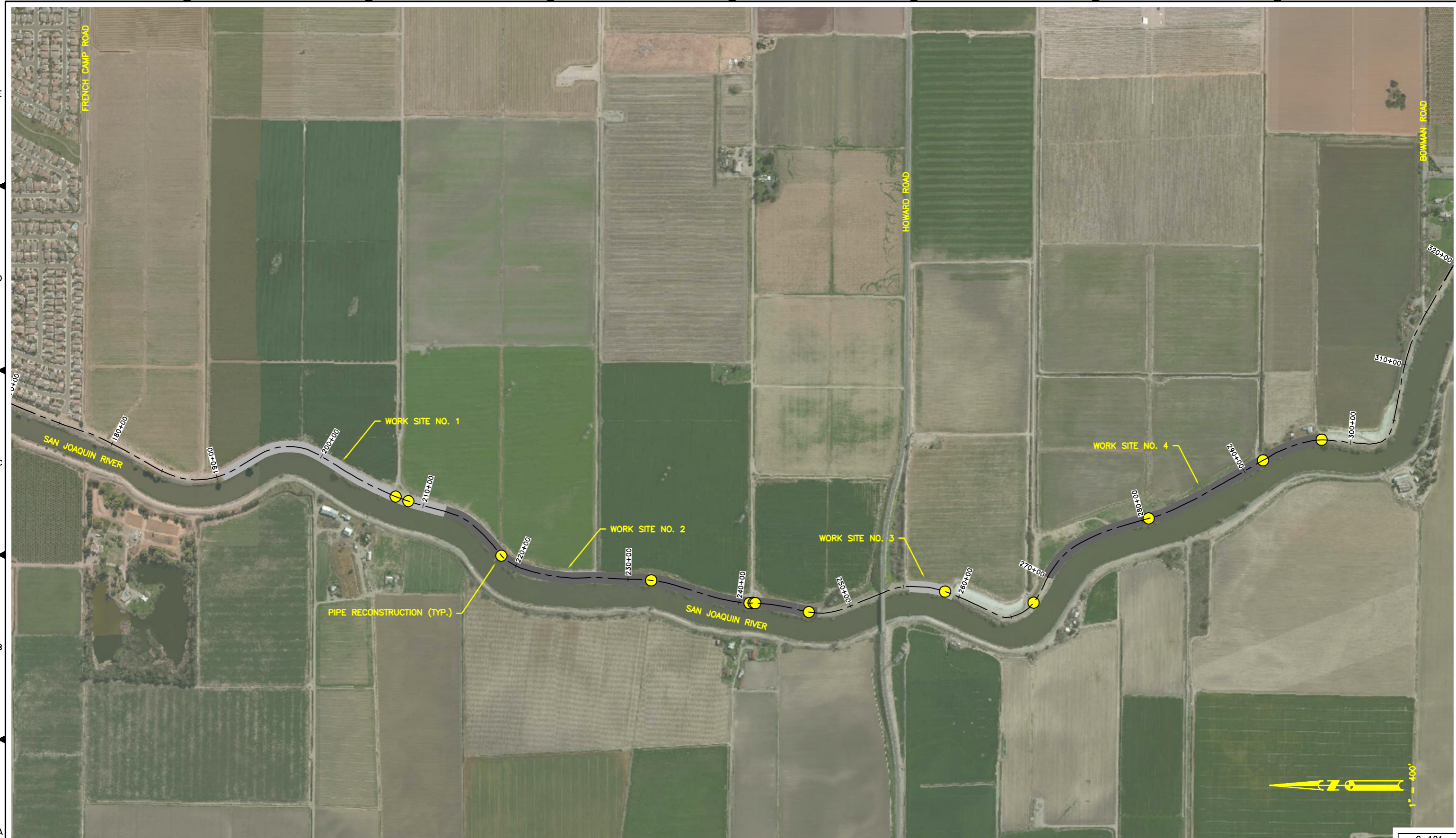
CITIES OF LATHROP AND MANTECA
 ULDC PROJECT 5.2 - SEEPAGE BERM
 SAN JOAQUIN COUNTY, CALIFORNIA

TITLE SHEET

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C-001

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C-101



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**CITIES OF LATHROP AND MANTECA
 ULDC PROJECT 5.2 - SEEPAGE BERM
 SAN JOAQUIN COUNTY, CALIFORNIA**

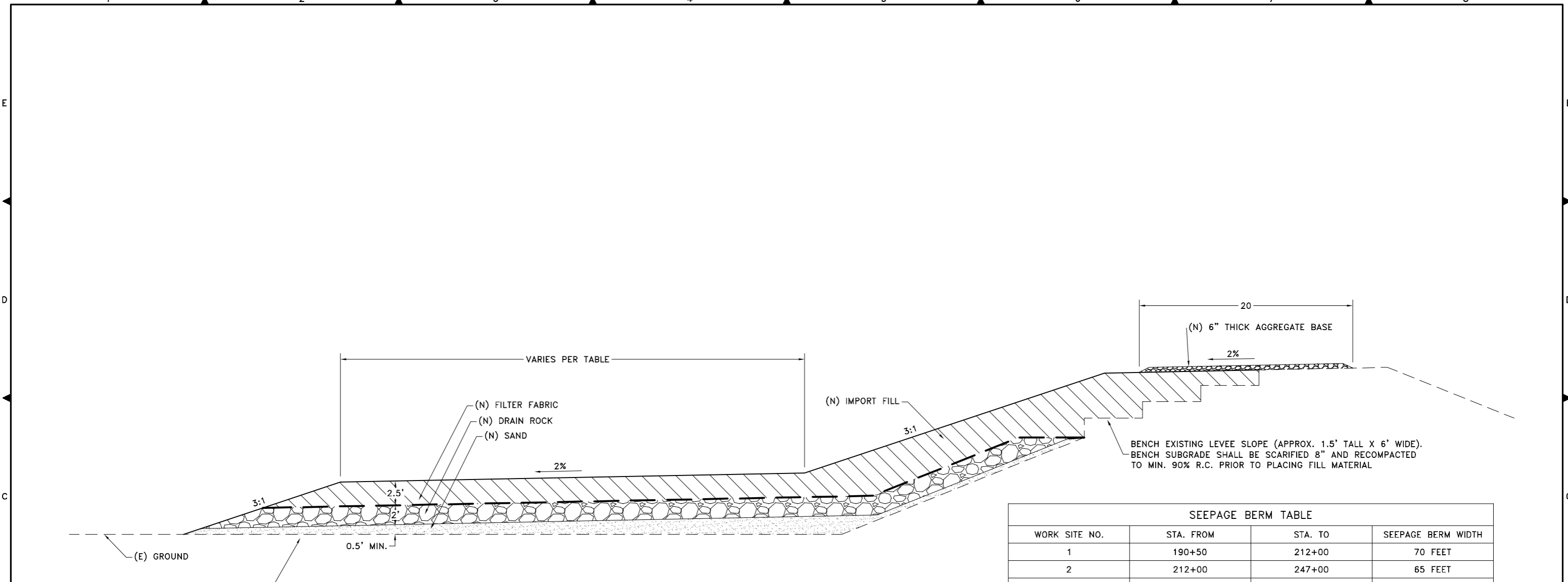
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Revisions				
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Date NOVEMBER 2015
Sheet Number 2 Of 4
Project File No. 2255-0030

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 PLOT DATE: Dec 08, 2015 - 8:32am



AREAS TO RECEIVE FILL SHALL BE SCARIFIED 8" AND RECOMPACTED TO MIN. 90% R.C. PRIOR TO PLACING SAND MATERIAL

BENCH EXISTING LEVEE SLOPE (APPROX. 1.5' TALL X 6' WIDE). BENCH SUBGRADE SHALL BE SCARIFIED 8" AND RECOMPACTED TO MIN. 90% R.C. PRIOR TO PLACING FILL MATERIAL

SEEPAGE BERM TABLE			
WORK SITE NO.	STA. FROM	STA. TO	SEEPAGE BERM WIDTH
1	190+50	212+00	70 FEET
2	212+00	247+00	65 FEET
3	255+50	259+50	60 FEET
4	270+00	297+75	60 FEET

1 SEEPAGE BERM
 SCALE: N.T.S.

	Submittal	
	%	Date
	10%	12/2/2015

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CITIES OF LATHROP AND MANTECA
 ULDC PROJECT 5.2 - SEEPAGE BERM
 SAN JOAQUIN COUNTY, CALIFORNIA

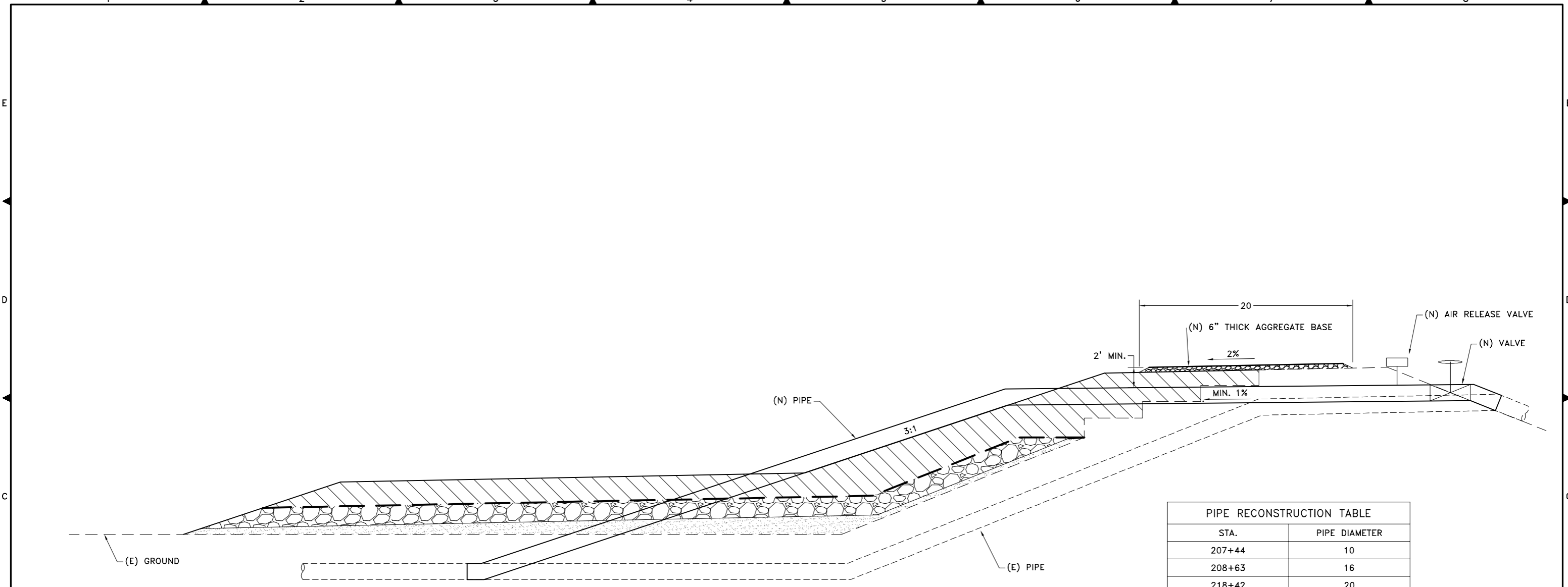
DETAILS

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Check CHN		Project File No. 2255-0030

C-501

FILE SPEC: P:\2255_Lathrop_Manteca_ULDC_Evaluation\0030_ULDC_Analyze and Identify Deficiencies\05_Civil\CAD\Improvements\05.2_Sht_04_Details.dwg
 PLOT DATE: Dec 08, 2015 - 8:34am



2 PIPE RECONSTRUCTION
 SCALE: N.T.S.

PIPE RECONSTRUCTION TABLE	
STA.	PIPE DIAMETER
207+44	10
208+63	16
218+42	20
232+05	8
240+95	8
241+31	8
241+46	8
246+25	10
258+70	10
267+39	10
280+59	16
291+91	12
297+44	12

	Submittal	
	%	Date
	10%	12/2/2015

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CITIES OF LATHROP AND MANTECA
ULDC PROJECT 5.2 - SEEPAGE BERM
SAN JOAQUIN COUNTY, CALIFORNIA

DETAILS

Revisions				
No.	Description	Date	By	Appr. By

Design EEA	Scale AS SHOWN	Date NOVEMBER 2015
Drawn EEA	Original Drawing Scale 0 1/2" 1"	Sheet Number 4 Of 4
Check CHN		Project File No. 2255-0030

C-502

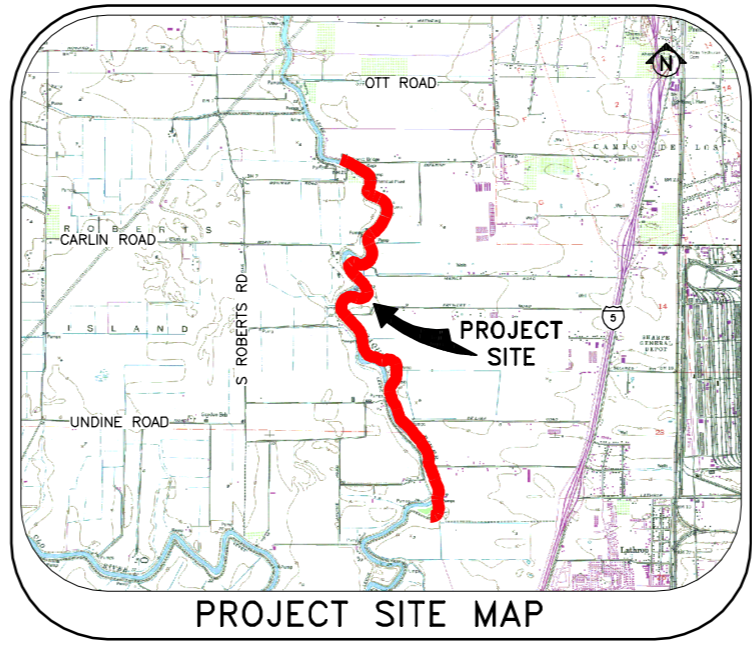
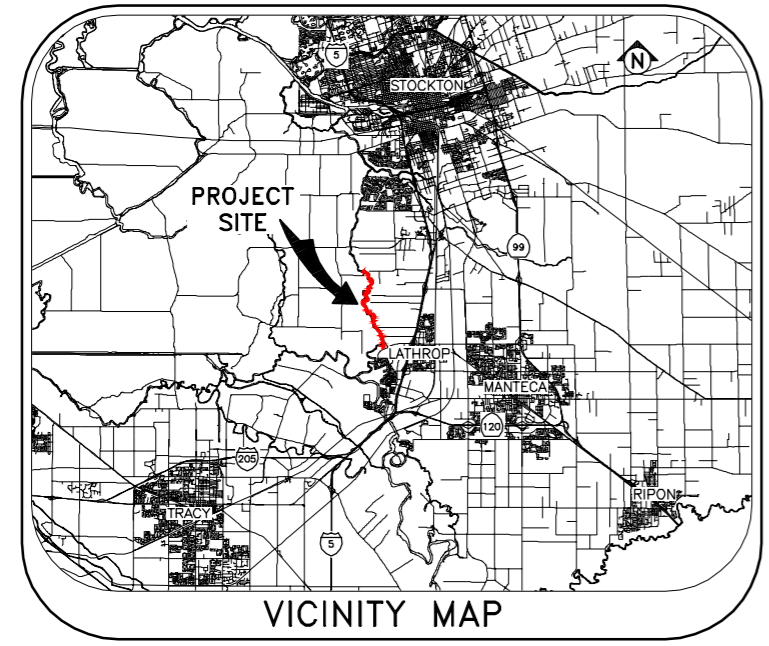
RECLAMATION DISTRICT NO. 17

MOSSDALE TRACT

SAN JOAQUIN COUNTY, CALIFORNIA

URBAN LEVEE DESIGN CRITERIA, PROJECT NO. 5.3 CUTOFF WALL IMPROVEMENTS

AT
VARIOUS LOCATION BETWEEN
STATION 311+00 AND STATION 518+50



SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	BASE MAP
3-4	DETAILS

SHEET INDEX

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PLOT DATE: Dec 04, 2015 - 3:51pm

	Submittal	
	%	Date
	10%	12/2/2015

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CITIES OF LATHROP AND MANTECA
ULDC PROJECT 5.3 - CUTOFF WALL
SAN JOAQUIN COUNTY, CALIFORNIA

TITLE SHEET

Revisions				Design EEA	Scale	Date NOVEMBER 2015
No.	Description	Date	By			
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				Check CHN		Project File No. 2255-0030

C-001

FILE SPEC: P:\2255_Lathrop_Manteca_ULDC_Evaluation\0030_ULDC_Analyze and Identify Deficiencies\05.3_Sht 02_Base Map.dwg
 PLOT DATE: Dec 07, 2015 - 9:35am



	Submittal	
	%	Date
	10%	12/2/2015

1	2	3	4	5	6	7	8
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**CITIES OF LATHROP AND MANTECA
 ULDC PROJECT 5.3 - CUTOFF WALL
 SAN JOAQUIN COUNTY, CALIFORNIA**

BASE MAP

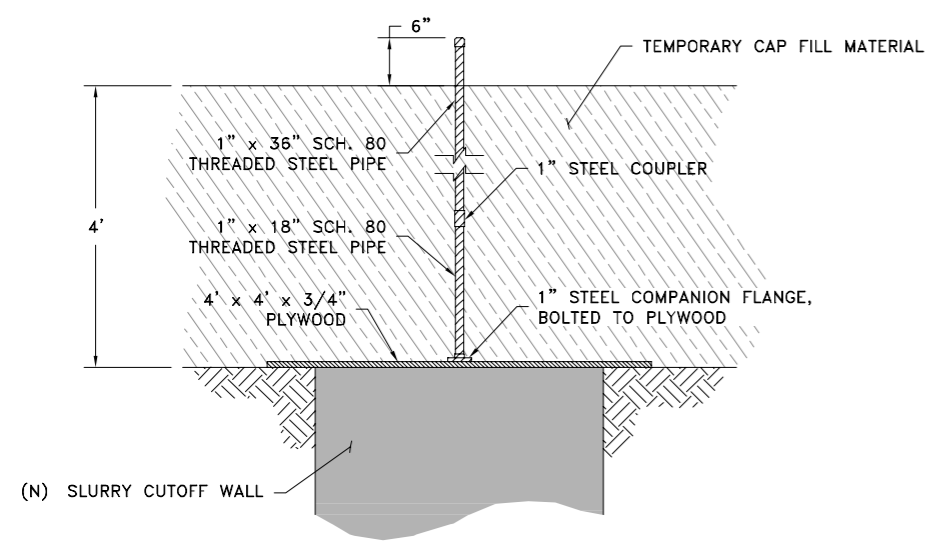
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Check CHN	

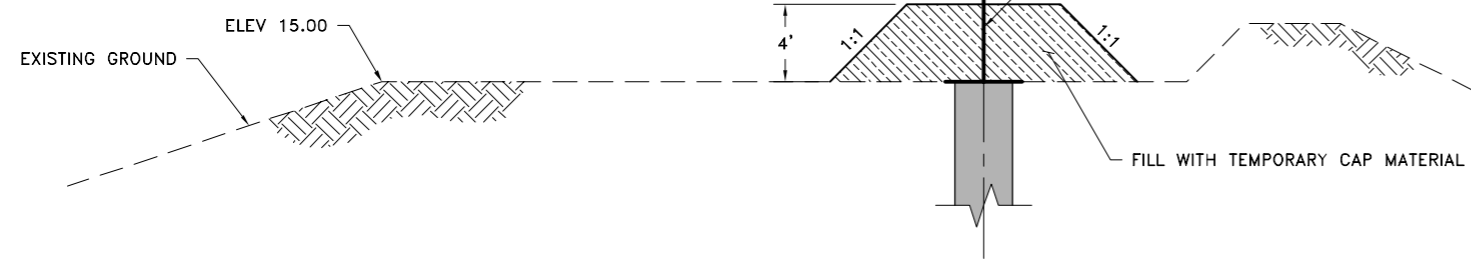
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Sheet Number 2 Of 4
Project File No. 2255-0030

C-101

FILE SPEC: P:\2255_Lathrop_Manteca_ULDC_Evaluation\0030_ULDC_Analyze and Identify Deficiencies\05_Civil\CAD\Improvements\05_3_Sht_03_Details.dwg
 PLOT DATE: Dec 08, 2015 - 8:42am



SETTLEMENT PLATE



TEMPORARY CAP NOTES:

1. AFTER SLURRY WALL HAS BEEN CONSTRUCTED, PLACE TEMPORARY CAP MATERIAL AS SHOWN.
2. INSTALL SETTLEMENT PLATES @ 200' O.C. ALONG LEVEE CENTERLINE. CONTRACTOR SHALL BE RESPONSIBLE TO SURVEY THE TOP OF EACH RISER PIPE EVERY OTHER DAY FOR A MIN. 2 WEEKS AND UNTIL SETTLEMENT HAS CEASED, AS APPROVED BY THE ENGINEER. THE SURVEYING OF SETTLEMENT PLATES SHALL BE PERFORMED BY A LICENSED SURVEYOR.
3. AFTER SETTLEMENT HAS CEASED, REMOVE TEMPORARY CAP MATERIAL AND DISPOSE OF OFFSITE AT THE CONTRACTOR'S EXPENSE.

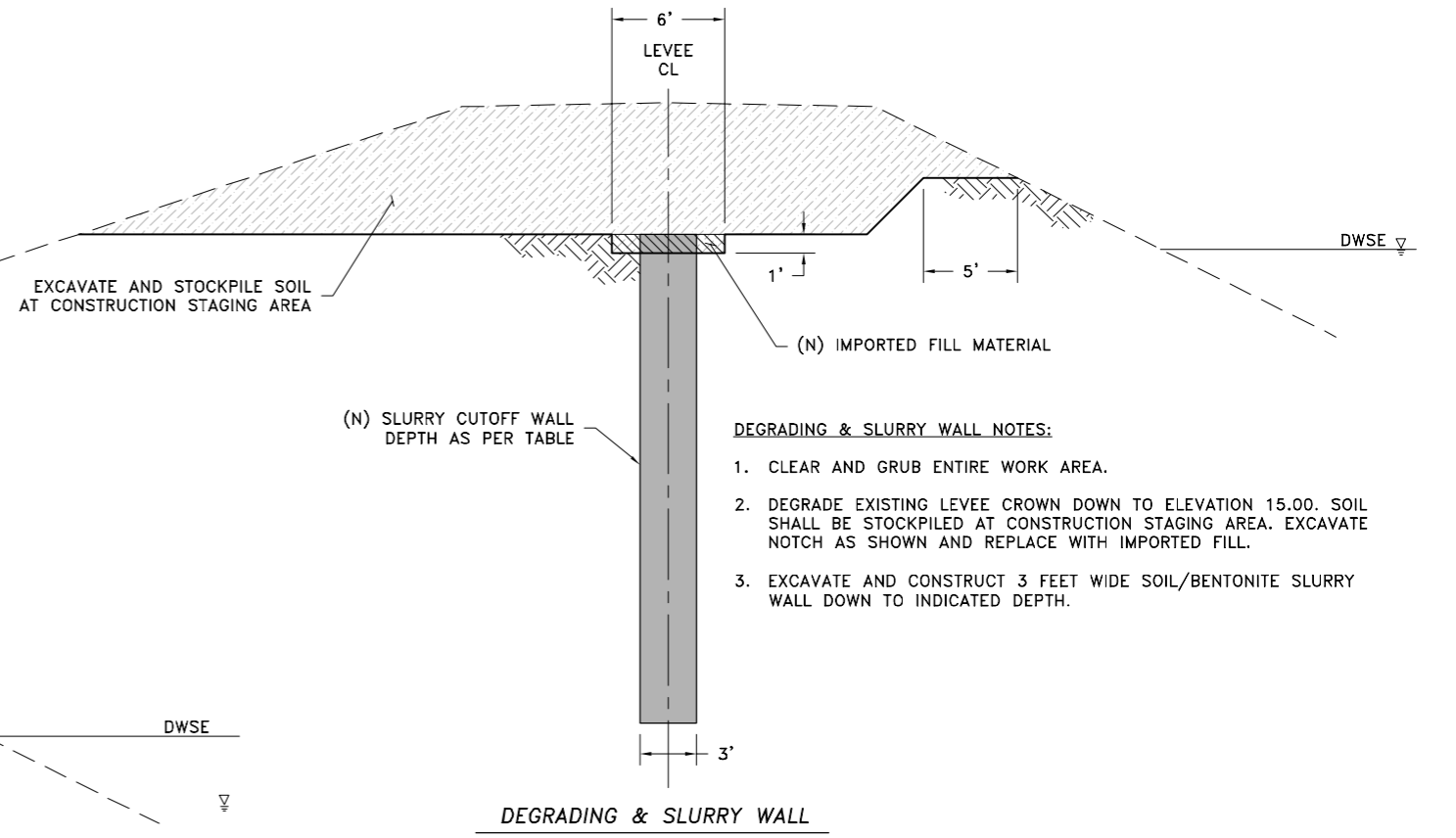
LEVEE CROWN FILL & ALL-WEATHER ROAD NOTES:

1. LEVEE CROWN FILL (PERMANENT CAP) SHALL NOT BE CONSTRUCTED UNTIL AFTER THE TEMPORARY CAP HAS CEASED TO SETTLE AND HAS BEEN REMOVED.
2. INSTALL TRACER WIRE, #10 AWG SINGLE STRAND SOFT DRAWN COPPER WIRE WITH INSULATION, CENTERED OVER TOP OF CUTOFF WALL. BRING TRACER WIRE INTO BOXES CENTERED OVER TOP OF WALL AT A 500' MAX. SPACING WITH 5' OF EXTRA WIRE COILED IN EACH BOX, FLUSH WITH TOP OF AB ROAD SURFACE. INSTALL ADDITIONAL BOXES AT EACH END OF CUTOFF WALL. BOXES SHALL BE CHRISTY G5 BOX OR APPROVED EQUAL.
3. FILL LEVEE TO PROPER ELEVATION AS SHOWN WITH IMPORTED FILL MATERIAL.
4. PLACE MIN. 6 INCHES OF COMPACTED AGGREGATE BASE MATERIAL.

TEMPORARY CAP

SLURRY CUTOFF WALL TABLE			
WORK SITE NO.	STA. FROM	STA. TO	WALL DEPTH
1	311+00	321+00	35 FEET
2	321+00	339+00	45 FEET
3	339+00	362+50	90 FEET
4	388+00	420+00	55 FEET
5	420+00	445+00	70 FEET
6	445+00	466+00	60 FEET
7	466+00	506+00	75 FEET
8	506+00	518+50	40 FEET

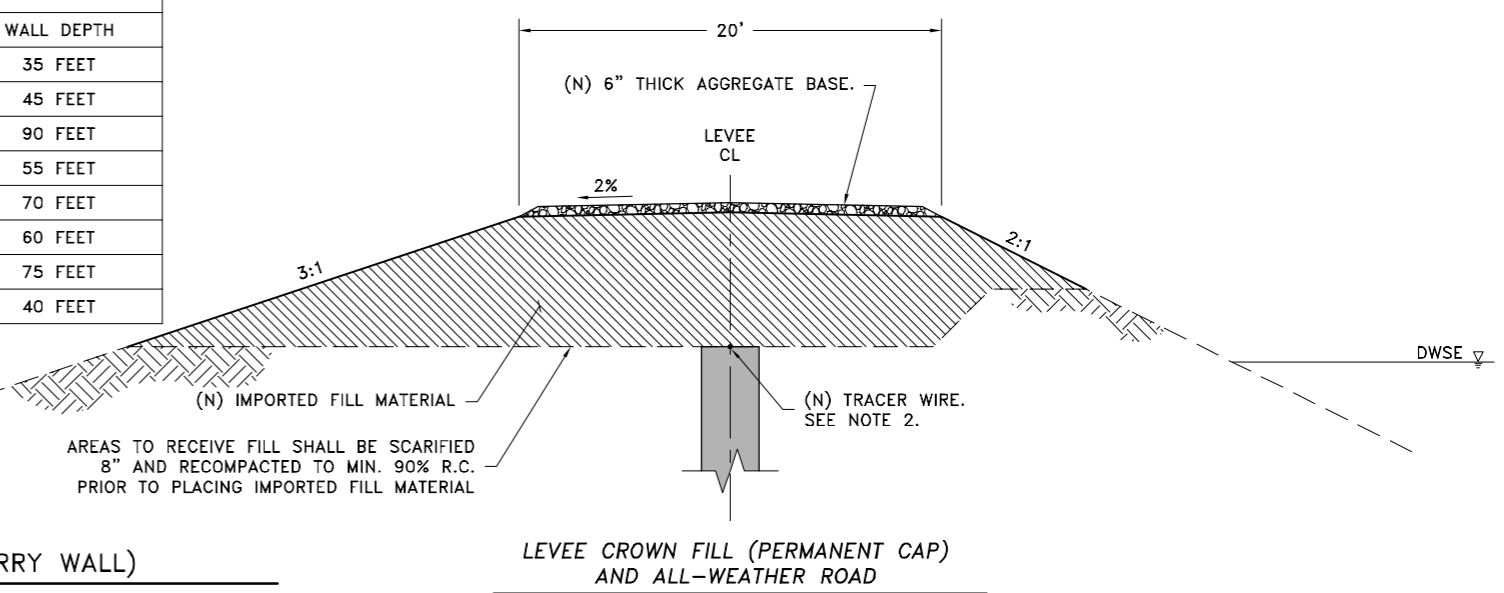
1 CUTOFF WALL (SLURRY WALL)
SCALE: N.T.S.



DEGRADING & SLURRY WALL NOTES:

1. CLEAR AND GRUB ENTIRE WORK AREA.
2. DEGRADE EXISTING LEVEE CROWN DOWN TO ELEVATION 15.00. SOIL SHALL BE STOCKPILED AT CONSTRUCTION STAGING AREA. EXCAVATE NOTCH AS SHOWN AND REPLACE WITH IMPORTED FILL.
3. EXCAVATE AND CONSTRUCT 3 FEET WIDE SOIL/BENTONITE SLURRY WALL DOWN TO INDICATED DEPTH.

DEGRADING & SLURRY WALL



LEVEE CROWN FILL (PERMANENT CAP) AND ALL-WEATHER ROAD

	Submittal
	% Date
	10% 12/2/2015

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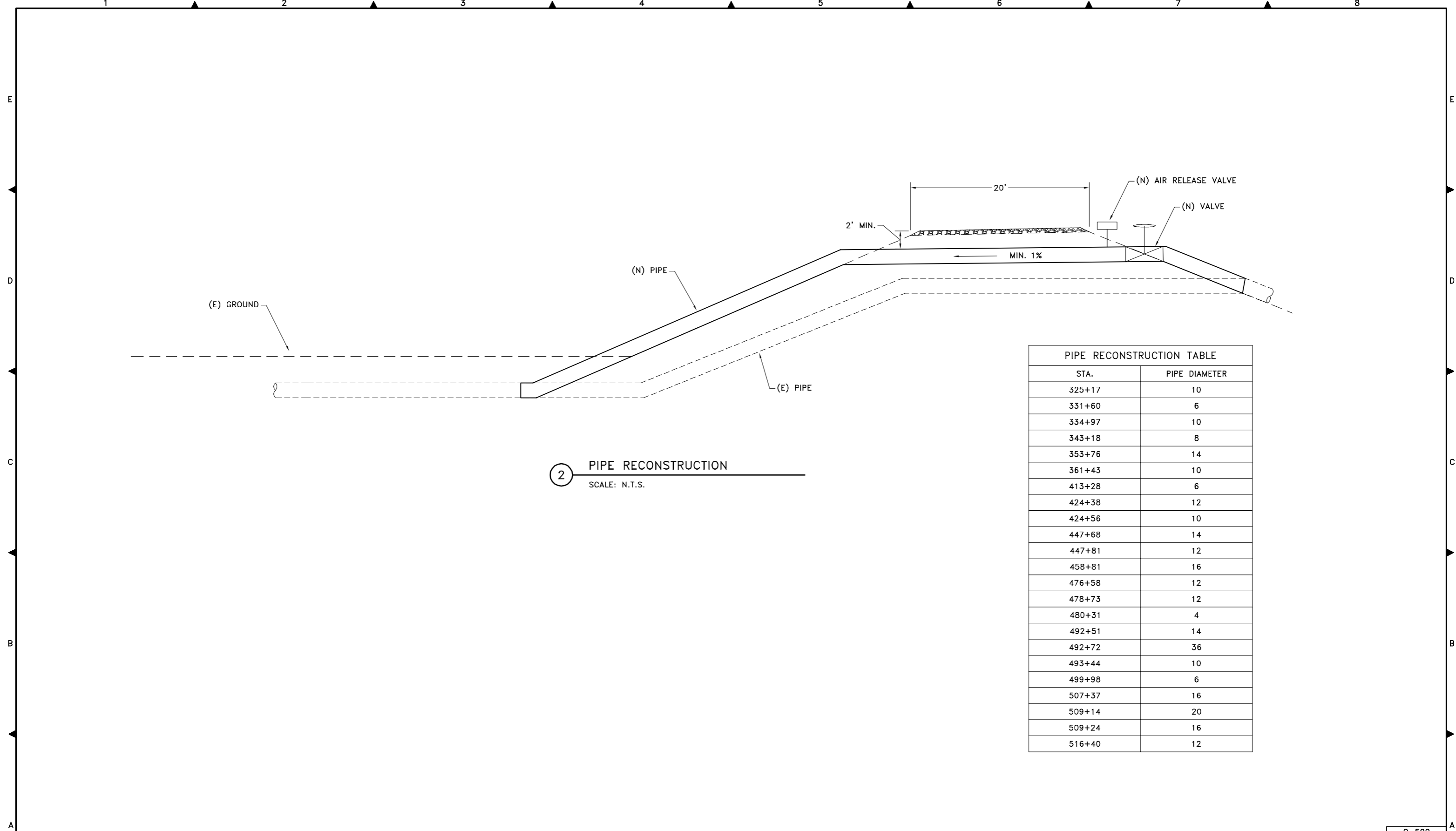
CITIES OF LATHROP AND MANTECA
ULDC PROJECT 5.3 - CUTOFF WALL
SAN JOAQUIN COUNTY, CALIFORNIA

DETAILS

Revisions				Design	Scale	Date
No.	Description	Date	By	EEA	AS SHOWN	NOVEMBER 2015
				Drawn		Sheet Number
				EEA		3 Of 4
				Check	Original Drawing Scale	Project File No.
				CHN	0 1/2" 1"	2255-0030

C-501

FILE SPEC: P:\2255_Lathrop_Manteca_ULDC_Evaluation\0030_ULDC_Analyze and Identify Deficiencies\05_Civil\CAD\Improvements\05.3_Sht_04_Details.dwg
 PLOT DATE: Dec 08, 2015 - 8:44am



	Submittal	
	%	Date
	10%	12/2/2015

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 and Land Surveyors

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CITIES OF LATHROP AND MANTECA
ULDC PROJECT 5.3 - CUTOFF WALL
SAN JOAQUIN COUNTY, CALIFORNIA

Revisions				
No.	Description	Date	By	Appr. By

Design EEA
 Drawn EEA
 Check CHN

Scale
AS SHOWN
 Original Drawing Scale
 0 1/2" 1"

Date **NOVEMBER 2015**
 Sheet Number **4** Of **4**
 Project File No. **2255-0030**

C-502

RECLAMATION DISTRICT NO. 17

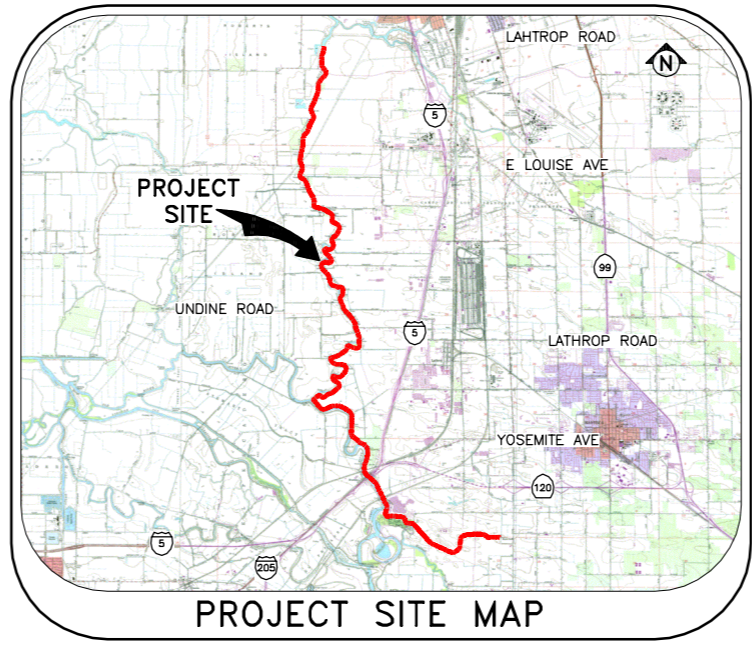
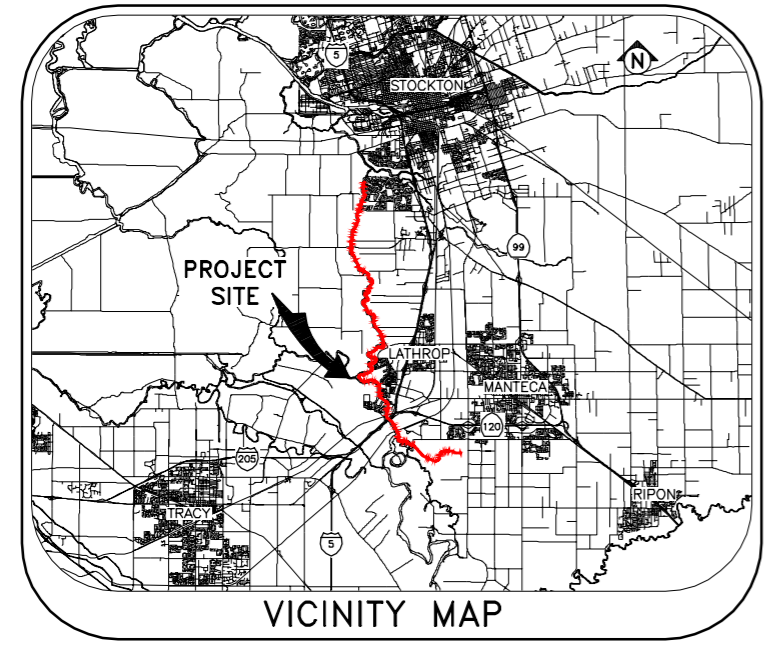
MOSSDALE TRACT

SAN JOAQUIN COUNTY, CALIFORNIA

URBAN LEVEE DESIGN CRITERIA, PROJECT NO. 10.1

EROSION REPAIRS

AT
 VARIOUS LOCATION BETWEEN
 STATION 114+00 AND STATION 972+25



SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	BASE MAP
3	DETAILS

SHEET INDEX

FILE SPEC: P:\2255_Lathrop_Manteca_ULDC_Evaluation\0030_ULDC_Analyze and Identify Deficiencies\05_Civil\CAD\Improvements\10.1_Sht 01_Title Sheet.dwg
 PLOT DATE: Dec 07, 2015 - 9:04am

	Submittal	
	%	Date
	10%	12/2/2015

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CITIES OF LATHROP AND MANTECA
 ULDC PROJECT 10.1 – EROSION REPAIRS
 SAN JOAQUIN COUNTY, CALIFORNIA

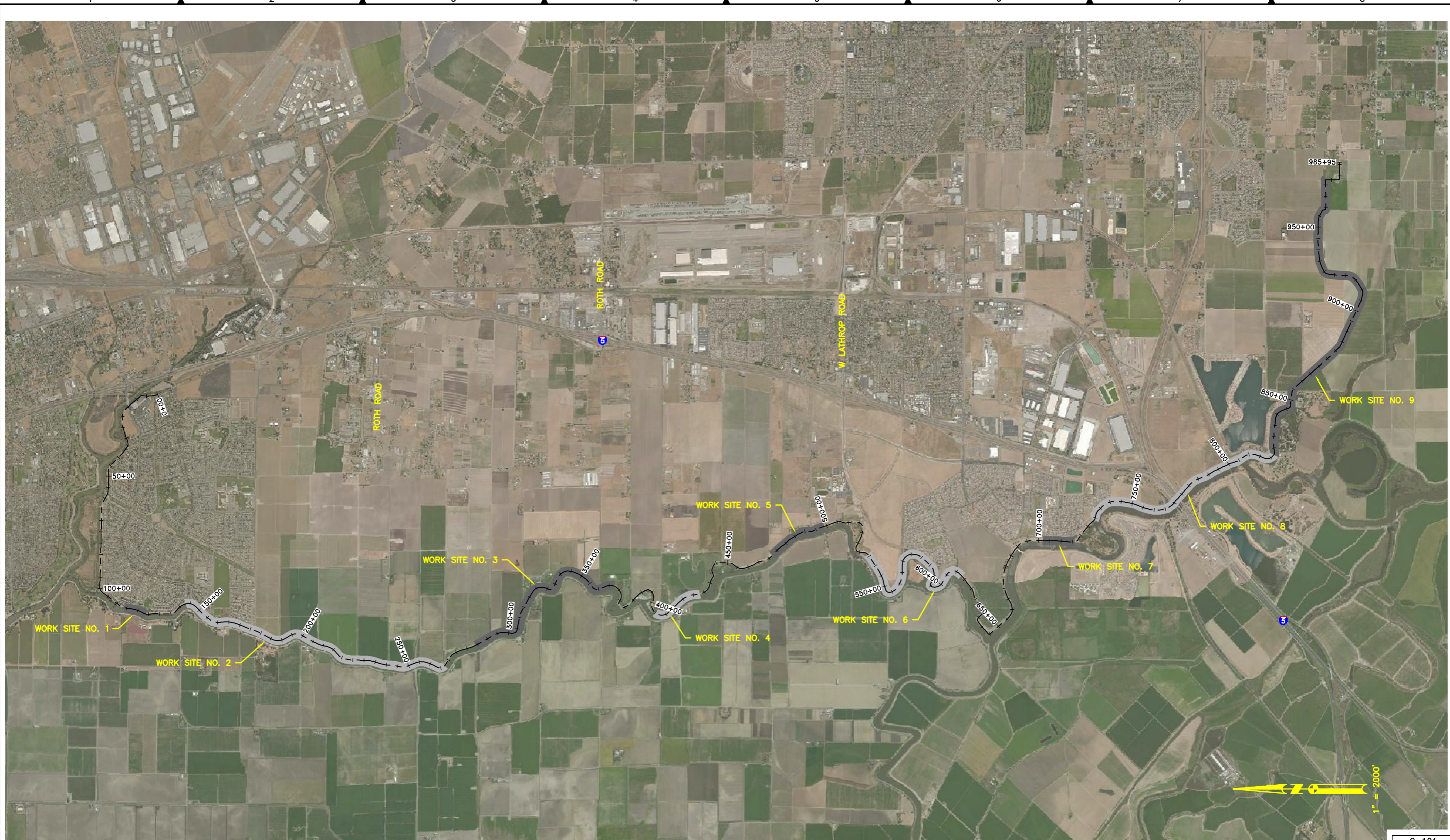
TITLE SHEET

Revisions		Date	By	Appr. By	Design EEA
No.	Description				

Scale	Date
AS SHOWN	NOVEMBER 2015
Original Drawing Scale	Sheet Number
0 1/2" = 1"	1 Of 3
	Project File No.
	2255-0030

C-001

FILE SPEC: P:\2255_Lathrop_Manteca_ULDC_Evaluation\0030_ULDC_Analyze and Identify Deficiencies\10.1_Sht_02_Base Map.dwg
 PLOT DATE: Dec 07, 2015 9:22am



	Submittal	
	%	Date
	10%	12/2/2015

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**CITIES OF LATHROP AND MANTECA
 ULDC PROJECT 10.1 – EROSION REPAIRS
 SAN JOAQUIN COUNTY, CALIFORNIA**

BASE MAP

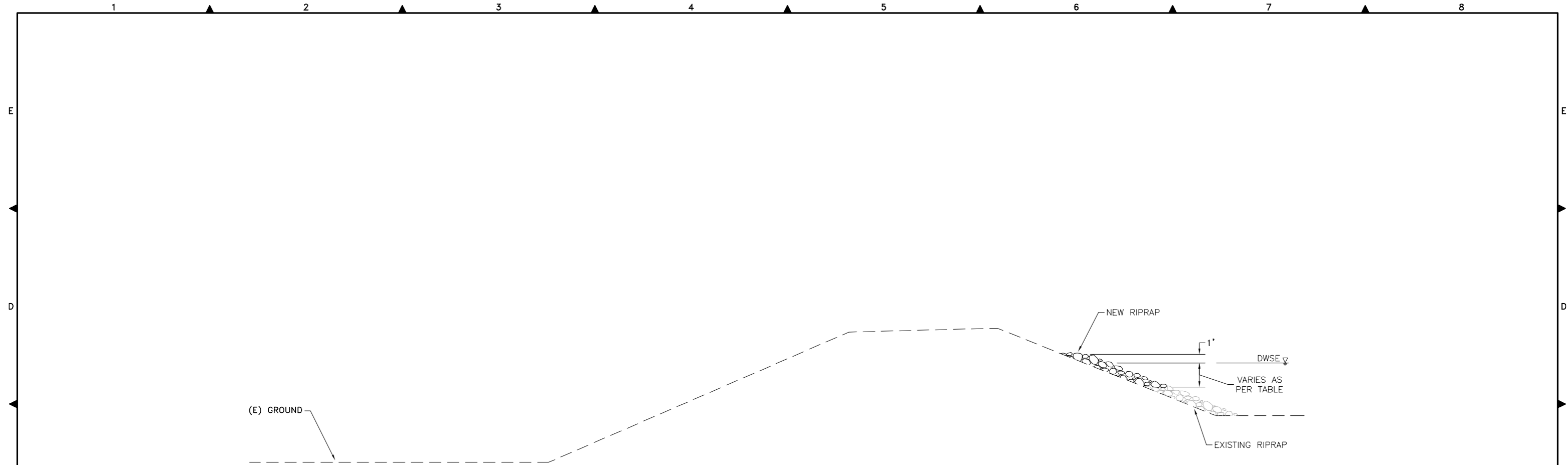
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No.	Description	Date	By	Appr. By

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Drawn EEA	
Check CHN	

Date NOVEMBER 2015
Sheet Number 2 Of 3
Project File No. 2255-0030

C-101

FILE SPEC: P:\2255_Lathrop_Manteca_ULDC_Evaluation\0030_ULDC_Analyze and Identify Deficiencies\05_Civil\CAD\Improvements\10.1_Sht_03_Details.dwg
 PLOT DATE: Dec 08, 2015 - 8:49am



EROSION REPAIR TABLE			
WORKS SITE NO.	STA. FROM	STA. TO	RIPRAP QUANTIFY
1	143+00	267+00	1 TO 1.5 TONS/LF
2	284+00	367+00	1 TO 1.5 TONS/LF
3	534+00	613+00	1 TO 1.5 TONS/LF
4	822+00	972+25	1 TO 1.5 TONS/LF
5	114+00	124+00	2 TO 2.5 TONS/LF
6	405+00	428+00	2 TO 2.5 TONS/LF
7	472+00	499+00	2 TO 2.5 TONS/LF
8	702+00	716+00	2 TO 2.5 TONS/LF
9	729+00	822+00	2 TO 2.5 TONS/LF

① EROSION REPAIR
 SCALE: N.T.S.

	Submittal	
	%	Date
	10%	12/2/2015

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CITIES OF LATHROP AND MANTECA
ULDC PROJECT 10.1 - EROSION REPAIRS
SAN JOAQUIN COUNTY, CALIFORNIA

DETAILS

Revisions			
No.	Description	Date	By

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Drawn EEA		Sheet Number 3 Of 3
Check CHN		Project File No. 2255-0030

C-501

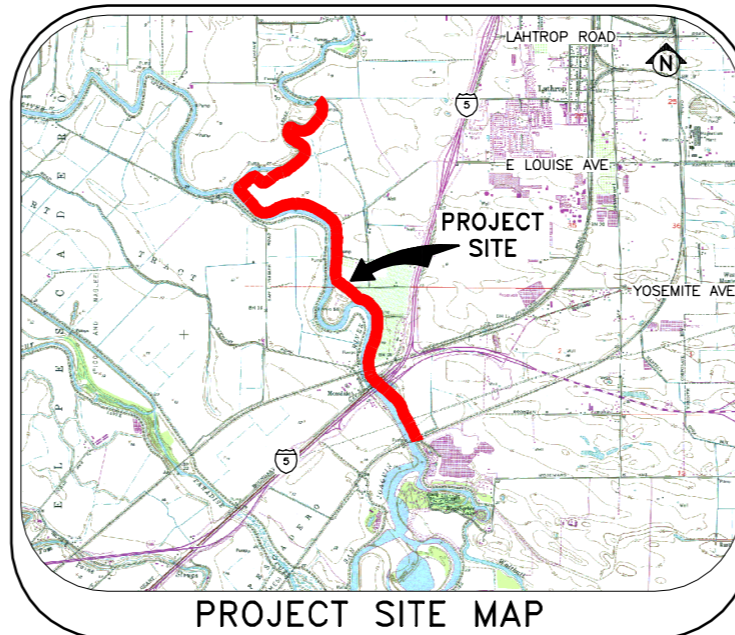
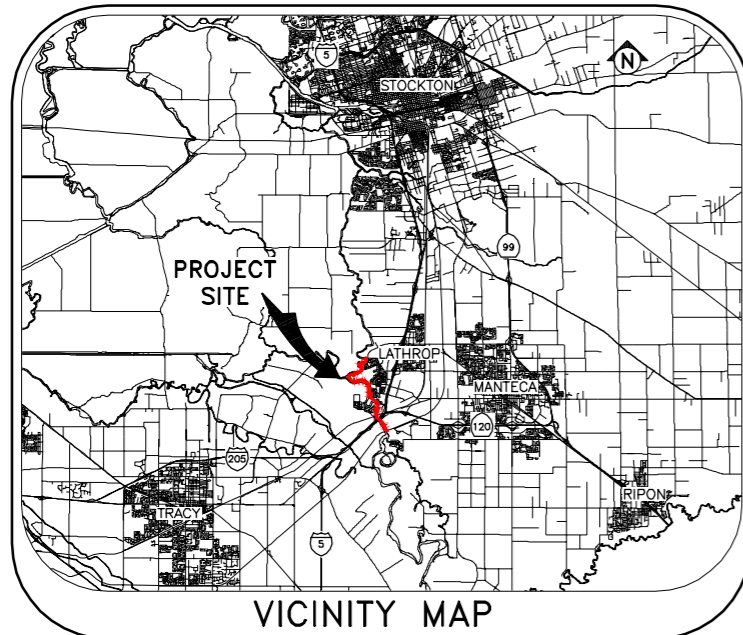
RECLAMATION DISTRICT NO. 17

MOSSDALE TRACT

SAN JOAQUIN COUNTY, CALIFORNIA

URBAN LEVEE DESIGN CRITERIA, PROJECT NO. 13.1
PENETRATION REHABILITATION

AT
 VARIOUS LOCATION BETWEEN
 STATION 571+35 AND STATION 801+00



SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	BASE MAP
3	DETAILS

SHEET INDEX

FILE SPEC: P:\2255_Lathrop_Manteca_ULDC_Evaluation\0030_ULDC_Analyze and Identify Deficiencies\05_Civil\CAD\Improvements\13.1_Sht 01_Title Sheet.dwg
 PLOT DATE: Dec 07, 2015 - 9:06am

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	%	Date
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CITIES OF LATHROP AND MANTECA
 ULDC PROJECT 13.1 - PENETRATION REHABILITATION
 SAN JOAQUIN COUNTY, CALIFORNIA

TITLE SHEET

Revisions				Design EEA	Scale	Date
No.	Description	Date	By	Aprvd. By	AS SHOWN	NOVEMBER 2015
					Original Drawing Scale	Sheet Number
					0 1/2" 1"	1 Of 3
						Project File No. 2255-0030

C-001

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 PLOT DATE: Dec 08, 2015 - 8:54am



Image courtesy of USGS © 2015 Microsoft Corporation

C-101



Submittal	
%	Date
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**CITIES OF LATHROP AND MANTECA
 ULDC PROJECT 13.1 - PENETRATION REHABILITATION
 SAN JOAQUIN COUNTY, CALIFORNIA**

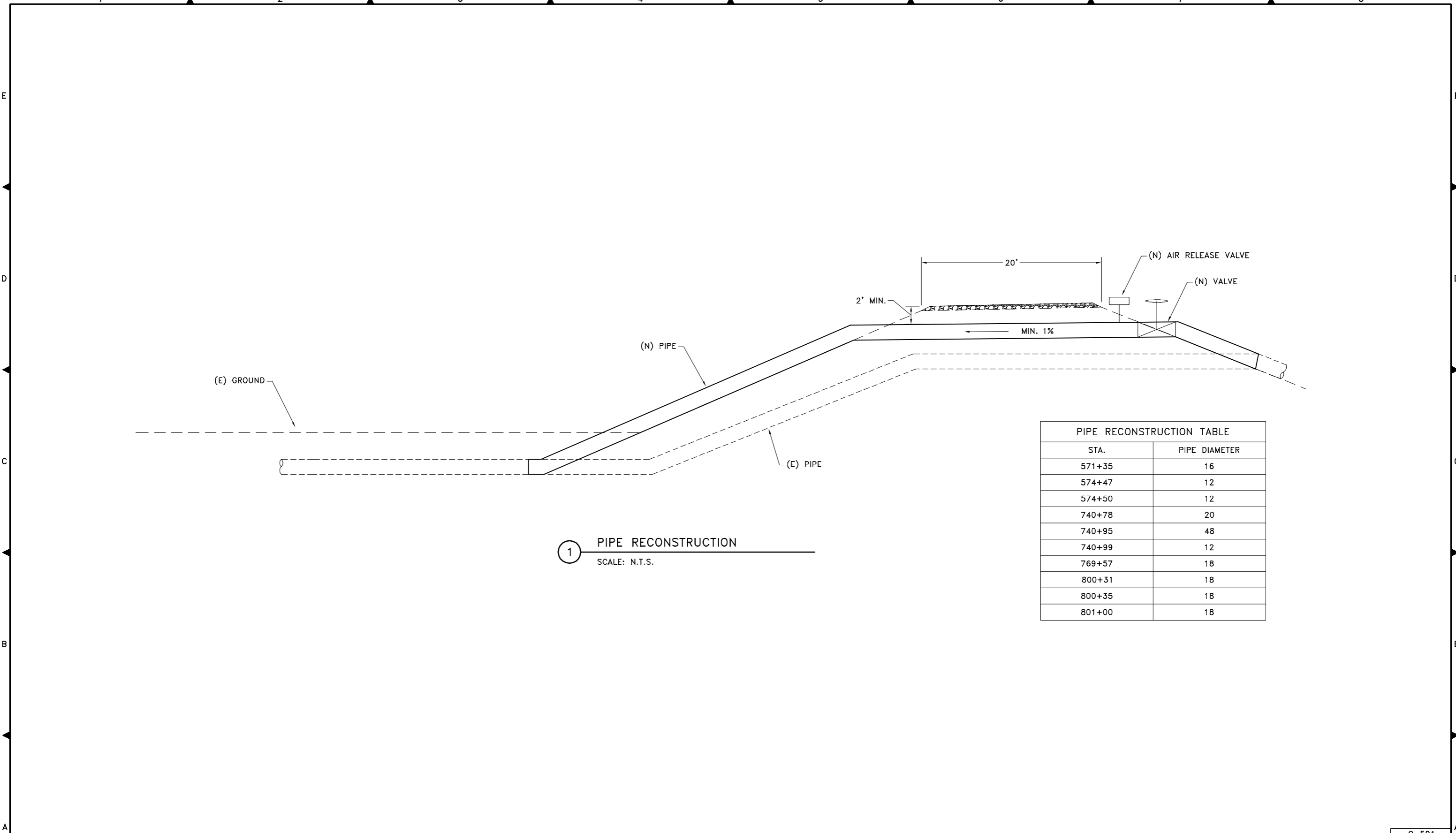
BASE MAP

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Drawn EEA	
Check CHN	

Date NOVEMBER 2015
Sheet Number 2 Of 3
Project File No. 2255-0030

FILE SPEC: P:\2255_Lathrop_Manteca_ULDC_Evaluation\0030_ULDC_Analyze and Identify Deficiencies\05_Civil\CAD\Improvements\13.1_Sht_03_Details.dwg
 PLOT DATE: Dec 04, 2015 4:07pm



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	%	Date
	10%	12/2/2015

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CITIES OF LATHROP AND MANTECA
ULDC PROJECT 13.1 - PENETRATION REHABILITATION
 SAN JOAQUIN COUNTY, CALIFORNIA

DETAILS

Revisions				Design	Scale	Date
No.	Description	Date	By	EEA	AS SHOWN	NOVEMBER 2015
				Drawn	Original Drawing Scale 0 1/2" 1"	Sheet Number
				EEA		3 Of 3
				Check		Project File No.
				CHN		2255-0030

C-501

Cities of Lathrop and Manteca
ULDC Evaluation
Identified Improvements

EXHIBIT 2
Detailed Cost Estimate

**CITIES OF LATHROP AND MANTECA
 ULDC EVALUATION
 SAN JOAQUIN COUNTY, CALIFORNIA**

OPINION OF PROBABLE COSTS

SUMMARY OF PROPOSED IMPROVEMENTS

Project No.	Sta.	Sta.	Proposed Project	Total Cost
Construction Improvements				
2.1	822+80	972+25	Dryland Levee Reconstruction and Seepage Berm	\$27,765,000
5.1	119+50	192+00	Cutoff Wall	\$10,224,000
5.2	190+50	297+75	Seepage Berm	\$19,501,000
5.3	311+00	518+50	Cutoff Wall	\$35,050,000
10.1	114+00	972+25	Erosion Repairs	\$9,386,000
12.1	112+73	815+40	Encroachment Remediation	\$678,000
13.1	571+35	801+00	Pipe Penetration Rehabilitation	\$2,128,000
Subtotal:				\$104,732,000
Real Estate Improvements				
11.1			Right-of-Way Acquisition (existing deficiencies)	\$12,381,000
11.2			Right-of-Way Acquisition (new construction improvements)	\$3,900,000
Subtotal:				\$16,281,000
SUBTOTAL:				\$121,013,000
DRYLAND LEVEE EXTENSION ALTERNATIVE:				\$15,872,000
TOTAL:				\$136,885,000

Notes:

- (1) This Opinion of Probable Costs is based on 2015\$ and only includes an approximation of the necessary improvements that would be required to achieve full ULDC compliance. This Opinion of Probable Costs does not include any additional enhancements or multi-purpose benefits that may be required to procure grant funding from the State of California or other agencies.
- (2) This Opinion of Probable Costs does not include costs associated with obtaining necessary project funding such as applying for and securing grants, assisting with the formation of assessment districts or areas of benefit, assisting in the development of builder impact fees, etc.

**CITIES OF LATHROP AND MANTECA
 ULDC EVALUATION
 SAN JOAQUIN COUNTY, CALIFORNIA**

**OPINION OF PROBABLE COSTS
 DETAILS OF PROPOSED IMPROVEMENTS**

Item	Description	Quantity	Unit	Unit Cost	Total Cost
------	-------------	----------	------	-----------	------------

PROJECT NO. 2.1

**DRYLAND LEVEE RECONSTRUCTION AND SEEPAGE BERM
 STA. 822+80 TO STA. 972+25**

Construction					
1.	Mobilization			3%	\$467,800
2.	Erosion Control			3%	\$467,800
3.	Clearing and Grubbing	36.9	AC	\$2,000	\$73,800
4.	Imported Engineered Fill	437,000	TN	\$15	\$6,555,000
5.	Drain Rock Material	191,800	TN	\$30	\$5,754,000
6.	Sand Filter Material	89,800	TN	\$25	\$2,245,000
7.	Filter Fabric	1,045,000	SF	\$0.50	\$522,500
8.	Class 2 Aggregate Base	8,800	TN	\$25	\$220,000
9.	Reconstruct Existing 20" Pipe	1	EA	\$95,000	\$95,000
10.	Air Release Valve	1	EA	\$2,000	\$2,000
11.	20" Valve	1	EA	\$18,000	\$18,000
12.	Hydroseeding	1,056,900	SF	\$0.10	\$105,700
Subtotal:					\$16,526,600

Mangement / Environmental / Engineering					
1.	Administration			5%	\$826,400
2.	Planning			3%	\$495,800
3.	Environmental and Permitting			5%	\$826,400
4.	Geotechnical Engineering			2%	\$330,600
5.	Surveying and Civil Engineering			10%	\$1,652,700
6.	Construction Management and Inspection			12%	\$1,983,200
7.	Mitigation			3%	\$495,800
Subtotal:					\$6,610,900

SUBTOTAL:	\$23,137,500
CONTINGENCY (20%):	\$4,627,500
PROJECT TOTAL:	\$27,765,000

**CITIES OF LATHROP AND MANTECA
 ULDC EVALUATION
 SAN JOAQUIN COUNTY, CALIFORNIA**

**OPINION OF PROBABLE COSTS
 DETAILS OF PROPOSED IMPROVEMENTS**

Item	Description	Quantity	Unit	Unit Cost	Total Cost
------	-------------	----------	------	-----------	------------

PROJECT NO. 5.1

CUTOFF WALL

STA. 119+50 TO STA.192+00

Construction					
1.	Mobilization			20%	\$989,500
2.	Erosion Control			3%	\$148,500
3.	Clearing and Grubbing	9.1	AC	\$2,000	\$18,200
5.	Mix-in-Place Cutoff Wall	171,300	SF	\$10	\$1,713,000
6.	Tracer Wire	4,900	LF	\$2	\$9,800
7.	Imported Engineered Fill	40,400	TN	\$20	\$808,000
8.	Class 2 Aggregate Base	3,600	TN	\$25	\$90,000
9.	Reconstruct Existing 8" Pipe	4	EA	\$45,000	\$180,000
10.	Reconstruct Existing 12" Pipe	1	EA	\$60,000	\$60,000
11.	Reconstruct Existing 16" Pipe	1	EA	\$80,000	\$80,000
12.	Reconstruct Existing 42" Pipe	6	EA	\$250,000	\$1,500,000
13.	Air Release Valve	12	EA	\$2,000	\$24,000
14.	8" Valve	4	EA	\$2,500	\$10,000
15.	12" Valve	1	EA	\$4,000	\$4,000
16.	16" Valve	1	EA	\$8,500	\$8,500
17.	42" Valve	6	EA	\$70,000	\$420,000
18.	Hydroseeding	216,300	SF	\$0.10	\$21,700
Subtotal:					\$6,085,200

Mangement / Environmental / Engineering					
1.	Administration			5%	\$304,300
2.	Planning			3%	\$182,600
3.	Environmental and Permitting			5%	\$304,300
4.	Geotechnical Engineering			2%	\$121,800
5.	Surveying and Civil Engineering			10%	\$608,600
6.	Construction Management and Inspection			12%	\$730,300
7.	Mitigation			3%	\$182,600
Subtotal:					\$2,434,500

SUBTOTAL:	\$8,519,700
CONTINGENCY (20%):	\$1,704,000
PROJECT TOTAL:	\$10,224,000

**CITIES OF LATHROP AND MANTECA
ULDC EVALUATION
SAN JOAQUIN COUNTY, CALIFORNIA**

**OPINION OF PROBABLE COSTS
DETAILS OF PROPOSED IMPROVEMENTS**

Item	Description	Quantity	Unit	Unit Cost	Total Cost
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PROJECT NO. 5.2

SEEPAGE BERM

STA. 190+50 TO STA. 297+75

Construction

1.	Mobilization			3%	\$328,500
2.	Erosion Control			3%	\$328,500
3.	Clearing and Grubbing	29.9	AC	\$2,000	\$59,800
4.	Imported Engineered Fill	225,700	TN	\$15	\$3,385,500
5.	Drain Rock Material	137,900	TN	\$30	\$4,137,000
6.	Sand Filter Material	70,500	TN	\$25	\$1,762,500
7.	Filter Fabric	939,200	SF	\$0.50	\$469,600
8.	Class 2 Aggregate Base	6,600	TN	\$25	\$165,000
9.	Reconstruct Existing 8" Pipe	4	EA	\$45,000	\$180,000
10.	Reconstruct Existing 10" Pipe	4	EA	\$55,000	\$220,000
11.	Reconstruct Existing 12" Pipe	2	EA	\$60,000	\$120,000
12.	Reconstruct Existing 16" Pipe	2	EA	\$80,000	\$160,000
13.	Reconstruct Existing 20" Pipe	1	EA	\$95,000	\$95,000
14.	Air Release Valve	13	EA	\$2,000	\$26,000
15.	8" Valve	4	EA	\$2,500	\$10,000
16.	10" Valve	4	EA	\$3,000	\$12,000
17.	12" Valve	2	EA	\$4,000	\$8,000
18.	16" Valve	2	EA	\$8,500	\$17,000
19.	20" Valve	1	EA	\$18,000	\$18,000
20.	Hydroseeding	1,045,100	SF	\$0.10	\$104,600
Subtotal:					\$11,607,000

Management / Environmental / Engineering

1.	Administration			5%	\$580,400
2.	Planning			3%	\$348,300
3.	Environmental and Permitting			5%	\$580,400
4.	Geotechnical Engineering			2%	\$232,200
5.	Surveying and Civil Engineering			10%	\$1,160,700
6.	Construction Management and Inspection			12%	\$1,392,900
7.	Mitigation			3%	\$348,300
Subtotal:					\$4,643,200

SUBTOTAL:	\$16,250,200
CONTINGENCY (20%):	\$3,250,100
PROJECT TOTAL:	\$19,501,000

**CITIES OF LATHROP AND MANTECA
ULDC EVALUATION
SAN JOAQUIN COUNTY, CALIFORNIA**

**OPINION OF PROBABLE COSTS
DETAILS OF PROPOSED IMPROVEMENTS**

Item	Description	Quantity	Unit	Unit Cost	Total Cost
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PROJECT NO. 5.3

CUTOFF WALL

STA. 311+00 TO STA. 518+50

Construction

1.	Mobilization			10%	\$1,846,300
2.	Erosion Control			3%	\$553,900
3.	Clearing and Grubbing	38.1	AC	\$2,000	\$76,200
4.	Degrade Existing Levee (1/3 Height)	83,000	CY	\$10	\$830,000
5.	Cement-Bentonite Slurry Cutoff Wall	1,154,500	SF	\$8	\$9,236,000
6.	Temporary Cap (Double Handle)	32,400	CY	\$10	\$324,000
7.	Tracer Wire	18,200	LF	\$2	\$36,400
8.	Imported Engineered Fill	384,400	TN	\$15	\$5,766,000
9.	Class 2 Aggregate Base	13,500	TN	\$25	\$337,500
10.	Reconstruct Existing 4" Pipe	1	EA	\$35,000	\$35,000
11.	Reconstruct Existing 6" Pipe	3	EA	\$40,000	\$120,000
12.	Reconstruct Existing 8" Pipe	1	EA	\$45,000	\$45,000
13.	Reconstruct Existing 10" Pipe	5	EA	\$55,000	\$275,000
14.	Reconstruct Existing 12" Pipe	5	EA	\$60,000	\$300,000
15.	Reconstruct Existing 14" Pipe	3	EA	\$75,000	\$225,000
16.	Reconstruct Existing 16" Pipe	3	EA	\$80,000	\$240,000
17.	Reconstruct Existing 20" Pipe	1	EA	\$95,000	\$95,000
18.	Reconstruct Existing 36" Pipe	1	EA	\$200,000	\$200,000
19.	Air Release Valve	23	EA	\$2,000	\$46,000
20.	4" Valve	1	EA	\$1,500	\$1,500
21.	6" Valve	3	EA	\$2,000	\$6,000
22.	8" Valve	1	EA	\$2,500	\$2,500
23.	10" Valve	5	EA	\$3,000	\$15,000
24.	12" Valve	5	EA	\$4,000	\$20,000
25.	14" Valve	3	EA	\$7,000	\$21,000
26.	16" Valve	3	EA	\$8,500	\$25,500
27.	20" Valve	1	EA	\$18,000	\$18,000
28.	36" Valve	1	EA	\$55,000	\$55,000
29.	Hydroseeding	1,110,200	SF	\$0.10	\$111,100
				Subtotal:	\$20,862,900

Mangement / Environmental / Engineering

1.	Administration			5%	\$1,043,200
2.	Planning			3%	\$625,900
3.	Environmental and Permitting			5%	\$1,043,200
4.	Geotechnical Engineering			2%	\$417,300
5.	Surveying and Civil Engineering			10%	\$2,086,300
6.	Construction Management and Inspection			12%	\$2,503,600
7.	Mitigation			3%	\$625,900
				Subtotal:	\$8,345,400

				SUBTOTAL:	\$29,208,300
				CONTINGENCY (20%):	\$5,841,700
				PROJECT TOTAL:	\$35,050,000

**CITIES OF LATHROP AND MANTECA
 ULDC EVALUATION
 SAN JOAQUIN COUNTY, CALIFORNIA**

**OPINION OF PROBABLE COSTS
 DETAILS OF PROPOSED IMPROVEMENTS**

Item	Description	Quantity	Unit	Unit Cost	Total Cost
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PROJECT NO. 10.1

EROSION REPAIRS

STA. 114+00 TO STA. 972+25

Construction

1.	Mobilization			3%	\$158,100
2.	Erosion Control			3%	\$158,100
3.	Clearing and Grubbing	34.0	AC	\$2,000	\$68,000
4.	Quarry Stone Riprap	115,600	TN	\$45.00	\$5,202,000
				Subtotal:	\$5,586,200

Mangement / Environmental / Engineering

1.	Administration			5%	\$279,400
2.	Planning			3%	\$167,600
3.	Environmental and Permitting			5%	\$279,400
4.	Geotechnical Engineering			2%	\$111,800
5.	Surveying and Civil Engineering			10%	\$558,700
6.	Construction Management and Inspection			12%	\$670,400
7.	Mitigation			3%	\$167,600
				Subtotal:	\$2,067,300

				SUBTOTAL:	\$7,821,100
				CONTINGENCY (20%):	\$1,564,300
				PROJECT TOTAL:	\$9,386,000

**CITIES OF LATHROP AND MANTECA
 ULDC EVALUATION
 SAN JOAQUIN COUNTY, CALIFORNIA**

**OPINION OF PROBABLE COSTS
 DETAILS OF PROPOSED IMPROVEMENTS**

Item	Description	Quantity	Unit	Unit Cost	Total Cost
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PROJECT NO. 12.1

ENCROACHMENT REMEDIATION

STA. 112+73 TO STA. 815+40

Construction

1.	Mobilization			3%	\$11,700
2.	Erosion Control			1%	\$3,900
3.	Remove Fence @ Weston Ranch	500	LF	\$10	\$5,000
4.	Wrought-Iron Fence, 6' Tall @ Weston Ranch	500	LF	\$25	\$12,500
5.	Remove Miscellaneous Structures	7	EA	\$10,000	\$70,000
6.	Remove Septic Tank @ Oak Shores	15	EA	\$10,000	\$150,000
7.	Remove Structures @ Oak Shores	15	EA	\$10,000	\$150,000
				Subtotal:	\$403,100

Mangement / Environmental / Engineering

1.	Administration			5%	\$20,200
2.	Planning			3%	\$12,100
3.	Environmental and Permitting			5%	\$20,200
4.	Geotechnical Engineering			2%	\$8,100
5.	Surveying and Civil Engineering			10%	\$40,400
6.	Construction Management and Inspection			12%	\$48,400
7.	Mitigation			3%	\$12,100
				Subtotal:	\$149,400

				SUBTOTAL:	\$564,600
				CONTINGENCY (20%):	\$113,000
				PROJECT TOTAL:	\$678,000

**CITIES OF LATHROP AND MANTECA
 ULDC EVALUATION
 SAN JOAQUIN COUNTY, CALIFORNIA**

**OPINION OF PROBABLE COSTS
 DETAILS OF PROPOSED IMPROVEMENTS**

Item	Description	Quantity	Unit	Unit Cost	Total Cost
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PROJECT NO. 13.1

PENETRATION REHABILITATION

STA. 571+35 TO STA. 801+00

Construction

1.	Mobilization			3%	\$35,900
2.	Erosion Control			3%	\$35,900
14.	Reconstruct Existing 12" Pipe	3	EA	\$60,000	\$180,000
15.	Reconstruct Existing 16" Pipe	1	EA	\$80,000	\$80,000
16.	Reconstruct Existing 18" Pipe	4	EA	\$85,000	\$340,000
17.	Reconstruct Existing 20" Pipe	1	EA	\$95,000	\$95,000
17.	Reconstruct Existing 48" Pipe	1	EA	\$300,000	\$300,000
19.	Air Release Valve	10	EA	\$2,000	\$20,000
24.	12" Valve	3	EA	\$4,000	\$12,000
25.	16" Valve	1	EA	\$8,500	\$8,500
26.	18" Valve	4	EA	\$14,000	\$56,000
27.	20" Valve	1	EA	\$18,000	\$18,000
27.	48" Valve	1	EA	\$85,000	\$85,000
				Subtotal:	\$1,266,300

Mangement / Environmental / Engineering

1.	Administration			5%	\$63,400
2.	Planning			3%	\$38,000
3.	Environmental and Permitting			5%	\$63,400
4.	Geotechnical Engineering			2%	\$25,400
5.	Surveying and Civil Engineering			10%	\$126,700
6.	Construction Management and Inspection			12%	\$152,000
7.	Mitigation			3%	\$38,000
				Subtotal:	\$468,900

				SUBTOTAL:	\$1,773,200
				CONTINGENCY (20%):	\$354,700
				PROJECT TOTAL:	\$2,128,000

CITIES OF LATHROP AND MANTECA
 ULDC EVALUATION
 SAN JOAQUIN COUNTY, CALIFORNIA

ULDC COST ESTIMATE
 OPINION OF PROBABLE COSTS

7.11 RIGHT-OF-WAY

Item	Description	Quantity	Unit	Unit Cost	Total Cost
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PROJECT NO. 11-1
RIGHT-OF-WAY ACQUISITION (EXISTING DEFICIENCIES,

Real Estate					
1.	Land Valuation (Agricultural)	40.7	AC	\$25,000	\$1,017,500
2.	Land Valuation (Residential)	3.0	AC	\$250,000	\$750,000
3.	Land Valuation (Commercial)	1.0	AC	\$250,000	\$250,000
4.	Improvement Valuation (Residential)	15	EA	\$150,000	\$2,250,000
5.	Easement Acquisition	113	EA	\$50,000	\$5,650,000
6.	Easement Acquisition (Oak Shores)	1	EA	\$400,000	\$400,000
Subtotal:					\$10,317,500

				SUBTOTAL:	\$10,317,500
				CONTINGENCY (20%):	\$2,063,500
				PROJECT TOTAL:	\$12,381,000

PROJECT NO. 11.2
RIGHT-OF-WAY ACQUISITION (NEW CONSTRUCTION IMPROVEMENTS,

Real Estate					
1.	Land Valuation (Agricultural)	42.0	AC	\$25,000	\$1,050,000
2.	Land Valuation (Commercial)	0.8	AC	\$250,000	\$200,000
3.	Easement Acquisition	40	EA	\$50,000	\$2,000,000
Subtotal:					\$3,250,000

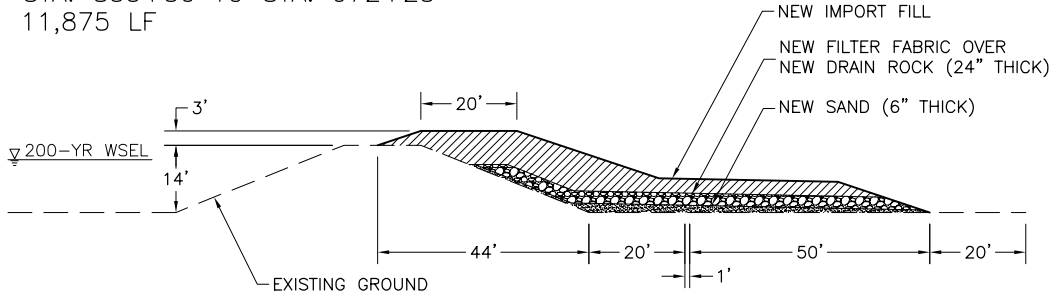
				SUBTOTAL:	\$3,250,000
				CONTINGENCY (20%):	\$650,000
				PROJECT TOTAL:	\$3,900,000

Cities of Lathrop and Manteca
ULDC Evaluation
Identified Improvements

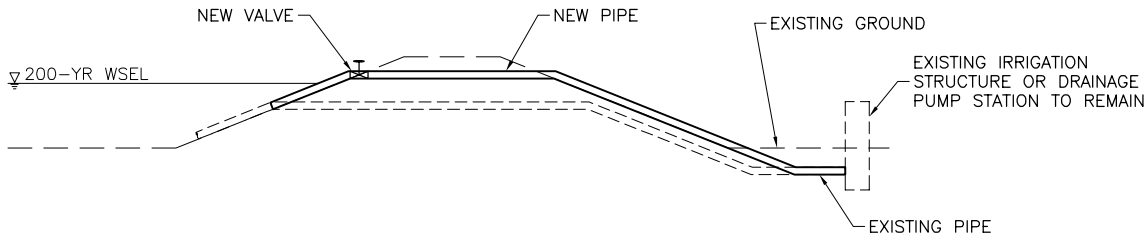
EXHIBIT 3
Basis of Quantity Calculations

PROJECT NO. 2-1
 STA. 853+50 TO STA. 972+25
 11,875 LF

CLEAR 135 SF/LF
 FILL 460 CF/LF
 ROCK 218 CF/LF
 SAND 102 CF/LF
 FABRIC 88 SF/LF
 AB 10 CF/LF
 SEED 89 SF/LF
 ROW 71 SF/LF



STA. 853+50 TO STA. 972+25
 1 EA



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 PLOT DATE: Mar 04, 2016 - 11:59am

K S N INC.
**KJELDEN
 SINNOCK
 NEUDECK**
 Civil Engineers
 and Land Surveyors

711 N Pershing Avenue
 Stockton, CA 95203
 209-946-0268

1355 Halyard Drive, Suite 100
 West Sacramento, CA 95691
 916-403-5900
 www.ksninc.com

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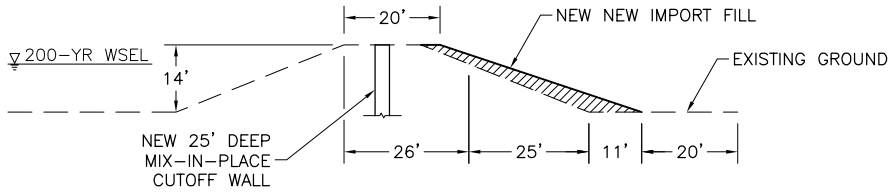
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CITIES OF LATHROP AND MANTECA
 ULDC EVALUATION
 COST ESTIMATE
 BASIS OF QUANTITY CALCULATIONS

EXHIBIT
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 PAGE 1

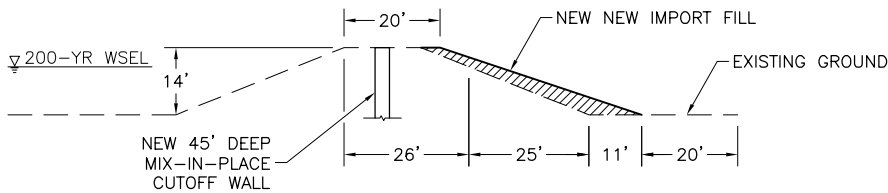
PROJECT NO. 5.1
 STA. 119+50 TO STA. 142+00
 2,250 LF

CLEAR 82 SF/LF
 WALL 25 SF/LF
 FILL 105 CF/LF
 AB 10 CF/LF
 SEED 45 SF/LF
 ROW 11 SF/LF

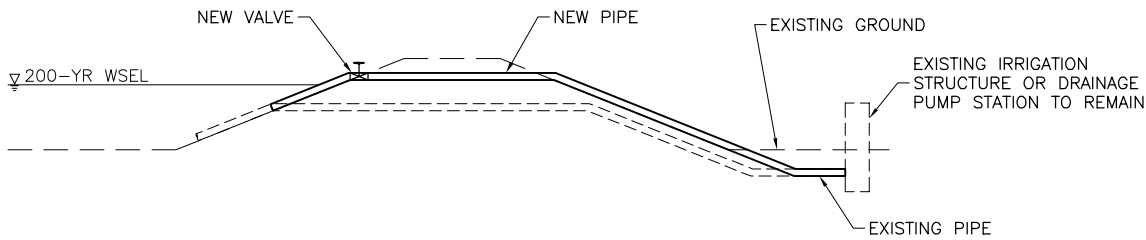


STA. 142+00 TO STA. 148+00
 STA. 172+45 TO STA. 192+00
 2,555 LF

CLEAR 82 SF/LF
 WALL 45 SF/LF
 FILL 105 CF/LF
 AB 10 CF/LF
 SEED 45 SF/LF
 ROW 11 SF/LF



STA. 119+50 TO STA. 192+00
 12 EA



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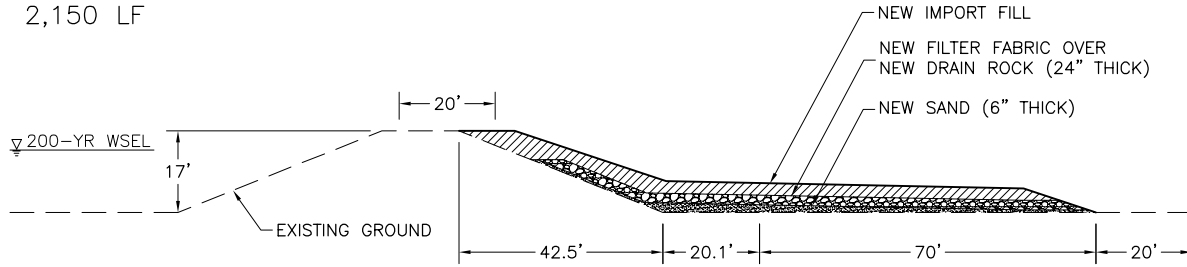
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CITIES OF LATHROP AND MANTECA
 ULDC EVALUATION
 COST ESTIMATE
 BASIS OF QUANTITY CALCULATIONS

EXHIBIT
 5.1
 PAGE 1

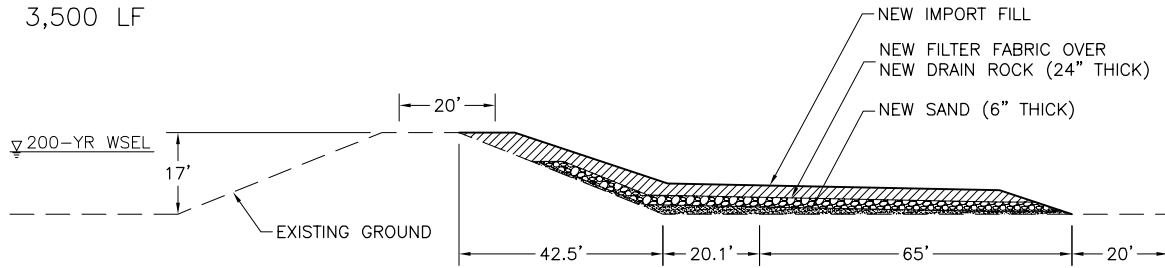
PROJECT NO. 5.2
 STA. 190+50 TO STA. 212+00
 2,150 LF

CLEAR 153 SF/LF
 FILL 333 CF/LF
 ROCK 222 CF/LF
 SAND 119 CF/LF
 FABRIC 112 SF/LF
 AB 10 CF/LF
 SEED 124 SF/LF
 ROW 90 SF/LF



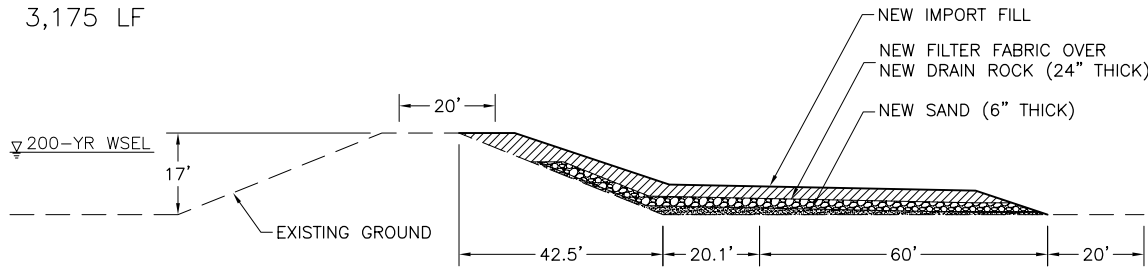
STA. 212+00 TO STA. 247+00
 3,500 LF

CLEAR 148 SF/LF
 FILL 321 CF/LF
 ROCK 212 CF/LF
 SAND 109 CF/LF
 FABRIC 107 SF/LF
 AB 10 CF/LF
 SEED 119 SF/LF
 ROW 85 SF/LF

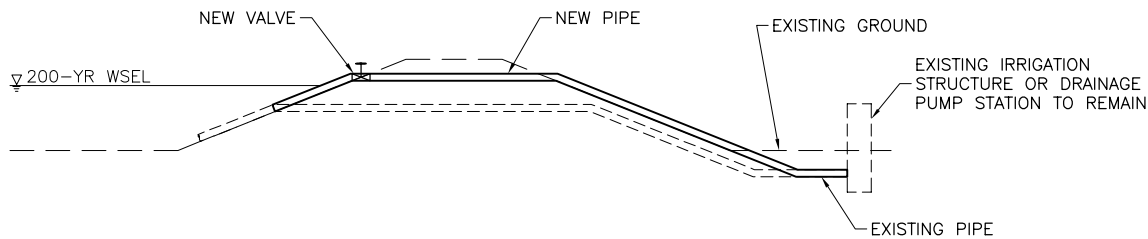


STA. 255+50 TO STA. 259+50
 STA. 270+00 TO STA. 297+75
 3,175 LF

CLEAR 143 SF/LF
 FILL 309 CF/LF
 ROCK 202 CF/LF
 SAND 99 CF/LF
 FABRIC 102 SF/LF
 AB 10 CF/LF
 SEED 114 SF/LF
 ROW 80 SF/LF



STA. 190+50 TO STA. 297+75
 13 EA



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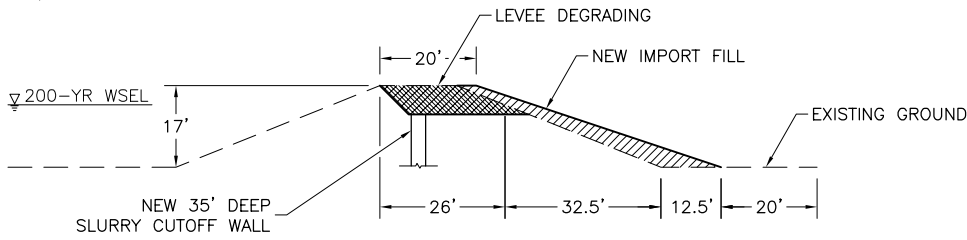
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**CITIES OF LATHROP AND MANTECA
 ULDC EVALUATION
 COST ESTIMATE
 BASIS OF QUANTITY CALCULATIONS**

**EXHIBIT
 5.2
 PAGE 1**

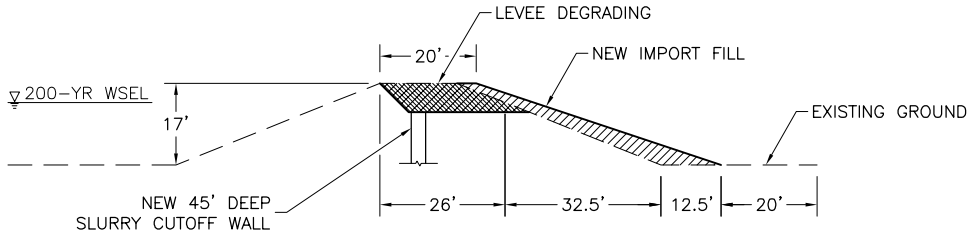
PROJECT NO. 5.3
 STA. 311+00 TO STA. 321+00
 1,000 LF

CLEAR 91 SF/LF
 DEGRADE 123 CF/LF
 WALL 35 SF/LF
 FILL 264 CF/LF
 AB 10 CF/LF
 SEED 54 SF/LF
 ROW 13 SF/LF



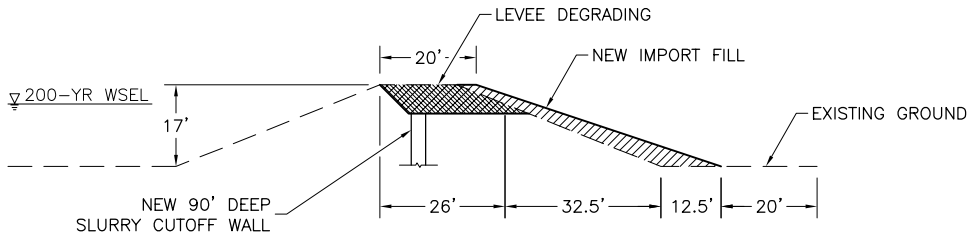
STA. 321+00 TO STA. 339+00
 1,800 LF

CLEAR 91 SF/LF
 DEGRADE 123 CF/LF
 WALL 45 SF/LF
 FILL 264 CF/LF
 AB 10 CF/LF
 SEED 54 SF/LF
 ROW 13 SF/LF



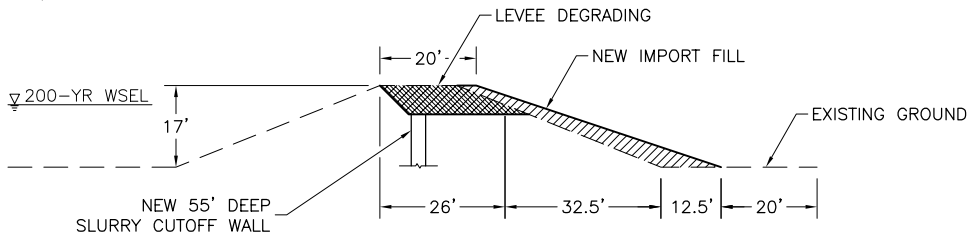
STA. 339+00 TO STA. 362+50
 2,350 LF

CLEAR 91 SF/LF
 DEGRADE 123 CF/LF
 WALL 90 SF/LF
 FILL 264 CF/LF
 AB 10 CF/LF
 SEED 54 SF/LF
 ROW 13 SF/LF



STA. 388+00 TO STA. 420+00
 3,200 LF

CLEAR 91 SF/LF
 DEGRADE 123 CF/LF
 WALL 55 SF/LF
 FILL 264 CF/LF
 AB 10 CF/LF
 SEED 54 SF/LF
 ROW 13 SF/LF



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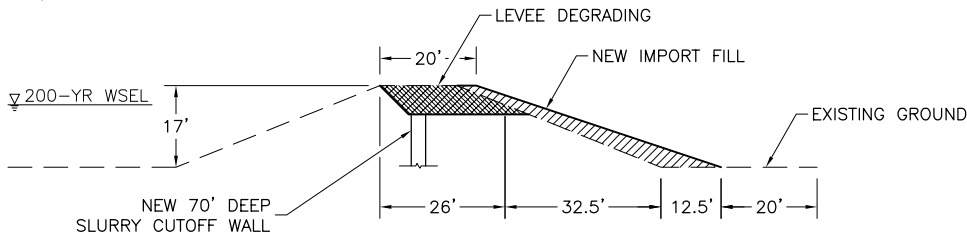
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**CITIES OF LATHROP AND MANTECA
 ULDC EVALUATION
 COST ESTIMATE
 BASIS OF QUANTITY CALCULATIONS**

**EXHIBIT
 5.3
 PAGE 1**

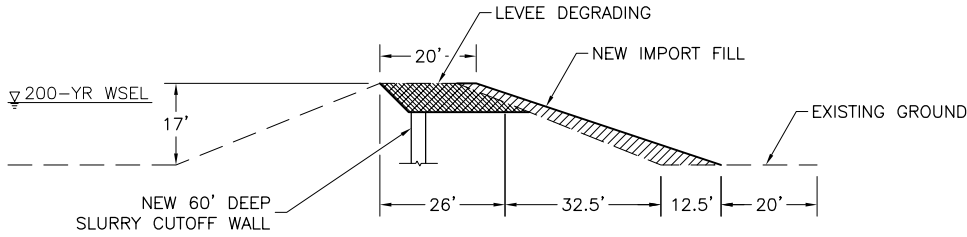
STA. 420+00 TO STA. 445+00
2,500 LF

CLEAR 91 SF/LF
DEGRADE 123 CF/LF
WALL 70 SF/LF
FILL 264 CF/LF
AB 10 CF/LF
SEED 54 SF/LF
ROW 13 SF/LF



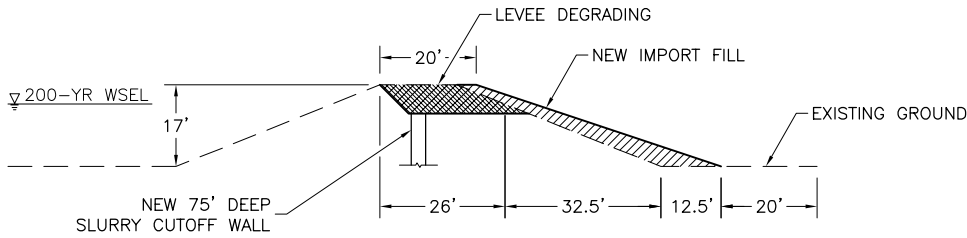
STA. 445+00 TO STA. 466+00
2,100 LF

CLEAR 91 SF/LF
DEGRADE 123 CF/LF
WALL 60 SF/LF
FILL 264 CF/LF
AB 10 CF/LF
SEED 54 SF/LF
ROW 13 SF/LF



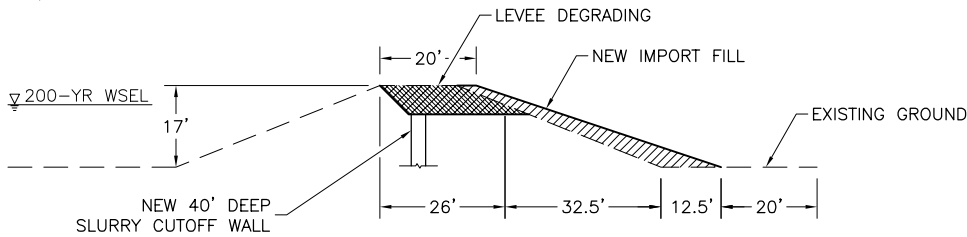
STA. 466+00 TO STA. 506+00
4,000 LF

CLEAR 91 SF/LF
DEGRADE 123 CF/LF
WALL 75 SF/LF
FILL 264 CF/LF
AB 10 CF/LF
SEED 54 SF/LF
ROW 13 SF/LF



STA. 506+00 TO STA. 518+50
1,250 LF

CLEAR 91 SF/LF
DEGRADE 123 CF/LF
WALL 40 SF/LF
FILL 264 CF/LF
AB 10 CF/LF
SEED 54 SF/LF
ROW 13 SF/LF



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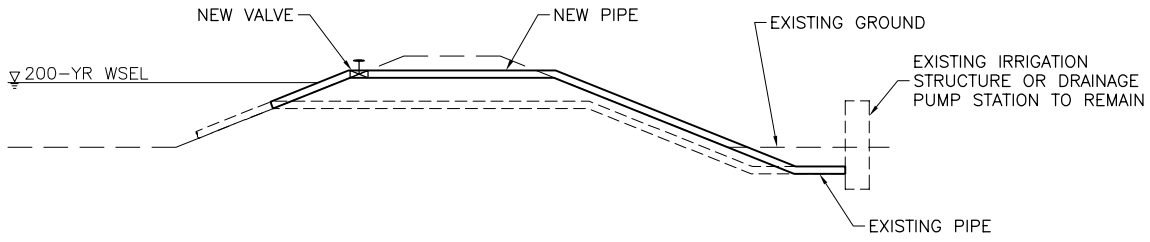
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Scale
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Original Drawing Scale
0 1/4" 1/2"

CITIES OF LATHROP AND MANTECA
ULDC EVALUATION
COST ESTIMATE
BASIS OF QUANTITY CALCULATIONS

EXHIBIT
5.3
PAGE 2

STA. 311+00 TO STA. 518+50
23 EA



FILE SPEC: P:\2255_Lathrop_Manteca_ULDC Evaluation\0030_ULDC_Analyze and Identify Deficiencies\05_Civil\CAD\Exhibits\Exh_Cost Estimate_Typ Sections.dwg
PLOT DATE: Mar 04, 2016 - 12:00pm

K | **KJELDSSEN** | 711 N Pershing Avenue
S | **SINNOCK** | Stockton, CA 95203
N | **NEUDECK** | 209-946-0268
INC. | Civil Engineers and Land Surveyors | 1355 Halyard Drive, Suite 100
West Sacramento, CA 95691
916-403-5900
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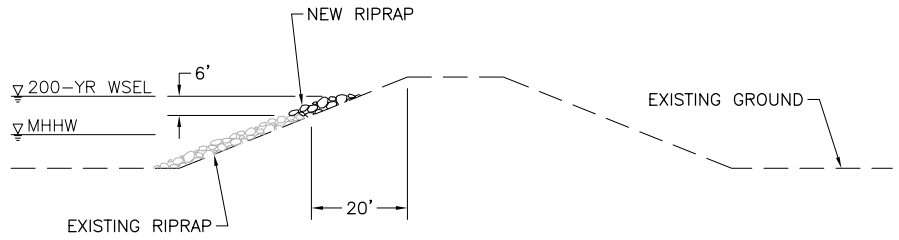
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N.T.S.
Original Drawing Scale
0 1/4" 1/2"

CITIES OF LATHROP AND MANTECA
ULDC EVALUATION
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BASIS OF QUANTITY CALCULATIONS

EXHIBIT
5.3
PAGE 3

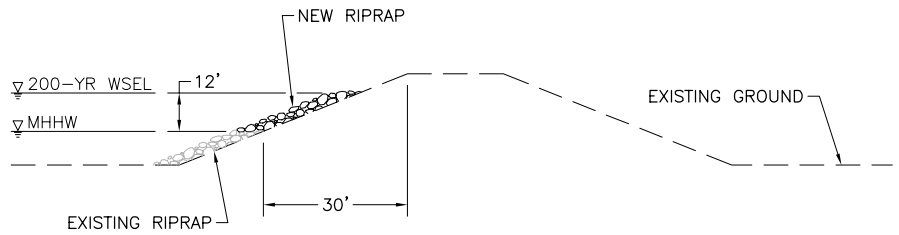
PROJECT NO. 10.1
 STA. 143+00 TO STA. 267+00
 STA. 284+00 TO STA. 383+00
 STA. 534+00 TO STA. 613+00
 STA. 822+00 TO STA. 972+25
 45,225 LF

CLEAR 20 SF/LF
 RIPRAP 21 CF/LF
 ROW - SF/LF



STA. 114+00 TO STA. 124+00
 STA. 405+00 TO STA. 439+00
 STA. 306+00 TO STA. 466+00
 STA. 472+00 TO STA. 499+00
 STA. 702+00 TO STA. 822+00
 19,100 LF

CLEAR 30 SF/LF
 RIPRAP 34 CF/LF
 ROW - SF/LF



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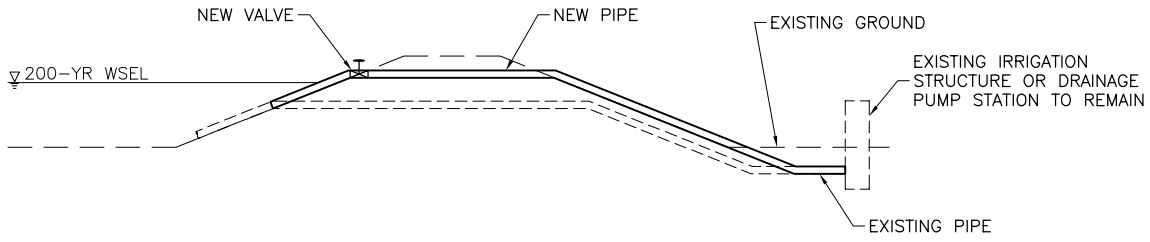
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CITIES OF LATHROP AND MANTECA
 ULDC EVALUATION
 COST ESTIMATE
 BASIS OF QUANTITY CALCULATIONS

EXHIBIT
 10.1
 PAGE 1

PROJECT NO. 13.1
 STA. 571+35 TO STA. 801+00
 9 EA



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CITIES OF LATHROP AND MANTECA
 ULDC EVALUATION
 COST ESTIMATE
 BASIS OF QUANTITY CALCULATIONS

EXHIBIT
 13.1
 PAGE 1