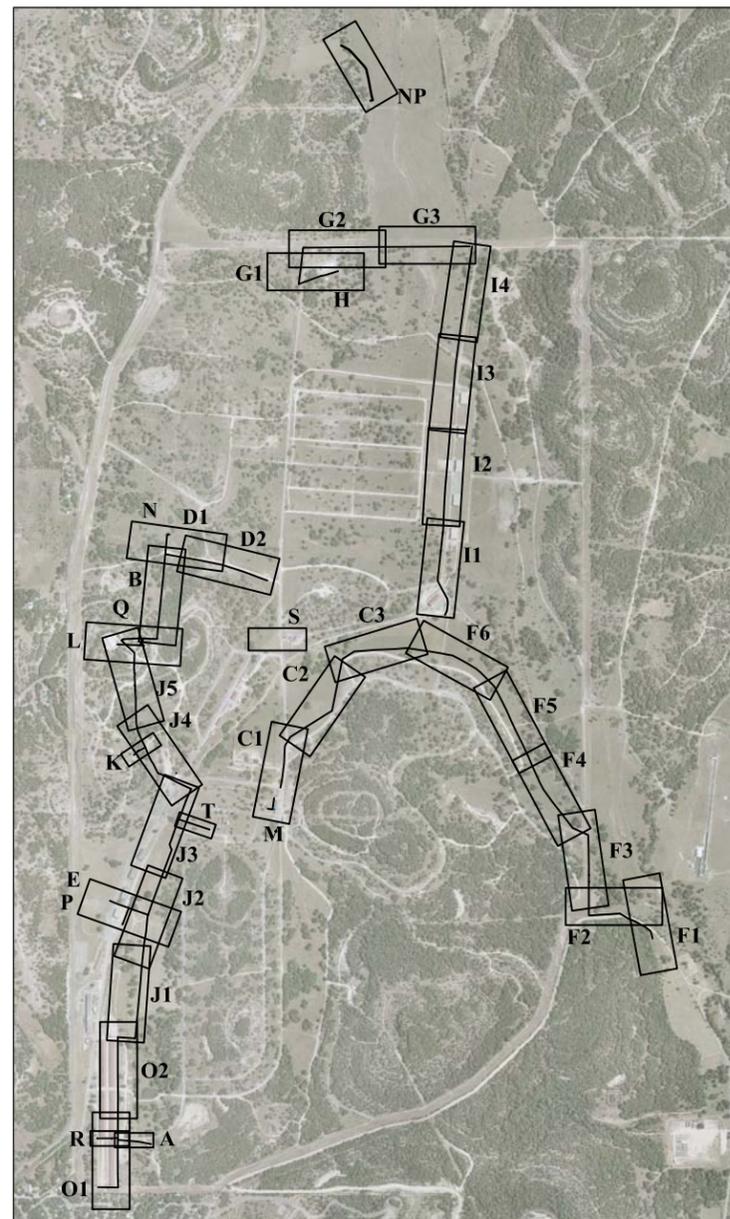
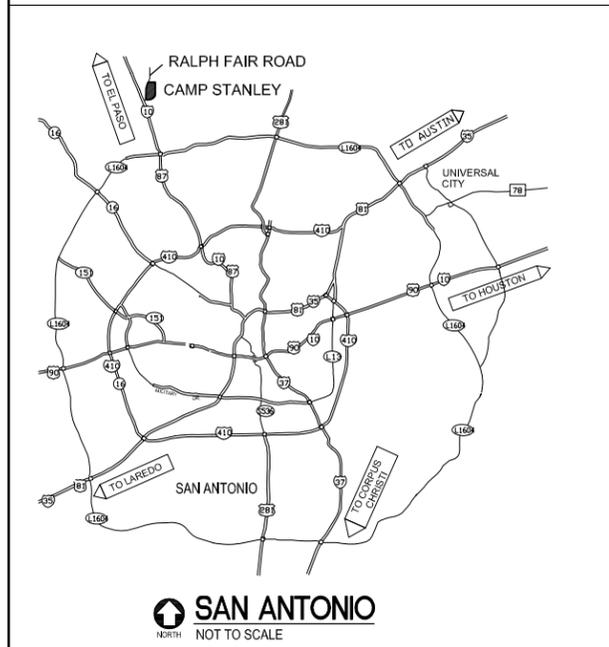
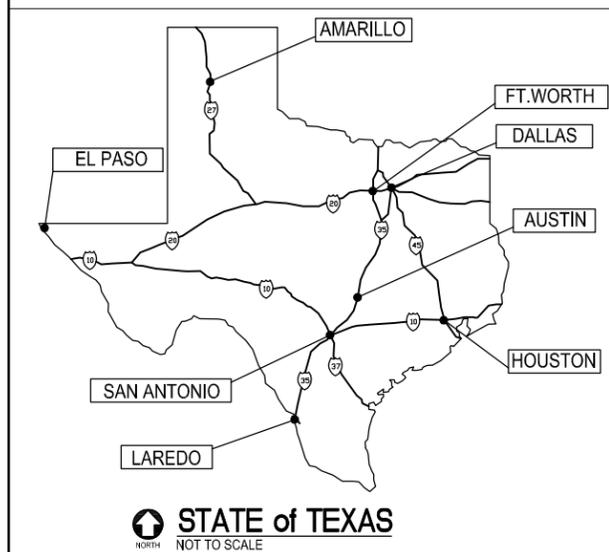


APPENDIX B
AS-BUILT DRAWINGS
SPECIFICATIONS

CONSTRUCTION DRAWINGS FOR CAMP STANLEY STORAGE ACTIVITY WATER SYSTEM REHABILITATION

JANUARY 2009



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C-03	PIPING PLAN AND PROFILE, SEGMENT A	I-04	PIPING AND INSTRUMENTATION DIAGRAM BLDGS 44 & 45 (AMMO)
C-04	PIPING PLAN AND PROFILE, SEGMENT R	I-05	PIPING AND INSTRUMENTATION DIAGRAM BLDG 76 (TANK)
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C-06	PIPING PLAN AND PROFILE, SEGMENT J1	I-07	PIPING AND INSTRUMENTATION DIAGRAM BLDG 201 (UTILITY)
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C-25	PIPING PLAN AND PROFILE, SEGMENT F1		
C-26	PIPING PLAN AND PROFILE, SEGMENT I1		
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KEYMAP
NORTH NOT TO SCALE

AS-BUILT
JANUARY 2009

REV.	DESCRIPTION	BY:	DATE:
1	AS-BUILT SET	HCD	1/2009
0	ISSUED FOR CONSTRUCTION	HCD	12/2007

REVISIONS

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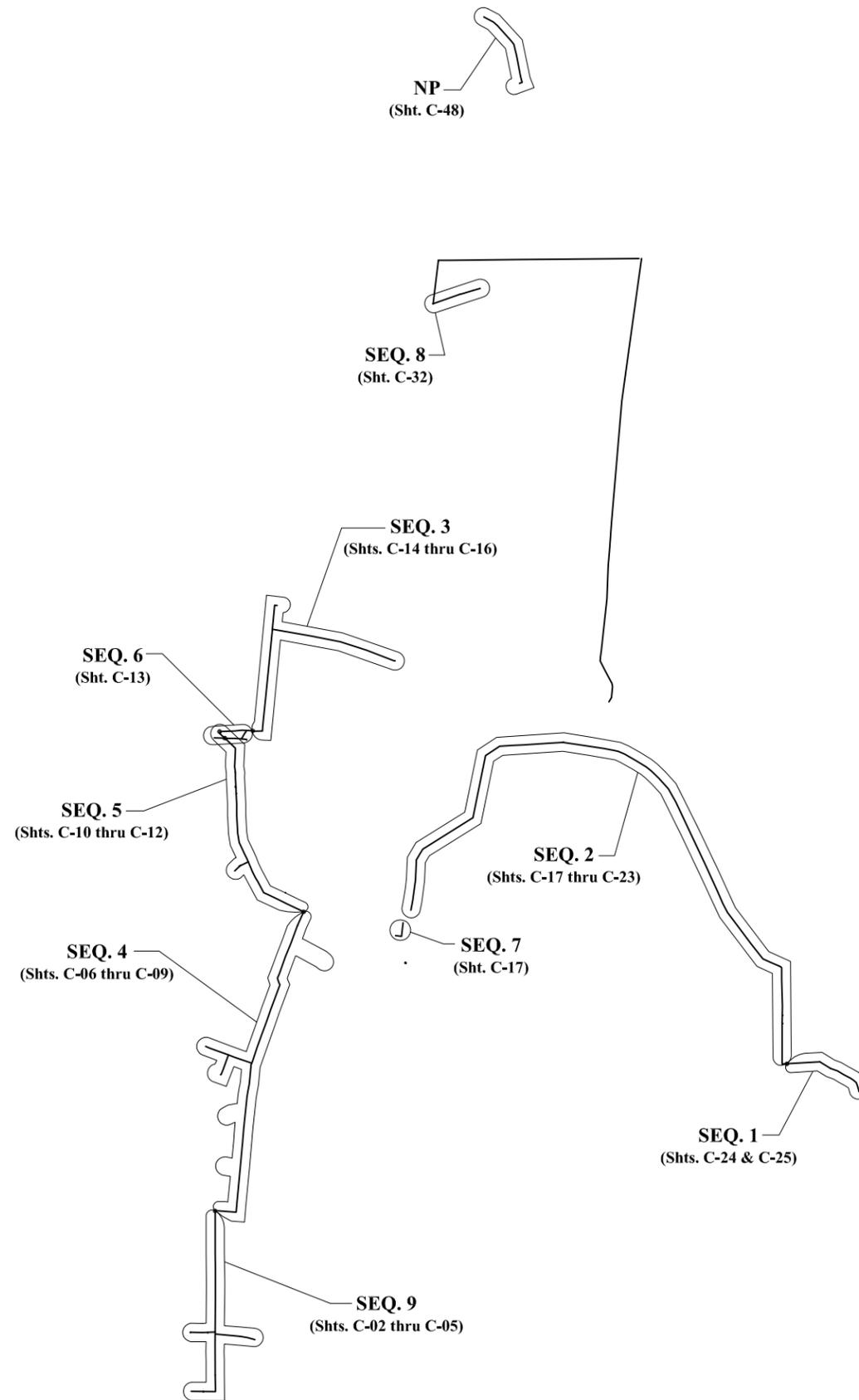
CAMP STANLEY STORAGE ACTIVITY
WATER SYSTEM REHABILITATION

Contract No. FA8903-04-D-8675 Task Order No. 022

CONTRACTOR :
PARSONS Job No. 745006 WBS 03000

Drawing Title :
**COVER SHEET,
KEY PLAN, AND DRAWING INDEX**

Designed : HCD	Drawn : JLH	Rev: 1
Checked : KMK	Approved :	
Scale : N.T.S.	Date : JANUARY 2009	Drawing No. : C-01



SEQUENCE LAYOUT
NOT TO SCALE

AS-BUILT
 JANUARY 2009

REV.	DESCRIPTION	BY:	DATE:
1	AS-BUILT SET	HCD	1/2009
0	ISSUED FOR CONSTRUCTION	HCD	12/2007

REVISIONS

SCALES SHOWN ON THIS DRAWING ARE APPLICABLE ONLY TO D SIZE DRAWING

CAMP STANLEY STORAGE ACTIVITY
 WATER SYSTEM REHABILITATION

Contract No. FA8903-04-D-8675 Task Order No. 022

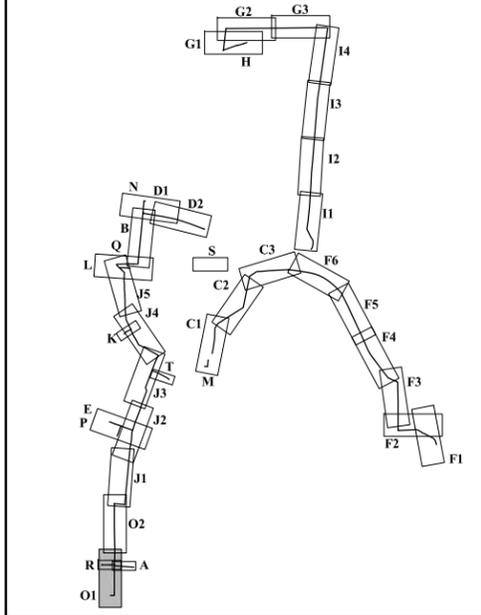
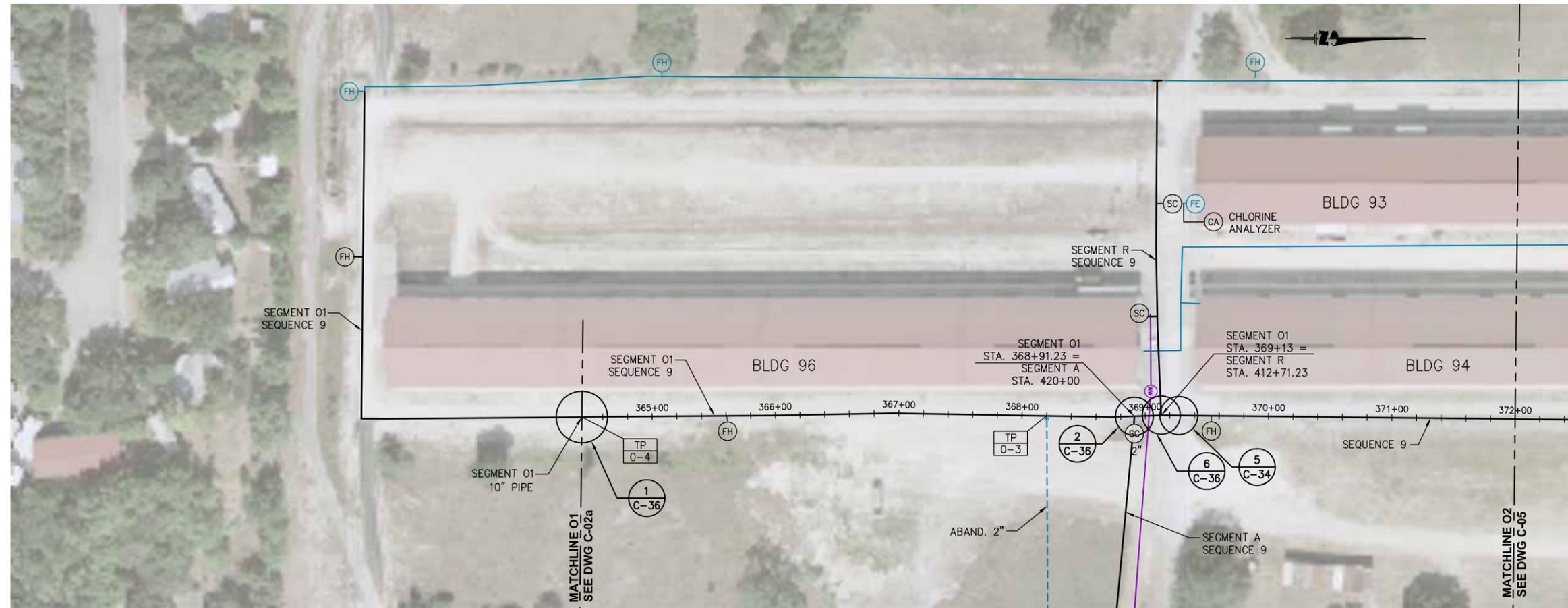
CONTRACTOR :

PARSONS Job No. 745006 WBS 03000

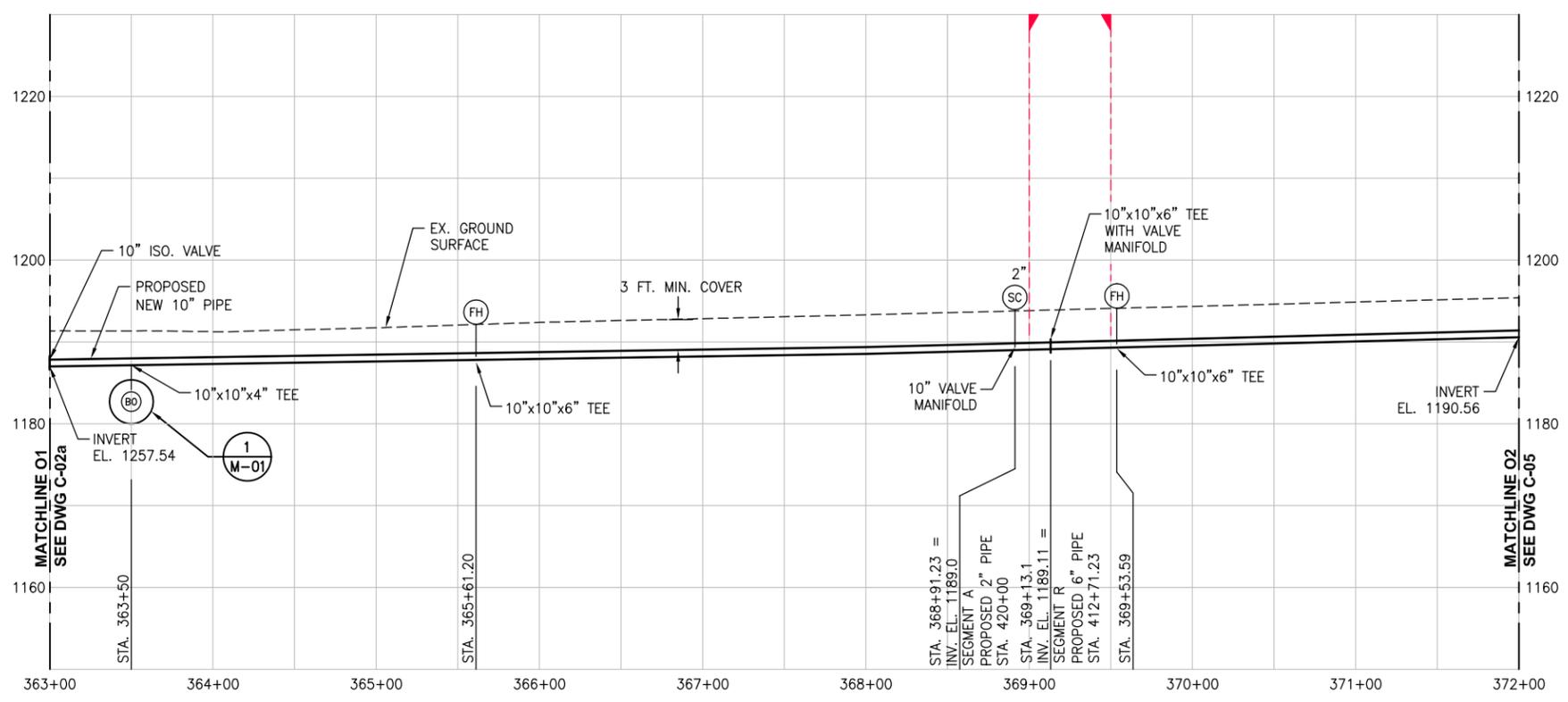
Drawing Title :

SEQUENCE LAYOUT

Designed : HCD	Drawn : JLH	Rev: 1
Checked : KMK	Approved :	
Scale : N.T.S.	Date : JANUARY 2009	Drawing No. : C-01a



- LEGEND**
- (FH) FIRE HYDRANT
 - (MH) MANHOLE
 - (FE) FLOWMETER
 - (AR) AIR RELEASE VALVE
 - ▽ REDUCER
 - ◇ GATE VALVE
 - BALL VALVE
 - ⊥ CHECK VALVE
 - ⊘ REMOVE PIPE
 - (CA) CHLORINE ANALYZER
 - (BO) BLOWOFF VALVE
 - (SC) SERVICE CONNECTION
 - (FS) SADDLE CLAMP
 - (TP) TRENCH PLUG
 - ▭ POSSIBLE UTILITY CROSSING AREA
- TP TIE POINT
 — GAS LINE
 — WASTEWATER LINE
 — BURIED ELECTRIC LINE
 — EX. WATER LINE
 — NEW WATER LINE
 - - - ABANDONED OR TO BE ABANDONED WATER LINE
 - - - MATCHLINE



PROFILE - SEGMENT 01

AS-BUILT
 JANUARY 2009
 PROFILES NOT UPDATED

REV.	DESCRIPTION	BY:	DATE:
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0	ISSUED FOR CONSTRUCTION	HCD	12/2007

REVISIONS

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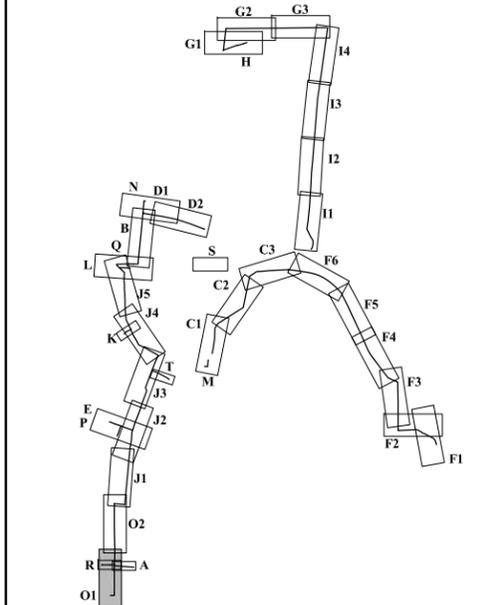
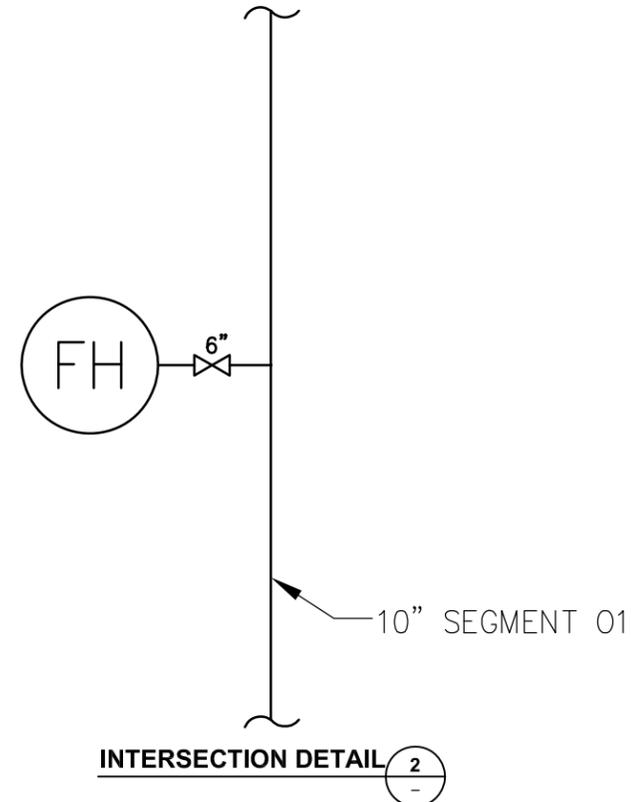
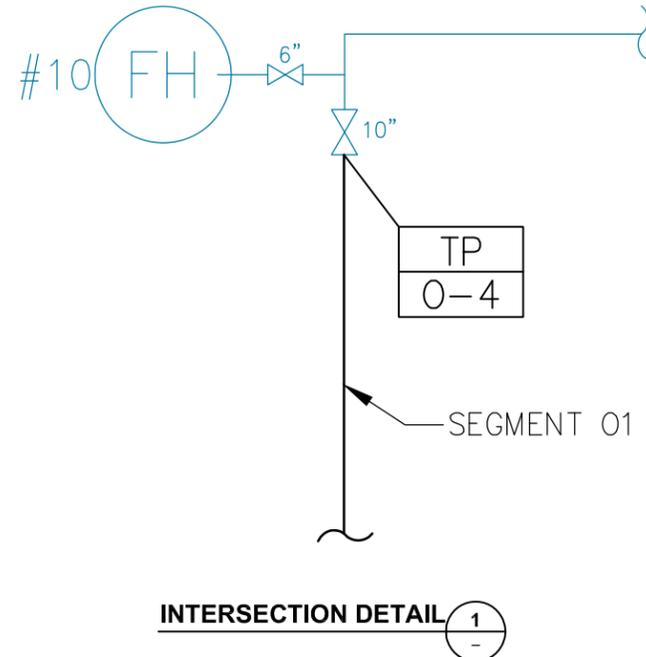
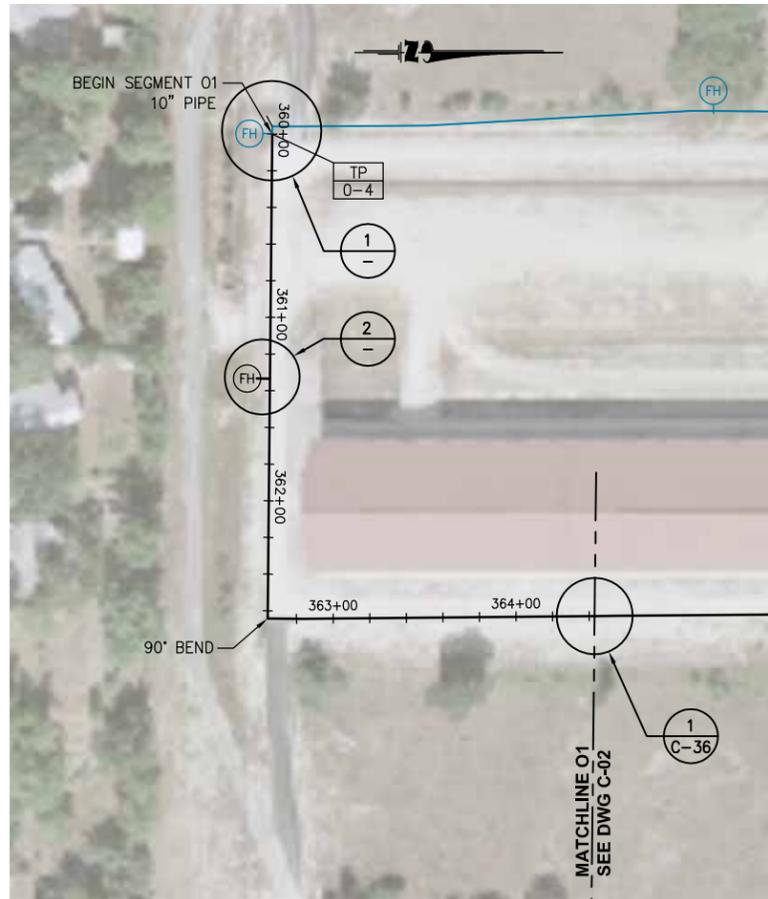
**CAMP STANLEY STORAGE ACTIVITY
 WATER SYSTEM REHABILITATION**

Contract No. FA8903-04-D-8675 Task Order No. 022

CONTRACTOR :
PARSONS Job No. 745006 WBS 03000

Drawing Title :
**PIPING PLAN AND PROFILE
 SEGMENT 01 (10")
 SEQUENCE 9**

Designed : HCD	Drawn : JLH	Rev: 1
Checked : KMK	Approved :	
Scale : HORIZ. 1" = 50' VERT. 1" = 10'	Date : JANUARY 2009	Drawing No. : C-02



- LEGEND**
- (FH) FIRE HYDRANT
 - (MH) MANHOLE
 - (FE) FLOWMETER
 - (AR) AIR RELEASE VALVE
 - ◻ REDUCER
 - ⊗ GATE VALVE
 - ⊙ BALL VALVE
 - ⌞ CHECK VALVE
 - ⊘ REMOVE PIPE
 - TP TIE POINT
 - GAS LINE
 - WASTEWATER LINE
 - BURIED ELECTRIC LINE
 - EX. WATER LINE
 - NEW WATER LINE
 - - - ABANDONED OR TO BE ABANDONED WATER LINE
 - - - MATCHLINE
 - (CA) CHLORINE ANALYZER
 - (BO) BLOWOFF VALVE
 - (SC) SERVICE CONNECTION
 - (FS) FIRE STAND
 - (TP) TRENCH PLUG
 - ▭ POSSIBLE UTILITY CROSSING AREA



REV.	DESCRIPTION	BY:	DATE:
1	AS-BUILT SET	HCD	1/2009
0	ISSUED FOR CONSTRUCTION	HCD	12/2007

REVISIONS

SCALES SHOWN ON THIS DRAWING ARE APPLICABLE ONLY TO D SIZE DRAWING

CAMP STANLEY STORAGE ACTIVITY
WATER SYSTEM REHABILITATION

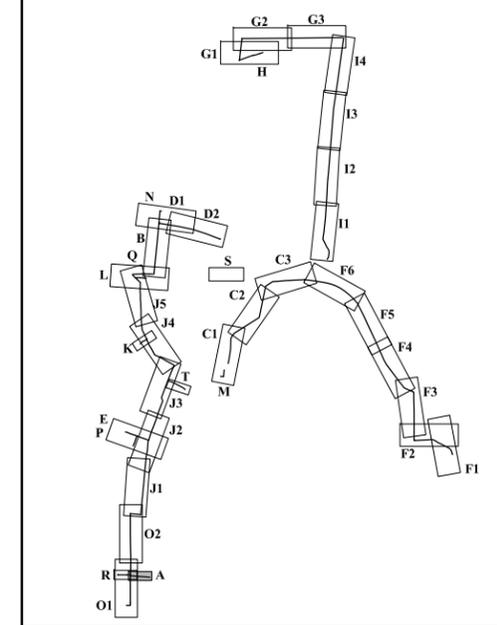
Contract No. FA8903-04-D-8675 Task Order No. 022

CONTRACTOR :
PARSONS Job No. 745006 WBS 03000

Drawing Title :
**PIPING PLAN
PARTIAL SEGMENT 01 (10")**

Designed : HCD	Drawn : JLH	Rev: 1
Checked : KMK	Approved :	
Scale : HORIZ. 1" = 50' VERT. 1" = 10'	Date : JANUARY 2009	Drawing No. : C-02a

AS-BUILT
JANUARY 2009



LEGEND

(FH)	FIRE HYDRANT	(CA)	CHLORINE ANALYZER
(MH)	MANHOLE	(BO)	BLOWOFF VALVE
(FE)	FLOWMETER	(SC)	SERVICE CONNECTION SADDLE CLAMP
(AR)	AIR RELEASE VALVE	(FS)	FIRE STAND
◻	REDUCER	(TP)	TRENCH PLUG
⊗	GATE VALVE	▭	POSSIBLE UTILITY CROSSING AREA
⊙	BALL VALVE		
⌵	CHECK VALVE		
▨	REMOVE PIPE		
TP	TIE POINT		
—	GAS LINE		
—	WASTEWATER LINE		
—	BURIED ELECTRIC LINE		
—	EX. WATER LINE		
—	NEW WATER LINE		
---	ABANDONED OR TO BE ABANDONED WATER LINE		
---	MATCHLINE		

1	AS-BUILT SET	HCD	1/2009
0	ISSUED FOR CONSTRUCTION	HCD	12/2007
REV.	DESCRIPTION	BY:	DATE:

REVISIONS

SCALES SHOWN ON THIS DRAWING ARE APPLICABLE ONLY TO D SIZE DRAWING

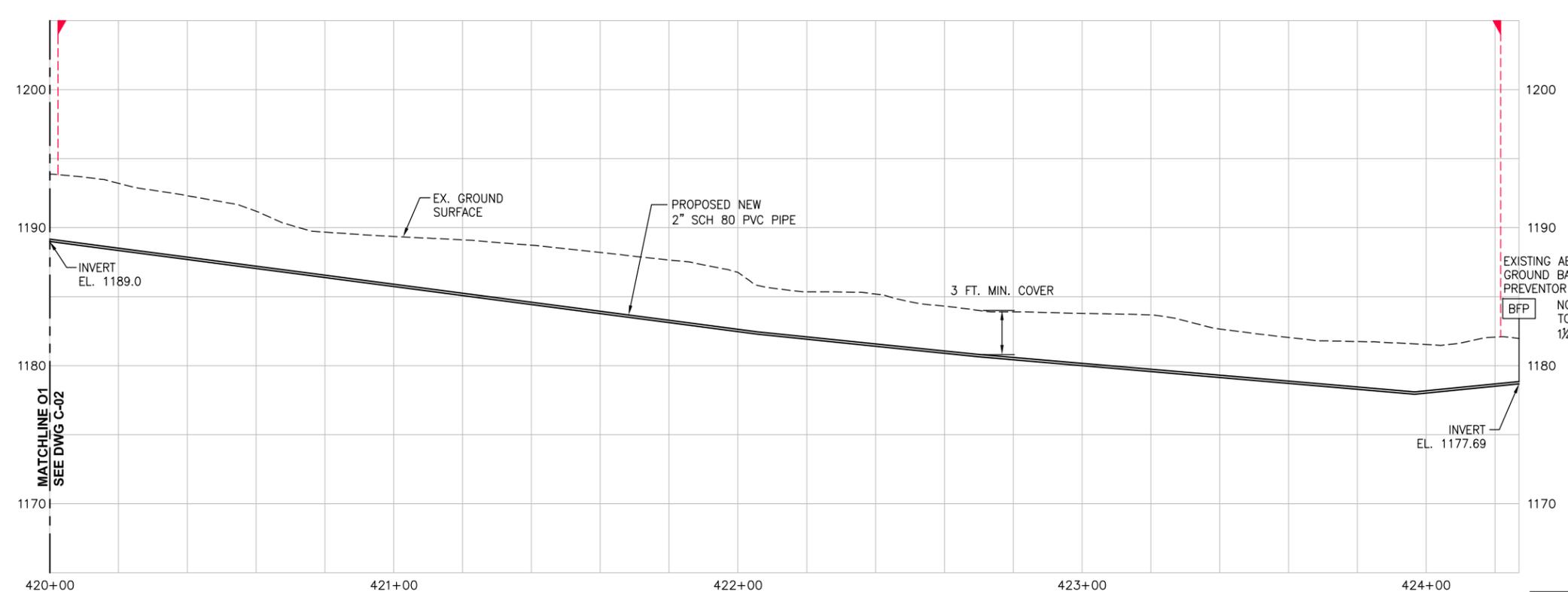
CAMP STANLEY STORAGE ACTIVITY
WATER SYSTEM REHABILITATION

Contract No. FA8903-04-D-8675 Task Order No. 022

CONTRACTOR :
PARSONS Job No. 745006 WBS 03000

Drawing Title :
**PIPING PLAN AND PROFILE
SEGMENT A (2")
SEQUENCE 9**

Designed : HCD	Drawn : JLH	Rev: 1
Checked : KMK	Approved :	
Scale : HORIZ. 1" = 20' VERT. 1" = 5'	Date : JANUARY 2009	Drawing No. : C-03

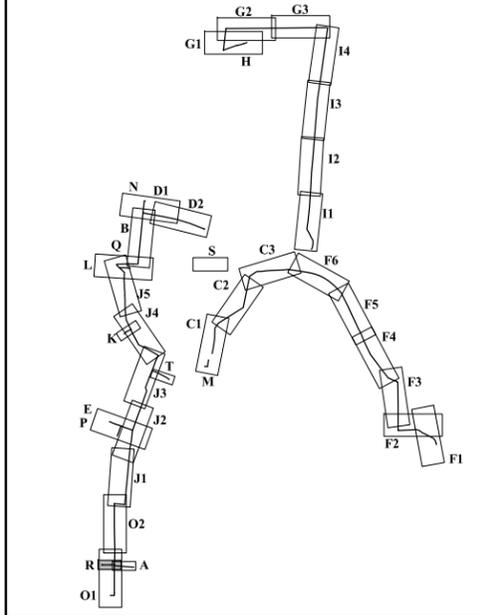
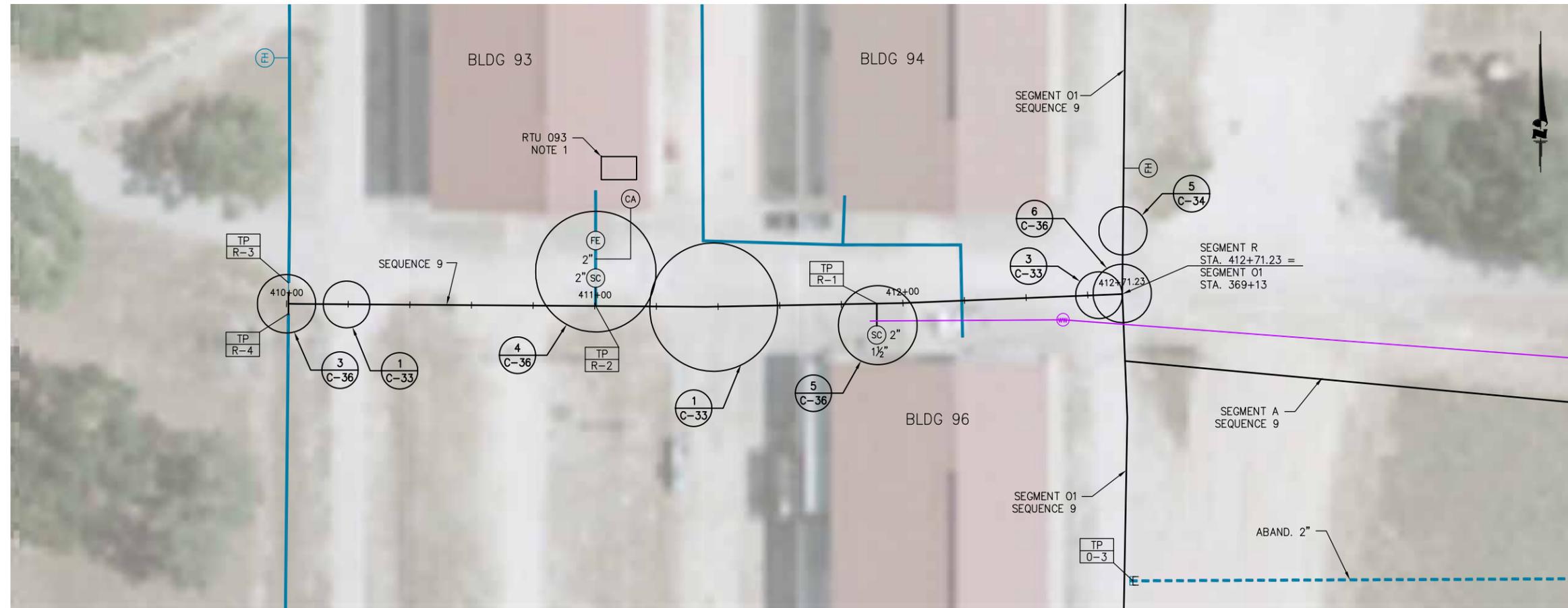


NOTE 2: CAP AND PLUG EX. SERVICE LINE

NOTE 3: MAINTAIN MINIMUM 10" SEPARATION BETWEEN EXISTING WASTEWATER LINE AND PROPOSED WATER LINE

PROFILE - SEGMENT A

AS-BUILT
JANUARY 2009
PROFILES NOT UPDATED



- LEGEND**
- (FH) FIRE HYDRANT
 - (MH) MANHOLE
 - (FE) FLOWMETER
 - (AR) AIR RELEASE VALVE
 - ◻ REDUCER
 - ⊗ GATE VALVE
 - ⊙ BALL VALVE
 - ⊠ CHECK VALVE
 - (CA) CHLORINE ANALYZER
 - (BO) BLOWOFF VALVE
 - (SC) SERVICE CONNECTION SADDLE CLAMP
 - (FS) FIRE STAND
 - (TP) TRENCH PLUG
 - ▭ POSSIBLE UTILITY CROSSING AREA
 - ⊘ REMOVE PIPE



- TP TIE POINT
- GAS LINE
- WASTEWATER LINE
- BURIED ELECTRIC LINE
- EX. WATER LINE
- NEW WATER LINE
- - - ABANDONED OR TO BE ABANDONED WATER LINE
- - - MATCHLINE

REV.	DESCRIPTION	BY:	DATE:
1	AS-BUILT SET	HCD	1/2009
0	ISSUED FOR CONSTRUCTION	HCD	12/2007

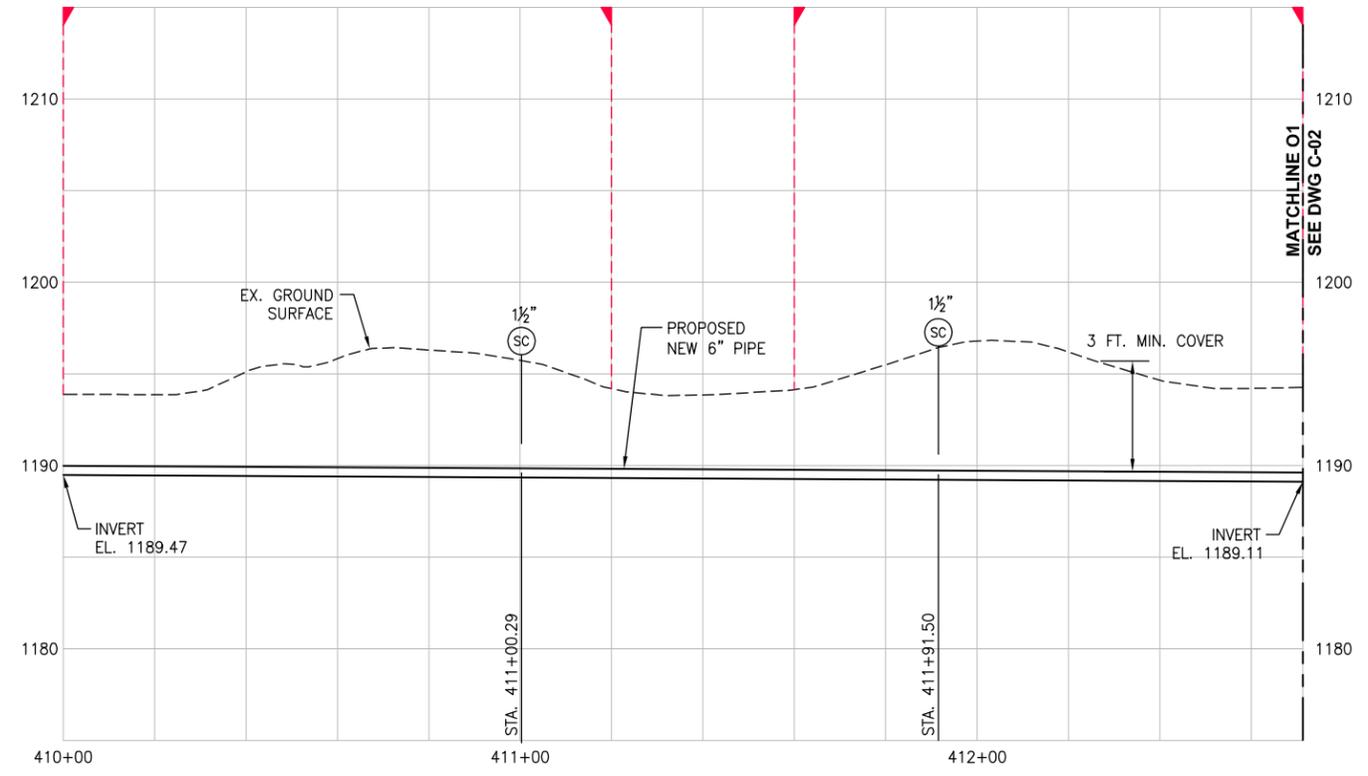
SCALES SHOWN ON THIS DRAWING ARE APPLICABLE ONLY TO D SIZE DRAWING

CAMP STANLEY STORAGE ACTIVITY
WATER SYSTEM REHABILITATION
Contract No. FA8903-04-D-8675 Task Order No. 022

CONTRACTOR :
PARSONS Job No. 745006 WBS 03000

Drawing Title :
**PIPING PLAN AND PROFILE
SEGMENT R (6")
SEQUENCE 9**

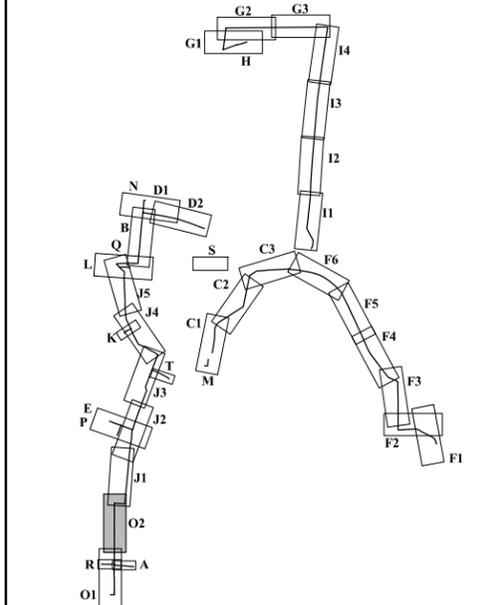
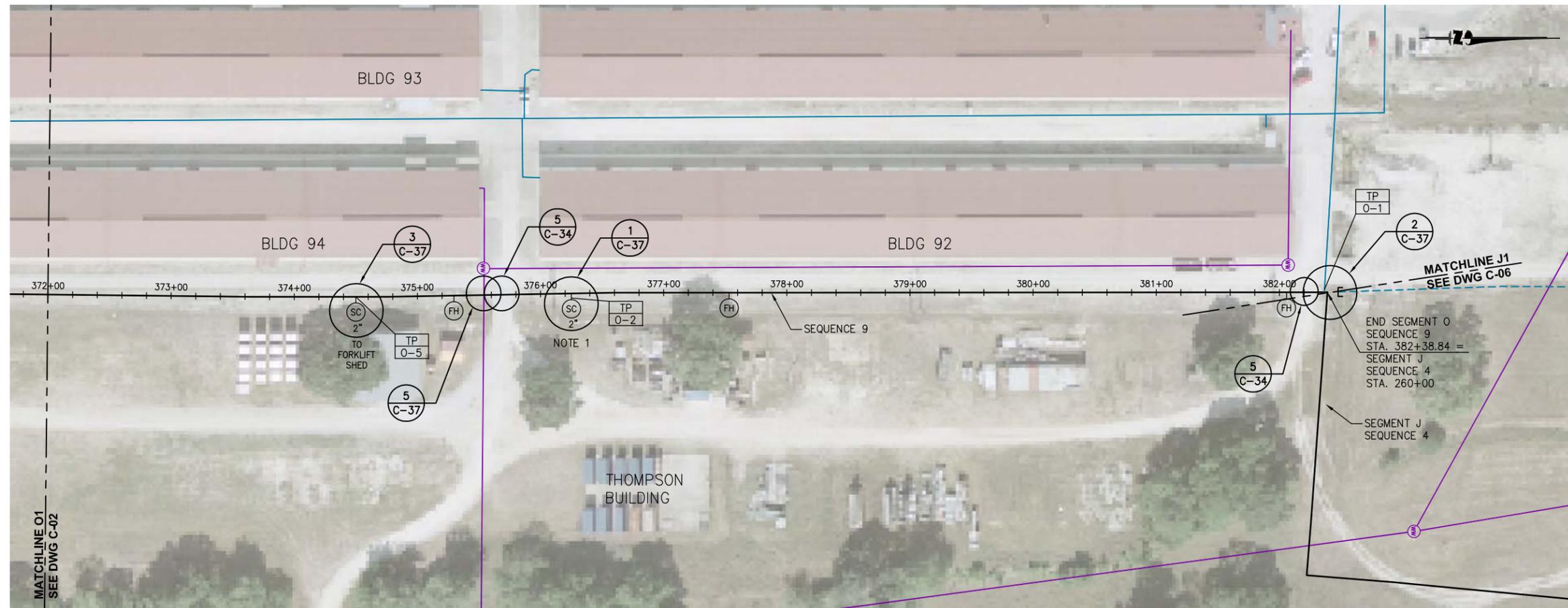
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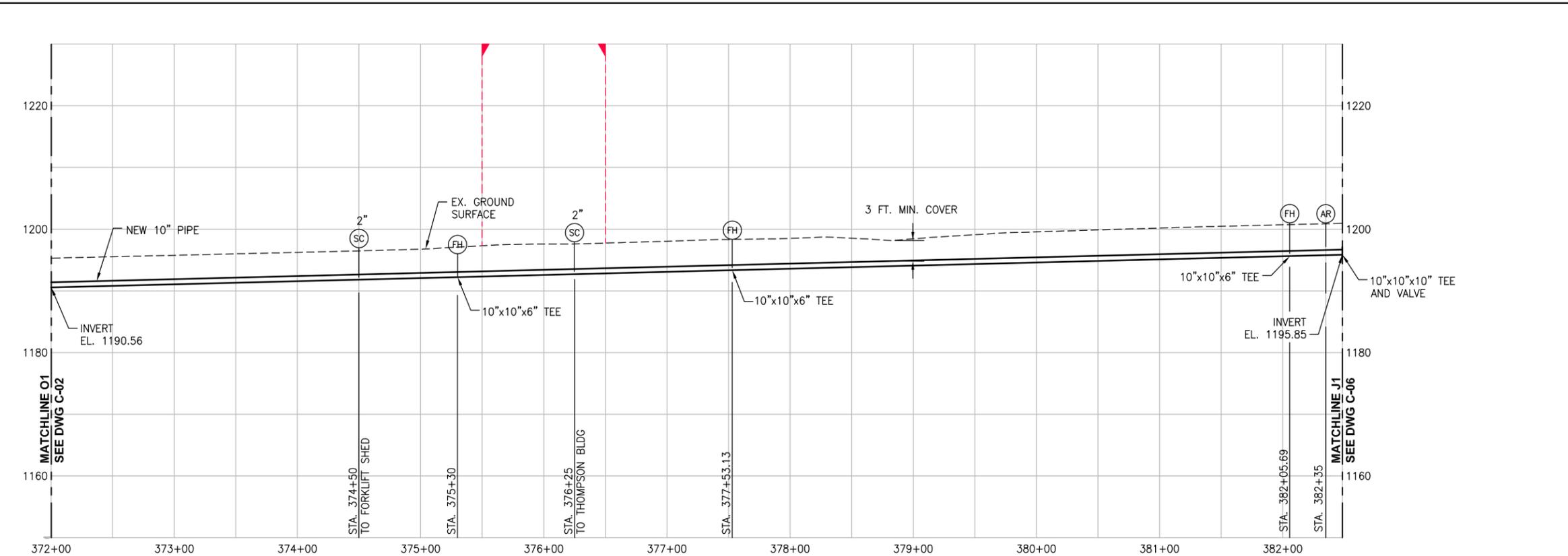
PROFILE - SEGMENT R

NOTE 1: RUN RGS CONDUIT FROM CHLORINE ANALYZER TO BLDG 93 RTU-093.

AS-BUILT
JANUARY 2009
PROFILES NOT UPDATED



- LEGEND**
- (FH) FIRE HYDRANT
 - (MH) MANHOLE
 - (FE) FLOWMETER
 - (AR) AIR RELEASE VALVE
 - ▽ REDUCER
 - ◇ GATE VALVE
 - ⊖ BALL VALVE
 - ⊣ CHECK VALVE
 - (CA) CHLORINE ANALYZER
 - (BO) BLOWOFF VALVE
 - (SC) SERVICE CONNECTION
 - (FS) FIRE STAND
 - (TP) TRENCH PLUG
 - ▭ POSSIBLE UTILITY CROSSING AREA



- (TP) TIE POINT
- GAS LINE
- WASTEWATER LINE
- BURIED ELECTRIC LINE
- EX. WATER LINE
- NEW WATER LINE
- - - ABANDONED OR TO BE ABANDONED WATER LINE
- - - MATCHLINE

1	AS-BUILT SET	HCD	1/2009
0	ISSUED FOR CONSTRUCTION	HCD	12/2007
REV.	DESCRIPTION	BY:	DATE:

REVISIONS

SCALES SHOWN ON THIS DRAWING ARE APPLICABLE ONLY TO D SIZE DRAWING

**CAMP STANLEY STORAGE ACTIVITY
WATER SYSTEM REHABILITATION**

Contract No. FA8903-04-D-8675 Task Order No. 022

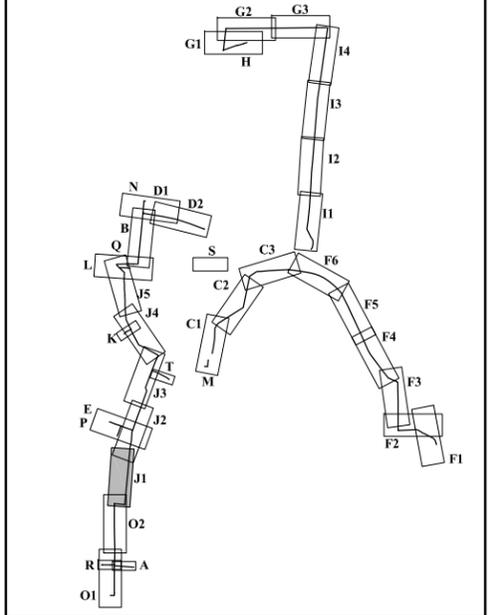
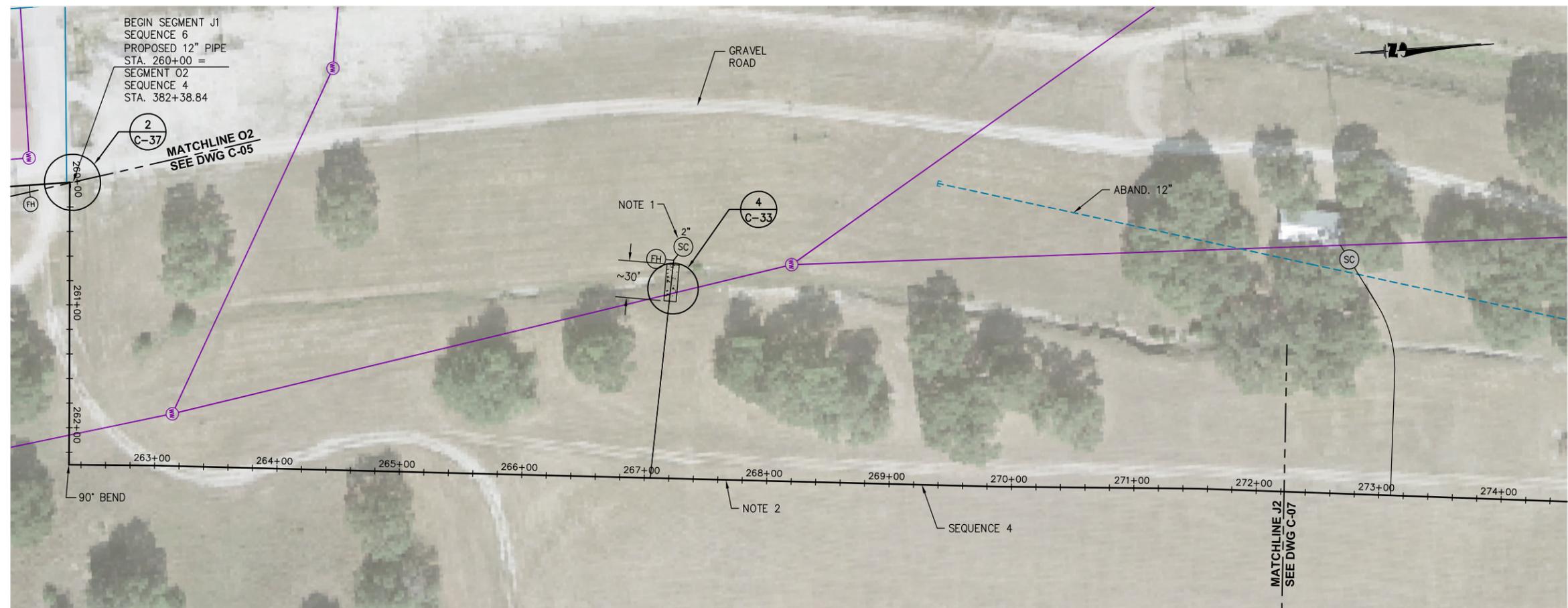
CONTRACTOR : **PARSONS** Job No. 745006 WBS 03000

Drawing Title : **PIPING PLAN AND PROFILE
SEGMENT O2 (10")
SEQUENCES 4 & 9**

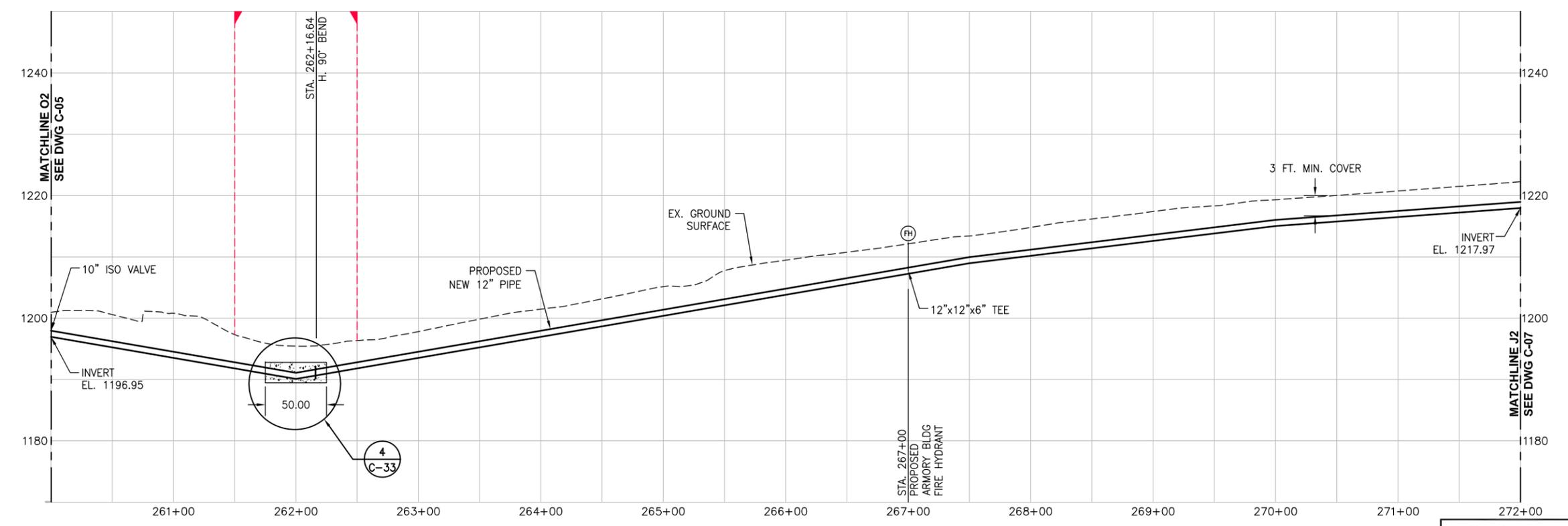
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Checked : KMK	Approved :	
Scale : HORIZ. 1" = 50' VERT. 1" = 10'	Date : JANUARY 2009	Drawing No. : C-05

AS-BUILT
JANUARY 2009
PROFILES NOT UPDATED

PROFILE - SEGMENT O2



- LEGEND**
- (FH) FIRE HYDRANT
 - (MH) MANHOLE
 - (FE) FLOWMETER
 - (AR) AIR RELEASE VALVE
 - REDUCER
 - ⊗ GATE VALVE
 - ⊙ BALL VALVE
 - ⌞ CHECK VALVE
 - ⊘ REMOVE PIPE
 - TP TIE POINT
 - GAS LINE
 - WASTEWATER LINE
 - BURIED ELECTRIC LINE
 - EX. WATER LINE
 - NEW WATER LINE
 - - - ABANDONED OR TO BE ABANDONED WATER LINE
 - - - MATCHLINE
 - (CA) CHLORINE ANALYZER
 - (BO) BLOWOFF VALVE
 - (SC) SERVICE CONNECTION
 - (FS) SADDLE CLAMP
 - (TP) TRENCH PLUG
 - POSSIBLE UTILITY CROSSING AREA



- NOTES:**
- 2" SERVICE CONNECTION FOR FUTURE ARMORY BLDG.
 - PIPE UNDER GRAVEL ROAD TO BE COVERED PER DETAIL 1, C-33 WHERE PIPELINE CROSSES OR IS PARALLEL TO AND UNDERNEATH ROAD.

PROFILE - SEGMENT J1

AS-BUILT
 JANUARY 2009
 PROFILES NOT UPDATED

REV.	DESCRIPTION	BY:	DATE:
1	AS-BUILT SET	HCD	1/2009
0	ISSUED FOR CONSTRUCTION	HCD	12/2007

REVISIONS

SCALES SHOWN ON THIS DRAWING ARE APPLICABLE ONLY TO D SIZE DRAWING

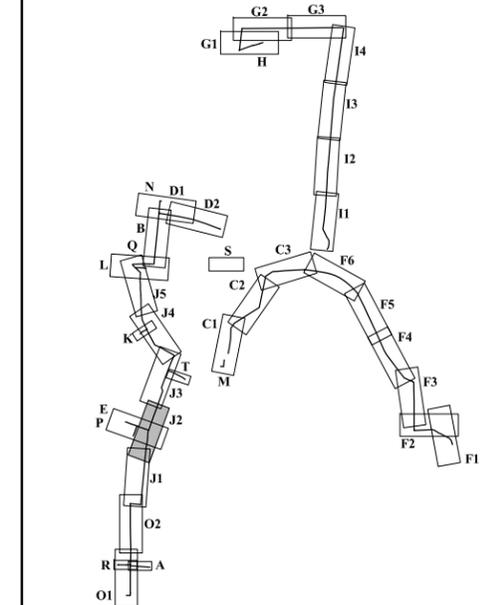
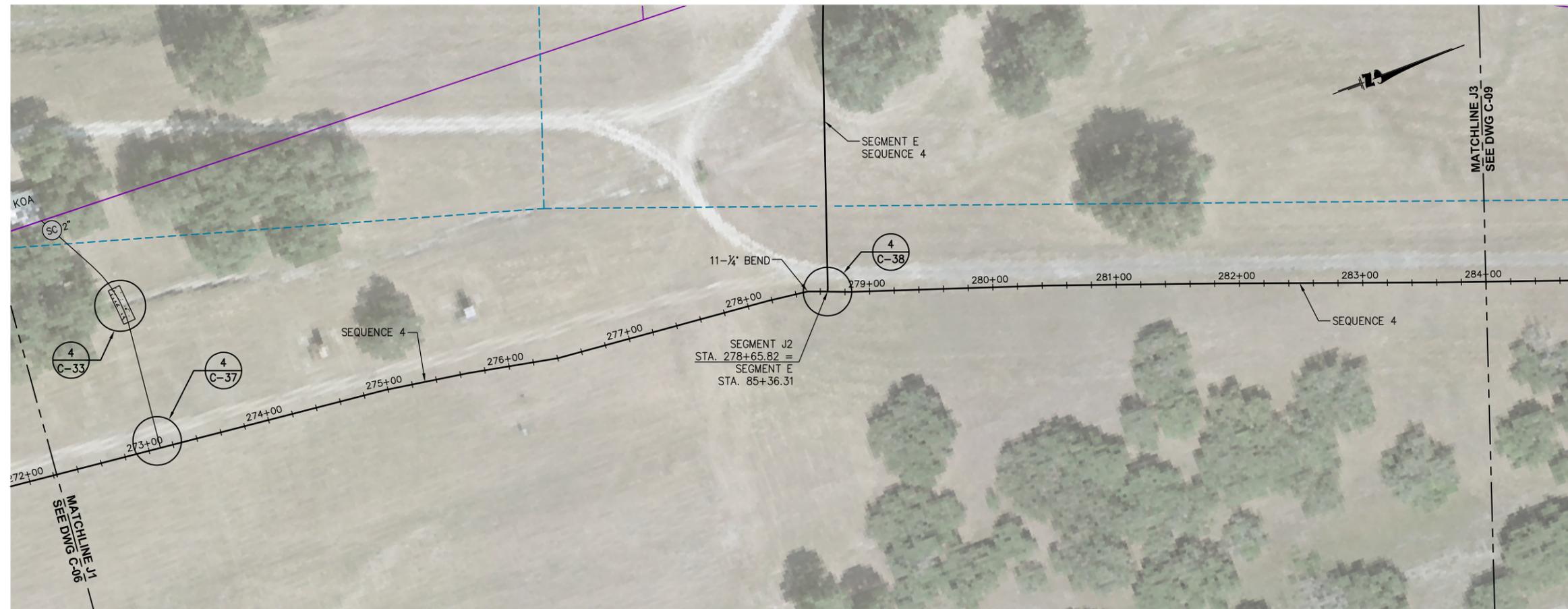
**CAMP STANLEY STORAGE ACTIVITY
 WATER SYSTEM REHABILITATION**

Contract No. FA8903-04-D-8675 Task Order No. 022

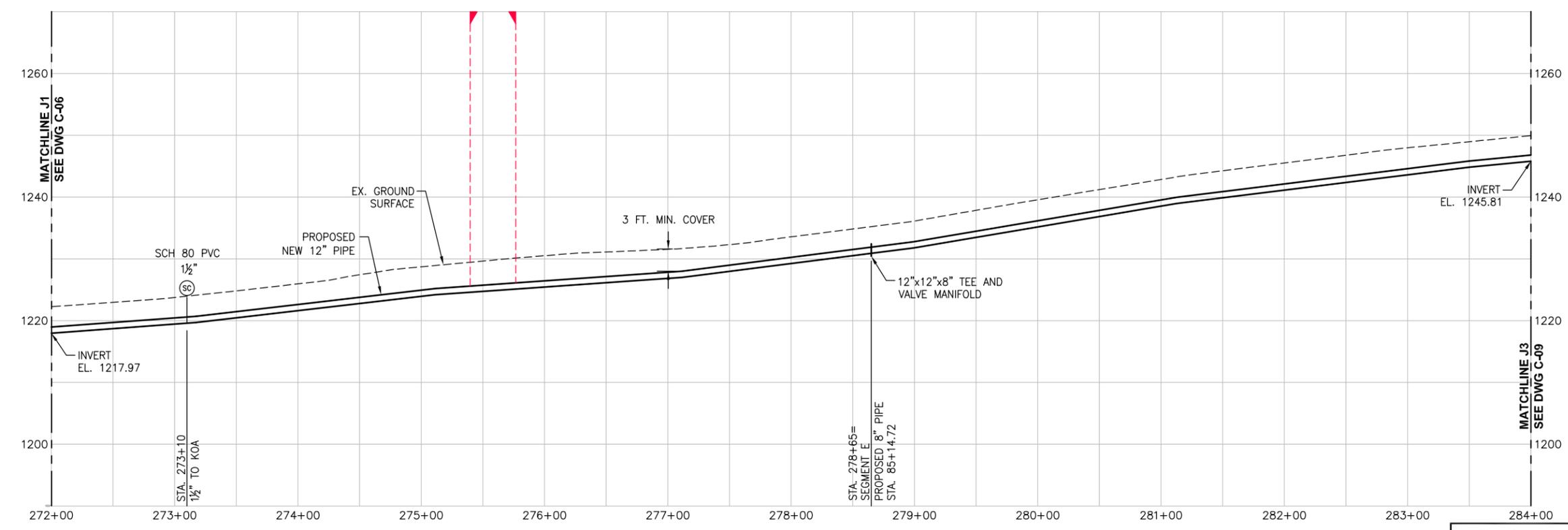
CONTRACTOR :
PARSONS Job No. 745006 WBS 03000

Drawing Title :
**PIPING PLAN AND PROFILE
 SEGMENT J1 (12")
 SEQUENCE 4**

Designed : HCD	Drawn : JLH	Rev: 1
Checked : KMK	Approved :	
Scale : HORIZ. 1" = 50' VERT. 1" = 10'	Date : JANUARY 2009	Drawing No. : C-06



- LEGEND**
- (FH) FIRE HYDRANT
 - (MH) MANHOLE
 - (FE) FLOWMETER
 - (AR) AIR RELEASE VALVE
 - REDUCER
 - ⊗ GATE VALVE
 - ⊙ BALL VALVE
 - ⊏ CHECK VALVE
 - ⊘ REMOVE PIPE
 - (CA) CHLORINE ANALYZER
 - (BO) BLOWOFF VALVE
 - (SC) SERVICE CONNECTION
 - (FS) SADDLE CLAMP
 - (TP) TRENCH PLUG
 - ⊏ POSSIBLE UTILITY CROSSING AREA



- TP TIE POINT
- GAS LINE
- WASTEWATER LINE
- BURIED ELECTRIC LINE
- EX. WATER LINE
- NEW WATER LINE
- ABANDONED OR TO BE ABANDONED WATER LINE
- - - MATCHLINE

REV.	DESCRIPTION	BY:	DATE:
1	AS-BUILT SET	HCD	1/2009
0	ISSUED FOR CONSTRUCTION	HCD	12/2007

REVISIONS

SCALES SHOWN ON THIS DRAWING ARE APPLICABLE ONLY TO D SIZE DRAWING

CAMP STANLEY STORAGE ACTIVITY
WATER SYSTEM REHABILITATION

Contract No. FA8903-04-D-8675 Task Order No. 022

CONTRACTOR :
PARSONS Job No. 745006 WBS 03000

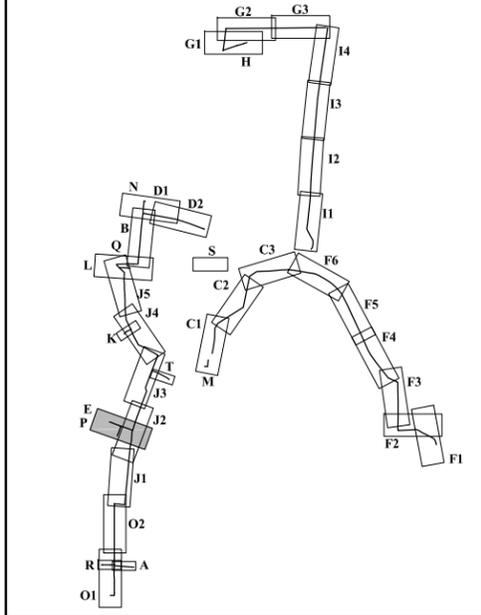
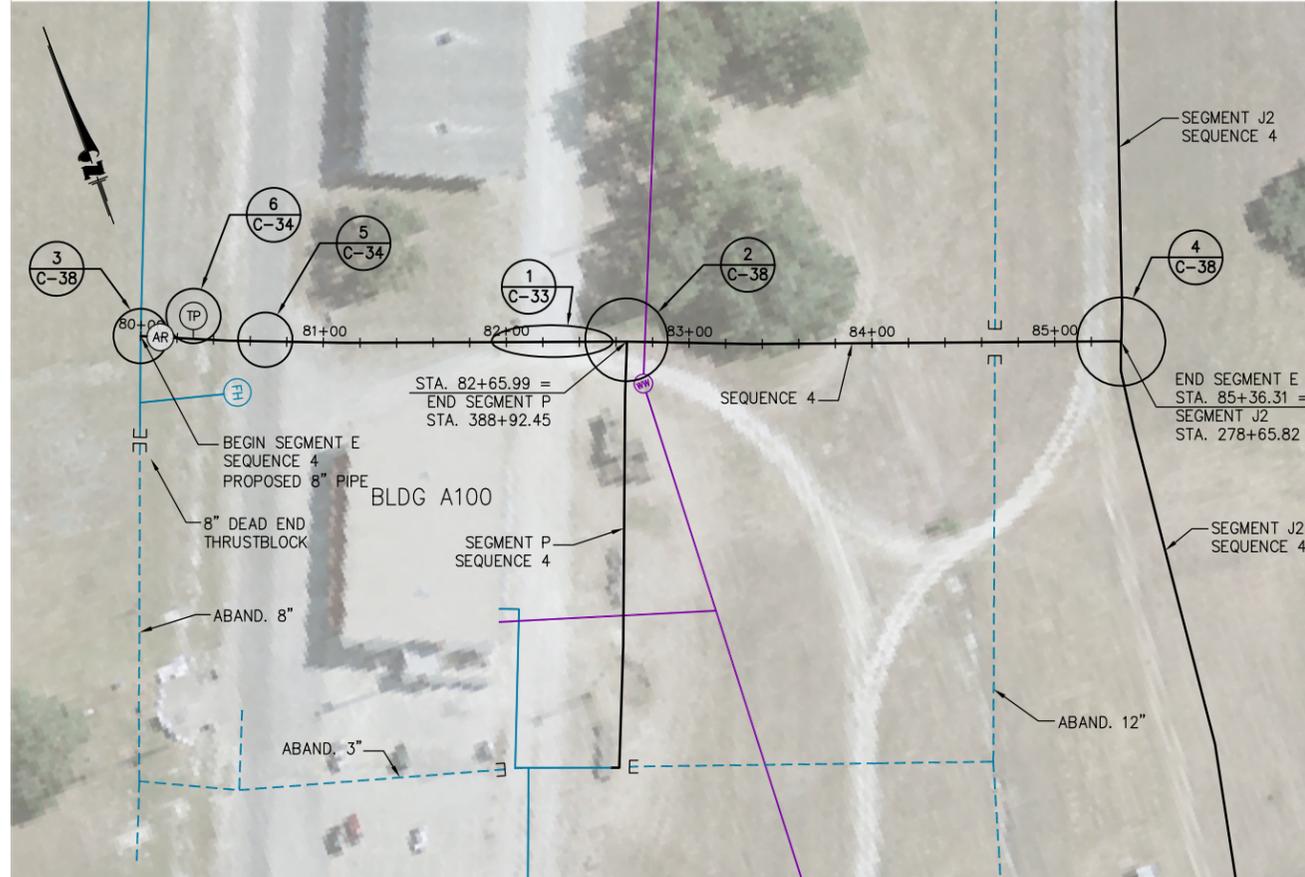
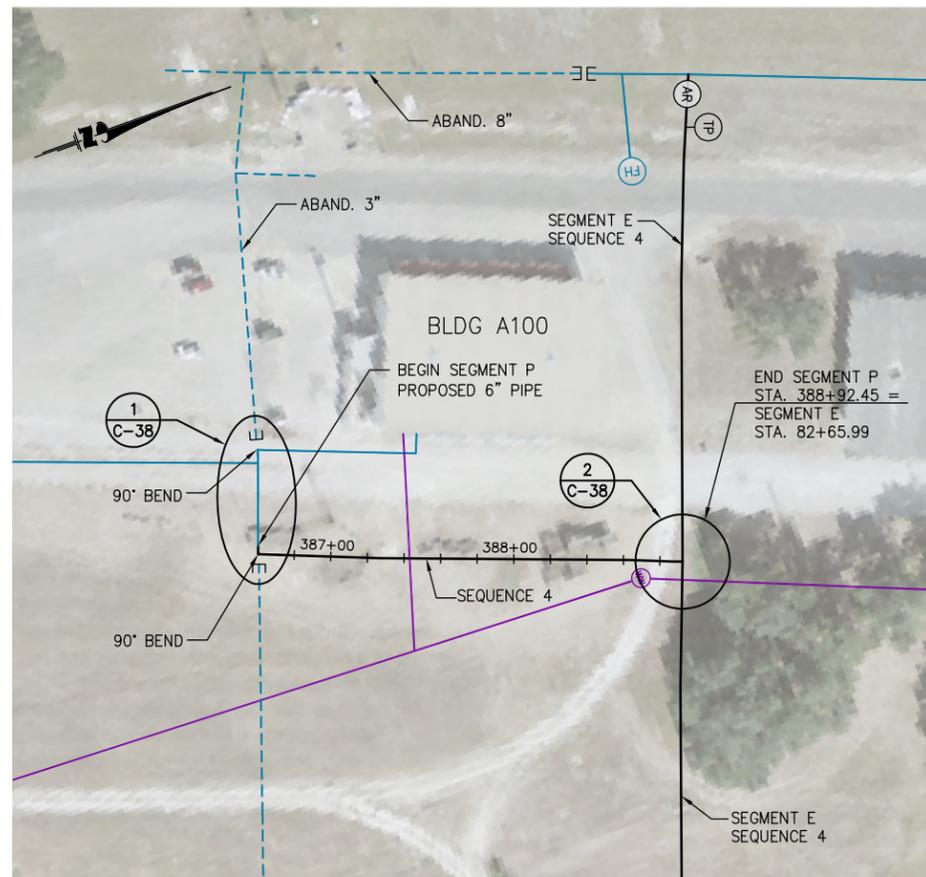
Drawing Title :
**PIPING PLAN AND PROFILE
SEGMENT J-2 (12")
SEQUENCE 4**

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Checked : KMK	Approved :	
Scale : HORIZ. 1" = 50' VERT. 1" = 10'	Date : JANUARY 2009	Drawing No. : C-07

NOTE 1: PIPE UNDER GRAVEL ROAD TO BE COVERED PER DETAIL 1, C-33 WHERE PIPELINE CROSSES OR IS PARALLEL TO AND UNDERNEATH ROAD.

PROFILE - SEGMENT J-2

AS-BUILT
JANUARY 2009
PROFILES NOT UPDATED



LEGEND

(FH)	FIRE HYDRANT	(CA)	CHLORINE ANALYZER
(MH)	MANHOLE	(BO)	BLOWOFF VALVE
(FE)	FLOWMETER	(SC)	SERVICE CONNECTION
(AR)	AIR RELEASE VALVE	(FS)	SADDLE CLAMP
□	REDUCER	(TP)	TRENCH PLUG
⊗	GATE VALVE	▭	POSSIBLE UTILITY CROSSING AREA
⊘	BALL VALVE		
⌞	CHECK VALVE		
▨	REMOVE PIPE		
TP	TIE POINT		
—	GAS LINE		
—	WASTEWATER LINE		
—	BURIED ELECTRIC LINE		
—	EX. WATER LINE		
—	NEW WATER LINE		
- - -	ABANDONED OR TO BE ABANDONED WATER LINE		
- - -	MATCHLINE		

REV.	DESCRIPTION	BY:	DATE:
1	AS-BUILT SET	HCD	1/2009
0	ISSUED FOR CONSTRUCTION	HCD	12/2007

REVISIONS

SCALES SHOWN ON THIS DRAWING ARE APPLICABLE ONLY TO D SIZE DRAWING

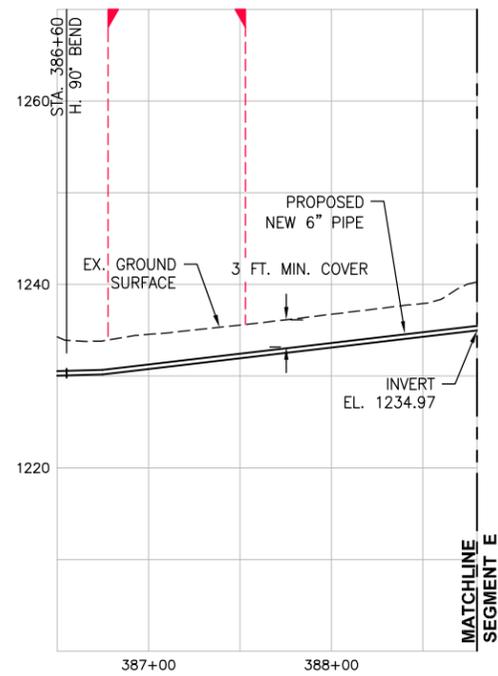
CAMP STANLEY STORAGE ACTIVITY
WATER SYSTEM REHABILITATION

Contract No. FA8903-04-D-8675 Task Order No. 022

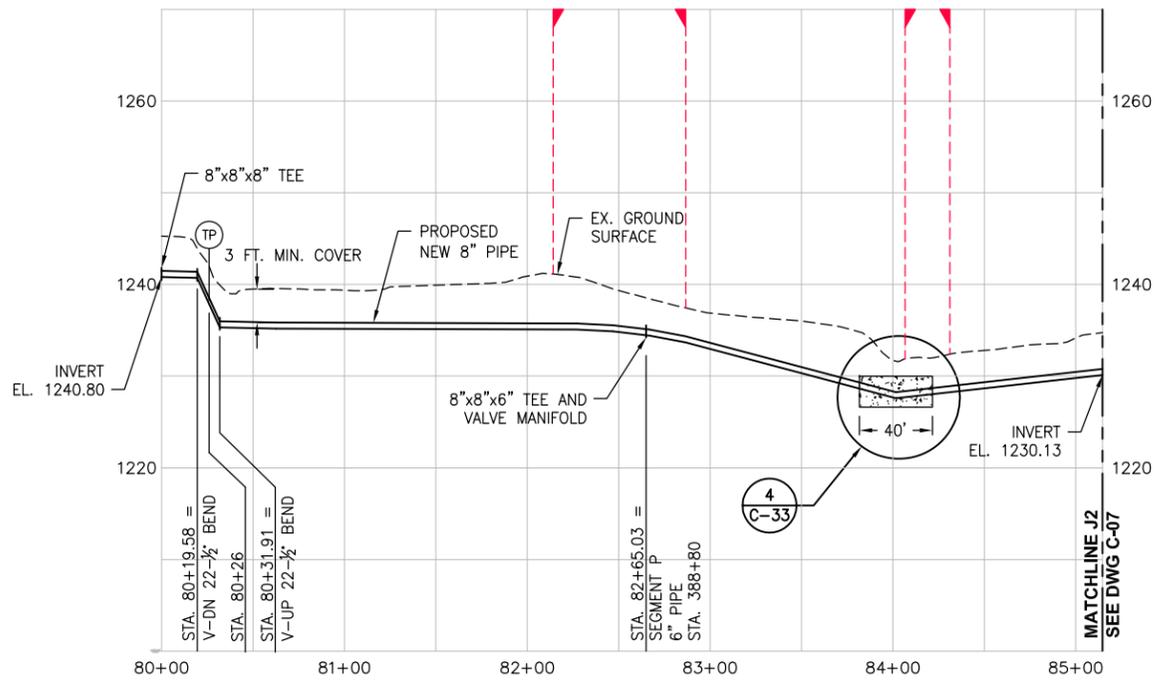
CONTRACTOR :
PARSONS Job No. 745006 WBS 03000

Drawing Title :
**PIPING PLAN AND PROFILE
SEGMENT E (8") AND P (6")
SEQUENCE 4**

Designed : HCD	Drawn : JLH	Rev: 1
Checked : KMK	Approved :	
Scale : HORIZ. 1" = 50' VERT. 1" = 10'	Date : JANUARY 2009	Drawing No. : C-08

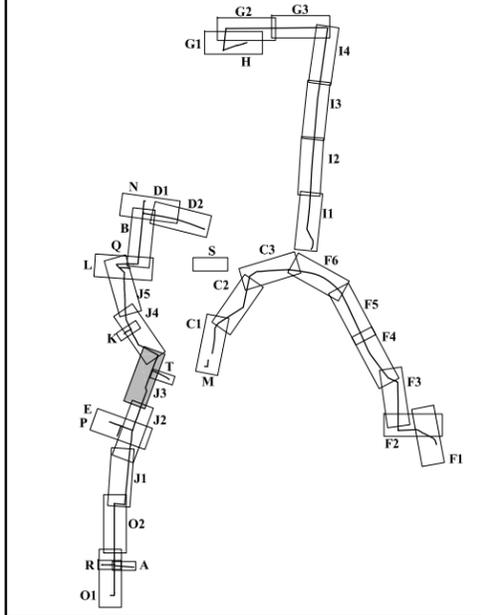
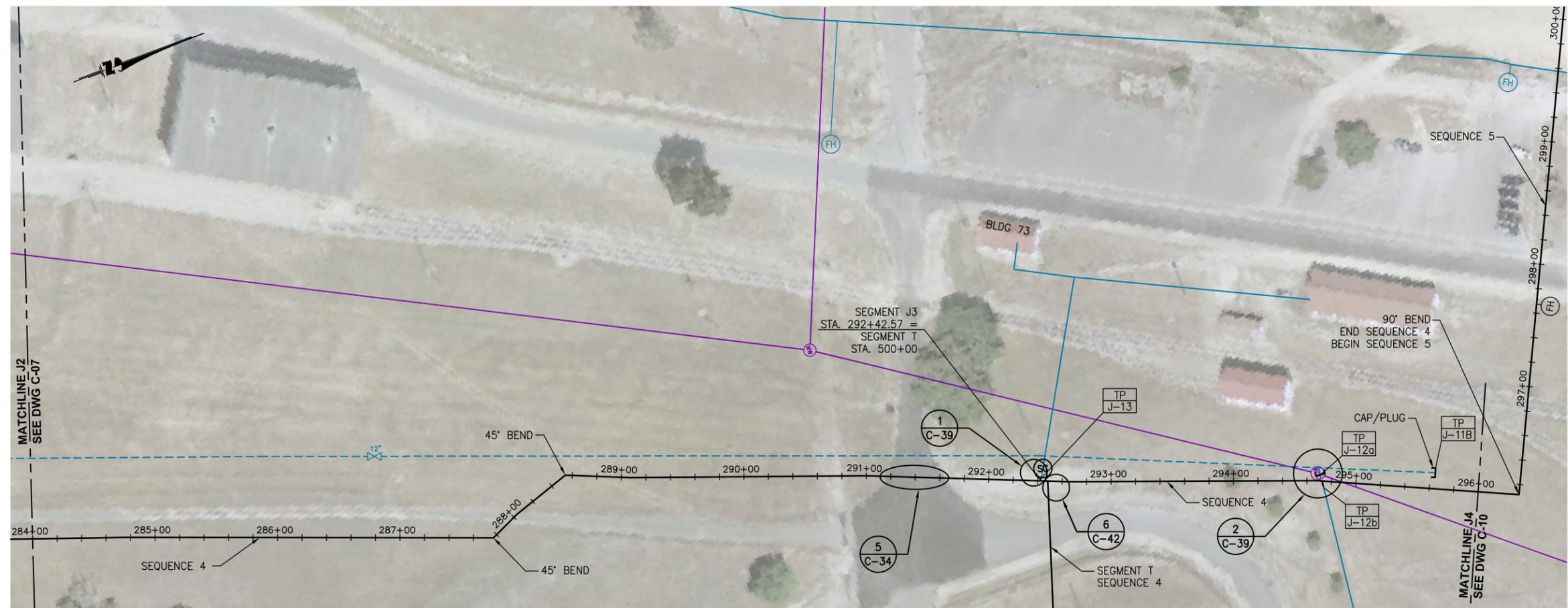


PROFILE - SEGMENT P

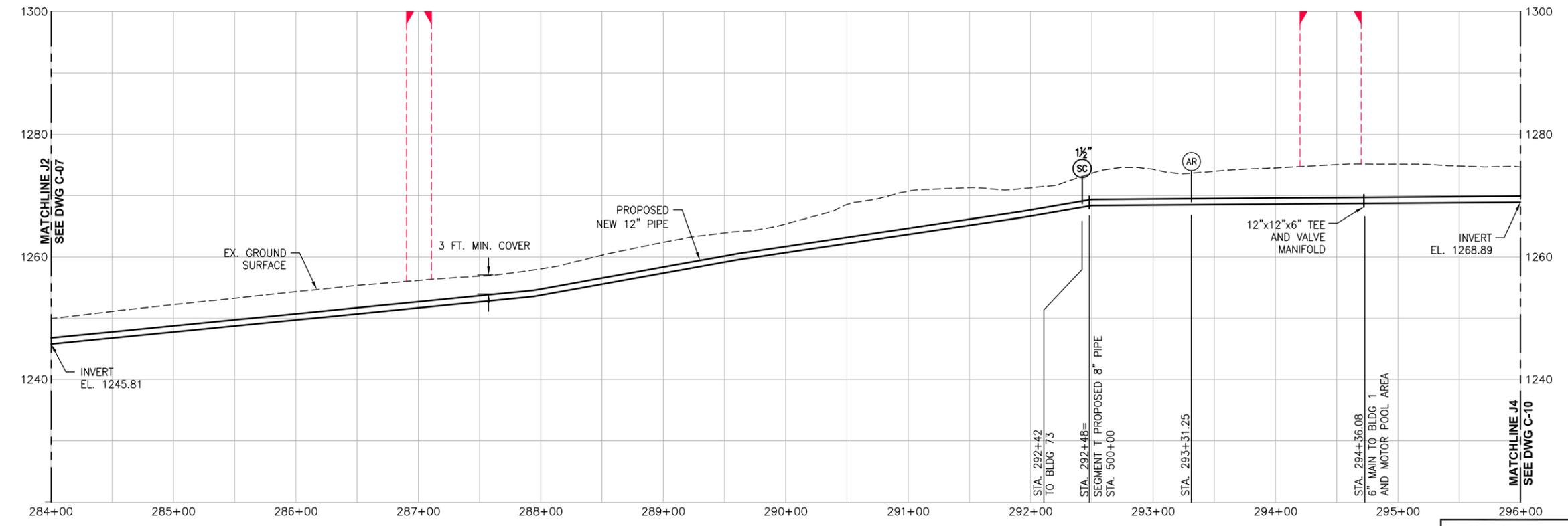


PROFILE - SEGMENT E

AS-BUILT
JANUARY 2009
PROFILES NOT UPDATED



- LEGEND**
- (FH) FIRE HYDRANT
 - (MH) MANHOLE
 - (FE) FLOWMETER
 - (AR) AIR RELEASE VALVE
 - ▽ REDUCER
 - ◇ GATE VALVE
 - BALL VALVE
 - ⊠ CHECK VALVE
 - (CA) CHLORINE ANALYZER
 - (BO) BLOWOFF VALVE
 - (SC) SERVICE CONNECTION
 - (FS) SADDLE CLAMP
 - (TP) TRENCH PLUG
 - POSSIBLE UTILITY CROSSING AREA
 - REMOVE PIPE
 - TP TIE POINT



PROFILE - SEGMENT J3

AS-BUILT
 JANUARY 2009
 PROFILES NOT UPDATED

REV.	DESCRIPTION	BY:	DATE:
1	AS-BUILT SET	HCD	1/2009
0	ISSUED FOR CONSTRUCTION	HCD	12/2007

REVISIONS

SCALES SHOWN ON THIS DRAWING ARE APPLICABLE ONLY TO D SIZE DRAWING

**CAMP STANLEY STORAGE ACTIVITY
 WATER SYSTEM REHABILITATION**

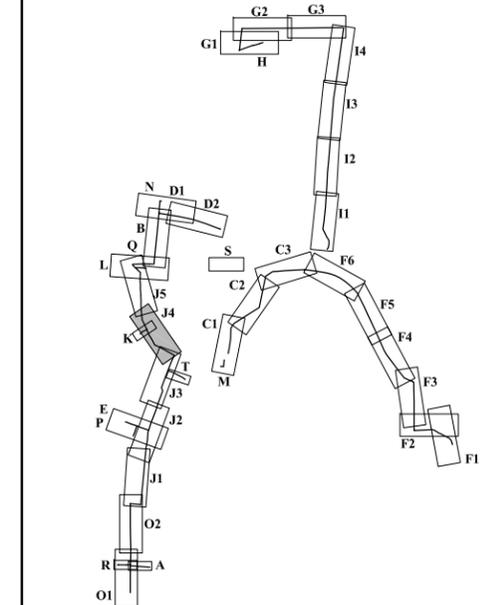
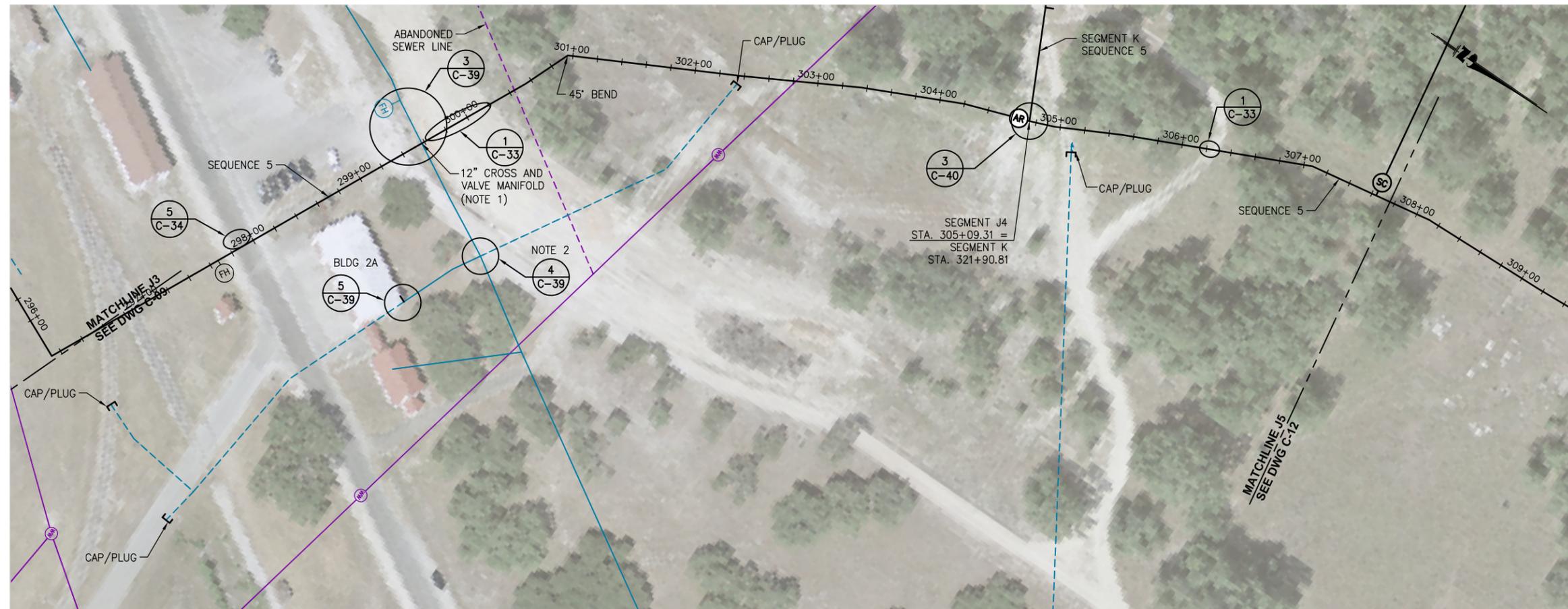
Contract No. FA8903-04-D-8675 Task Order No. 022

CONTRACTOR :
PARSONS Job No. 745006 WBS 03000

Drawing Title :
**PIPING PLAN AND PROFILE
 SEGMENT J3 (12")
 SEQUENCES 4 & 5**

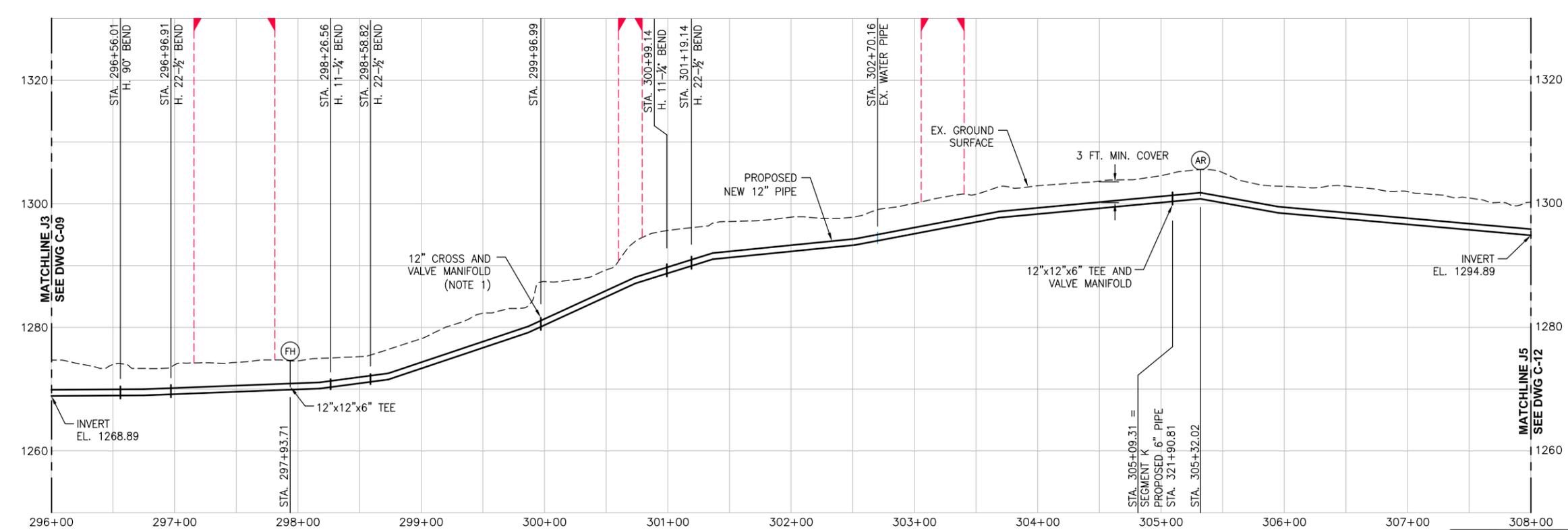
Designed : HCD	Drawn : JLH	Rev: 1
Checked : KMK	Approved :	
Scale : HORIZ. 1" = 50' VERT. 1" = 10'	Date : JANUARY 2009	Drawing No. : C-09

NOTE 1: TRENCH DUE WEST AND INSTALL CONDUIT FOR FLOWMETER UNDERGROUND TO RTU-908 ED#6.



LEGEND

(FH)	FIRE HYDRANT	(CA)	CHLORINE ANALYZER
(MH)	MANHOLE	(BO)	BLOWOFF VALVE
(FE)	FLOWMETER	(SC)	SERVICE CONNECTION
(AR)	AIR RELEASE VALVE	(FS)	SADDLE CLAMP
□	REDUCER	(TP)	TRENCH PLUG
⊗	GATE VALVE	▭	POSSIBLE UTILITY CROSSING AREA
⊙	BALL VALVE		
⌞	CHECK VALVE		
▨	REMOVE PIPE		



REVISIONS

REV.	DESCRIPTION	BY:	DATE:
1	AS-BUILT SET	HCD	11/2008
0	ISSUED FOR CONSTRUCTION	HCD	12/2007

SCALES SHOWN ON THIS DRAWING ARE APPLICABLE ONLY TO D SIZE DRAWING

**CAMP STANLEY STORAGE ACTIVITY
WATER SYSTEM REHABILITATION**

Contract No. FA8903-04-D-8675 Task Order No. 022

CONTRACTOR :
PARSONS Job No. 745006 WBS 03000

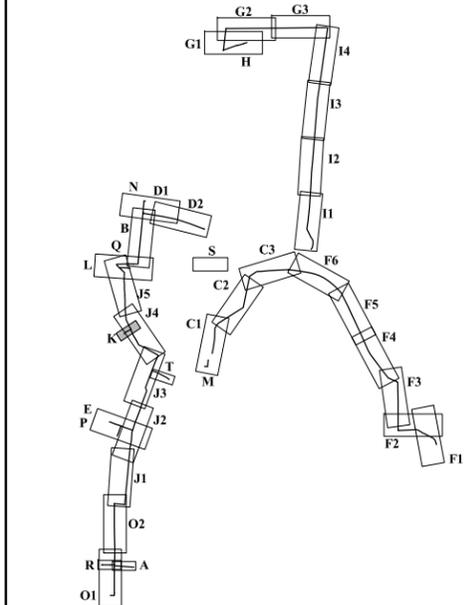
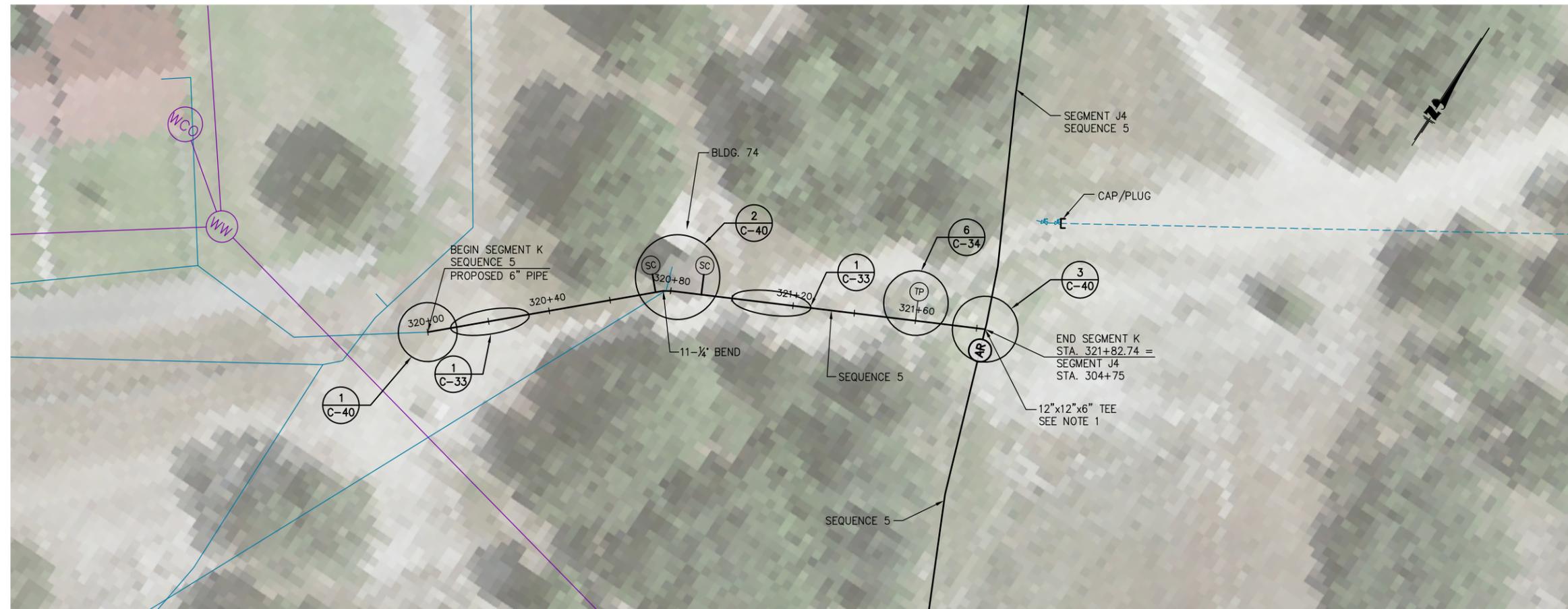
Drawing Title :
**PIPING PLAN AND PROFILE
SEGMENT J-4 (12")
SEQUENCE 5**

Designed : HCD	Drawn : JLH	Rev: 1
Checked : KMK	Approved :	
Scale : HORIZ. 1" = 50' VERT. 1" = 10'	Date : NOVEMBER 2008	Drawing No. : C-10

NOTE 1: FIELD VERIFY DEPTH OF EXISTING 8" WATER MAIN AND MATCH NEW 12" TO IT FOR CROSS INSTALLATION.
NOTE 2: MOVE SERVICE CONNECTION TO BLDG 2A FROM 12" MAIN TO 8" MAIN.

AS-BUILT
NOVEMBER 2008
PROFILES NOT UPDATED

PROFILE - SEGMENT J-4



- LEGEND**
- (FH) FIRE HYDRANT
 - (MH) MANHOLE
 - (FE) FLOWMETER
 - (AR) AIR RELEASE VALVE
 - ◻ REDUCER
 - ⊗ GATE VALVE
 - ⊙ BALL VALVE
 - ⊣ CHECK VALVE
 - ⊘ REMOVE PIPE
 - (CA) CHLORINE ANALYZER
 - (BO) BLOWOFF VALVE
 - (SC) SERVICE CONNECTION SADDLE CLAMP
 - (FS) FIRE STAND
 - (TP) TRENCH PLUG
 - ⊕ POSSIBLE UTILITY CROSSING AREA



- (TP) TIE POINT
- GAS LINE
- WASTEWATER LINE
- BURIED ELECTRIC LINE
- EX. WATER LINE
- NEW WATER LINE
- - - ABANDONED OR TO BE ABANDONED WATER LINE
- - - MATCHLINE

1	AS-BUILT SET	HCD	1/2009
0	ISSUED FOR CONSTRUCTION	HCD	12/2007
REV.	DESCRIPTION	BY:	DATE:

REVISIONS

SCALES SHOWN ON THIS DRAWING ARE APPLICABLE ONLY TO D SIZE DRAWING

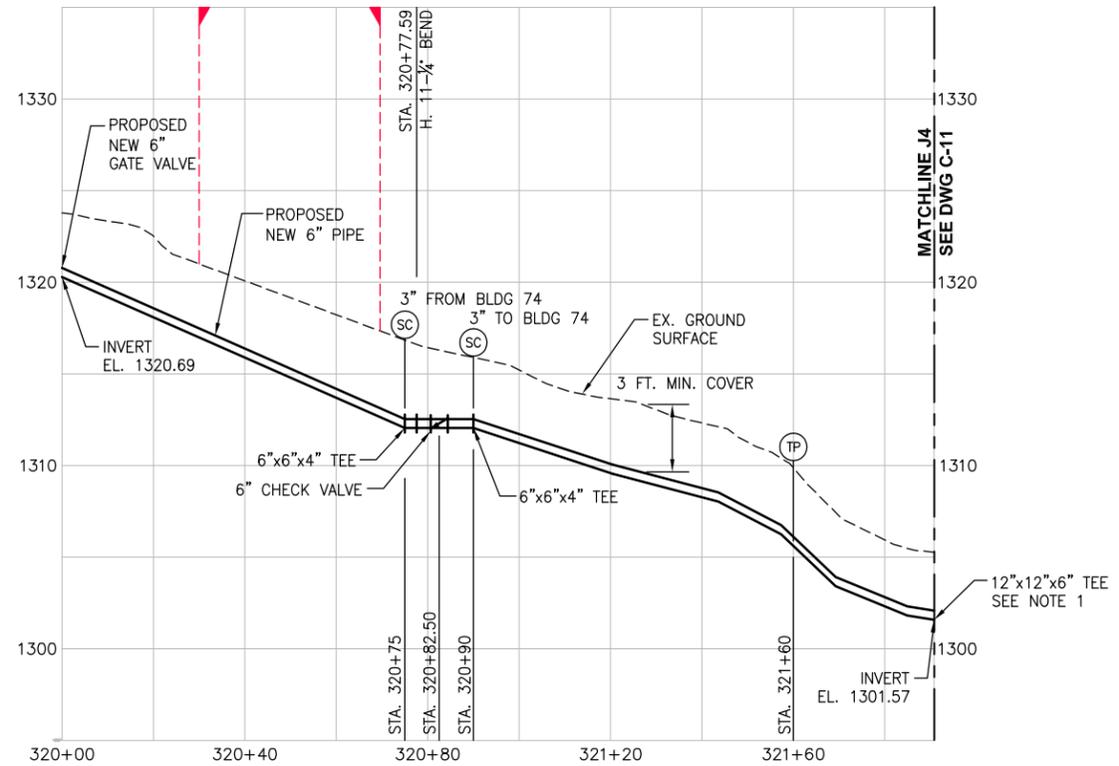
CAMP STANLEY STORAGE ACTIVITY
WATER SYSTEM REHABILITATION

Contract No. FA8903-04-D-8675 Task Order No. 022

CONTRACTOR :
PARSONS Job No. 745006 WBS 03000

Drawing Title :
**PIPING PLAN AND PROFILE
SEGMENT K (6")
SEQUENCE 5**

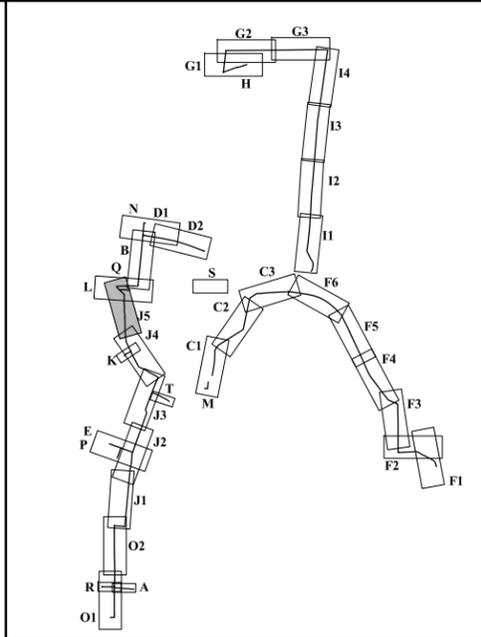
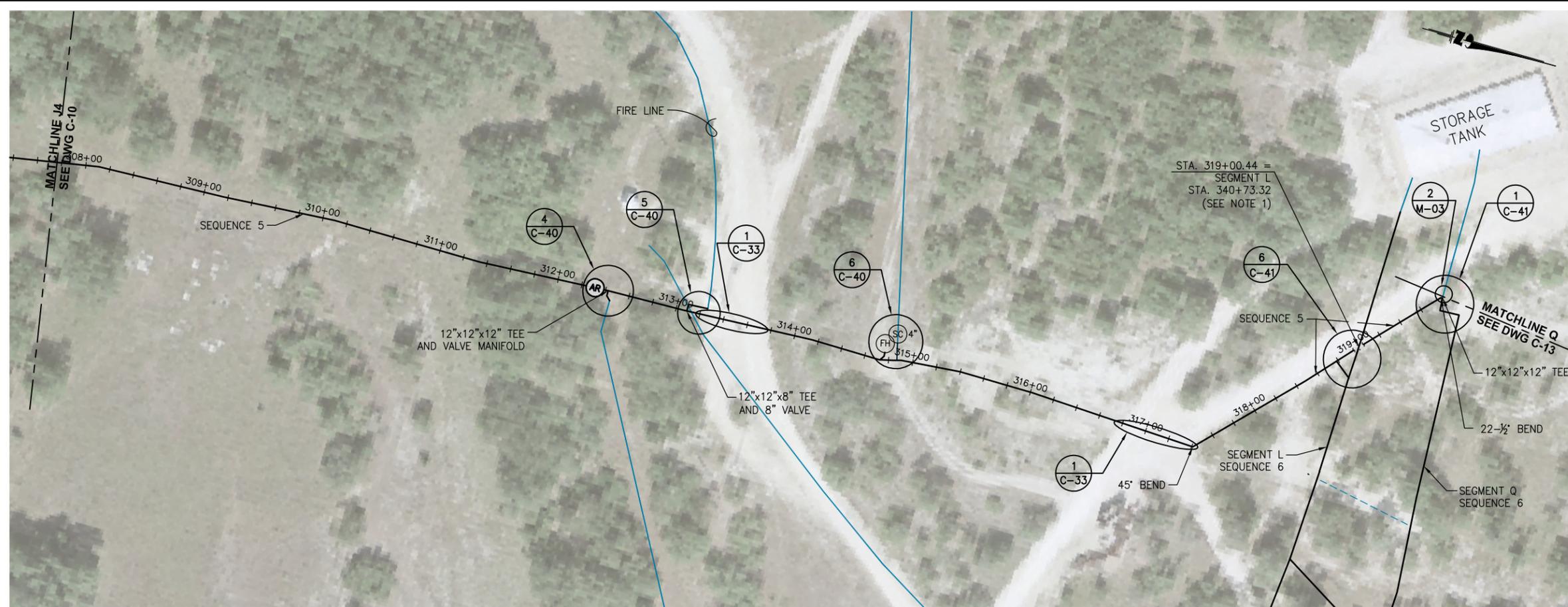
Designed : HCD	Drawn : JLH	Rev: 1
Checked : KMK	Approved :	
Scale : HORIZ. 1" = 20' VERT. 1" = 5'	Date : JANUARY 2009	Drawing No. : C-11



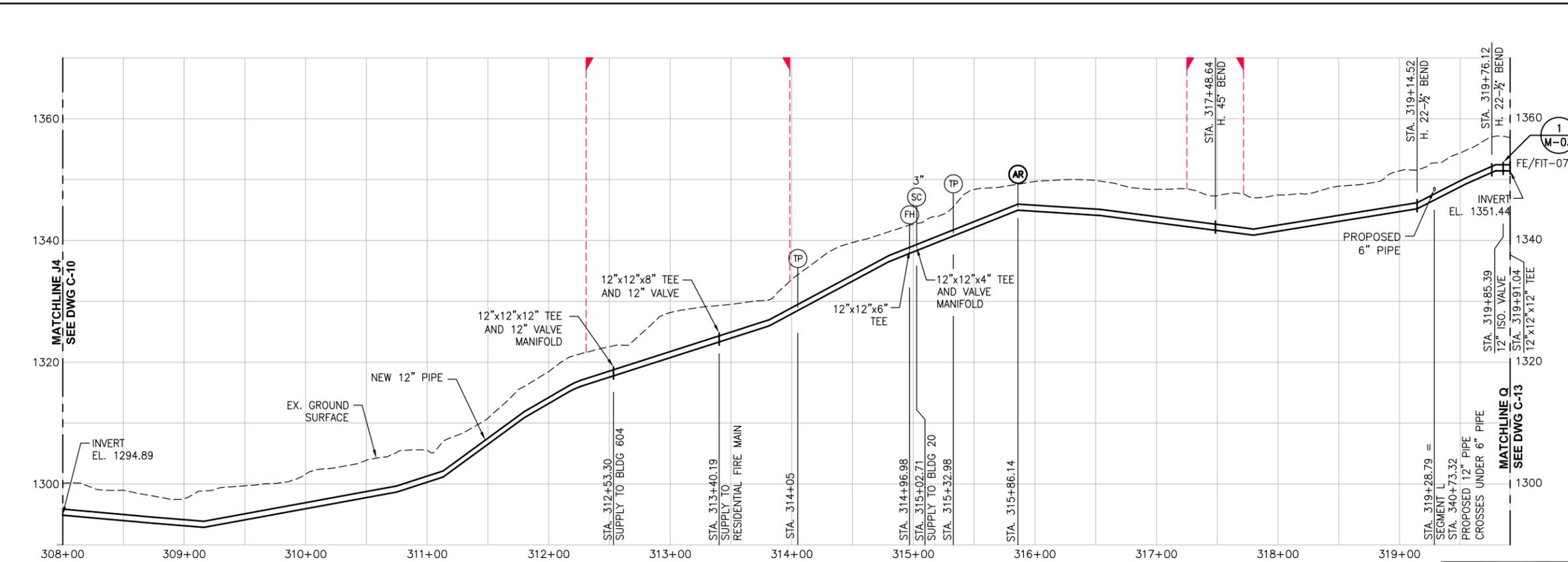
PROFILE - SEGMENT K

NOTE 1: ROLL 12"x12"x6" TEE TO MAKE ANGLE.

AS-BUILT
JANUARY 2009
PROFILES NOT UPDATED



- LEGEND**
- (FH) FIRE HYDRANT
 - (MH) MANHOLE
 - (FE) FLOWMETER
 - (AR) AIR RELEASE VALVE
 - ▽ REDUCER
 - ⊗ GATE VALVE
 - ⊙ BALL VALVE
 - ⊘ CHECK VALVE
 - (SC) SERVICE CONNECTION
 - (FS) FIRE STAND
 - (TP) TRENCH PLUG
 - (CA) CHLORINE ANALYZER
 - (BO) BLOWOFF VALVE
 - (SC) SERVICE CONNECTION SADDLE CLAMP
 - (FS) FIRE STAND
 - (TP) TRENCH PLUG
 - POSSIBLE UTILITY CROSSING AREA
 - REMOVE PIPE



- (TP) TIE POINT
- GAS LINE
- WASTEWATER LINE
- BURIED ELECTRIC LINE
- EX. WATER LINE
- NEW WATER LINE
- - - ABANDONED OR TO BE ABANDONED WATER LINE
- - - MATCHLINE

REV.	DESCRIPTION	BY:	DATE:
1	AS-BUILT SET	HCD	1/2009
0	ISSUED FOR CONSTRUCTION	HCD	12/2007

REVISIONS

SCALES SHOWN ON THIS DRAWING ARE APPLICABLE ONLY TO D SIZE DRAWING

**CAMP STANLEY STORAGE ACTIVITY
WATER SYSTEM REHABILITATION**

Contract No. FA8903-04-D-8675 Task Order No. 022

CONTRACTOR :
PARSONS Job No. 745006 WBS 03000

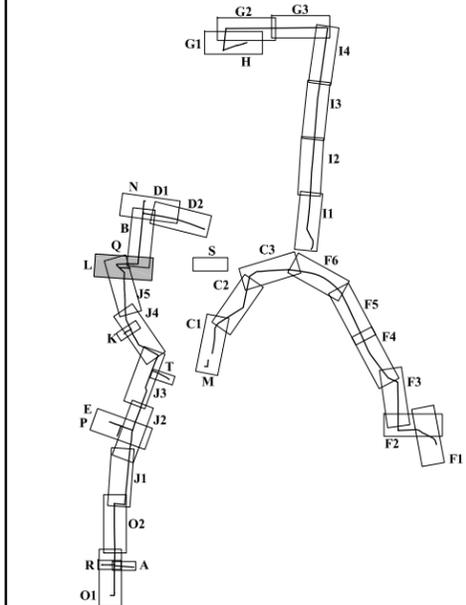
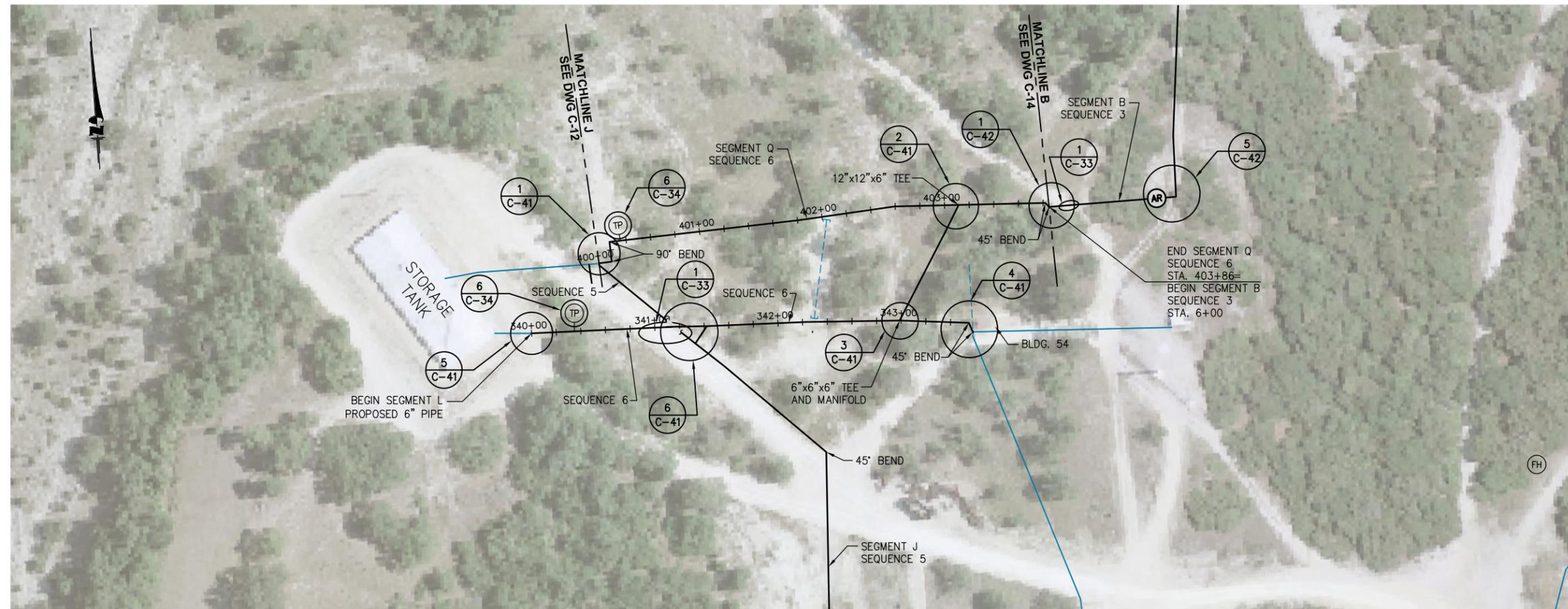
Drawing Title :
**PIPING PLAN AND PROFILE
SEGMENT J5 (12")
SEQUENCES 5 & 6**

Designed : HCD	Drawn : JLH	Rev: 1
Checked : KMK	Approved :	
Scale : HORIZ. 1" = 50' VERT. 1" = 10'	Date : JANUARY 2009	Drawing No. : C-12

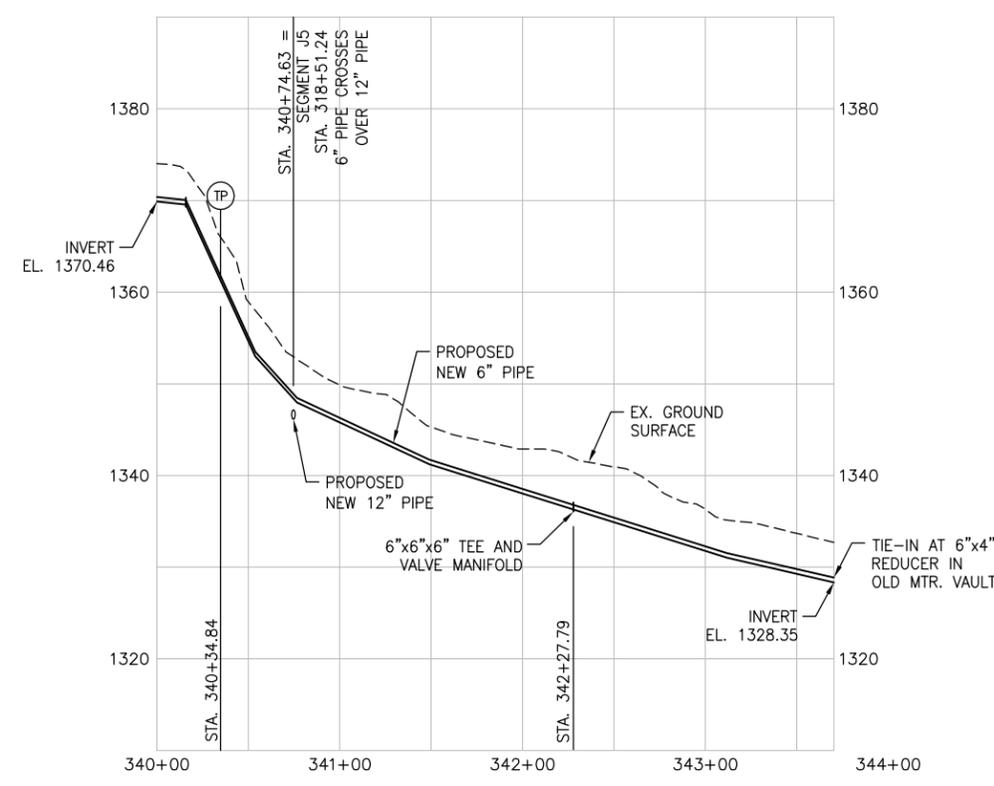
AS-BUILT
JANUARY 2009
PROFILES NOT UPDATED

NOTE 1: 12" PIPE CROSSES UNDER 6" PIPE.

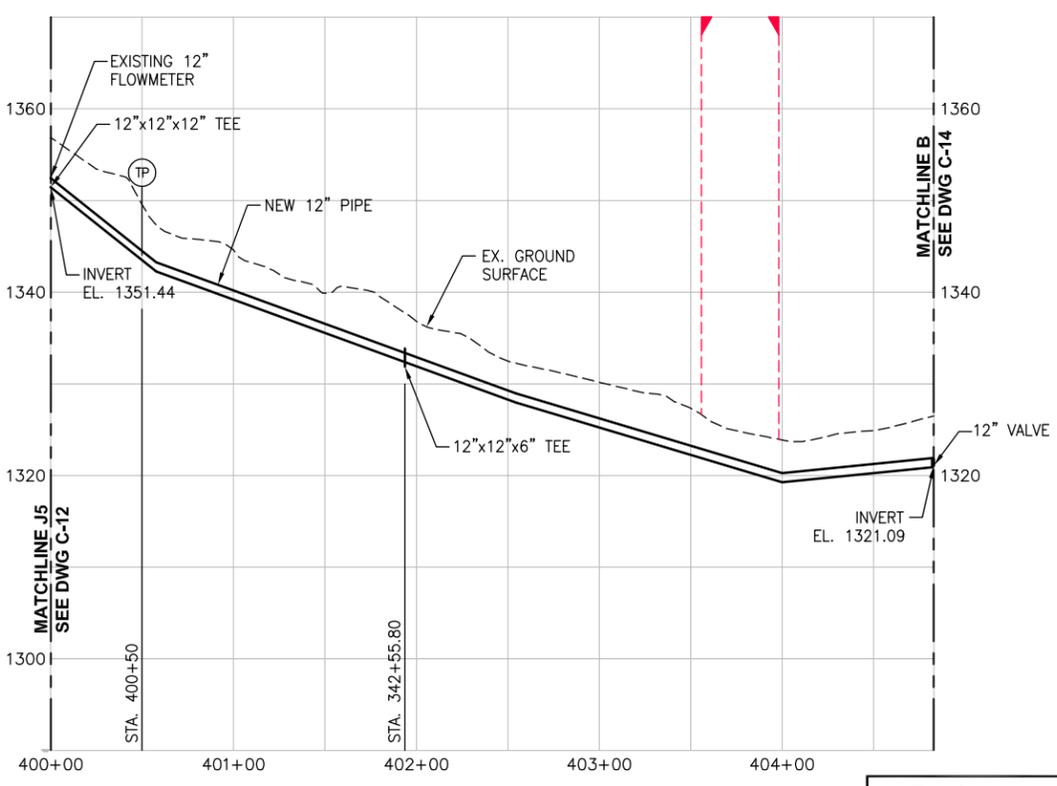
PROFILE - SEGMENT J5



- LEGEND**
- (FH) FIRE HYDRANT
 - (MH) MANHOLE
 - (FE) FLOWMETER
 - (AR) AIR RELEASE VALVE
 - ◻ REDUCER
 - ⊗ GATE VALVE
 - ⊙ BALL VALVE
 - ⌞ CHECK VALVE
 - ◌ REMOVE PIPE
 - (TP) TIE POINT
 - (CA) CHLORINE ANALYZER
 - (BO) BLOWOFF VALVE
 - (SC) SERVICE CONNECTION
 - (FS) FIRE STAND
 - (TP) TRENCH PLUG
 - ▭ POSSIBLE UTILITY CROSSING AREA



PROFILE - SEGMENT L



PROFILE - SEGMENT Q

REV.	DESCRIPTION	BY:	DATE:
1	AS-BUILT SET	HCD	1/2009
0	ISSUED FOR CONSTRUCTION	HCD	12/2007

REVISIONS

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**CAMP STANLEY STORAGE ACTIVITY
WATER SYSTEM REHABILITATION**

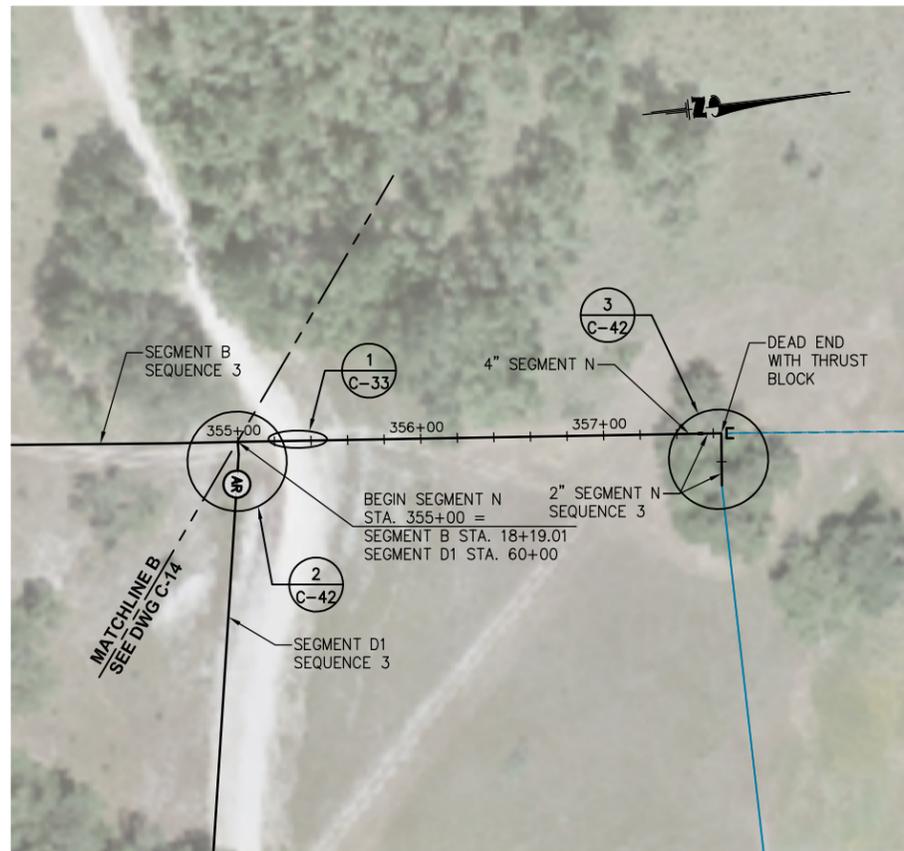
Contract No. FA8903-04-D-8675 Task Order No. 022

CONTRACTOR :
PARSONS Job No. 745006 WBS 03000

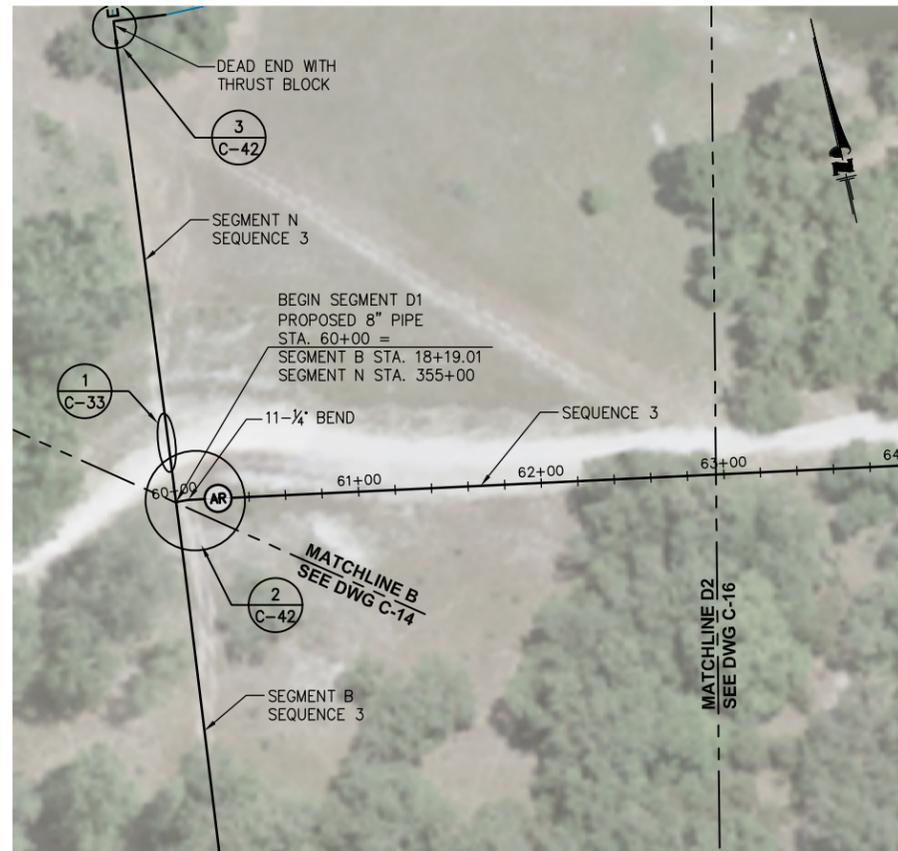
Drawing Title :
**PIPING PLAN AND PROFILE
SEGMENT L (6") AND
SEGMENT Q (12")
SEQUENCES 5, 6 & 3**

Designed : HCD	Drawn : JLH	Rev: 1
Checked : KMK	Approved :	
Scale : HORIZ. 1" = 50' VERT. 1" = 10'	Date : JANUARY 2009	Drawing No. : C-13

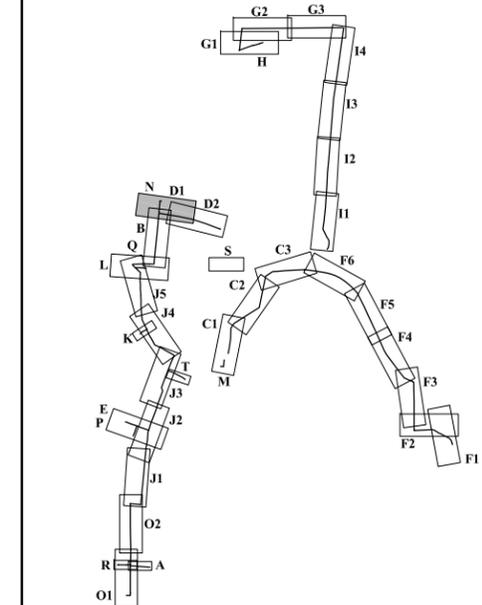
AS-BUILT
JANUARY 2009
PROFILES NOT UPDATED



PLAN - SEGMENT N

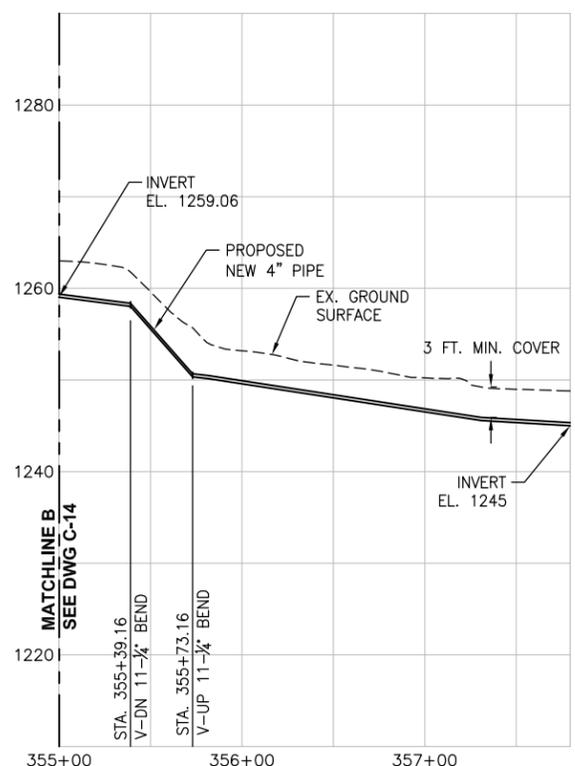


PLAN - SEGMENT D1

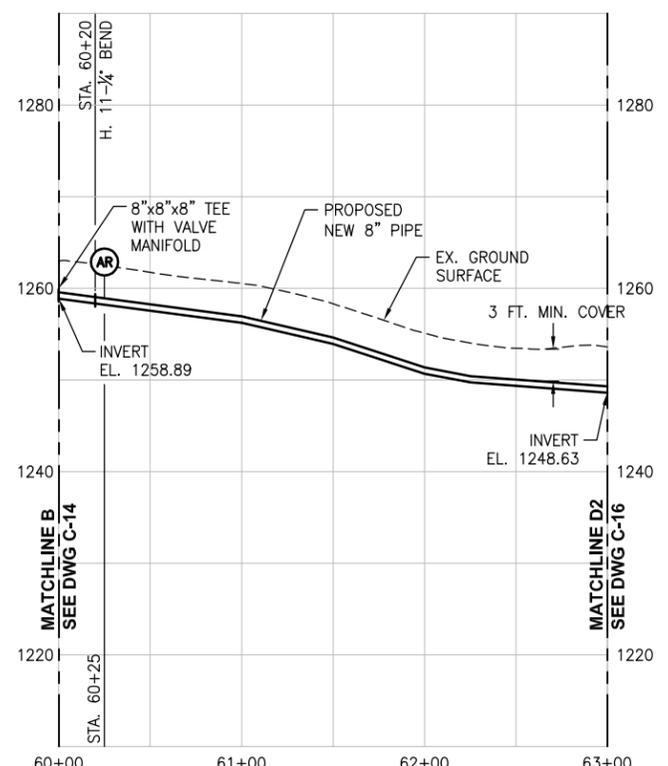


LEGEND

(FH)	FIRE HYDRANT	(CA)	CHLORINE ANALYZER
(MH)	MANHOLE	(BO)	BLOWOFF VALVE
(FE)	FLOWMETER	(SC)	SERVICE CONNECTION
(AR)	AIR RELEASE VALVE	(FS)	SADDLE CLAMP
□	REDUCER	(TP)	FIRE STAND
⊗	GATE VALVE	▭	TRENCH PLUG
⊙	BALL VALVE	▭	POSSIBLE UTILITY CROSSING AREA
⌞	CHECK VALVE		
▨	REMOVE PIPE		



PROFILE - SEGMENT N



PROFILE - SEGMENT D1

NOTE: PIPE UNDER GRAVEL ROAD TO BE COVERED PER DETAIL 1, C-33 WHERE PIPELINE CROSSES OR IS PARALLEL TO AND UNDERNEATH ROAD.

AS-BUILT
 JANUARY 2009
 PROFILES NOT UPDATED

REV.	DESCRIPTION	BY:	DATE:
1	AS-BUILT SET	HCD	1/2009
0	ISSUED FOR CONSTRUCTION	HCD	12/2007

REVISIONS

SCALES SHOWN ON THIS DRAWING ARE APPLICABLE ONLY TO D SIZE DRAWING

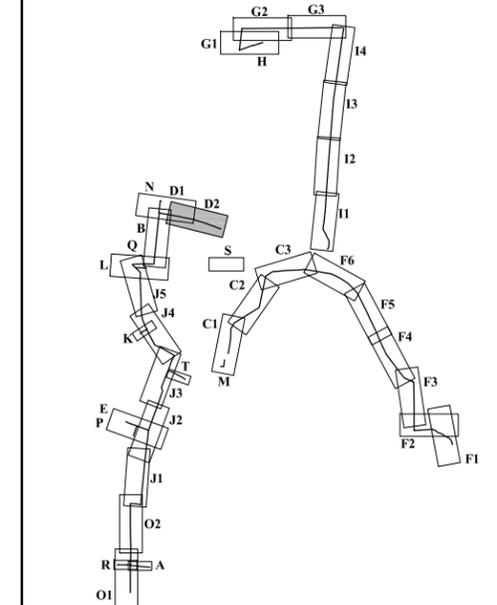
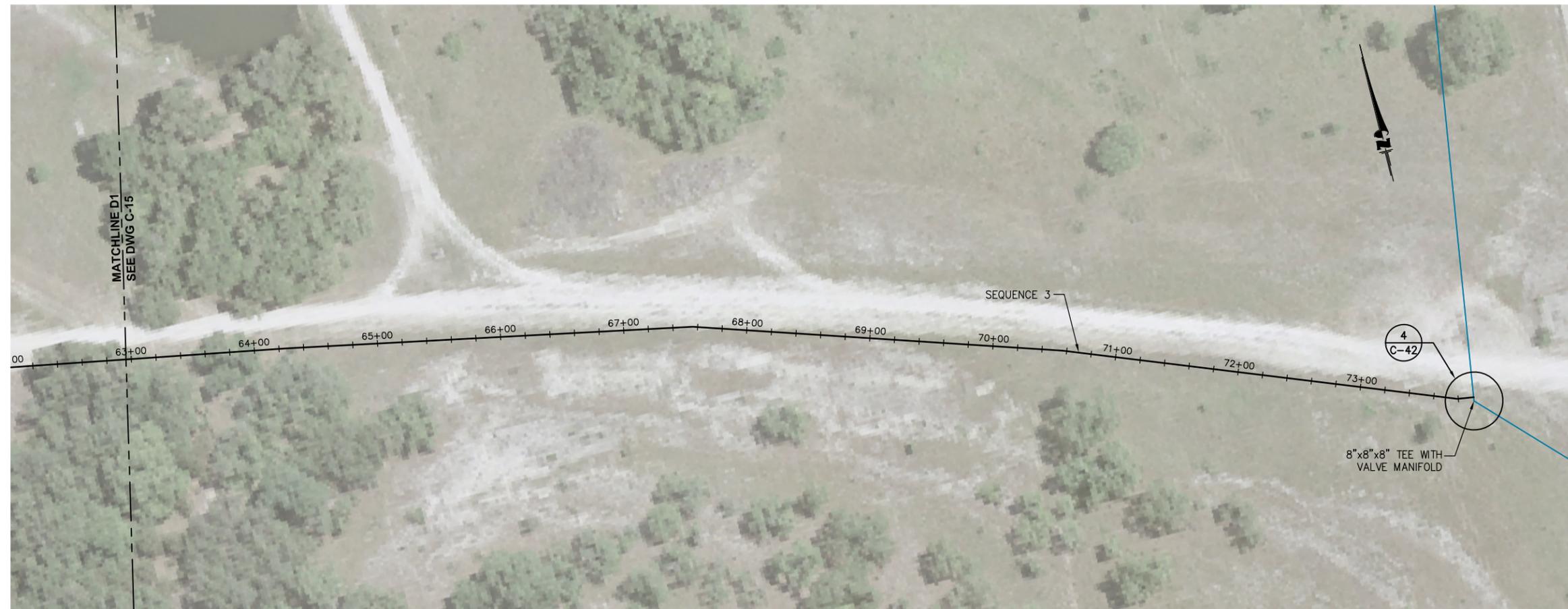
**CAMP STANLEY STORAGE ACTIVITY
 WATER SYSTEM REHABILITATION**

Contract No. FA8903-04-D-8675 Task Order No. 022

CONTRACTOR :
PARSONS Job No. 745006 WBS 03000

Drawing Title :
**PIPING PLAN AND PROFILE
 SEGMENT N (4")
 SEGMENT D1 (8")
 SEQUENCE 3**

Designed : HCD	Drawn : JLH	Rev: 1
Checked : KMK	Approved :	
Scale : HORIZ. 1" = 50' VERT. 1" = 10'	Date : JANUARY 2009	Drawing No. : C-15



- LEGEND**
- (FH) FIRE HYDRANT
 - (MH) MANHOLE
 - (FE) FLOWMETER
 - (AR) AIR RELEASE VALVE
 - ◻ REDUCER
 - ⊗ GATE VALVE
 - ⊙ BALL VALVE
 - ⌞ CHECK VALVE
 - ⊘ REMOVE PIPE
 - (TP) TIE POINT
 - CA CHLORINE ANALYZER
 - BO BLOWOFF VALVE
 - SC SERVICE CONNECTION
 - FS SADDLE CLAMP
 - FS FIRE STAND
 - TP TRENCH PLUG
 - POSSIBLE UTILITY CROSSING AREA
- TP TIE POINT
 - GAS LINE
 - WASTEWATER LINE
 - BURIED ELECTRIC LINE
 - EX. WATER LINE
 - NEW WATER LINE
 - ABANDONED OR TO BE ABANDONED WATER LINE
 - MATCHLINE

REV.	DESCRIPTION	BY:	DATE:
1	AS-BUILT SET	HCD	11/2008
0	ISSUED FOR CONSTRUCTION	HCD	12/2007

R E V I S I O N S

SCALES SHOWN ON THIS DRAWING ARE APPLICABLE ONLY TO D SIZE DRAWING

**CAMP STANLEY STORAGE ACTIVITY
WATER SYSTEM REHABILITATION**

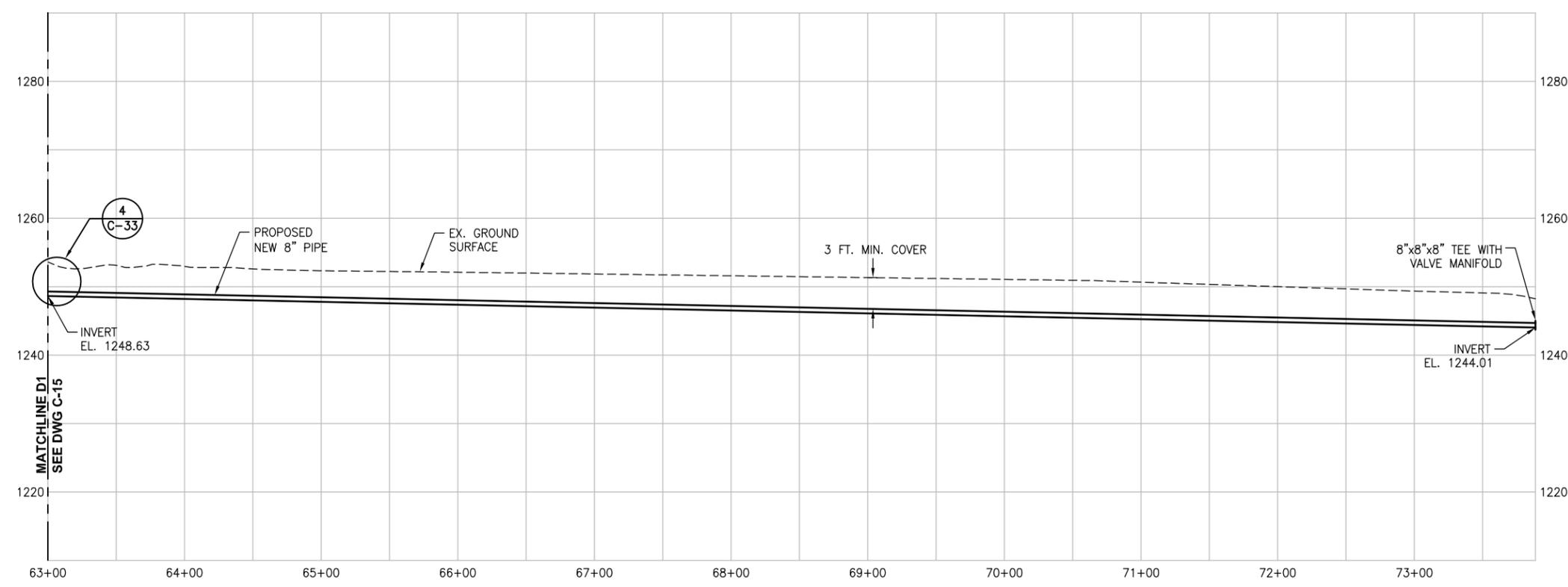
Contract No. FA8903-04-D-8675 Task Order No. 022

CONTRACTOR :
PARSONS Job No. 745006 WBS 03000

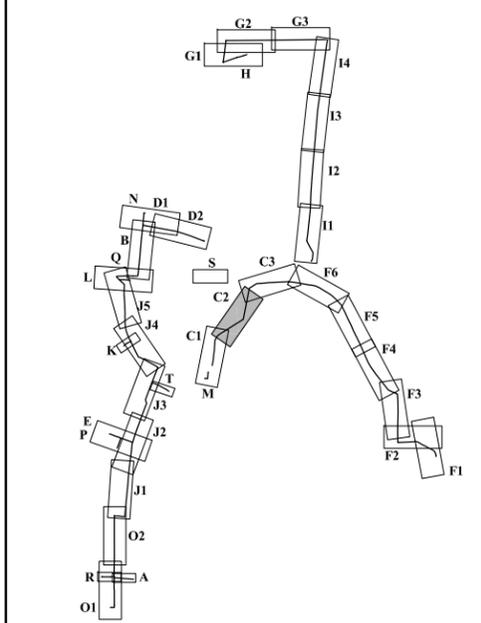
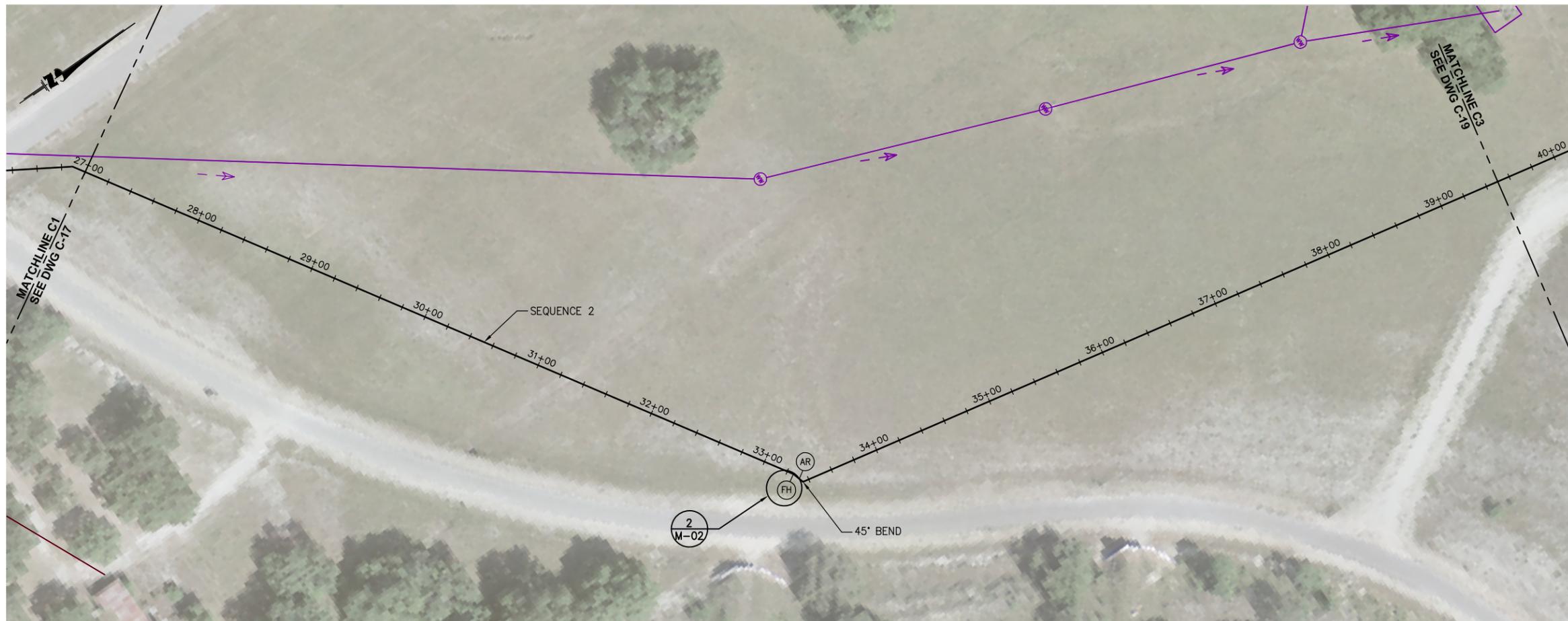
Drawing Title :
**PIPING PLAN AND PROFILE
SEGMENT D2 (8")
SEQUENCE 3**

Designed : HCD	Drawn : JLH	Rev: 1
Checked : KMK	Approved :	
Scale : HORIZ. 1" = 50' VERT. 1" = 10'	Date : NOVEMBER 2008	Drawing No. : C-16

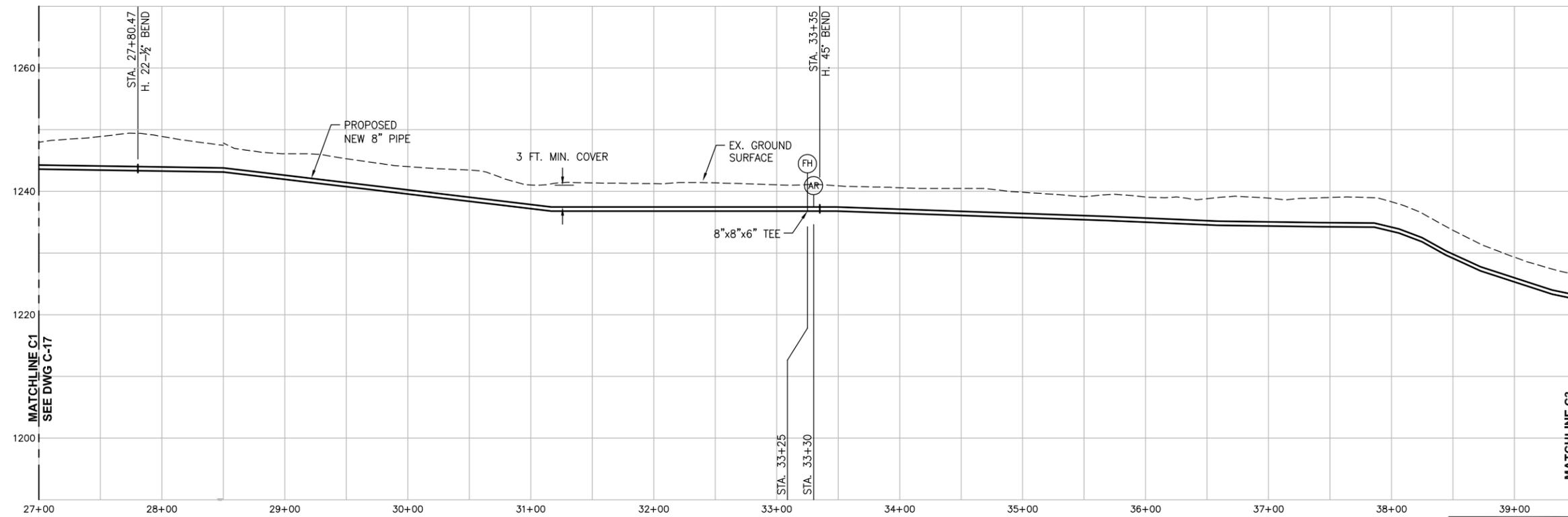
AS-BUILT
NOVEMBER 2008
PROFILES NOT UPDATED



PROFILE - SEGMENT D2



- LEGEND**
- (FH) FIRE HYDRANT
 - (MH) MANHOLE
 - (FE) FLOWMETER
 - (AR) AIR RELEASE VALVE
 - ◻ REDUCER
 - ⊗ GATE VALVE
 - ⊙ BALL VALVE
 - ⌞ CHECK VALVE
 - ⊘ REMOVE PIPE
 - (TP) TIE POINT
 - (CA) CHLORINE ANALYZER
 - (BO) BLOWOFF VALVE
 - (SC) SERVICE CONNECTION SADDLE CLAMP
 - (FS) FIRE STAND
 - (TP) TRENCH PLUG
 - ▭ POSSIBLE UTILITY CROSSING AREA



PROFILE - SEGMENT C2

AS-BUILT
 JANUARY 2009
 PROFILES NOT UPDATED

REV.	DESCRIPTION	BY:	DATE:
1	AS-BUILT SET	HCD	1/2009
0	ISSUED FOR CONSTRUCTION	HCD	12/2007

REVISIONS

SCALES SHOWN ON THIS DRAWING ARE APPLICABLE ONLY TO D SIZE DRAWING

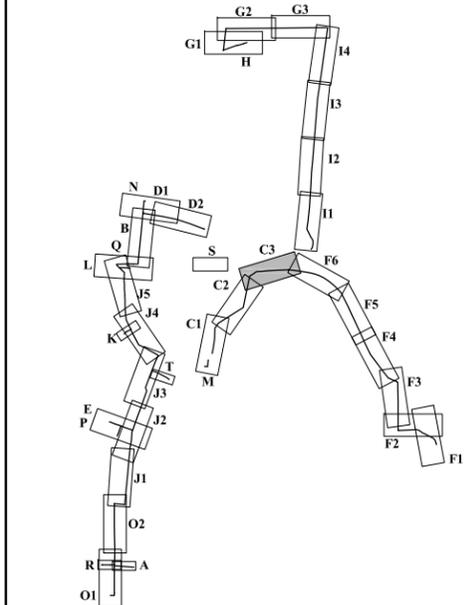
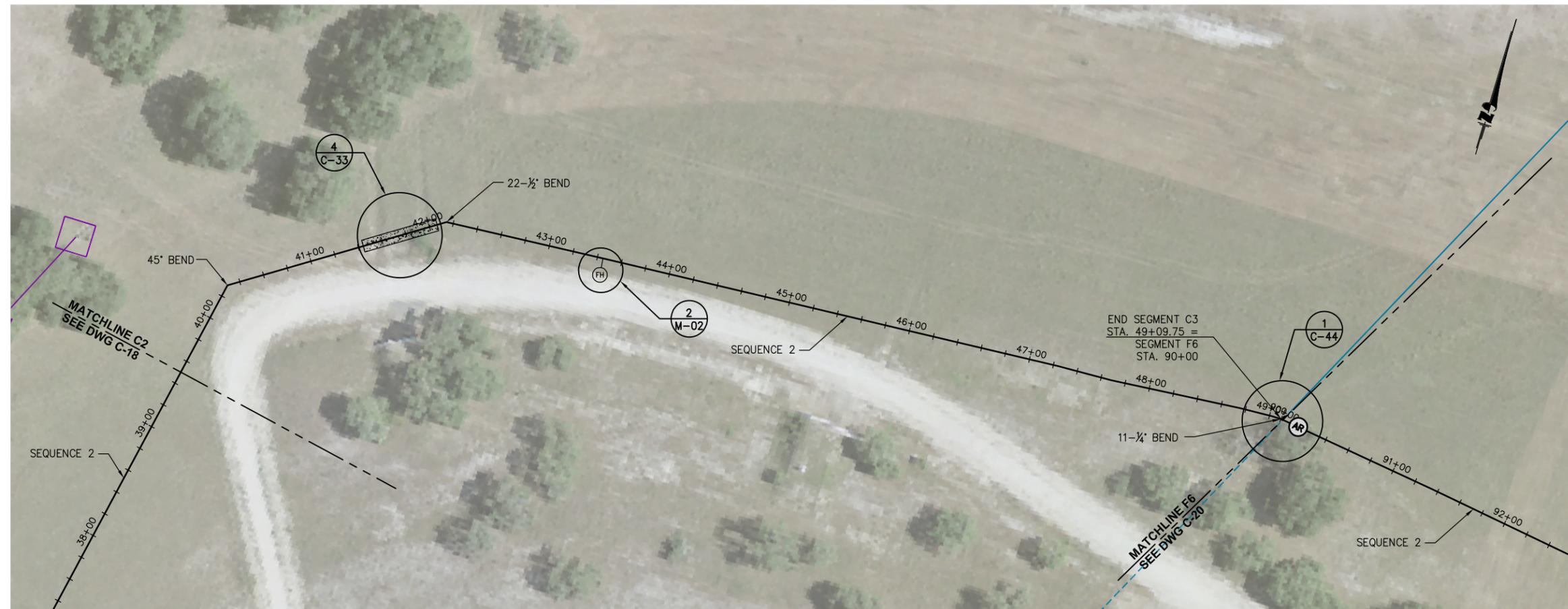
**CAMP STANLEY STORAGE ACTIVITY
 WATER SYSTEM REHABILITATION**

Contract No. FA8903-04-D-8675 Task Order No. 022

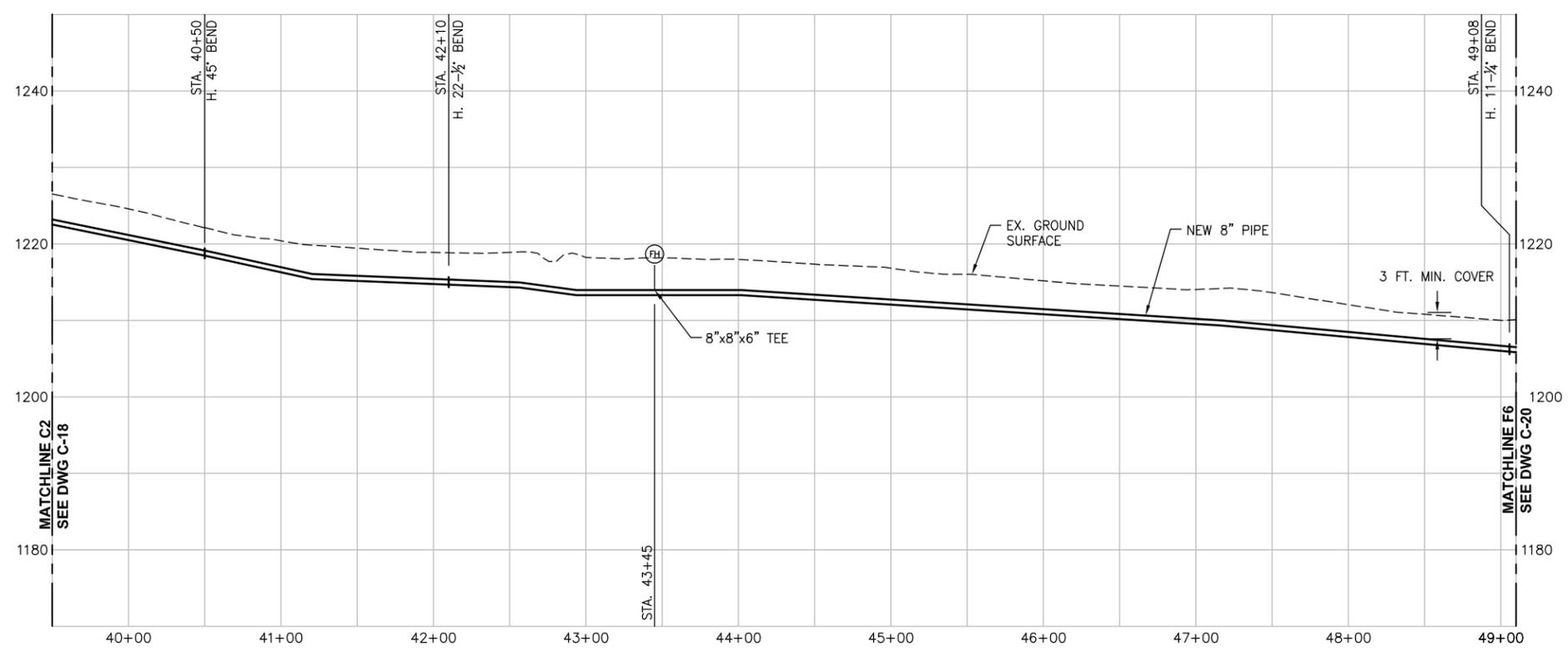
CONTRACTOR :
PARSONS Job No. 745006 WBS 03000

Drawing Title :
**PIPING PLAN AND PROFILE
 SEGMENT C2 (8")
 SEQUENCE 2**

Designed : HCD	Drawn : JLH	Rev: 1
Checked : KMK	Approved :	
Scale : HORIZ. 1" = 50' VERT. 1" = 10'	Date : JANUARY 2009	Drawing No. : C-18



- LEGEND**
- (FH) FIRE HYDRANT
 - (MH) MANHOLE
 - (FE) FLOWMETER
 - (AR) AIR RELEASE VALVE
 - ◻ REDUCER
 - ⊗ GATE VALVE
 - ⊙ BALL VALVE
 - ⊣ CHECK VALVE
 - ⊘ REMOVE PIPE
 - (TP) TIE POINT
 - (CA) CHLORINE ANALYZER
 - (BO) BLOWOFF VALVE
 - (SC) SERVICE CONNECTION
 - (FS) SADDLE CLAMP
 - (TP) TRENCH PLUG
 - ▭ POSSIBLE UTILITY CROSSING AREA



PROFILE - SEGMENT C3

REV.	DESCRIPTION	BY:	DATE:
1	AS-BUILT SET	HCD	1/2009
0	ISSUED FOR CONSTRUCTION	HCD	12/2007

REVISIONS

SCALES SHOWN ON THIS DRAWING ARE APPLICABLE ONLY TO D SIZE DRAWING

**CAMP STANLEY STORAGE ACTIVITY
WATER SYSTEM REHABILITATION**

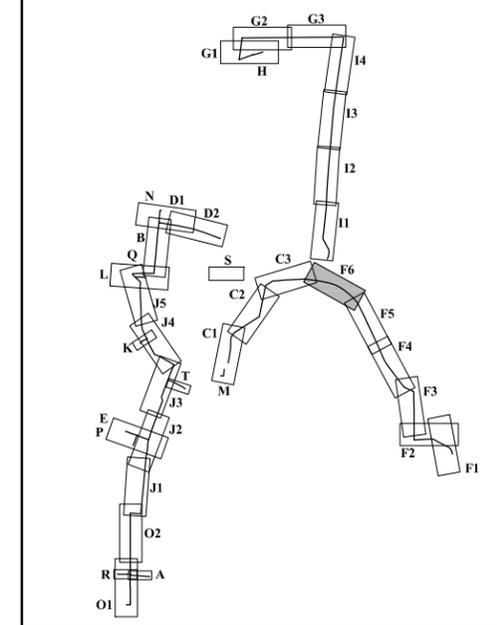
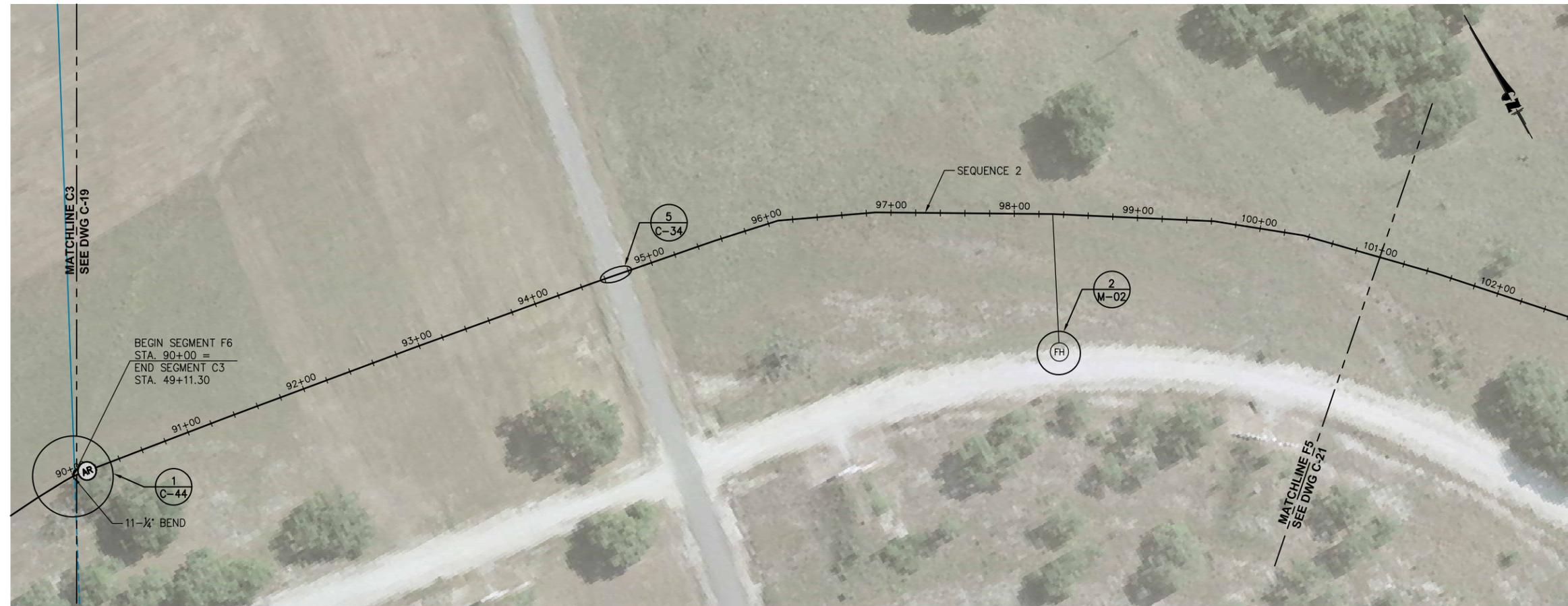
Contract No. FA8903-04-D-8675 Task Order No. 022

CONTRACTOR :
PARSONS Job No. 745006 WBS 03000

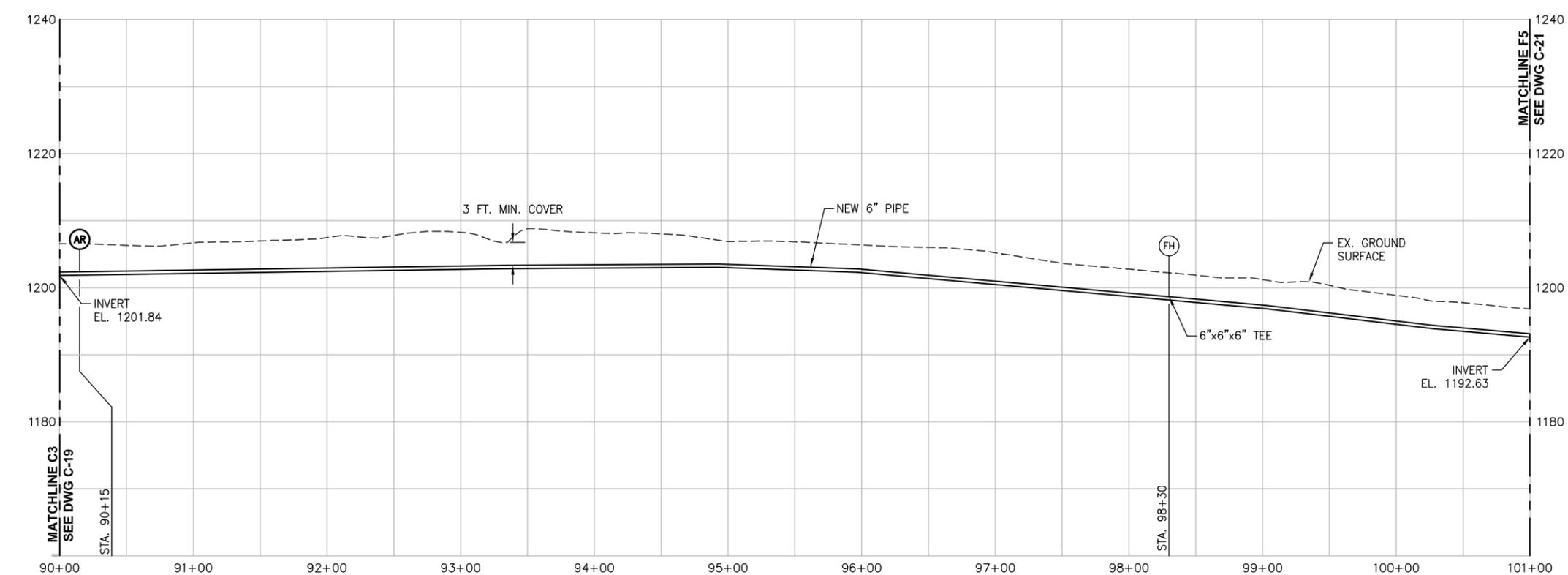
Drawing Title :
**PIPING PLAN AND PROFILE
SEGMENT C3 (8")
SEQUENCE 2**

Designed : HCD	Drawn : JLH	Rev: 1
Checked : KMK	Approved :	
Scale : HORIZ. 1" = 50' VERT. 1" = 10'	Date : JANUARY 2009	Drawing No. : C-19

AS-BUILT
JANUARY 2009
PROFILES NOT UPDATED



- LEGEND**
- (FH) FIRE HYDRANT
 - (MH) MANHOLE
 - (FE) FLOWMETER
 - (AR) AIR RELEASE VALVE
 - REDUCER
 - ⊗ GATE VALVE
 - ⊙ BALL VALVE
 - ⊠ CHECK VALVE
 - (CA) CHLORINE ANALYZER
 - (BO) BLOWOFF VALVE
 - (SC) SERVICE CONNECTION SADDLE CLAMP
 - (FS) FIRE STAND
 - (TP) TRENCH PLUG
 - ▭ POSSIBLE UTILITY CROSSING AREA
 - ⊘ REMOVE PIPE
 - TP TIE POINT



PROFILE - SEGMENT F6

REV.	DESCRIPTION	BY:	DATE:
1	AS-BUILT SET	HCD	1/2009
0	ISSUED FOR CONSTRUCTION	HCD	12/2007

REVISIONS

SCALES SHOWN ON THIS DRAWING ARE APPLICABLE ONLY TO D SIZE DRAWING

**CAMP STANLEY STORAGE ACTIVITY
WATER SYSTEM REHABILITATION**

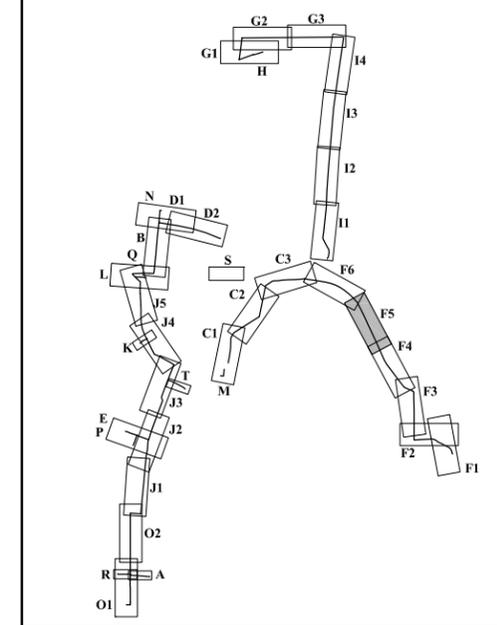
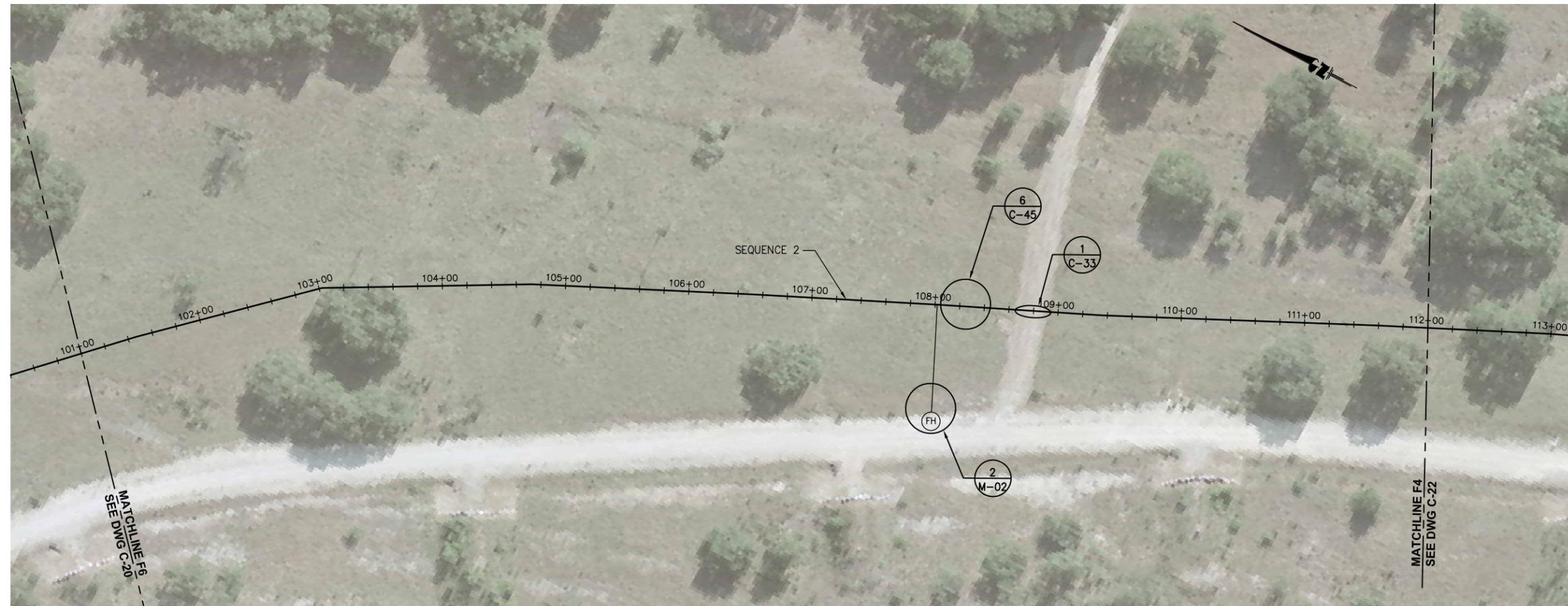
Contract No. FA8903-04-D-8675 Task Order No. 022

CONTRACTOR :
PARSONS Job No. 745006 WBS 03000

Drawing Title :
**PIPING PLAN AND PROFILE
SEGMENT F6 (6")
SEQUENCE 2**

Designed : HCD	Drawn : JLH	Rev: 1
Checked : KMK	Approved :	
Scale : HORIZ. 1" = 50' VERT. 1" = 10'	Date : JANUARY 2009	Drawing No. : C-20

AS-BUILT
JANUARY 2009
PROFILES NOT UPDATED



- LEGEND**
- (FH) FIRE HYDRANT
 - (MH) MANHOLE
 - (FE) FLOWMETER
 - (AR) AIR RELEASE VALVE
 - REDUCER
 - ⊗ GATE VALVE
 - ⊙ BALL VALVE
 - ⊗ CHECK VALVE
 - (CA) CHLORINE ANALYZER
 - (BO) BLOWOFF VALVE
 - (SC) SERVICE CONNECTION
 - (FS) SADDLE CLAMP
 - (TP) TRENCH PLUG
 - ⊗ POSSIBLE UTILITY CROSSING AREA
 - ⊗ REMOVE PIPE
 - ⊗ TIE POINT



REV.	DESCRIPTION	BY:	DATE:
1	AS-BUILT SET	HCD	1/2009
0	ISSUED FOR CONSTRUCTION	HCD	12/2007

REVISIONS

SCALES SHOWN ON THIS DRAWING ARE APPLICABLE ONLY TO D SIZE DRAWING

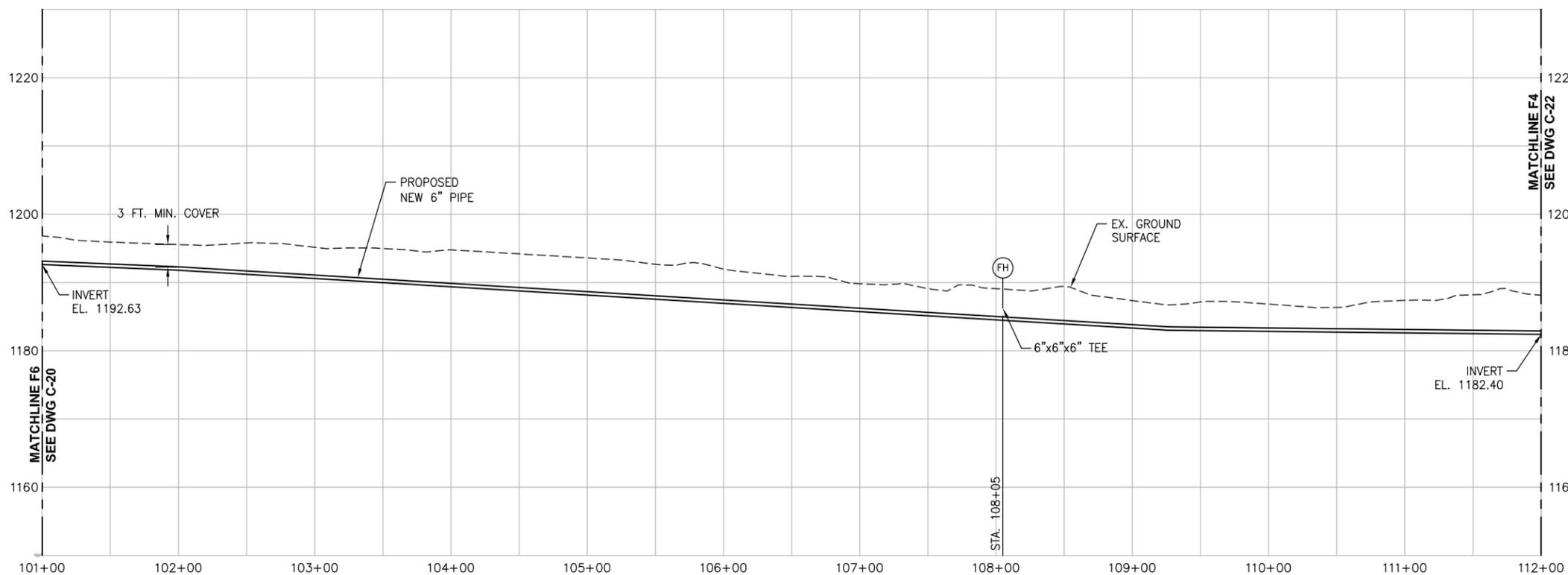
CAMP STANLEY STORAGE ACTIVITY
WATER SYSTEM REHABILITATION

Contract No. FA8903-04-D-8675 Task Order No. 022

CONTRACTOR :
PARSONS Job No. 745006 WBS 03000

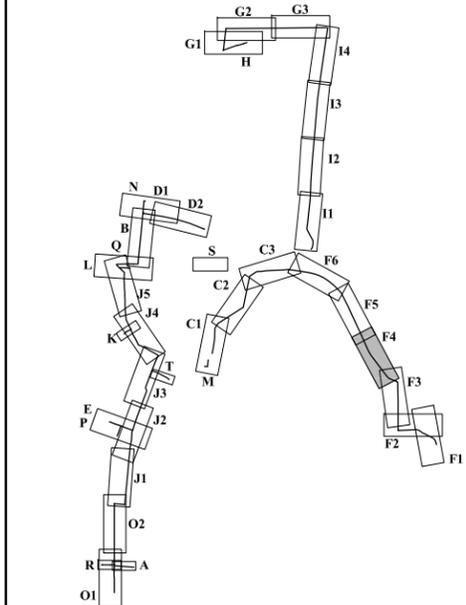
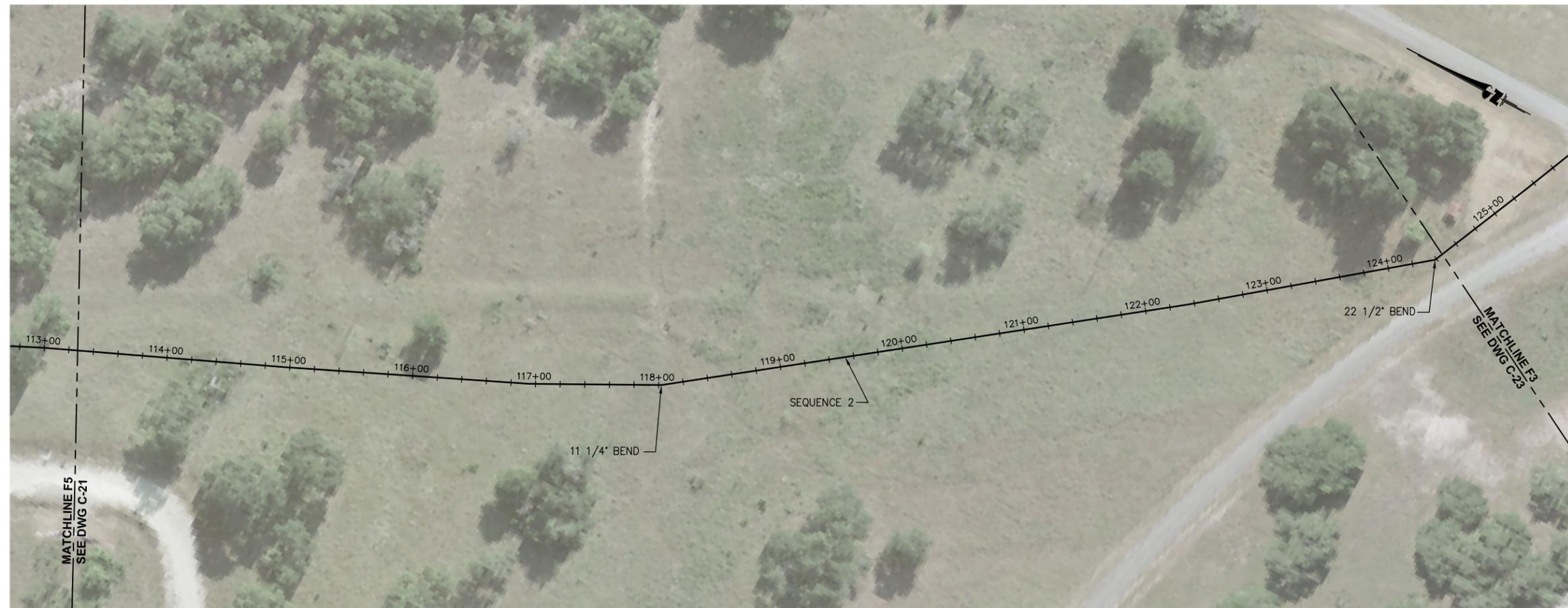
Drawing Title :
**PIPING PLAN AND PROFILE
SEGMENT F5 (6")
SEQUENCE 2**

Designed : HCD	Drawn : JLH	Rev: 1
Checked : KMK	Approved :	
Scale : HORIZ. 1" = 50' VERT. 1" = 10'	Date : JANUARY 2009	Drawing No. : C-21



PROFILE - SEGMENT F5

AS-BUILT
JANUARY 2009
PROFILES NOT UPDATED



- LEGEND**
- (FH) FIRE HYDRANT
 - (MH) MANHOLE
 - (FE) FLOWMETER
 - (AR) AIR RELEASE VALVE
 - ◻ REDUCER
 - ◻ GATE VALVE
 - ◻ BALL VALVE
 - ◻ CHECK VALVE
 - (CA) CHLORINE ANALYZER
 - (BO) BLOWOFF VALVE
 - (SC) SERVICE CONNECTION
 - (FS) FIRE STAND
 - (TP) TRENCH PLUG
 - ◻ POSSIBLE UTILITY CROSSING AREA
 - ◻ REMOVE PIPE
 - TP TIE POINT
 - GAS LINE
 - WASTEWATER LINE
 - BURIED ELECTRIC LINE
 - EX. WATER LINE
 - NEW WATER LINE
 - - - ABANDONED OR TO BE ABANDONED WATER LINE
 - - - MATCHLINE

REV.	DESCRIPTION	BY:	DATE:
1	AS-BUILT SET	HCD	11/2008
0	ISSUED FOR CONSTRUCTION	HCD	12/2007

R E V I S I O N S

SCALES SHOWN ON THIS DRAWING ARE APPLICABLE ONLY TO D SIZE DRAWING

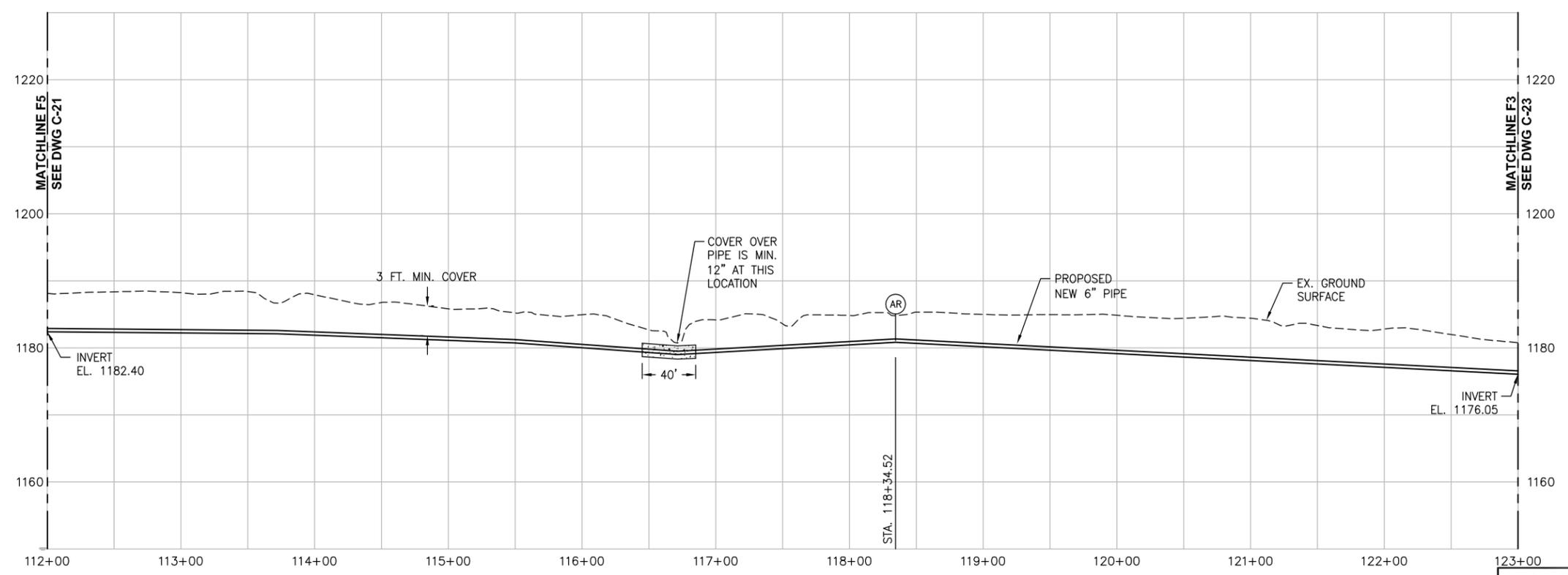
**CAMP STANLEY STORAGE ACTIVITY
WATER SYSTEM REHABILITATION**

Contract No. FA8903-04-D-8675 Task Order No. 022

CONTRACTOR :
PARSONS Job No. 745006 WBS 03000

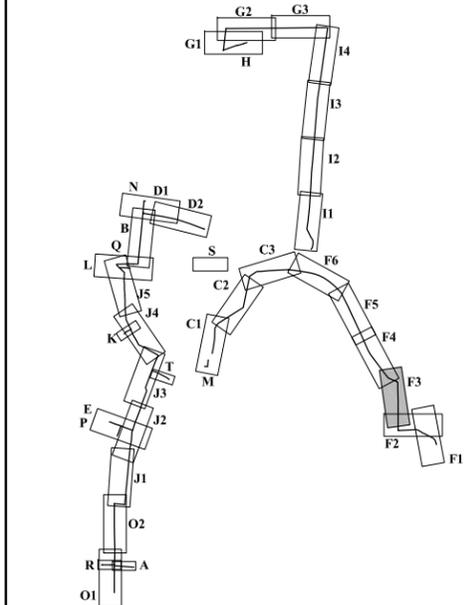
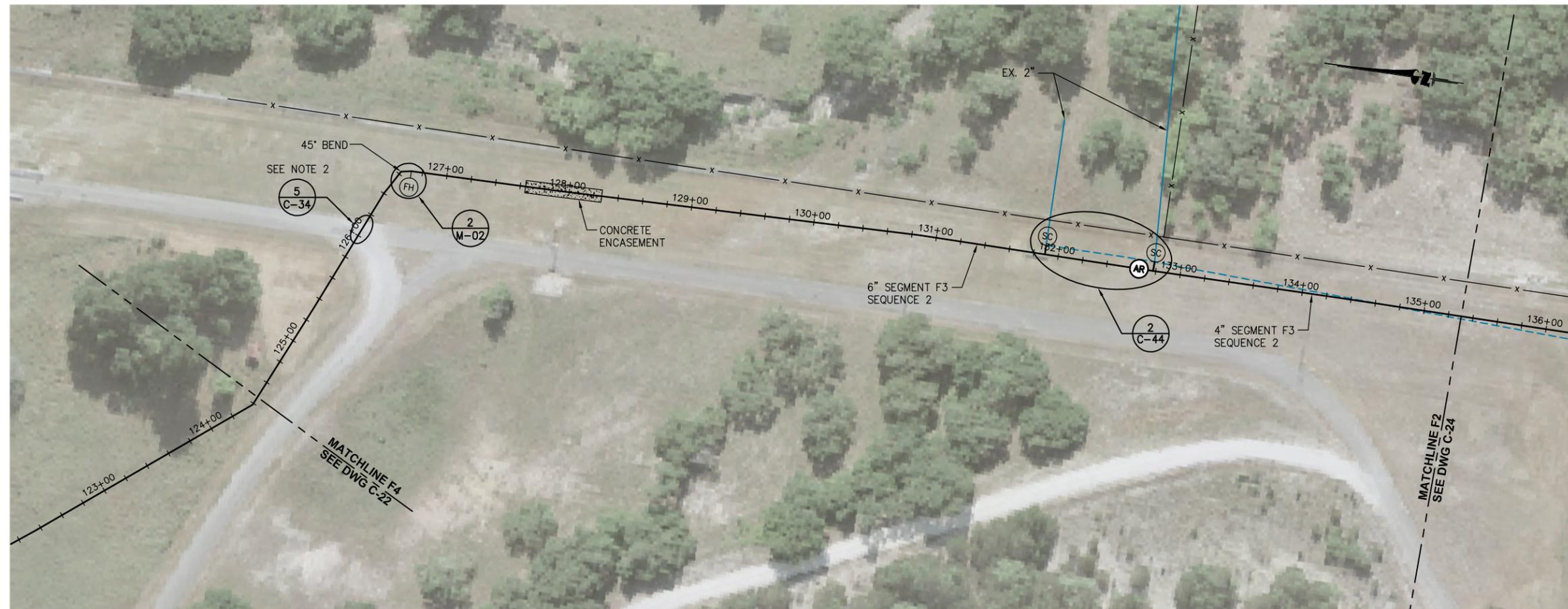
Drawing Title :
**PIPING PLAN AND PROFILE
SEGMENT F4 (6")
SEQUENCE 2**

Designed : HCD	Drawn : JLH	Rev: 1
Checked : KMK	Approved :	
Scale : HORIZ. 1" = 50' VERT. 1" = 10'	Date : NOVEMBER 2008	Drawing No. : C-22



PROFILE - SEGMENT F4

AS-BUILT
NOVEMBER 2008
PROFILES NOT UPDATED



- LEGEND**
- (FH) FIRE HYDRANT
 - (MH) MANHOLE
 - (FE) FLOWMETER
 - (AR) AIR RELEASE VALVE
 - REDUCER
 - ⊗ GATE VALVE
 - ⊙ BALL VALVE
 - ⚡ CHECK VALVE
 - (CA) CHLORINE ANALYZER
 - (BO) BLOWOFF VALVE
 - (SC) SERVICE CONNECTION SADDLE CLAMP
 - (FS) FIRE STAND
 - (TP) TRENCH PLUG
 - ▭ POSSIBLE UTILITY CROSSING AREA

- (Hatched) REMOVE PIPE
- (TP) TIE POINT
- (Orange line) GAS LINE
- (Purple line) WASTEWATER LINE
- (Red line) BURIED ELECTRIC LINE
- (Blue line) EX. WATER LINE
- (Black line) NEW WATER LINE
- (Dashed black line) ABANDONED OR TO BE ABANDONED WATER LINE
- (Dotted black line) MATCHLINE

1	AS-BUILT SET	HCD	11/2008
0	ISSUED FOR CONSTRUCTION	HCD	12/2007
REV.	DESCRIPTION	BY:	DATE:

R E V I S I O N S

SCALES SHOWN ON THIS DRAWING ARE APPLICABLE ONLY TO D SIZE DRAWING

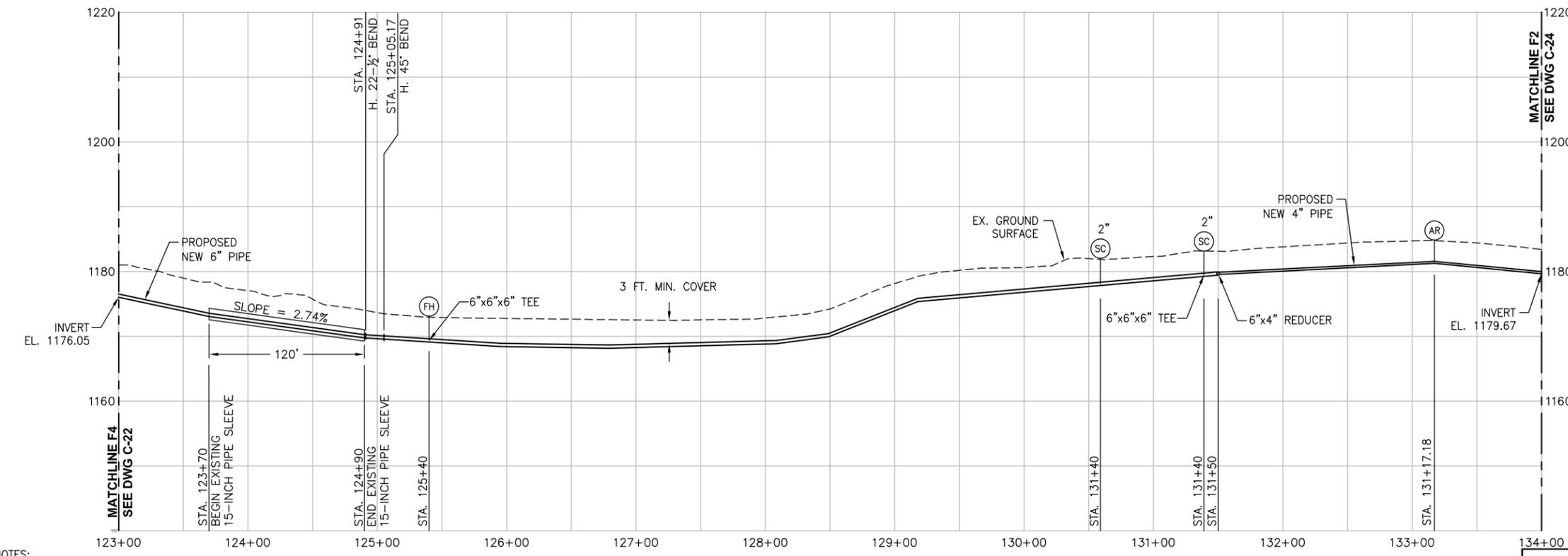
**CAMP STANLEY STORAGE ACTIVITY
WATER SYSTEM REHABILITATION**

Contract No. FA8903-04-D-8675 Task Order No. 022

CONTRACTOR :
PARSONS Job No. 745006 WBS 03000

Drawing Title :
**PIPING PLAN AND PROFILE
SEGMENT F3 (6")
SEQUENCE 2**

Designed : HCD	Drawn : JLH	Rev: 1
Checked : KMK	Approved :	
Scale : HORIZ. 1" = 50' VERT. 1" = 10'	Date : NOVEMBER 2008	Drawing No. : C-23

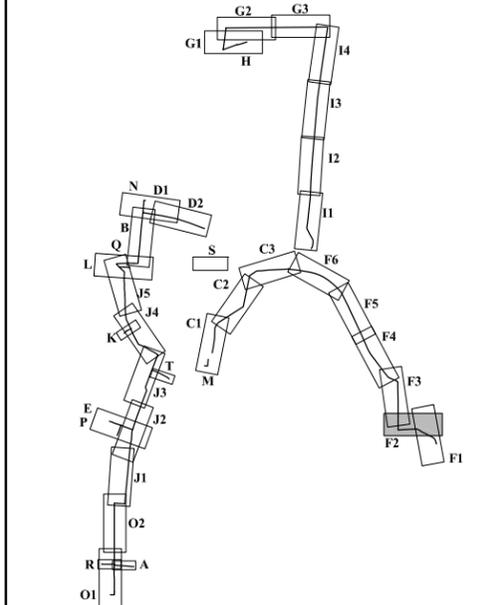


NOTES:

- FIELD ROUTE S. 80 PVC PIPE TO BFP (OR AIR GAP) AT WATERING TROUGH, BFP(S) SUPPLIED BY CSSA.
- 15-INCH ASTM D-3034 PVC SDR 35 PIPE APPROX. 115 FT LONG IS IN PLACE MARKED BY STAKES. SEWER PIPE TO SERVE AS CASING FOR 6-INCH C900 PVC SDR 18 WATER PIPE. INSTALL SPACERS AND END SEALS PER SPECIFICATION 02600. IF NEEDED EXCAVATE PIT ON STA. 123+70 SIDE TO JACK PIPE.

PROFILE - SEGMENT F3

AS-BUILT
NOVEMBER 2008
PROFILES NOT UPDATED



- LEGEND**
- (FH) FIRE HYDRANT
 - (MH) MANHOLE
 - (FE) FLOWMETER
 - (AR) AIR RELEASE VALVE
 - ◻ REDUCER
 - ◻ GATE VALVE
 - ◻ BALL VALVE
 - ◻ CHECK VALVE
 - (CA) CHLORINE ANALYZER
 - (BO) BLOWOFF VALVE
 - (SC) SERVICE CONNECTION
 - (FS) FIRE STAND
 - (TP) TRENCH PLUG
 - ◻ POSSIBLE UTILITY CROSSING AREA



- (TP) TIE POINT
- GAS LINE
- WASTEWATER LINE
- BURIED ELECTRIC LINE
- EX. WATER LINE
- NEW WATER LINE
- - - ABANDONED OR TO BE ABANDONED WATER LINE
- - - MATCHLINE

REV.	DESCRIPTION	BY:	DATE:
1	AS-BUILT SET	HCD	1/2009
0	ISSUED FOR CONSTRUCTION	HCD	12/2007

R E V I S I O N S

SCALES SHOWN ON THIS DRAWING ARE APPLICABLE ONLY TO D SIZE DRAWING

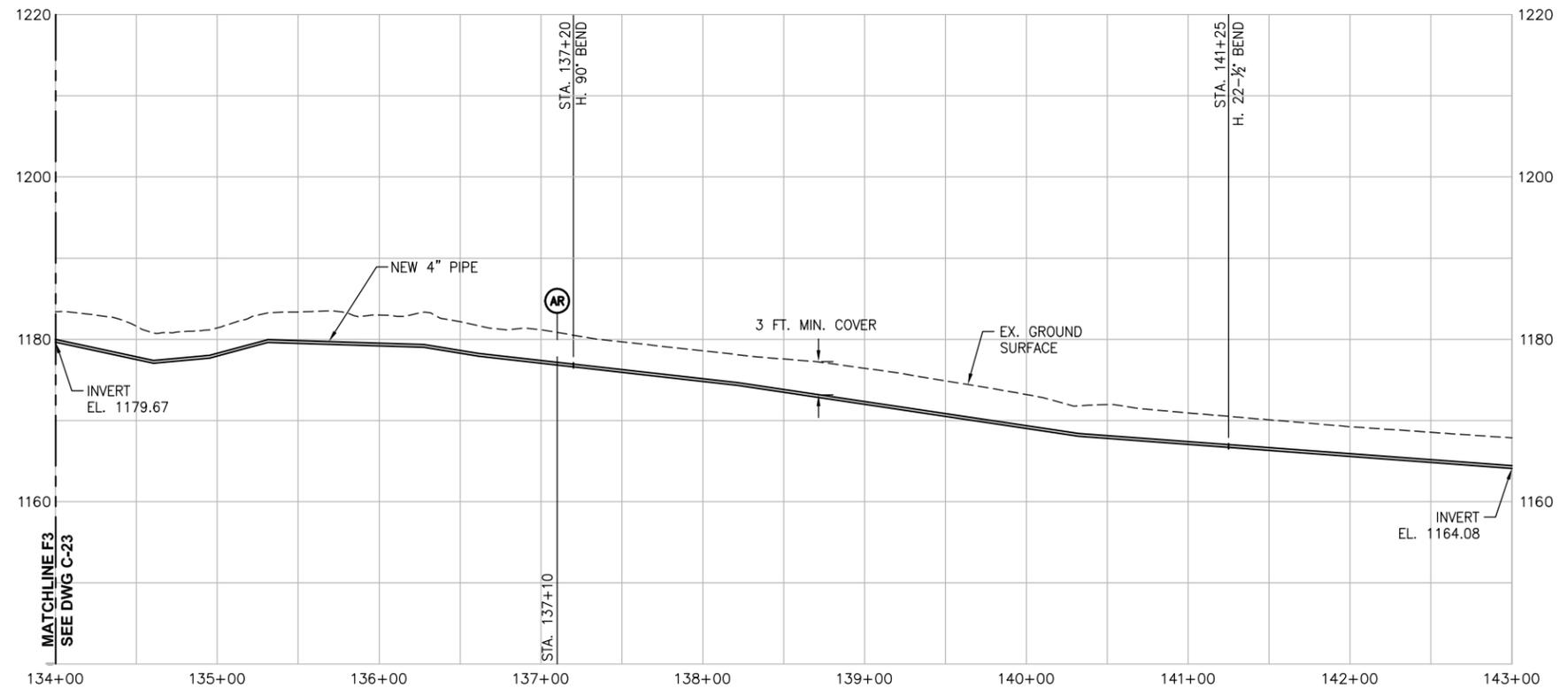
**CAMP STANLEY STORAGE ACTIVITY
WATER SYSTEM REHABILITATION**

Contract No. FA8903-04-D-8675 Task Order No. 022

CONTRACTOR :
PARSONS Job No. 745006 WBS 03000

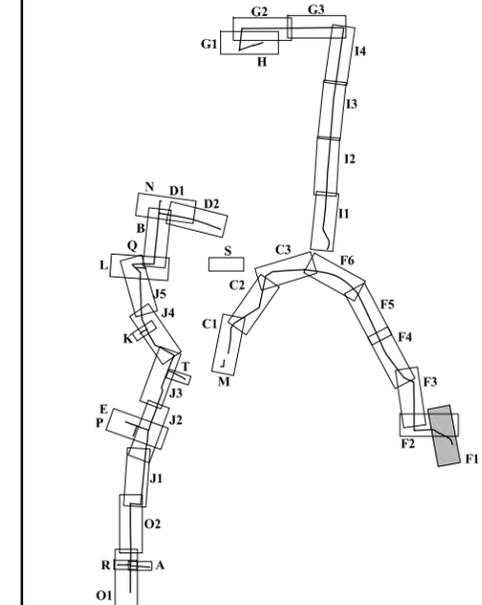
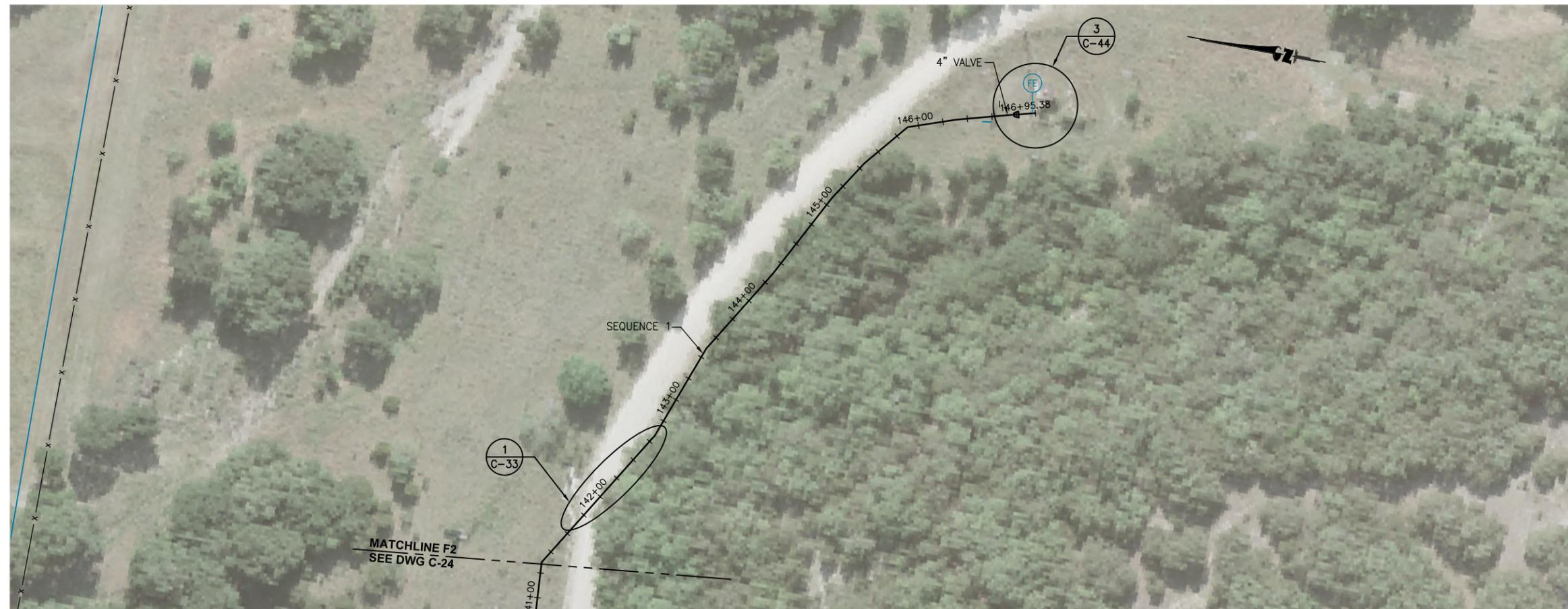
Drawing Title :
**PIPING PLAN AND PROFILE
SEGMENT F2 (6")
SEQUENCES 1 & 2**

Designed : HCD	Drawn : JLH	Rev: 1
Checked : KMK	Approved :	
Scale : HORIZ. 1" = 50' VERT. 1" = 10'	Date : JANUARY 2009	Drawing No. : C-24

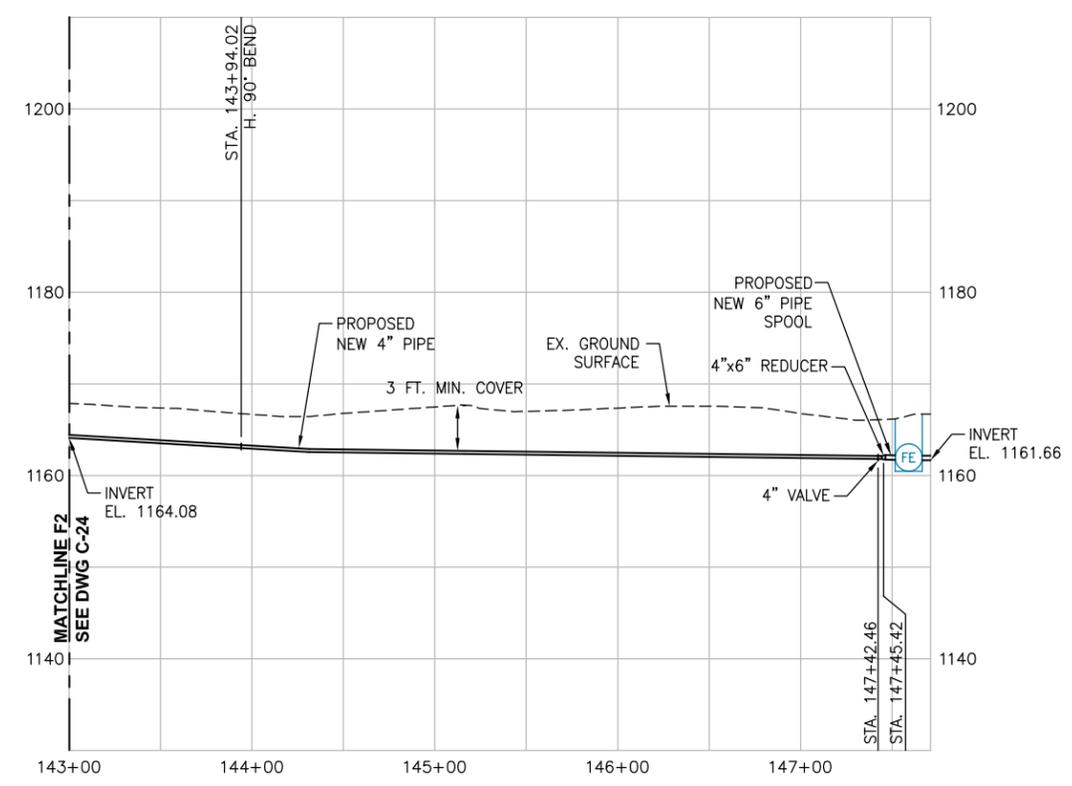


PROFILE - SEGMENT F2

AS-BUILT
JANUARY 2009
PROFILES NOT UPDATED



- LEGEND**
- (FH) FIRE HYDRANT
 - (MH) MANHOLE
 - (FE) FLOWMETER
 - (AR) AIR RELEASE VALVE
 - ◻ REDUCER
 - ⊗ GATE VALVE
 - ⊙ BALL VALVE
 - ⊣ CHECK VALVE
 - ⊘ REMOVE PIPE
 - TP TIE POINT
 - GAS LINE
 - WASTEWATER LINE
 - BURIED ELECTRIC LINE
 - EX. WATER LINE
 - NEW WATER LINE
 - - - ABANDONED OR TO BE ABANDONED WATER LINE
 - - - MATCHLINE
 - (CA) CHLORINE ANALYZER
 - (BO) BLOWOFF VALVE
 - (SC) SERVICE CONNECTION
 - (FS) SADDLE CLAMP
 - (TP) TRENCH PLUG
 - ▭ POSSIBLE UTILITY CROSSING AREA



PROFILE - SEGMENT F1

REV.	DESCRIPTION	BY:	DATE:
1	AS-BUILT SET	HCD	11/2008
0	ISSUED FOR CONSTRUCTION	HCD	12/2007

REVISIONS

SCALES SHOWN ON THIS DRAWING ARE APPLICABLE ONLY TO D SIZE DRAWING

CAMP STANLEY STORAGE ACTIVITY
WATER SYSTEM REHABILITATION

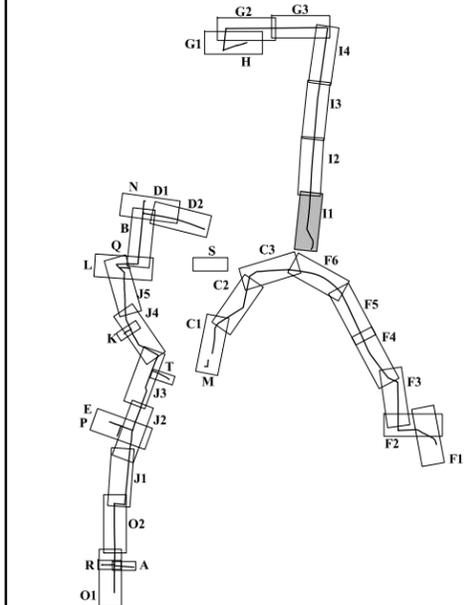
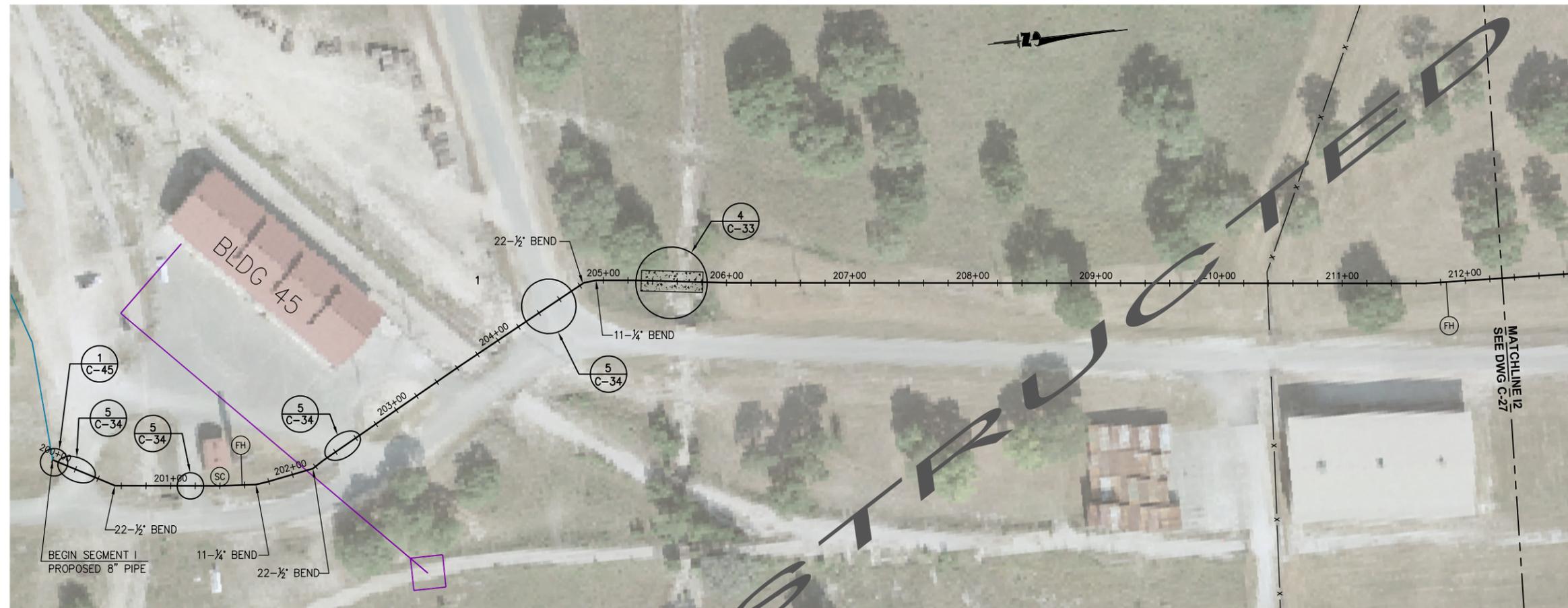
Contract No. FA8903-04-D-8675 Task Order No. 022

CONTRACTOR :
PARSONS Job No. 745006 WBS 03000

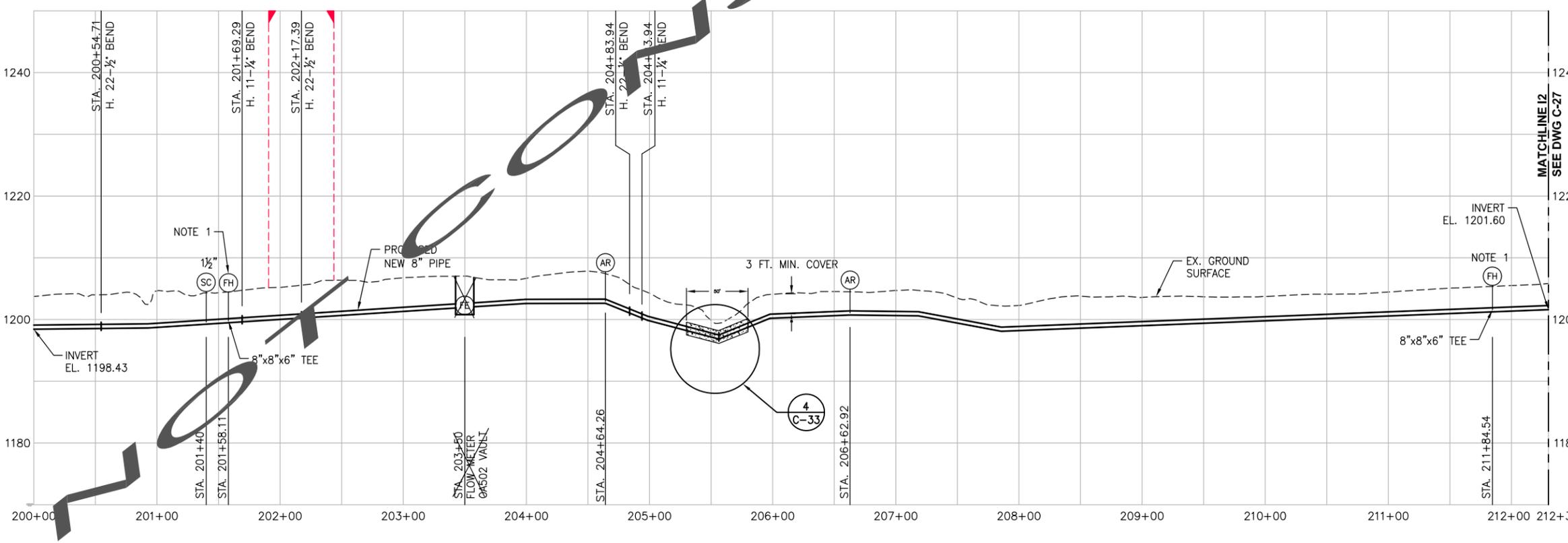
Drawing Title :
**PIPING PLAN AND PROFILE
SEGMENT F1 (4")
SEQUENCE 1**

Designed : HCD	Drawn : JLH	Rev: 1
Checked : KMK	Approved :	
Scale : HORIZ. 1" = 50' VERT. 1" = 10'	Date : NOVEMBER 2008	Drawing No. : C-25

AS-BUILT
NOVEMBER 2008
PROFILES NOT UPDATED



- LEGEND**
- (FH) FIRE HYDRANT
 - (MH) MANHOLE
 - (FE) FLOWMETER
 - (AR) AIR RELEASE VALVE
 - REDUCER
 - ⊗ GATE VALVE
 - ⊙ BALL VALVE
 - ⊣ CHECK VALVE
 - (CA) CHLORINE ANALYZER
 - (BO) BLOWOFF VALVE
 - (SC) SERVICE CONNECTION
 - (FS) SADDLE CLAMP
 - (TP) TRENCH PLUG
 - ⊗ POSSIBLE UTILITY CROSSING AREA



NOTES:
 1. REUSE EXISTING FIRE HYDRANT.

PROFILE - SEGMENT I1

- (TP) TIE POINT
- GAS LINE
- WASTEWATER LINE
- BURIED ELECTRIC LINE
- EX. WATER LINE
- NEW WATER LINE
- - - ABANDONED OR TO BE ABANDONED WATER LINE
- - - MATCHLINE
- x — FENCELINE

REV.	DESCRIPTION	BY:	DATE:
1	AS-BUILT SET	HCD	11/2008
0	ISSUED FOR CONSTRUCTION	HCD	12/2007

REVISIONS

SCALES SHOWN ON THIS DRAWING ARE APPLICABLE ONLY TO D SIZE DRAWING

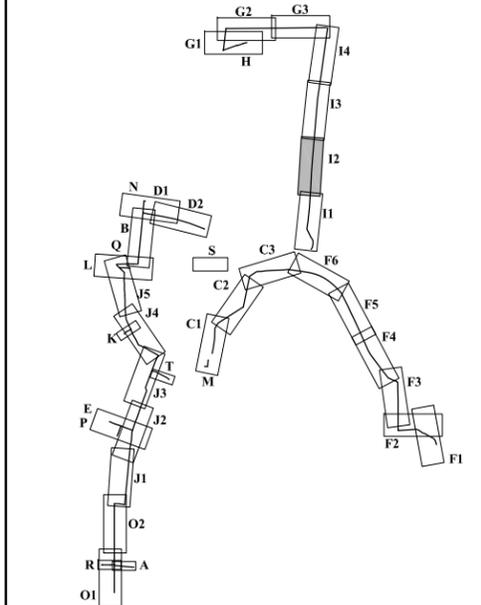
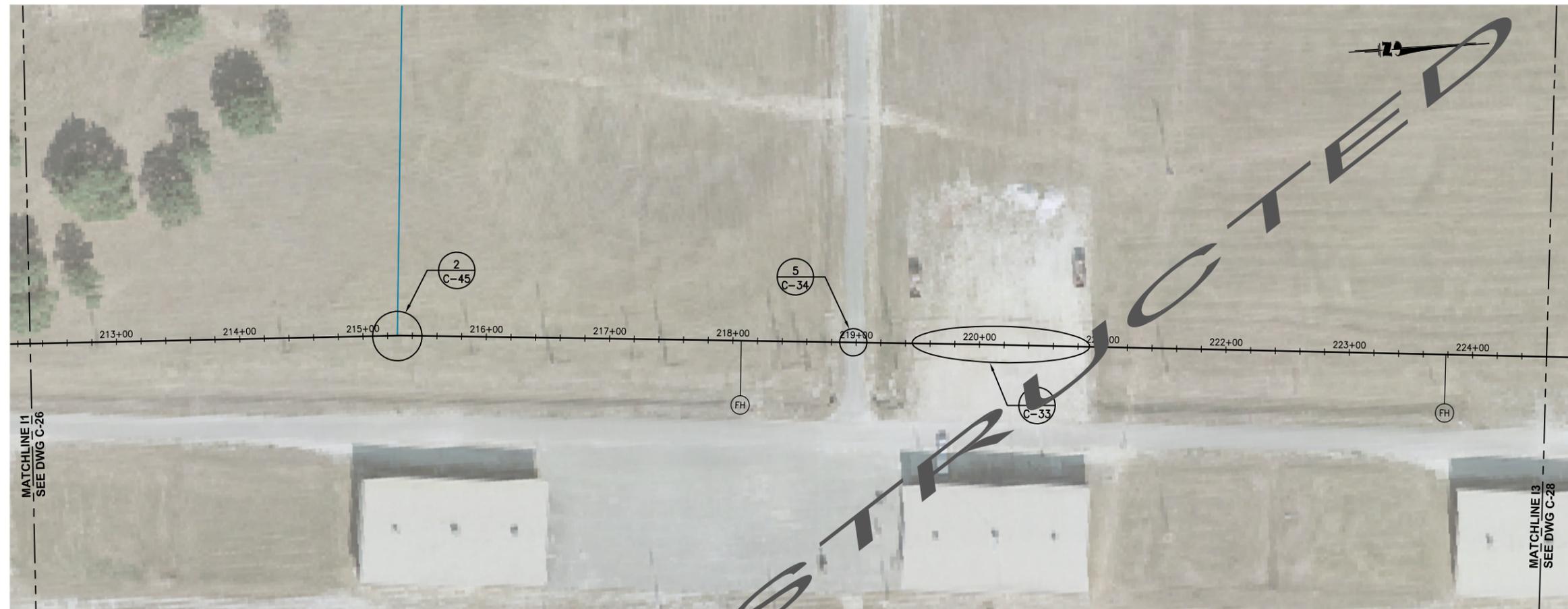
**CAMP STANLEY STORAGE ACTIVITY
 WATER SYSTEM REHABILITATION**

Contract No. FA8903-04-D-8675 Task Order No. 022

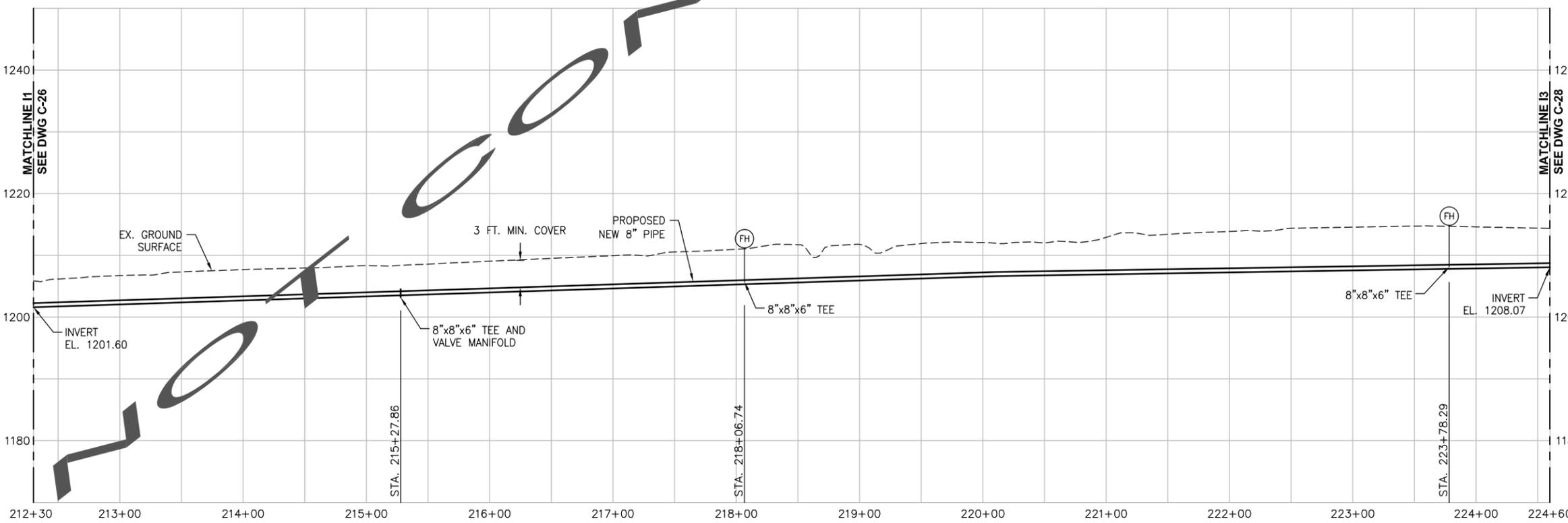
CONTRACTOR :
PARSONS Job No. 745006 WBS 03000

Drawing Title :
**PIPING PLAN AND PROFILE
 SEGMENT I1 (8")**

Designed : HCD	Drawn : JLH	Rev: 1
Checked : KMK	Approved :	
Scale : HORIZ. 1" = 50' VERT. 1" = 10'	Date : NOVEMBER 2008	Drawing No. : C-26



- LEGEND**
- (FH) FIRE HYDRANT
 - (MH) MANHOLE
 - (FE) FLOWMETER
 - (AR) AIR RELEASE VALVE
 - ▽ REDUCER
 - ⊗ GATE VALVE
 - ⊙ BALL VALVE
 - ⊢ CHECK VALVE
 - (CA) CHLORINE ANALYZER
 - (BO) BLOWOFF VALVE
 - (SC) SERVICE CONNECTION
 - (FS) FIRE STAND
 - (TP) TRENCH PLUG
 - POSSIBLE UTILITY CROSSING AREA
 - REMOVE PIPE
 - TP TIE POINT
 - GAS LINE
 - WASTEWATER LINE
 - BURIED ELECTRIC LINE
 - EX. WATER LINE
 - NEW WATER LINE
 - ABANDONED OR TO BE ABANDONED WATER LINE
 - MATCHLINE



PROFILE - SEGMENT I2

1	AS-BUILT SET	HCD	11/2008
0	ISSUED FOR CONSTRUCTION	HCD	12/2007
REV.	DESCRIPTION	BY:	DATE:

REVISIONS

SCALES SHOWN ON THIS DRAWING ARE APPLICABLE ONLY TO D SIZE DRAWING

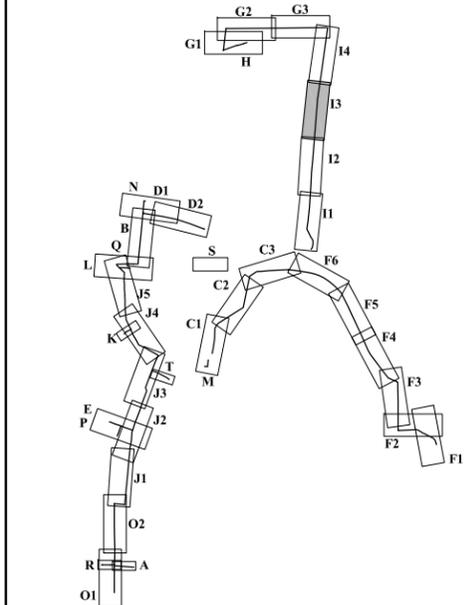
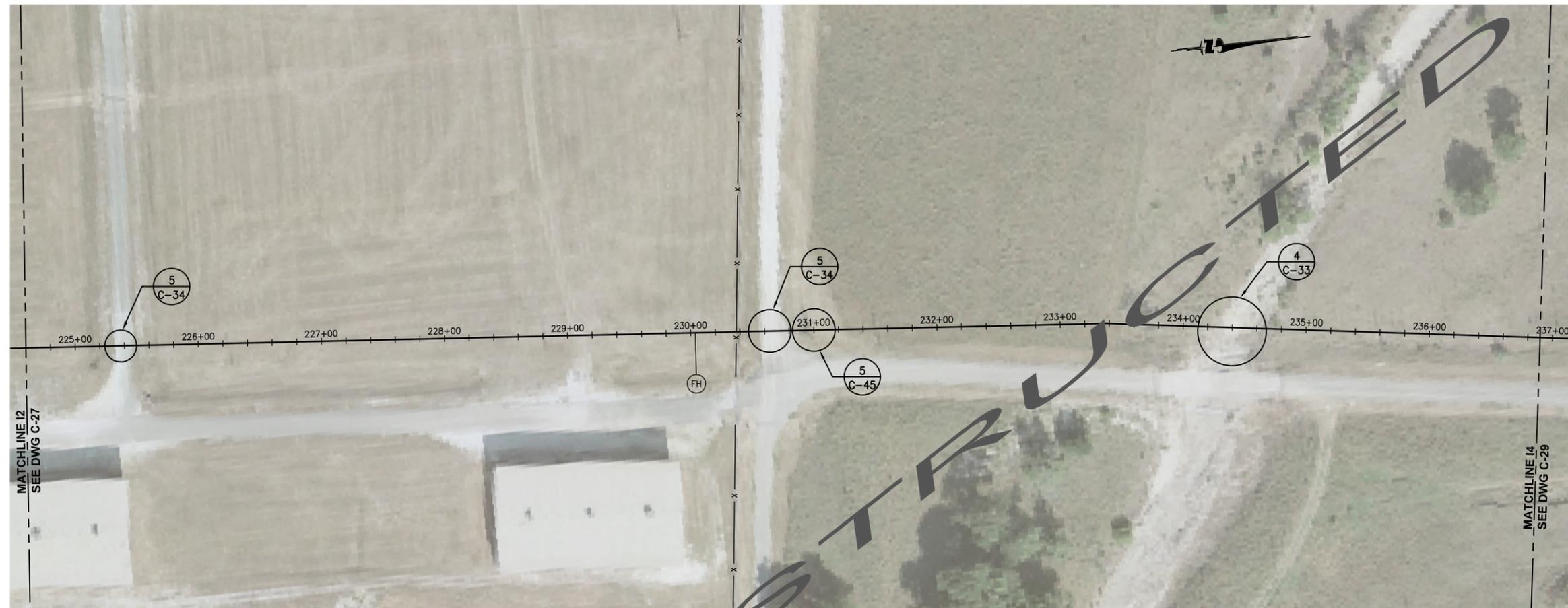
**CAMP STANLEY STORAGE ACTIVITY
WATER SYSTEM REHABILITATION**

Contract No. FA8903-04-D-8675 Task Order No. 022

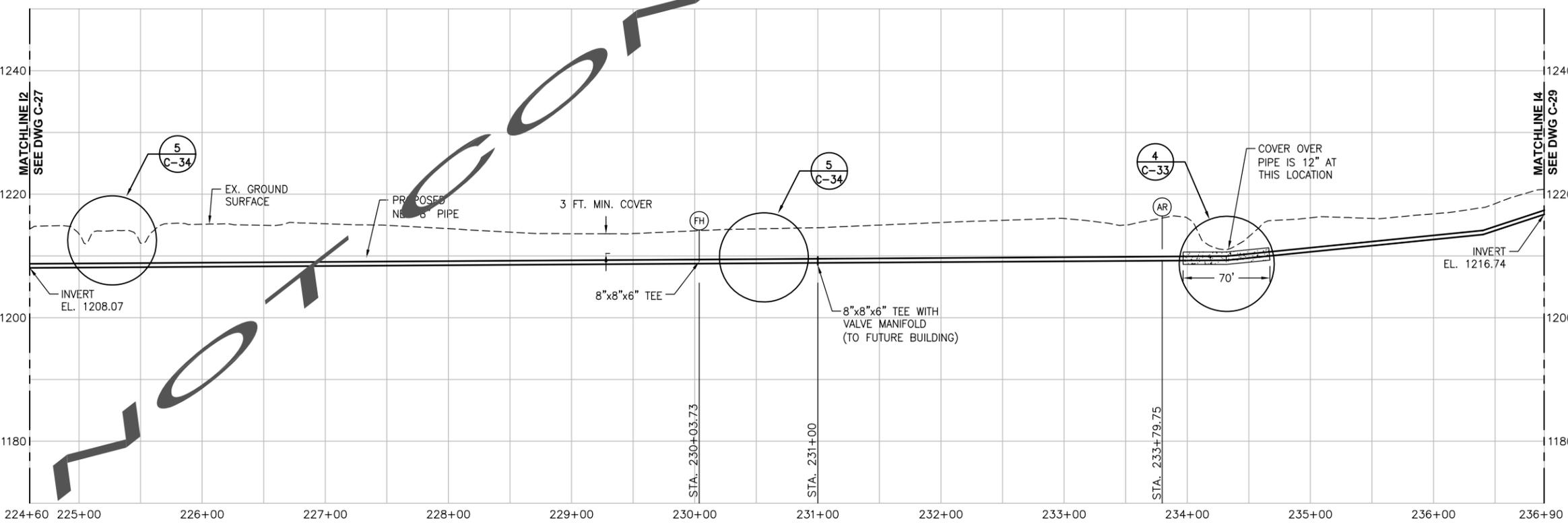
CONTRACTOR :
PARSONS Job No. 745006 WBS 03000

Drawing Title :
**PIPING PLAN AND PROFILE
SEGMENT I2 (8")**

Designed : HCD	Drawn : JLH	Rev: 1
Checked : KMK	Approved :	
Scale : HORIZ. 1" = 50' VERT. 1" = 10'	Date : NOVEMBER 2008	Drawing No. : C-27



- LEGEND**
- (FH) FIRE HYDRANT
 - (MH) MANHOLE
 - (FE) FLOWMETER
 - (AR) AIR RELEASE VALVE
 - ▽ REDUCER
 - ◇ GATE VALVE
 - ⊙ BALL VALVE
 - ⊣ CHECK VALVE
 - ⊘ REMOVE PIPE
 - (CA) CHLORINE ANALYZER
 - (BO) BLOWOFF VALVE
 - (SC) SERVICE CONNECTION
 - (FS) SADDLE CLAMP
 - (TP) TRENCH PLUG
 - ▭ POSSIBLE UTILITY CROSSING AREA



PROFILE - SEGMENT 13

- (TP) TIE POINT
- GAS LINE
- WASTEWATER LINE
- BURIED ELECTRIC LINE
- EX. WATER LINE
- NEW WATER LINE
- ABANDONED OR TO BE ABANDONED WATER LINE
- - - MATCHLINE
- x EX. FENCE

1	AS-BUILT SET	HCD	11/2008
0	ISSUED FOR CONSTRUCTION	HCD	12/2007

REV. DESCRIPTION BY: DATE:

REVISIONS

SCALES SHOWN ON THIS DRAWING ARE APPLICABLE ONLY TO D SIZE DRAWING

**CAMP STANLEY STORAGE ACTIVITY
WATER SYSTEM REHABILITATION**

Contract No. FA8903-04-D-8675 Task Order No. 022

CONTRACTOR :
PARSONS Job No. 745006 WBS 03000

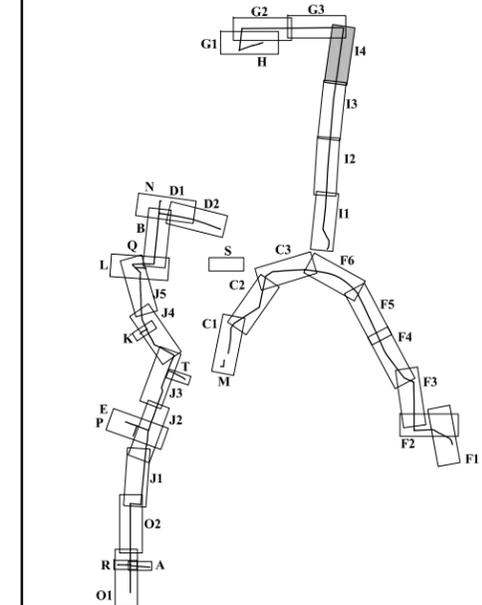
Drawing Title :
**PIPING PLAN AND PROFILE
SEGMENT 13 (8")**

Designed : HCD	Drawn : JLH	Rev: 1
Checked : KMK	Approved :	

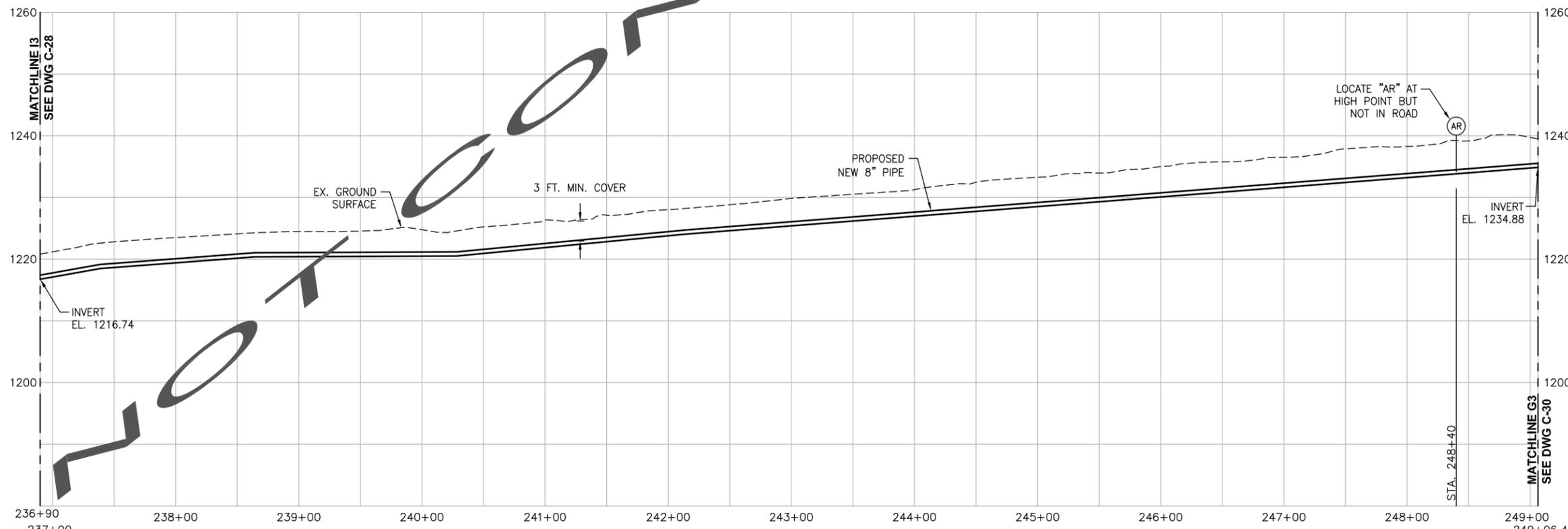
Scale :
HORIZ. 1" = 50'
VERT. 1" = 10'

Date :
NOVEMBER 2008

Drawing No. :
C-28



- LEGEND**
- (FH) FIRE HYDRANT
 - (MH) MANHOLE
 - (FE) FLOWMETER
 - (AR) AIR RELEASE VALVE
 - ◻ REDUCER
 - ◻ GATE VALVE
 - ◻ BALL VALVE
 - ◻ CHECK VALVE
 - ◻ REMOVE PIPE
 - (CA) CHLORINE ANALYZER
 - (BO) BLOWOFF VALVE
 - (SC) SERVICE CONNECTION
 - (FS) SADDLE CLAMP
 - (FS) FIRE STAND
 - (TP) TRENCH PLUG
 - ▬ POSSIBLE UTILITY CROSSING AREA



PROFILE - SEGMENT I4

- (TP) TIE POINT
- GAS LINE
- WASTEWATER LINE
- BURIED ELECTRIC LINE
- EX. WATER LINE
- NEW WATER LINE
- ABANDONED OR TO BE ABANDONED WATER LINE
- MATCHLINE

REV.	DESCRIPTION	BY:	DATE:
1	AS-BUILT SET	HCD	11/2008
0	ISSUED FOR CONSTRUCTION	HCD	12/2007

REVISIONS

SCALES SHOWN ON THIS DRAWING ARE APPLICABLE ONLY TO D SIZE DRAWING

**CAMP STANLEY STORAGE ACTIVITY
WATER SYSTEM REHABILITATION**

Contract No. FA8903-04-D-8675 Task Order No. 022

CONTRACTOR :
PARSONS Job No. 745006 WBS 03000

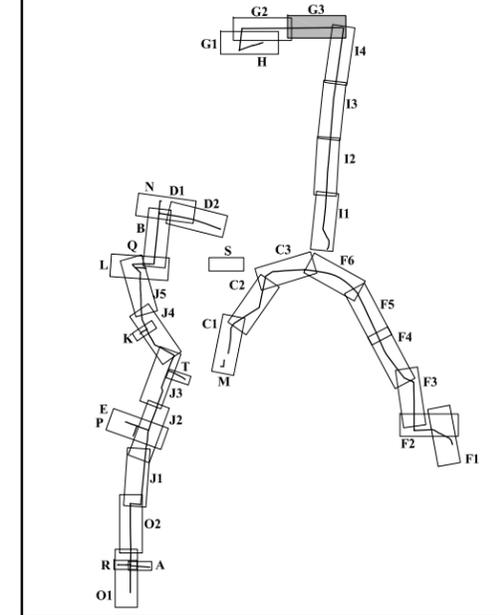
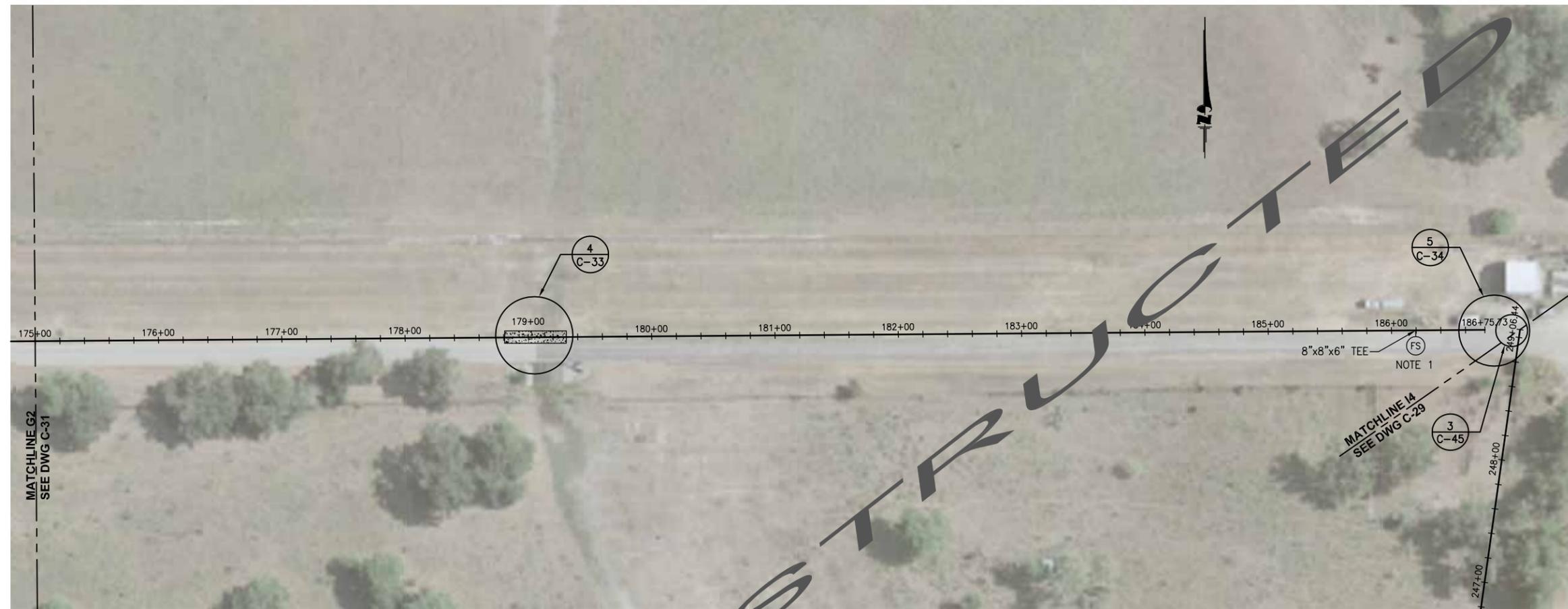
Drawing Title :
**PIPING PLAN AND PROFILE
SEGMENT I4 (8")**

Designed : HCD	Drawn : JLH	Rev: 1
Checked : KMK	Approved :	

Scale : HORIZ. 1" = 50'
VERT. 1" = 10'

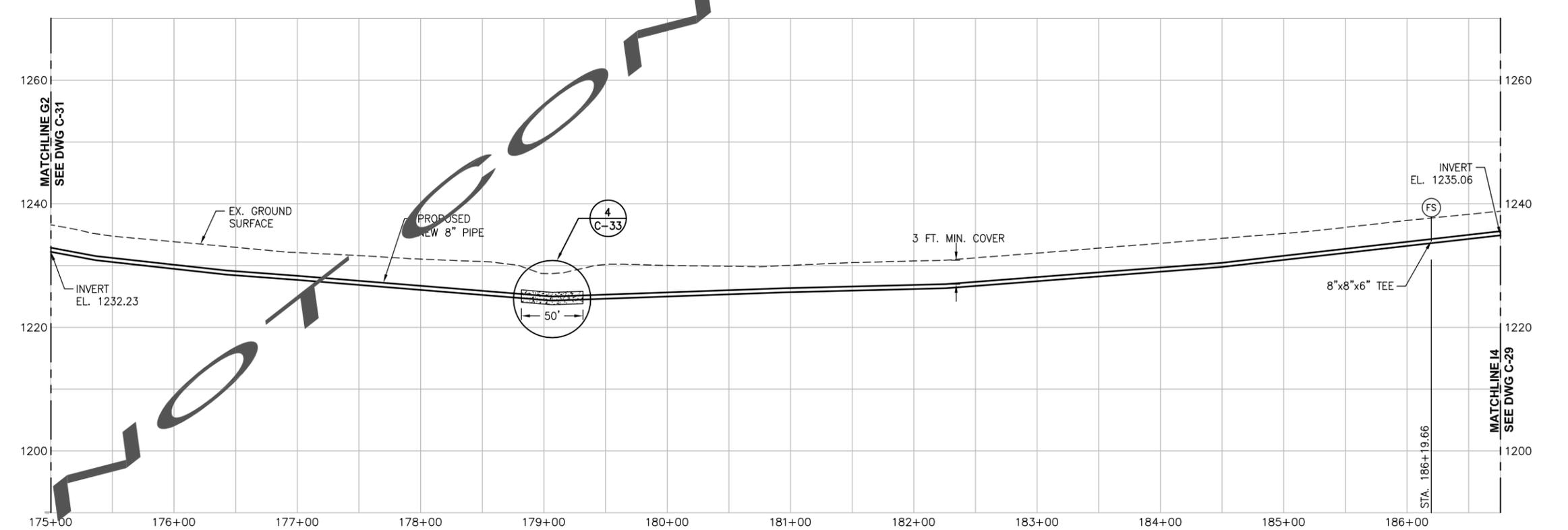
Date : NOVEMBER 2008

Drawing No. : C-29



LEGEND

(FH) FIRE HYDRANT	(CA) CHLORINE ANALYZER
(MH) MANHOLE	(BO) BLOWOFF VALVE
(FE) FLOWMETER	(SC) SERVICE CONNECTION
(AR) AIR RELEASE VALVE	(SCL) SADDLE CLAMP
□ REDUCER	(FS) FIRE STAND
⊗ GATE VALVE	(TP) TRENCH PLUG
⊙ BALL VALVE	▭ POSSIBLE UTILITY CROSSING AREA
⊢ CHECK VALVE	
▨ REMOVE PIPE	
▭ TIE POINT	
— GAS LINE	
— WASTEWATER LINE	
— BURIED ELECTRIC LINE	
— EX. WATER LINE	
— NEW WATER LINE	
- - - ABANDONED OR TO BE ABANDONED WATER LINE	
- - - MATCHLINE	



PROFILE - SEGMENT G3

NOTE 1: REUSE EXISTING FIRE STAND.

REV.	DESCRIPTION	BY:	DATE:
1	AS-BUILT SET	HCD	11/2008
0	ISSUED FOR CONSTRUCTION	HCD	12/2007

REVISIONS

SCALES SHOWN ON THIS DRAWING ARE APPLICABLE ONLY TO D SIZE DRAWING

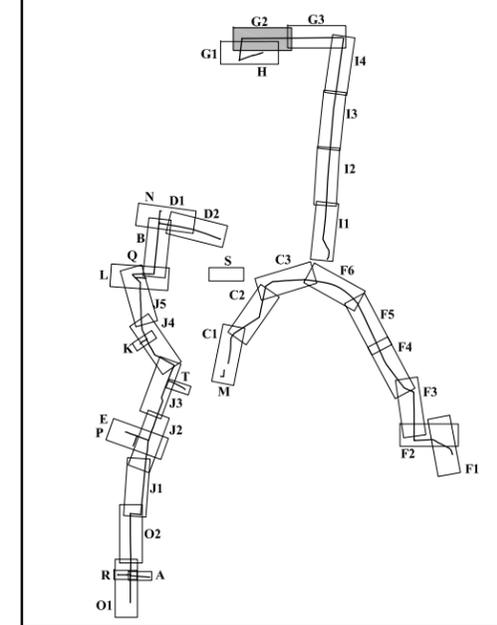
**CAMP STANLEY STORAGE ACTIVITY
WATER SYSTEM REHABILITATION**

Contract No. FA8903-04-D-8675 Task Order No. 022

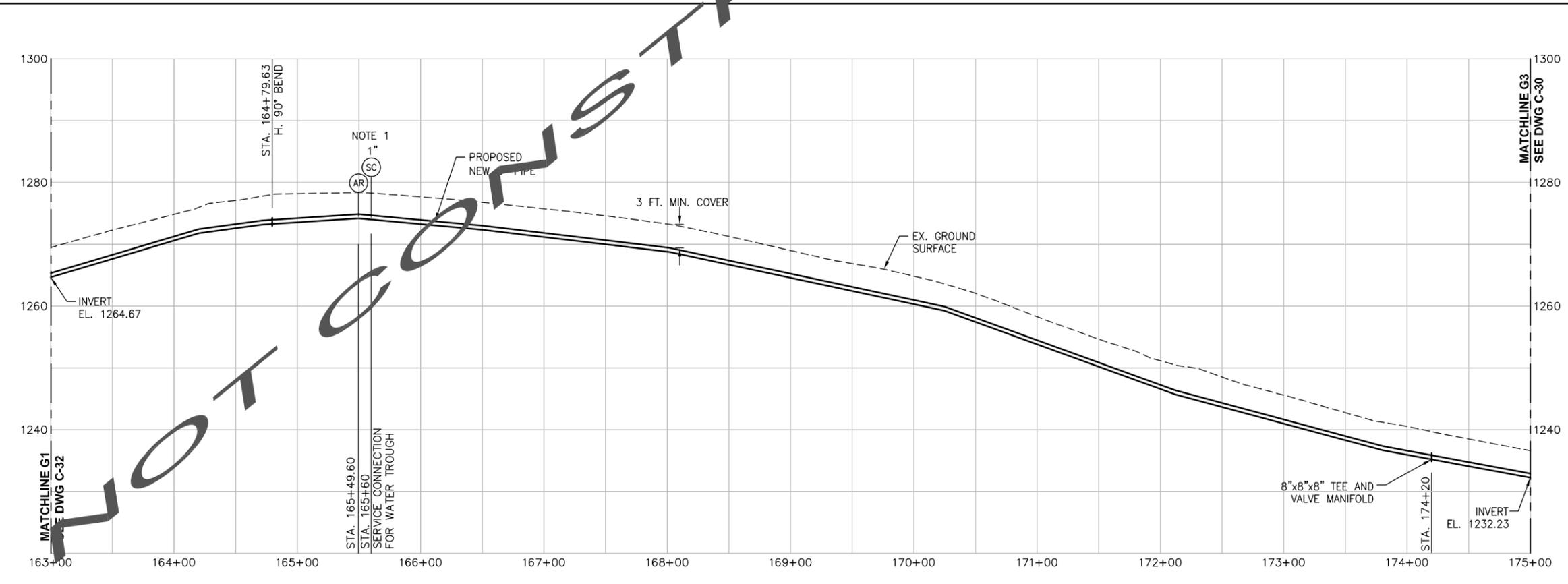
CONTRACTOR : **PARSONS** Job No. 745006 WBS 03000

Drawing Title : **PIPING PLAN AND PROFILE
SEGMENT G3 (8")**

Designed : HCD	Drawn : JLH	Rev: 1
Checked : KMK	Approved :	
Scale : HORIZ. 1" = 50' VERT. 1" = 10'	Date : NOVEMBER 2008	Drawing No. : C-30



- LEGEND**
- (FH) FIRE HYDRANT
 - (MH) MANHOLE
 - (FE) FLOWMETER
 - (AR) AIR RELEASE VALVE
 - REDUCER
 - ⊗ GATE VALVE
 - ⊙ BALL VALVE
 - ⌞ CHECK VALVE
 - ⊘ REMOVE PIPE
 - (CA) CHLORINE ANALYZER
 - (BO) BLOWOFF VALVE
 - (SC) SERVICE CONNECTION
 - (FS) SADDLE CLAMP
 - (TP) TRENCH PLUG
 - ▭ POSSIBLE UTILITY CROSSING AREA



- (TP) TIE POINT
- GAS LINE
- WASTEWATER LINE
- BURIED ELECTRIC LINE
- EX. WATER LINE
- NEW WATER LINE
- - - ABANDONED OR TO BE ABANDONED WATER LINE
- - - MATCHLINE

1	AS-BUILT SET	HCD	11/2008
0	ISSUED FOR CONSTRUCTION	HCD	12/2007
REV.	DESCRIPTION	BY:	DATE:

R E V I S I O N S

SCALES SHOWN ON THIS DRAWING ARE APPLICABLE ONLY TO D SIZE DRAWING

**CAMP STANLEY STORAGE ACTIVITY
WATER SYSTEM REHABILITATION**

Contract No. FA8903-04-D-8675 Task Order No. 022

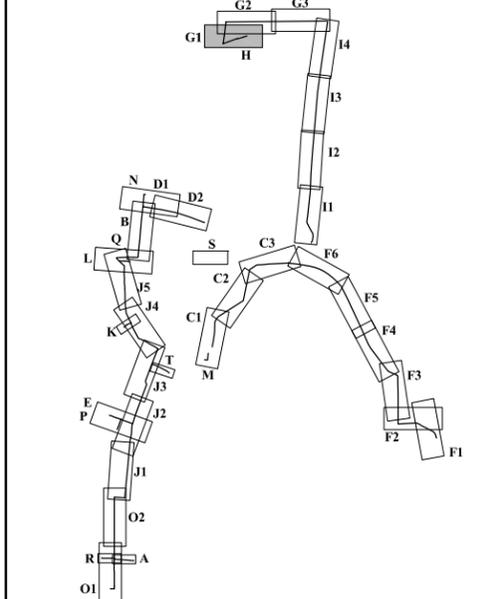
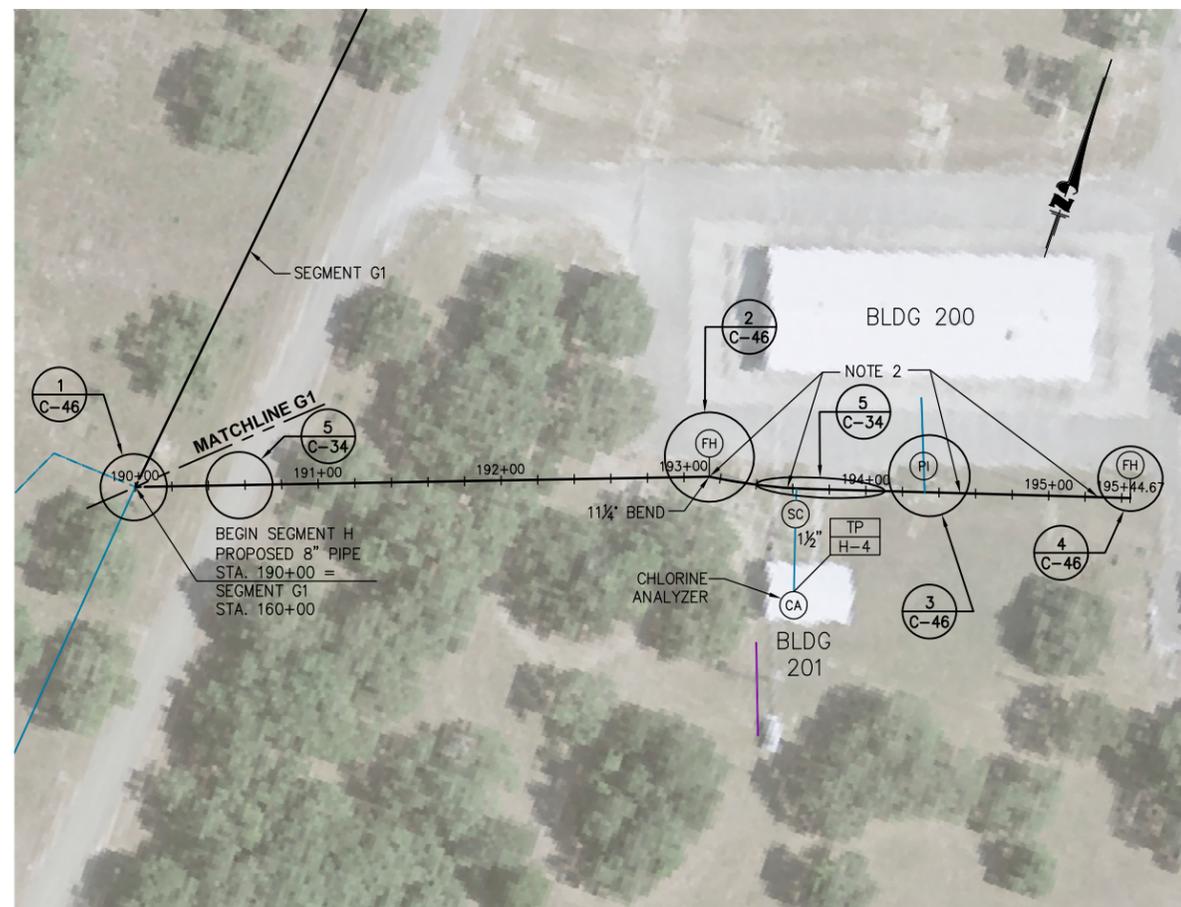
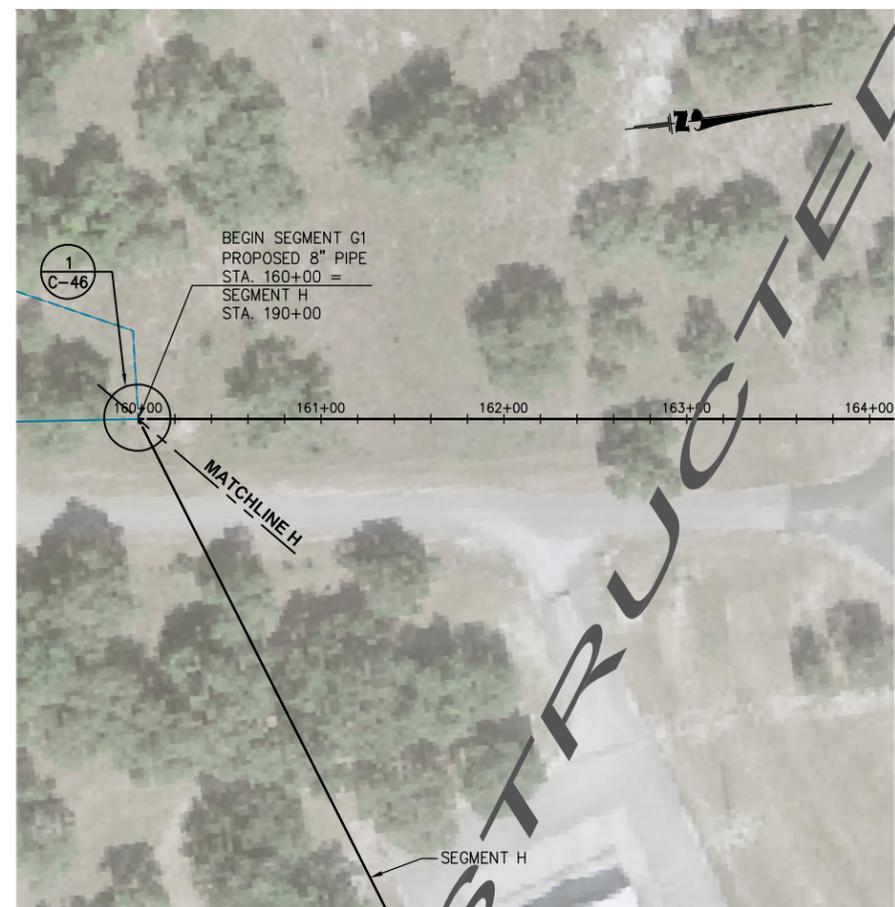
CONTRACTOR :
PARSONS Job No. 745006 WBS 03000

Drawing Title :
**PIPING PLAN AND PROFILE
SEGMENT G2 (8")**

Designed : HCD	Drawn : JLH	Rev: 1
Checked : KMK	Approved :	
Scale : HORIZ. 1" = 50' VERT. 1" = 10'	Date : NOVEMBER 2008	Drawing No. : C-31

NOTE 1: FIELD ROUTE 1" SCH. 80 PVC PIPE TO BFP (OR AIR GAP) AT WATERING TROUGH, BFP SUPPLIED BY OWNER.

PROFILE - SEGMENT G2



LEGEND

(FH) FIRE HYDRANT	(CA) CHLORINE ANALYZER
(MH) MANHOLE	(BO) BLOWOFF VALVE
(FE) FLOWMETER	(SC) SERVICE CONNECTION
(AR) AIR RELEASE VALVE	(FS) SADDLE CLAMP
◻ REDUCER	(TP) TRENCH PLUG
⊗ GATE VALVE	◻ POSSIBLE UTILITY CROSSING AREA
⊙ BALL VALVE	
⊗ CHECK VALVE	
⊘ REMOVE PIPE	
⊙ TIE POINT	

— GAS LINE
 — WASTEWATER LINE
 — BURIED ELECTRIC LINE
 — EX. WATER LINE
 — NEW WATER LINE
 - - - ABANDONED OR TO BE ABANDONED WATER LINE
 - - - MATCHLINE



REV.	DESCRIPTION	BY:	DATE:
1	AS-BUILT SET	HCD	1/2009
0	ISSUED FOR CONSTRUCTION	HCD	12/2007

REVISIONS

SCALES SHOWN ON THIS DRAWING ARE APPLICABLE ONLY TO D SIZE DRAWING

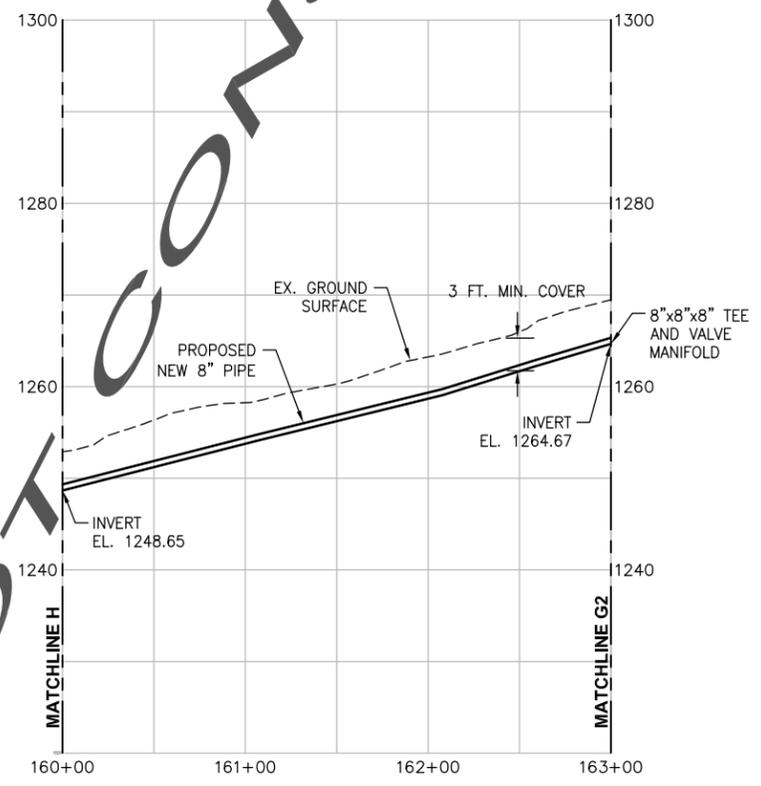
CAMP STANLEY STORAGE ACTIVITY
WATER SYSTEM REHABILITATION

Contract No. FA8903-04-D-8675 Task Order No. 022

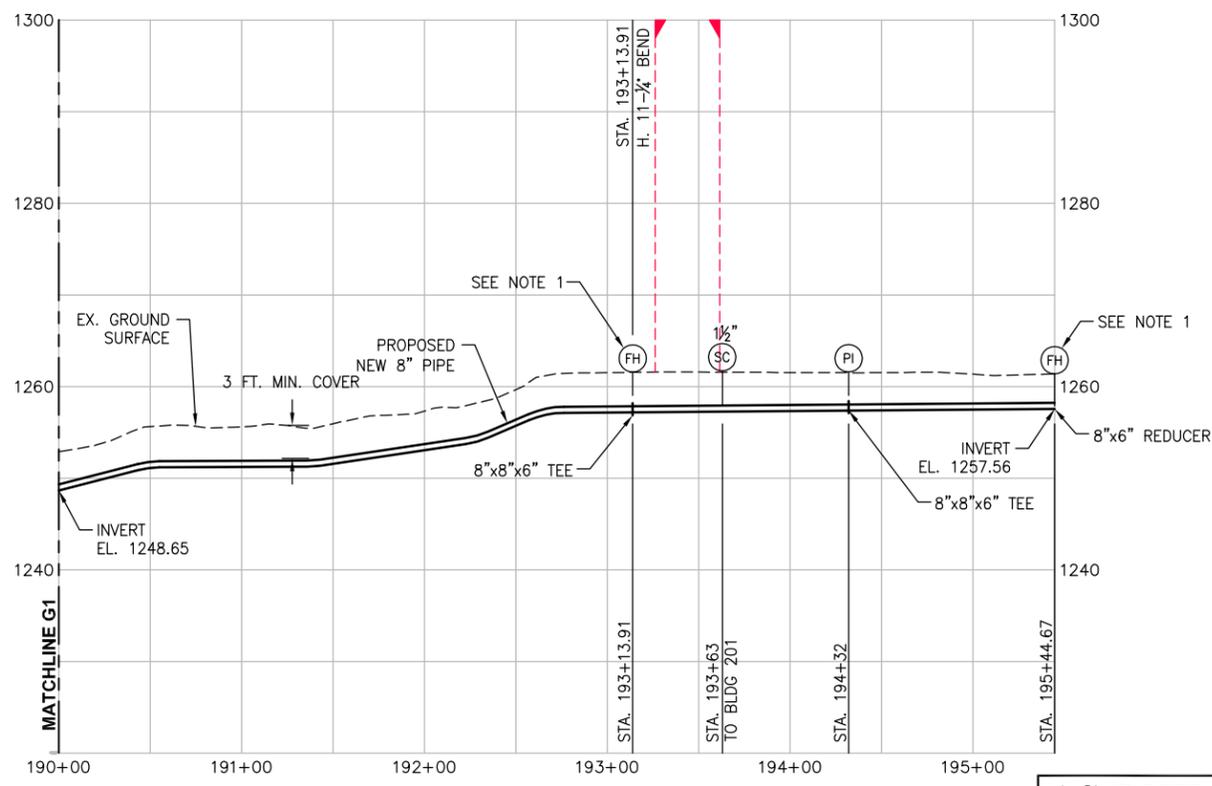
CONTRACTOR :
PARSONS Job No. 745006 WBS 03000

Drawing Title :
**PIPING PLAN AND PROFILE
SEGMENT G1 (8")
SEGMENT H (8") - SEQUENCE 8**

Designed : HCD	Drawn : JLH	Rev: 1
Checked : KMK	Approved :	
Scale : HORIZ. 1" = 50' VERT. 1" = 10'	Date : JANUARY 2009	Drawing No. : C-32



PROFILE - SEGMENT G1

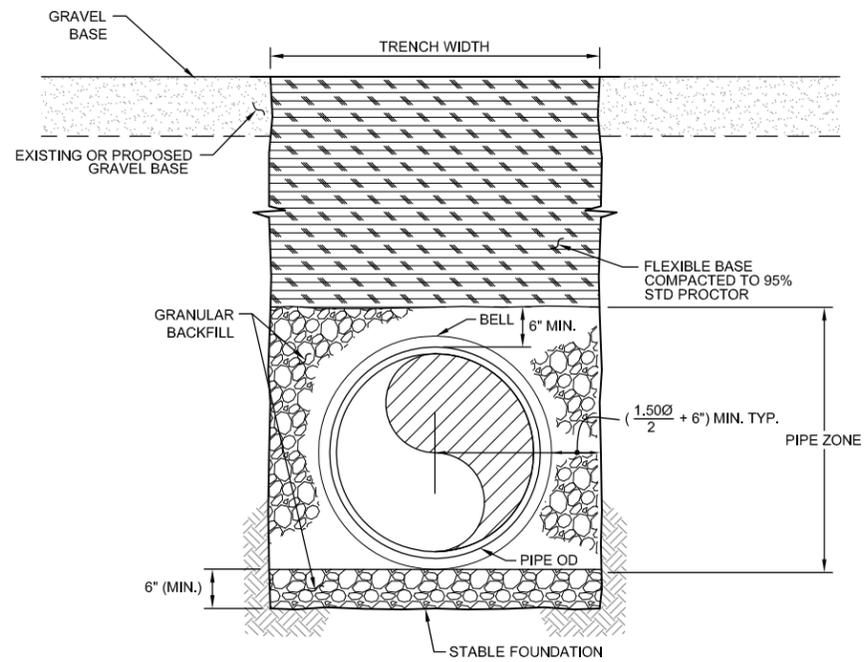


PROFILE - SEGMENT H

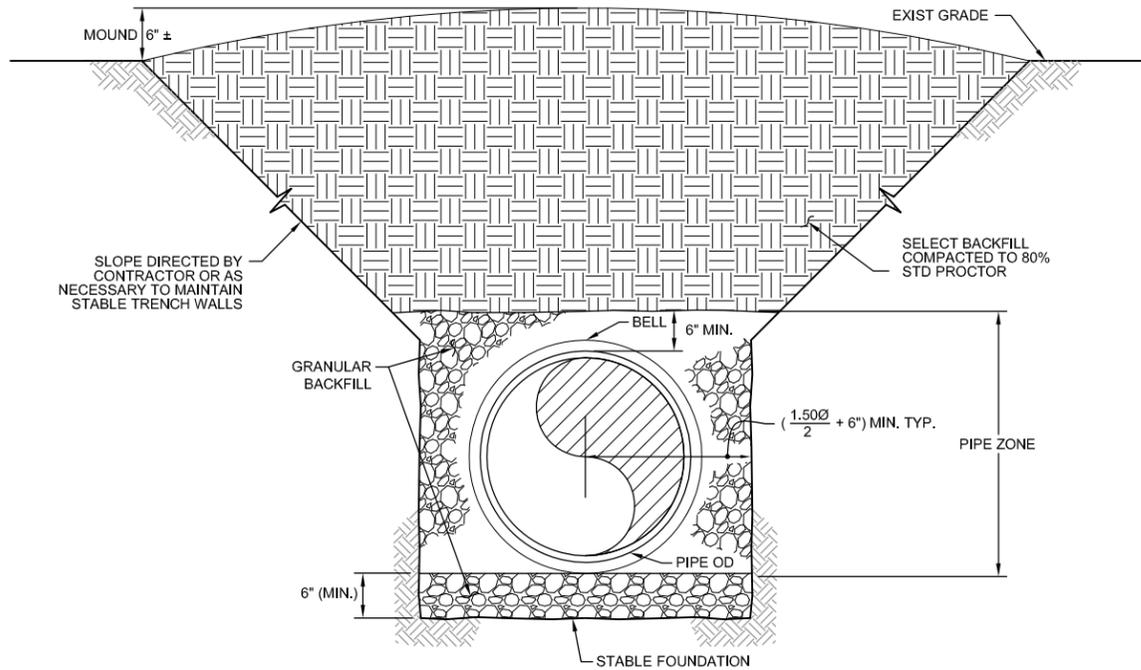
NOTES:
1. REUSE EXISTING FIRE HYDRANTS.
2. SAWCUT ASPHALT TO DEMOLISH AND REPAIR ASPHALT PER DETAIL 5, C-34.

AS-BUILT
JANUARY 2009
PROFILES NOT UPDATED

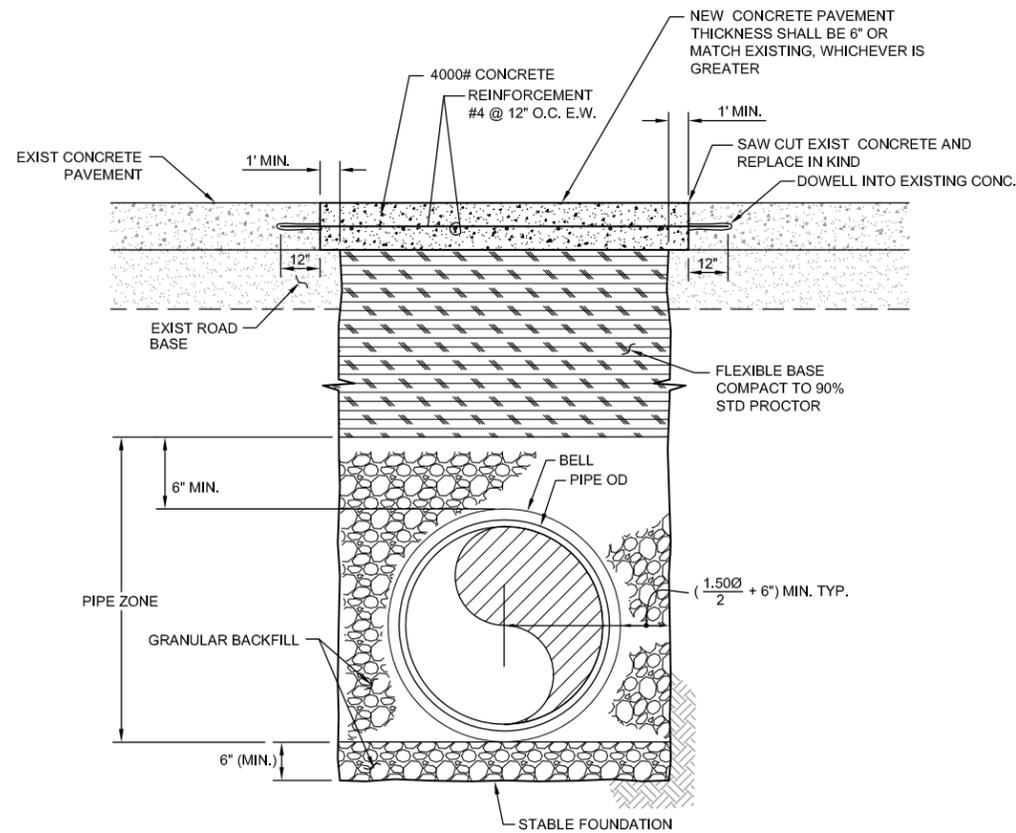
NOT FOR CONSTRUCTION



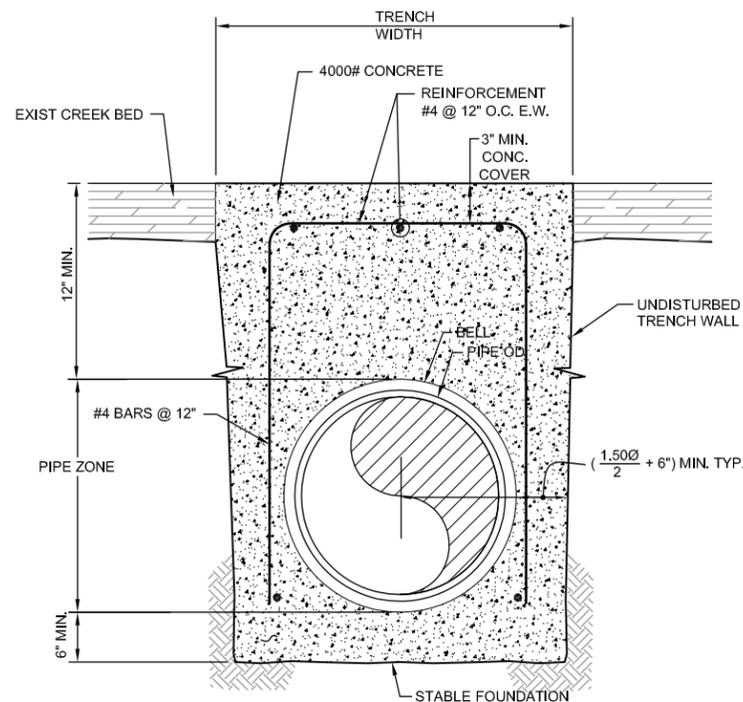
TYPICAL GRAVEL ROADWAY TRENCH SECTION 1
SCALE: NONE



TYPICAL OPEN AREA TRENCH SECTION 2
SCALE: NONE



TYPICAL CONCRETE ROADWAY TRENCH SECTION 3
SCALE: NONE



EMBEDDED CREEK CROSSING TRENCH SECTION 4
SCALE: NONE

REV.	DESCRIPTION	BY:	DATE:
1	AS-BUILT SET	HCD	11/2008
0	ISSUED FOR CONSTRUCTION	HCD	12/2007

REVISIONS

SCALES SHOWN ON THIS DRAWING ARE APPLICABLE ONLY TO D SIZE DRAWING

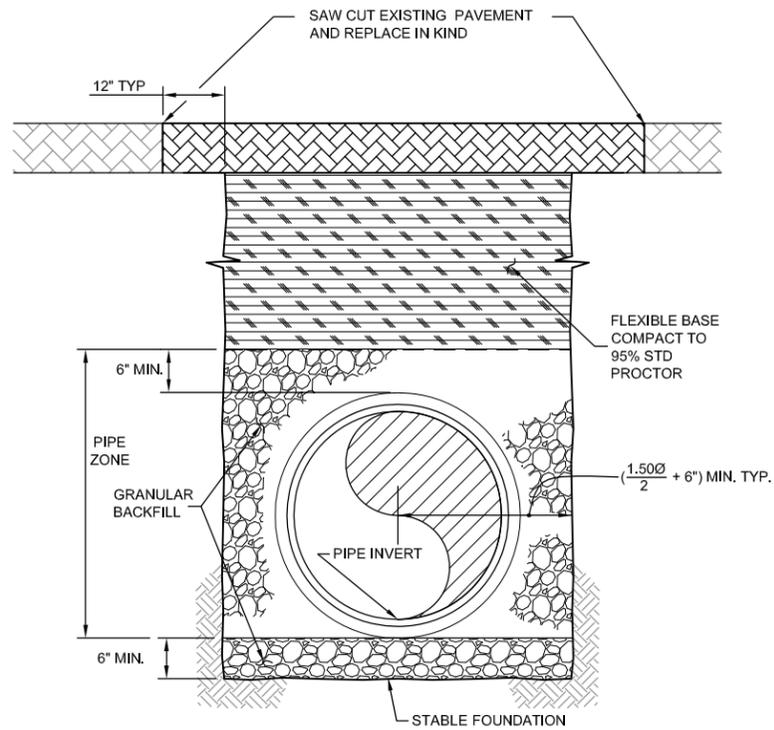
CAMP STANLEY STORAGE ACTIVITY
WATER SYSTEM REHABILITATION
Contract No. FA8903-04-D-8675 Task Order No. 022

CONTRACTOR :
PARSONS Job No. 745006 WBS 03000

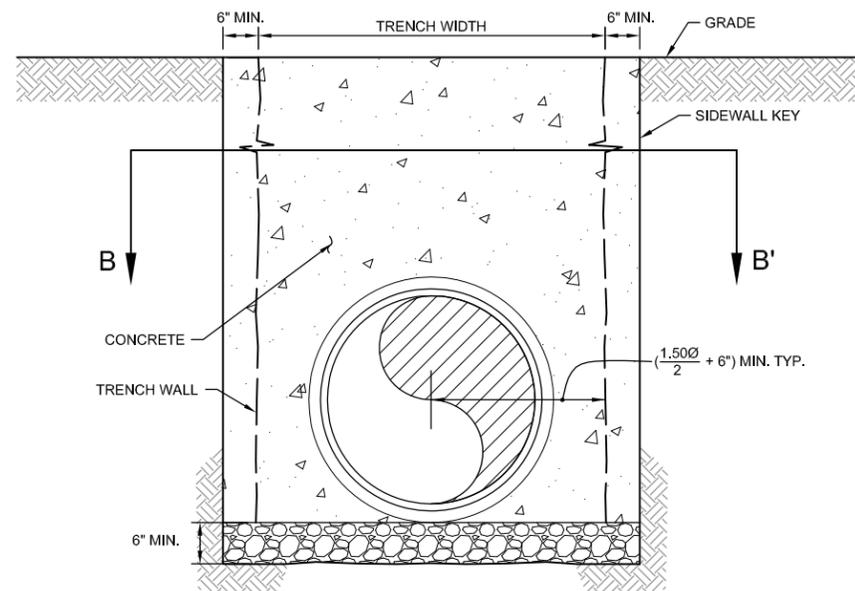
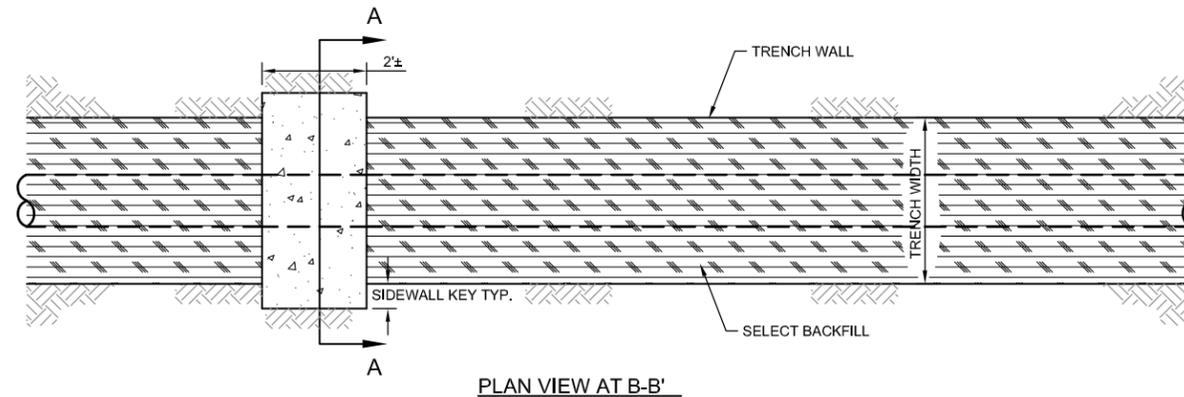
Drawing Title :
TYPICAL TRENCH DETAILS
SHEET 1 OF 2

Designed : HCD	Drawn : JLH	Rev: 1
Checked : KMK	Approved :	
Scale : N.T.S.	Date : NOVEMBER 2008	Drawing No. : C-33

AS-BUILT
NOVEMBER 2008



TYPICAL ASPHALT PAVEMENT ROADWAY TRENCH SECTION 5
SCALE: NOT TO SCALE



TYPICAL TRENCH PLUG SECTION A
SCALE: NOT TO SCALE

- NOTES:
1. INSTALL PLUGS IN TRENCH IN SLOPES STEEPER THAN 25% EVERY 100± OR WHERE INDICATED ON THE DRAWINGS.
 2. DO NOT INSTALL PLUGS OVER FITTINGS, VALVES OR SADDLE CLAMPS.
 3. PAVEMENT REPAIR TO MATCH EXISTING GRADE.
 4. CROWNS OF PIPES SHALL BE A MINIMUM OF 3' BELOW GRADE EXCEPT WHERE SPECIFICALLY NOTED OTHERWISE.

REV.	DESCRIPTION	BY:	DATE:
1	AS-BUILT SET	HCD	11/2008
0	ISSUED FOR CONSTRUCTION	HCD	12/2007

REVISIONS

SCALES SHOWN ON THIS DRAWING ARE APPLICABLE ONLY TO D SIZE DRAWING

CAMP STANLEY STORAGE ACTIVITY
WATER SYSTEM REHABILITATION

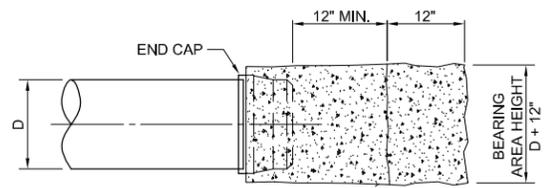
Contract No. FA8903-04-D-8675 Task Order No. 022

CONTRACTOR :
PARSONS Job No. 745006 WBS 03000

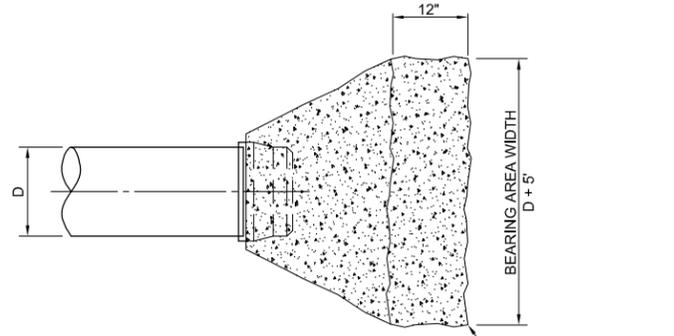
Drawing Title :
**TYPICAL TRENCH DETAILS
SHEET 2 OF 2**

Designed : HCD	Drawn : JLH	Rev: 1
Checked : KMK	Approved :	
Scale : N.T.S.	Date : NOVEMBER 2008	Drawing No. : C-34

AS-BUILT
NOVEMBER 2008



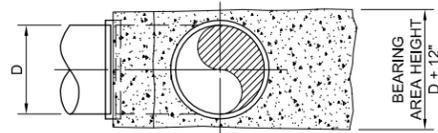
PROFILE



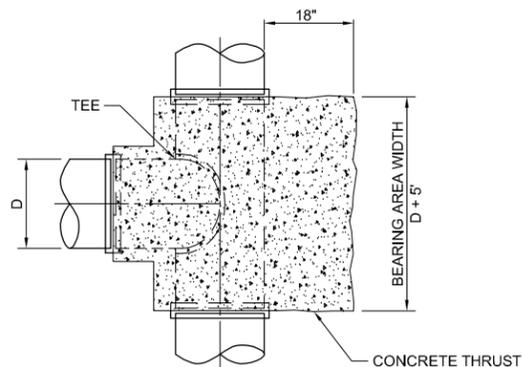
PLAN

CONCRETE THRUST BLOCK (TYP)

DEAD END THRUST BLOCKING 1
SCALE: NONE

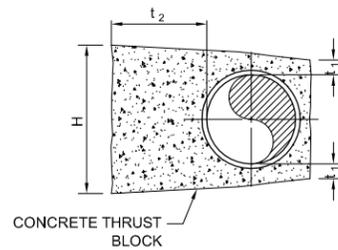


PROFILE

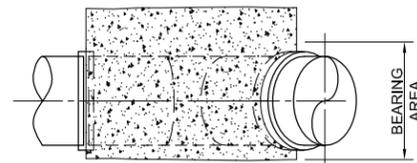


PLAN

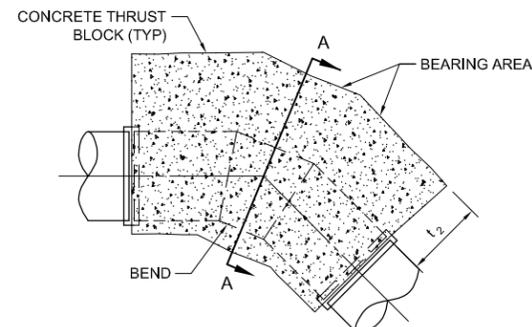
TEE THRUST BLOCKING 2
SCALE: NONE



TYPICAL SECTION A
SCALE: NONE

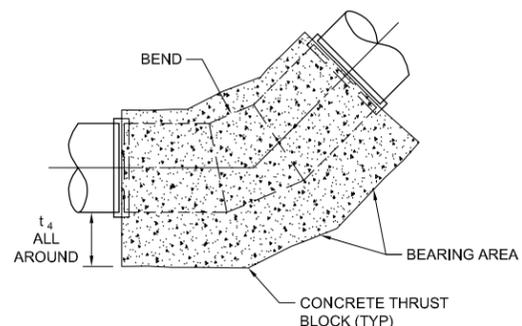


PROFILE



PLAN

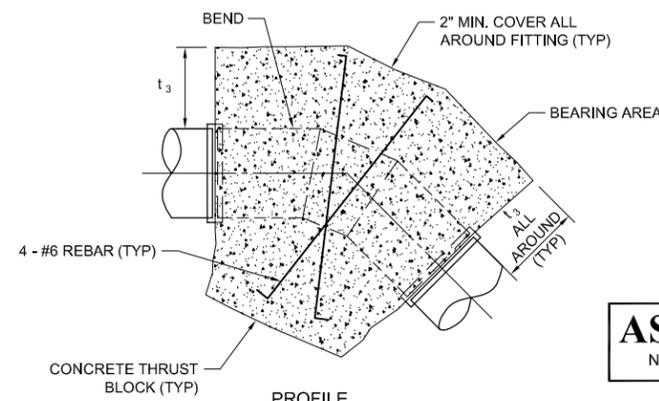
HORIZONTAL BEND THRUST BLOCKING 3
SCALE: NONE



PROFILE

VERTICAL UP-BEND THRUST BLOCKING 4
SCALE: NONE

PIPE DIA., D	STANDARD BENDS														
	90°			45°			22.5°			11.25°					
	t ₁	t ₂	H	t ₁	t ₂	H	t ₁	t ₂ /t _d	t ₃	H	t ₁	t ₂ /t _d	t ₃	H	
12" Ø	6"	18"	2'-6"	6"	18"	2'-6"	6"	15"	2'-3"	6"	12"	2'-0"	6"	12"	2'-0"
10" Ø	6"	15"	2'-0"	6"	15"	2'-0"	6"	12"	2'-0"	6"	10"	2'-0"	6"	10"	2'-0"
8" Ø	6"	12"	1'-9"	4"	12"	1'-6"	4"	12"	2'-0"	4"	8"	1'-9"	4"	8"	1'-9"
6" Ø	6"	9"	1'-6"	4"	10"	1'-3"	4"	10"	1'-9"	3"	8"	1'-6"	3"	8"	1'-6"
4" Ø	4"	6"	1'-3"	3"	8"	1'-0"	3"	8"	1'-3"	3"	8"	1'-0"	3"	8"	1'-3"



PROFILE

VERTICAL DOWN-BEND THRUST BLOCKING 5
SCALE: NONE

AS-BUILT
NOVEMBER 2008

NOTES:

1. CONCRETE FOR THRUST BLOCKS MUST COMPLETELY SURROUND FITTINGS FOR THEIR ENTIRE LENGTH AND CIRCUMFERENCE, OR SPECIFIED WIDTH WHICHEVER IS LARGER. THEY SHOULD BE PLACED AGAINST UNDISTURBED EARTH, INCREASE t₂ AS NECESSARY.
2. MAX JOINT DEFLECTIONS SHALL BE 75 % OF MANUFACTURERS RECOMMENDATIONS.
3. f_c' = 4,000 psi @ 28 DAYS.

REV.	DESCRIPTION	BY:	DATE:
1	AS-BUILT SET	HCD	11/2008
0	ISSUED FOR CONSTRUCTION	HCD	12/2007

REVISIONS

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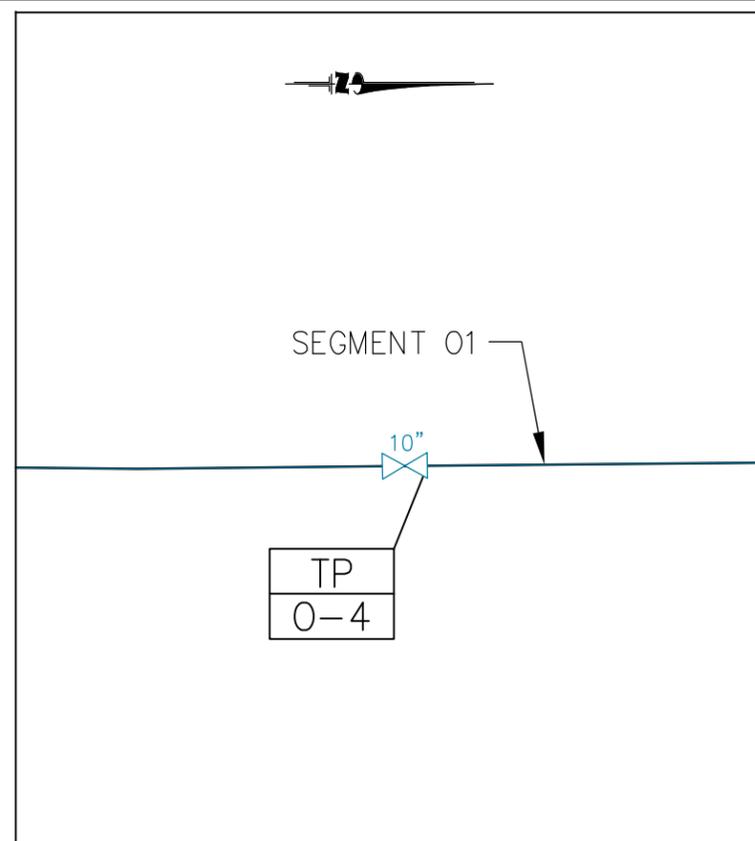
CAMP STANLEY STORAGE ACTIVITY
WATER SYSTEM REHABILITATION

Contract No. FA8903-04-D-8675 Task Order No. 022

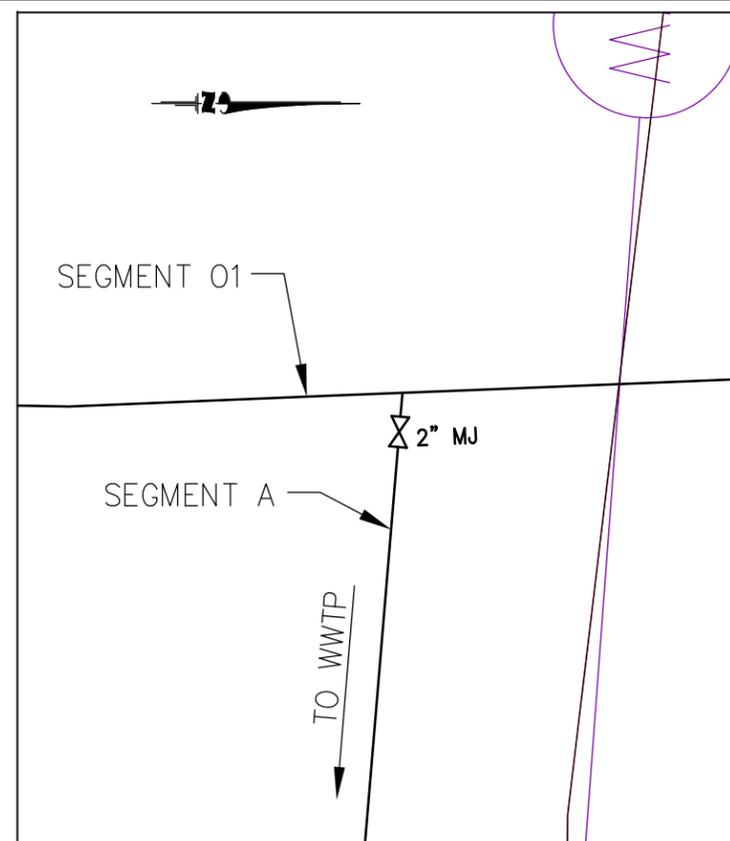
CONTRACTOR :
PARSONS Job No. 745006 WBS 03000

Drawing Title :
**WATER REHAB DETAILS
PIPING THRUST BLOCKS**

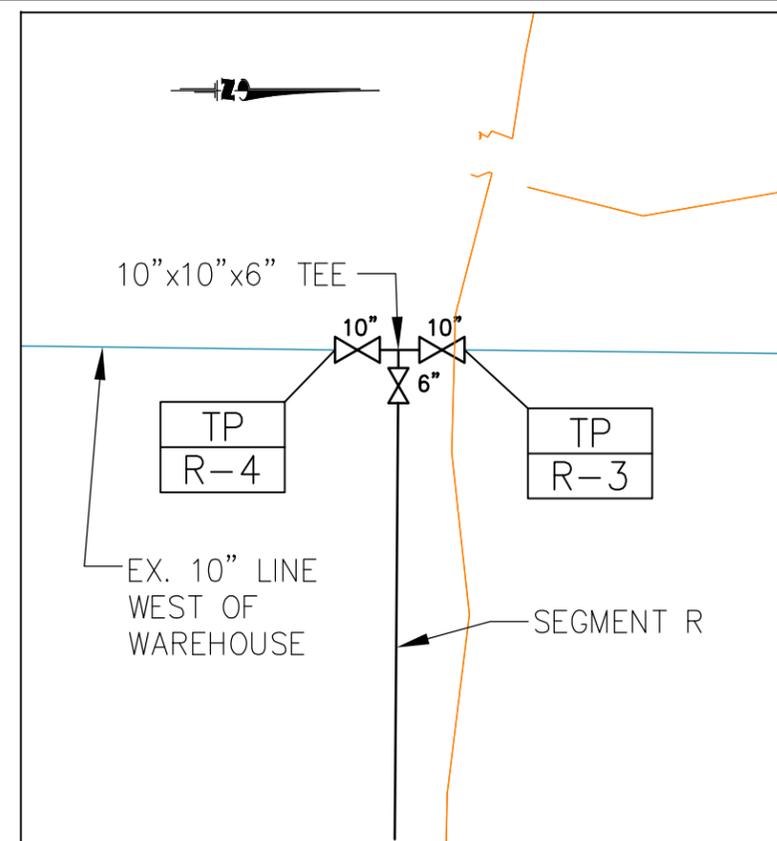
Designed : HCD	Drawn : JLH	Rev: 1
Checked : KMK	Approved :	
Scale : N.T.S.	Date : NOVEMBER 2008	Drawing No. : C-35



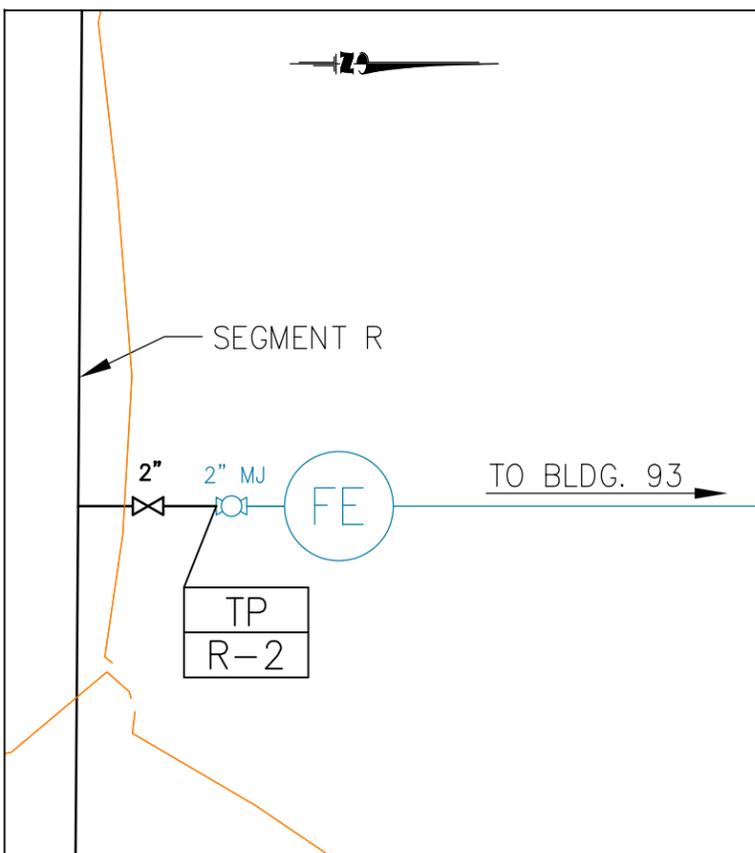
INTERSECTION DETAIL 1
C-02



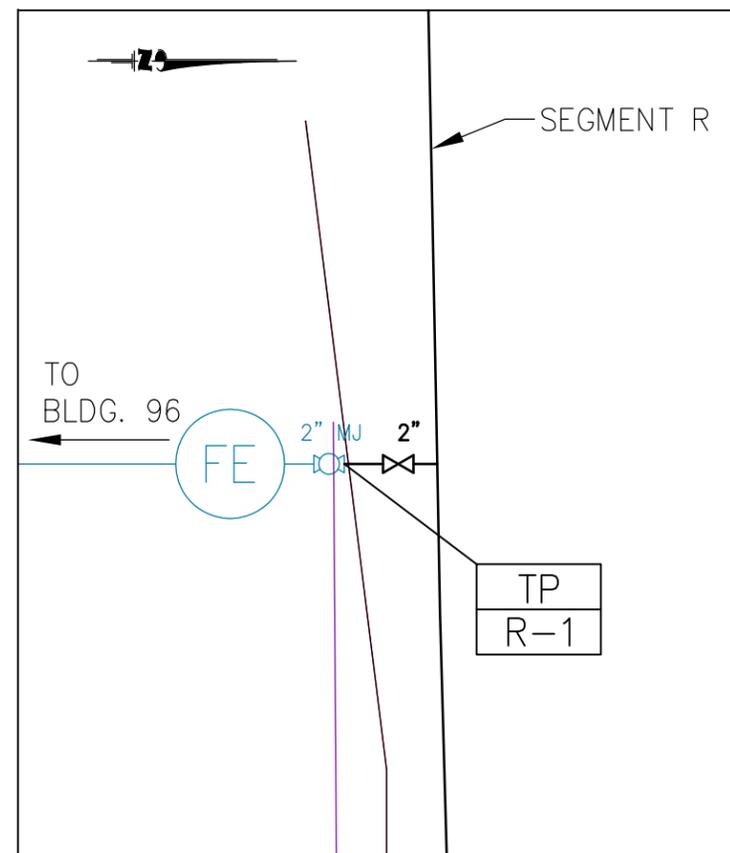
INTERSECTION DETAIL 2
C-02 C-03



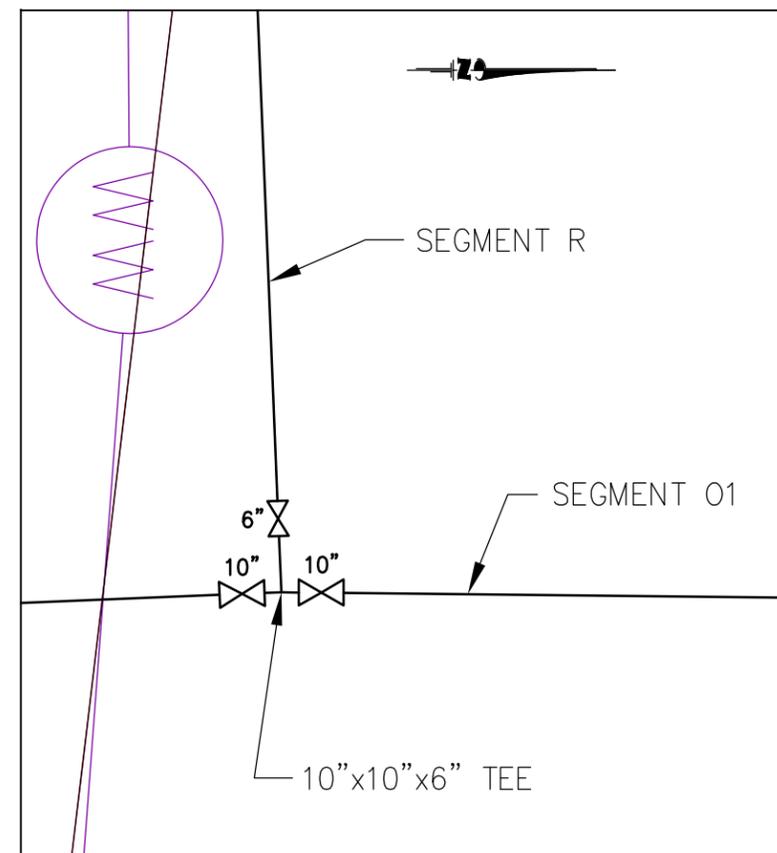
INTERSECTION DETAIL 3
C-04



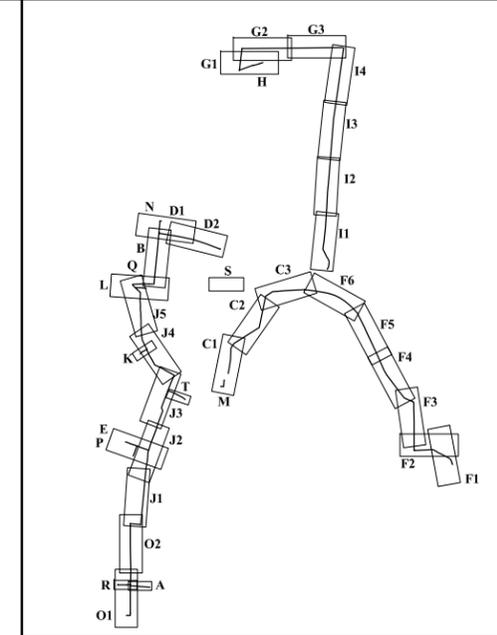
INTERSECTION DETAIL 4
C-04



INTERSECTION DETAIL 5
C-04



INTERSECTION DETAIL 6
C-02 C-04



- LEGEND**
- (FH) FIRE HYDRANT
 - (MH) MANHOLE
 - (FE) FLOWMETER
 - (AR) AIR RELEASE VALVE
 - ◻ REDUCER
 - ◻ GATE VALVE
 - ◻ BALL VALVE
 - ◻ CHECK VALVE
 - (CA) CHLORINE ANALYZER
 - (BO) BLOWOFF VALVE
 - (SC) SERVICE CONNECTION
 - (FS) SADDLE CLAMP
 - (TP) TRENCH PLUG
 - POSSIBLE UTILITY CROSSING AREA
 - REMOVE PIPE
 - TP TIE POINT
 - GAS LINE
 - WASTEWATER LINE
 - BURIED ELECTRIC LINE
 - EX. WATER LINE
 - NEW WATER LINE
 - ABANDONED OR TO BE ABANDONED WATER LINE
 - MATCHLINE

REV.	DESCRIPTION	BY:	DATE:
1	AS-BUILT SET	HCD	1/2009
0	ISSUED FOR CONSTRUCTION	HCD	12/2007

REVISIONS

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**CAMP STANLEY STORAGE ACTIVITY
WATER SYSTEM REHABILITATION**

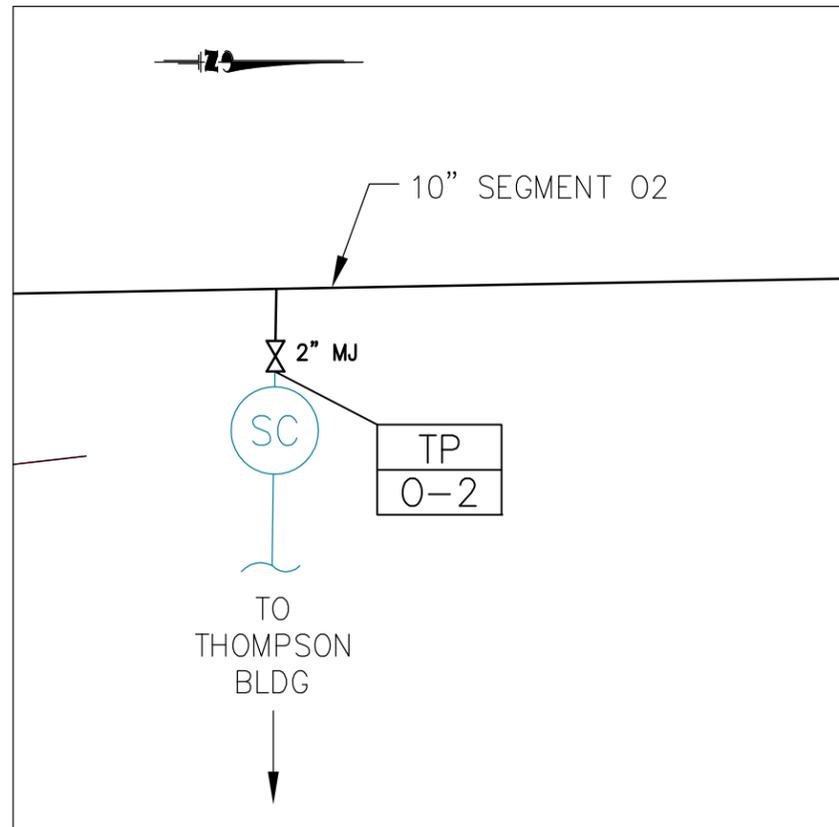
Contract No. FA8903-04-D-8675 Task Order No. 022

CONTRACTOR : **PARSONS** Job No. 745006 WBS 03000

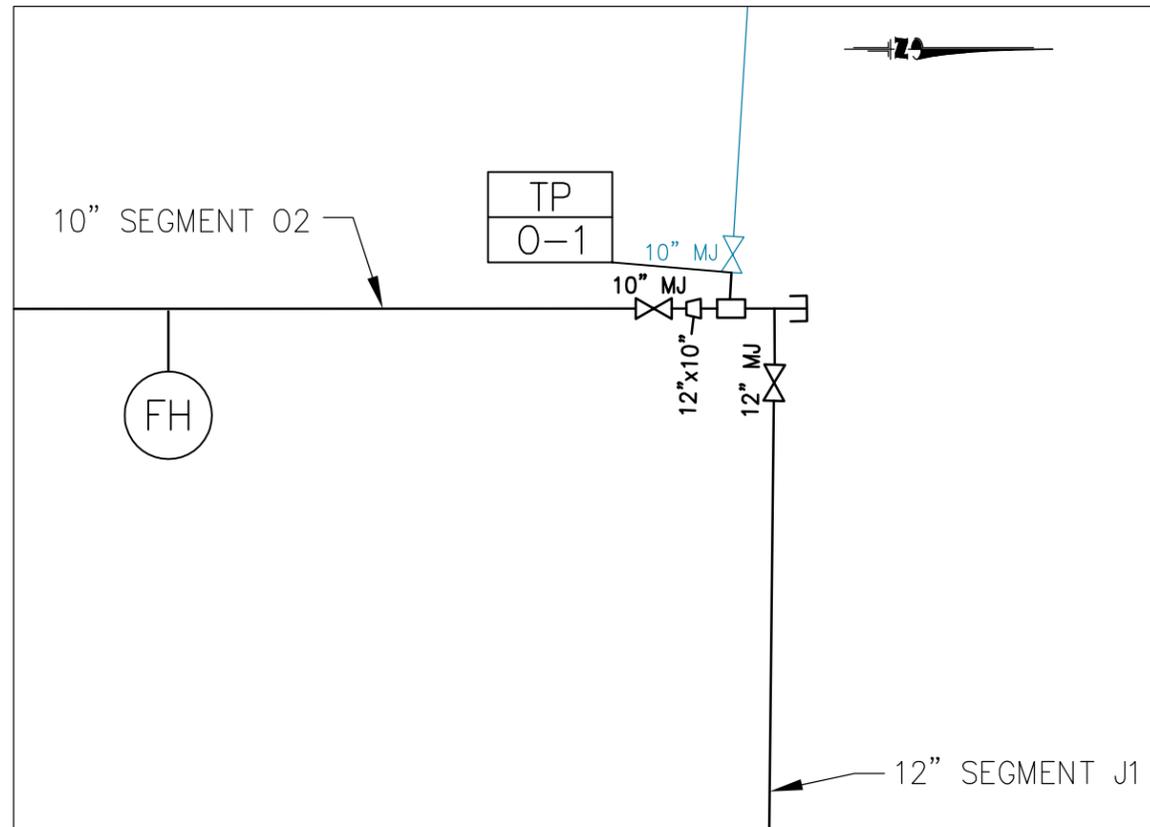
Drawing Title : **INTERSECTION DETAILS FOR SEGMENTS 01 AND R**

Designed : HCD	Drawn : JLH	Rev: 1
Checked : KMK	Approved :	
Scale : N.T.S.	Date : JANUARY 2009	Drawing No. : C-36

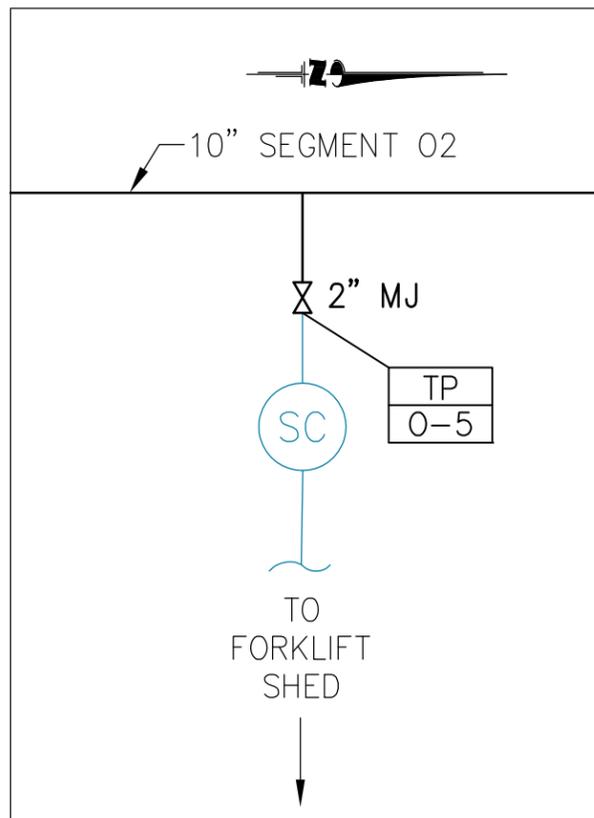
AS-BUILT
JANUARY 2009



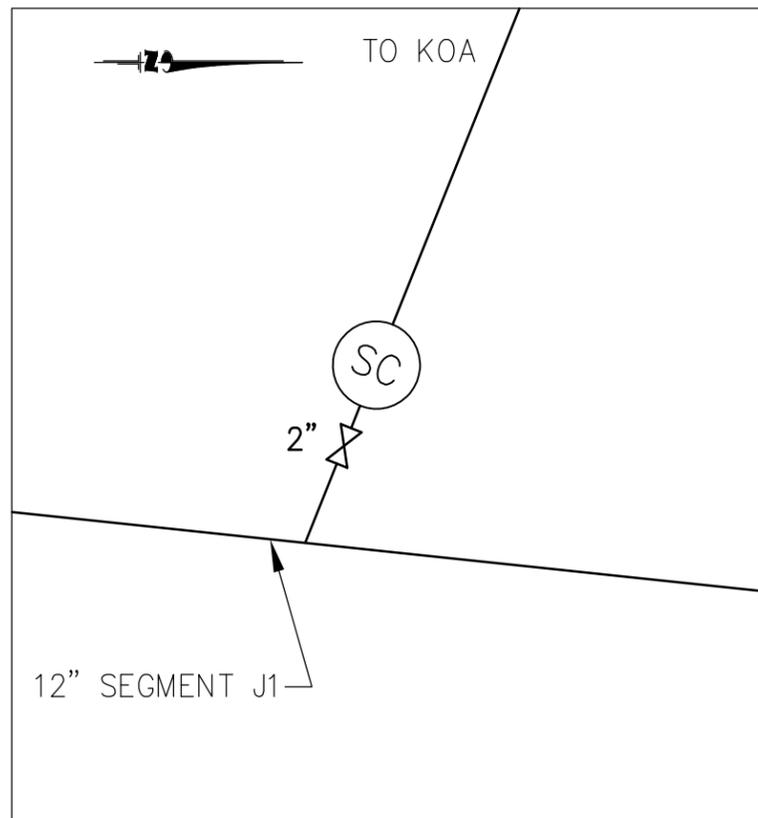
INTERSECTION DETAIL 1
C-05



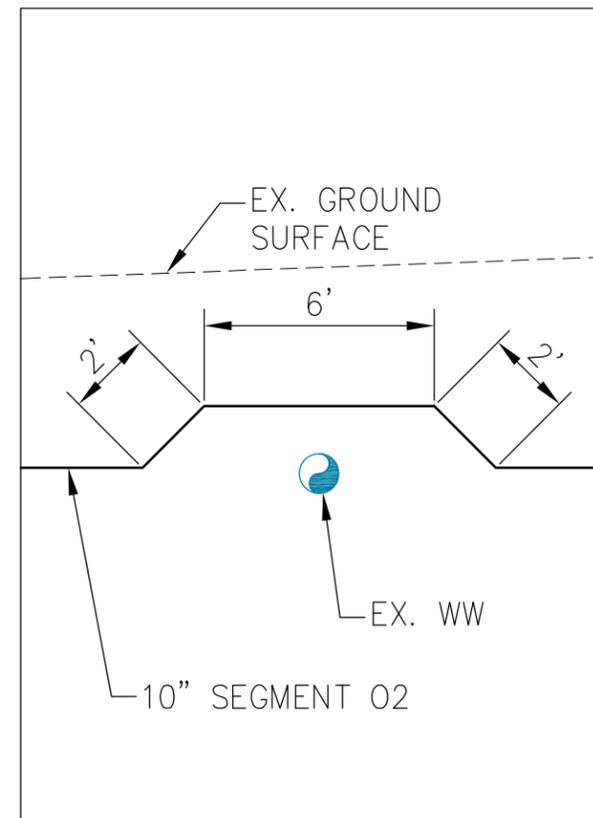
INTERSECTION DETAIL 2
C-05



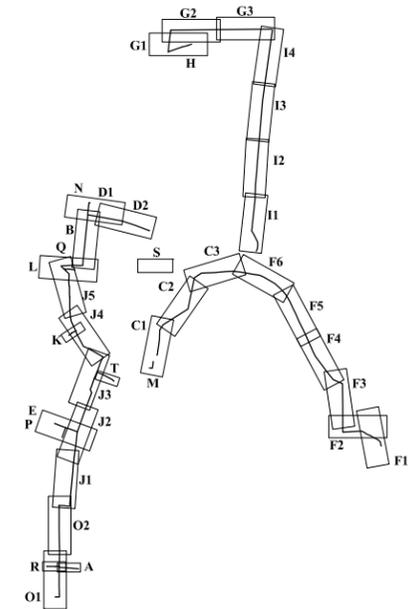
INTERSECTION DETAIL 3
C-05



INTERSECTION DETAIL 4
C-07



SEWER CROSSING PROFILE 5
C-05



- LEGEND**
- (FH) FIRE HYDRANT
 - (MH) MANHOLE
 - (FE) FLOWMETER
 - (AR) AIR RELEASE VALVE
 - ⊗ GATE VALVE
 - ⊘ BALL VALVE
 - ⊚ CHECK VALVE
 - ⊘ REMOVE PIPE
 - TP TIE POINT
 - GAS LINE
 - WASTEWATER LINE
 - BURIED ELECTRIC LINE
 - EX. WATER LINE
 - NEW WATER LINE
 - ABANDONED OR TO BE ABANDONED WATER LINE
 - MATCHLINE
 - (CA) CHLORINE ANALYZER
 - (BO) BLOWOFF VALVE
 - (SC) SERVICE CONNECTION SADDLE CLAMP
 - (FS) FIRE STAND
 - (TP) TRENCH PLUG
 - ↕ POSSIBLE UTILITY CROSSING AREA

REV.	DESCRIPTION	BY:	DATE:
1	AS-BUILT SET	HCD	1/2009
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REVISIONS

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**CAMP STANLEY STORAGE ACTIVITY
WATER SYSTEM REHABILITATION**

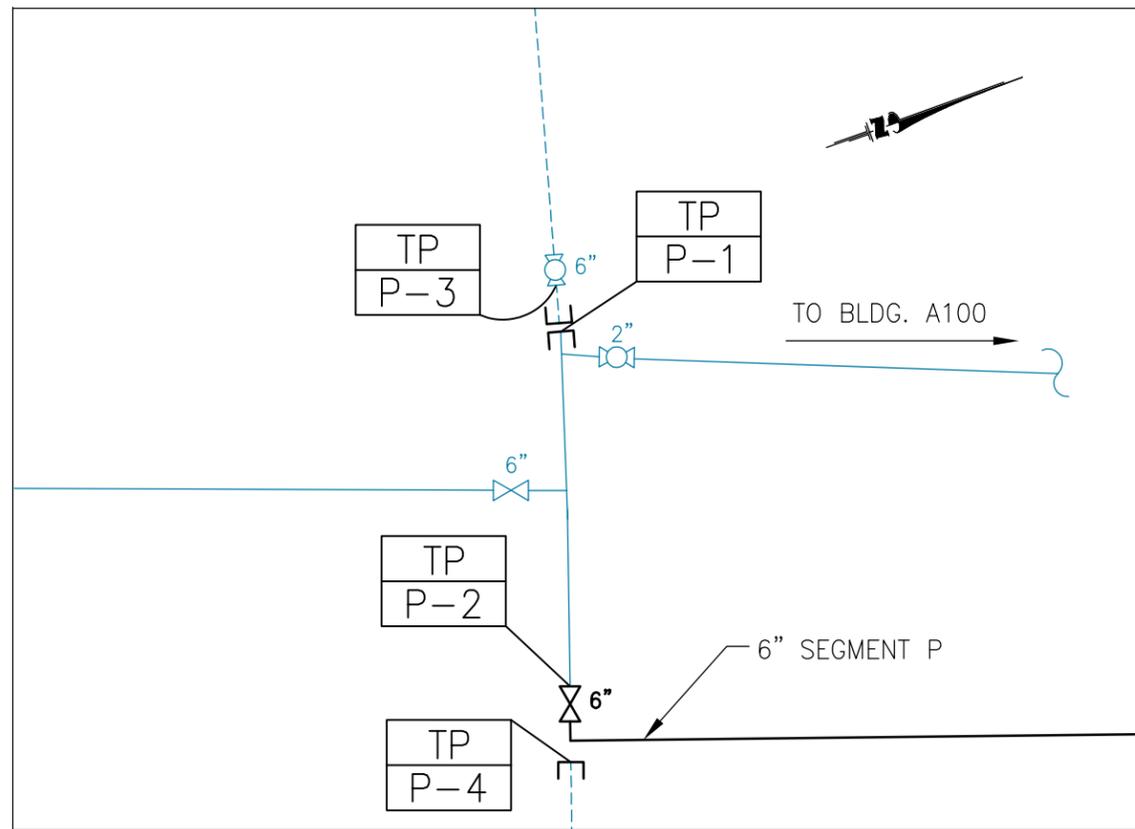
Contract No. FA8903-04-D-8675 Task Order No. 022

CONTRACTOR :
PARSONS Job No. 745006 WBS 03000

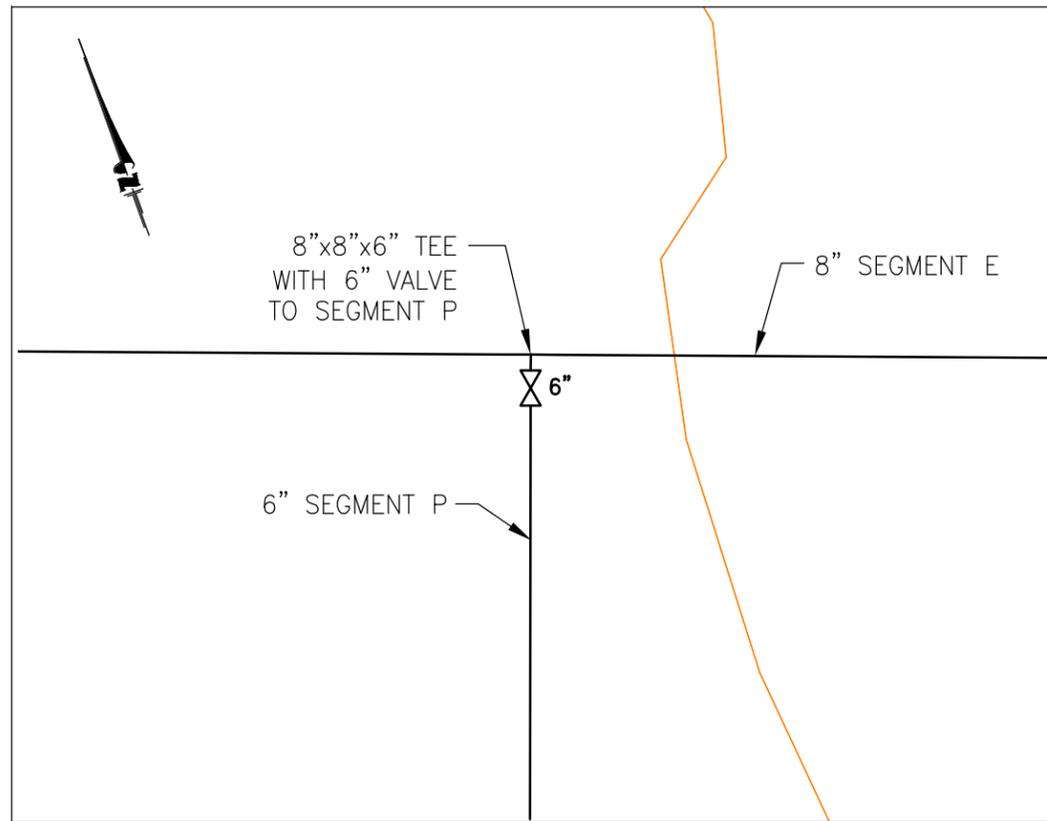
Drawing Title :
**INTERSECTION DETAILS FOR
SEGMENTS O2 AND J1**

Designed : HCD	Drawn : JLH	Rev: 1
Checked : KMK	Approved :	
Scale : N.T.S.	Date : JANUARY 2009	Drawing No. : C-37

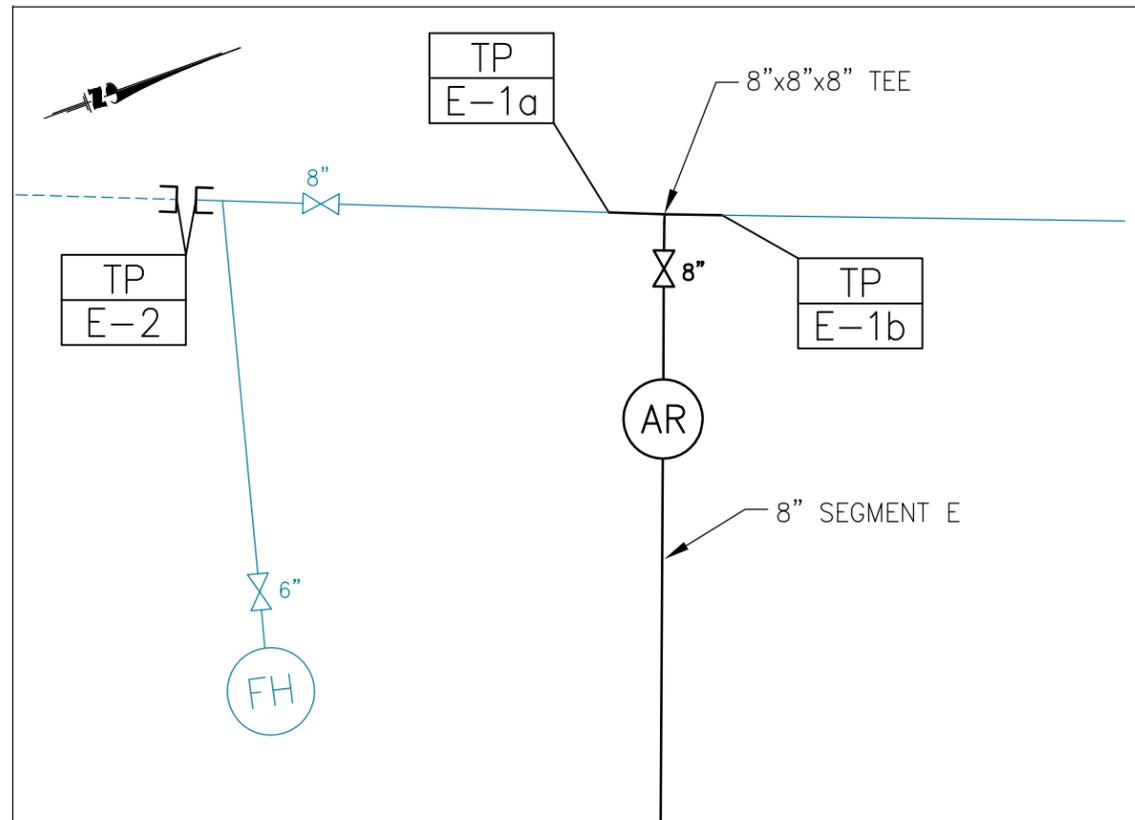
AS-BUILT
JANUARY 2009



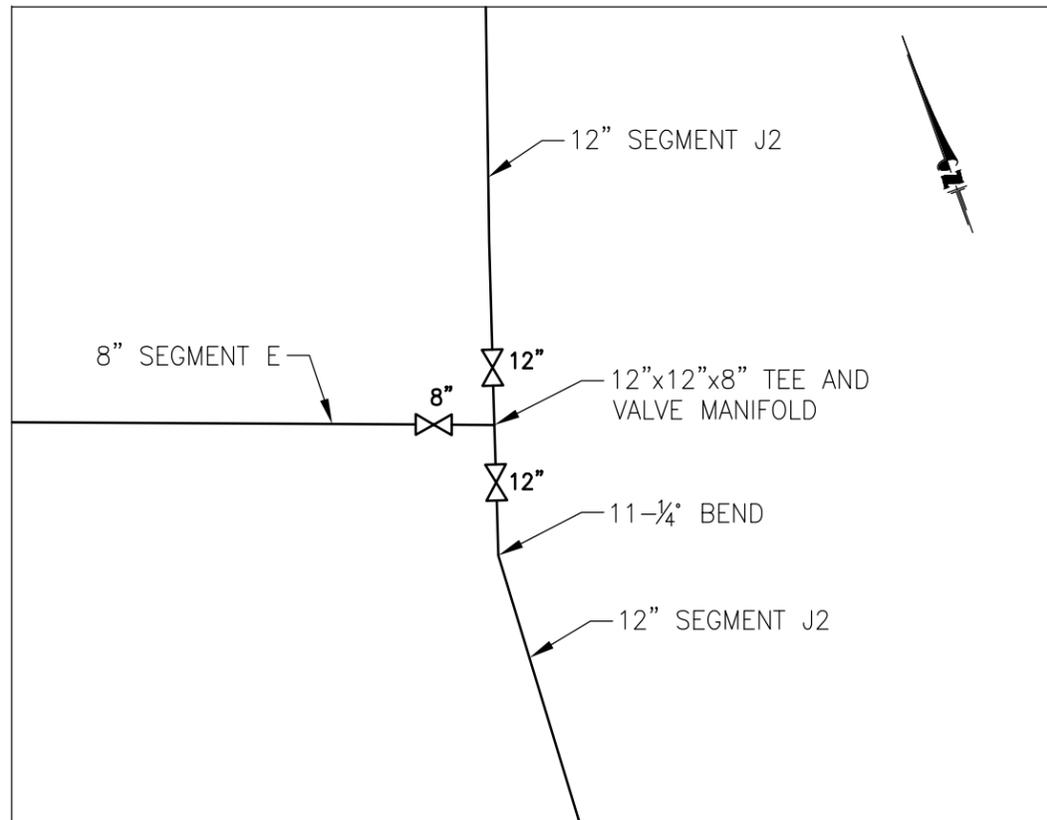
INTERSECTION DETAIL 1
C-08



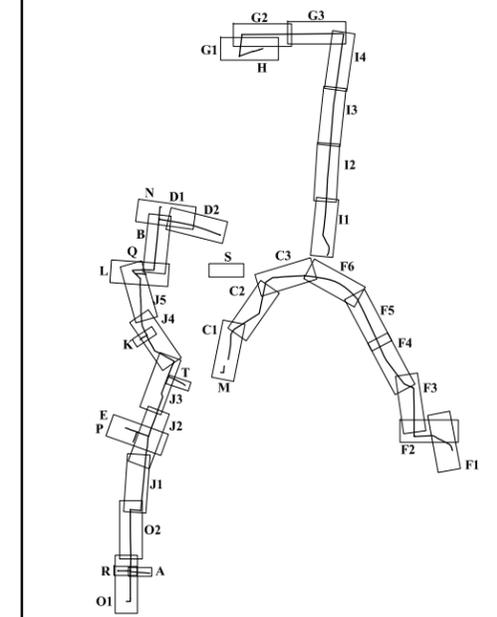
INTERSECTION DETAIL 2
C-08



INTERSECTION DETAIL 3
C-08



INTERSECTION DETAIL 4
C-07 C-08



- LEGEND**
- (FH) FIRE HYDRANT
 - (MH) MANHOLE
 - (FE) FLOWMETER
 - (AR) AIR RELEASE VALVE
 - ◻ REDUCER
 - ◻ GATE VALVE
 - ◻ BALL VALVE
 - ◻ CHECK VALVE
 - ◻ REMOVE PIPE
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 - GAS LINE
 - WASTEWATER LINE
 - BURIED ELECTRIC LINE
 - EX. WATER LINE
 - NEW WATER LINE
 - - - ABANDONED OR TO BE ABANDONED WATER LINE
 - - - MATCHLINE
 - (CA) CHLORINE ANALYZER
 - (BO) BLOWOFF VALVE
 - (SC) SERVICE CONNECTION
 - (FS) FIRE STAND
 - (TP) TRENCH PLUG
 - POSSIBLE UTILITY CROSSING AREA

1	AS-BUILT SET	HCD	1/2009
0	ISSUED FOR CONSTRUCTION	HCD	12/2007
REV.	DESCRIPTION	BY:	DATE:

REVISIONS

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**CAMP STANLEY STORAGE ACTIVITY
WATER SYSTEM REHABILITATION**

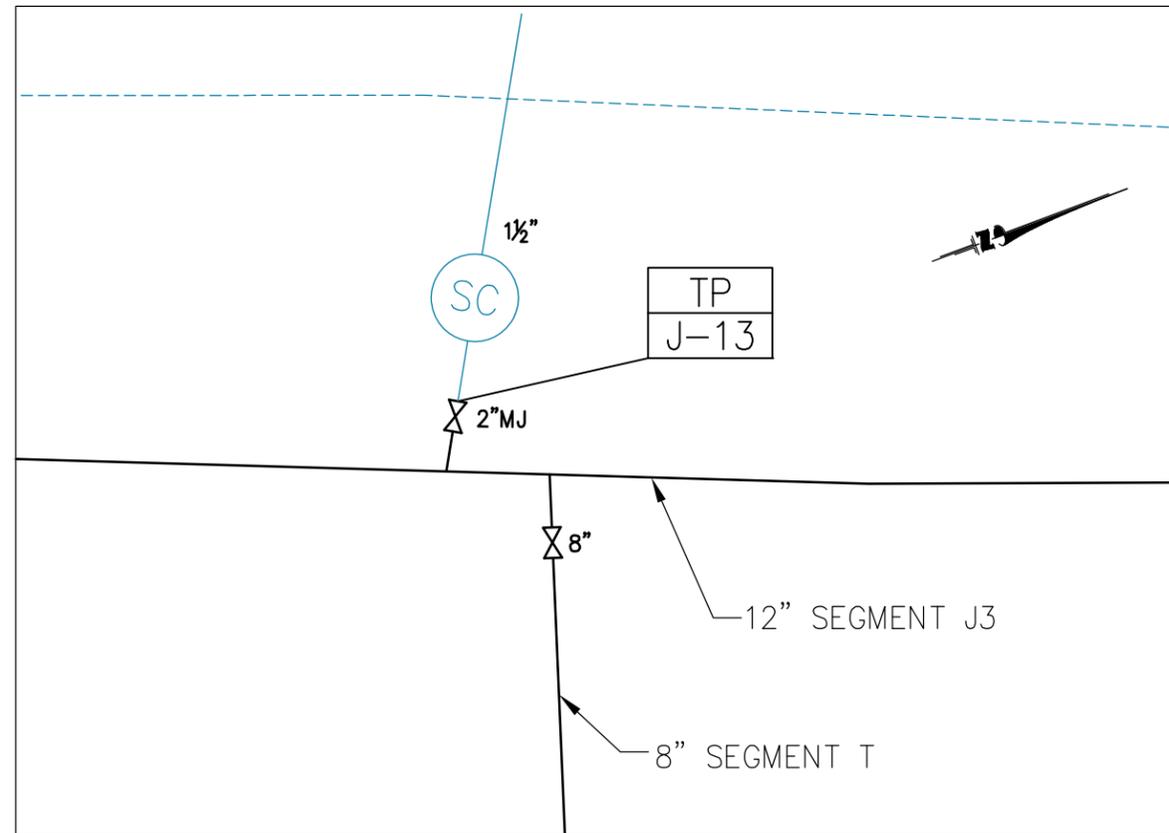
Contract No. FA8903-04-D-8675 Task Order No. 022

CONTRACTOR :
PARSONS Job No. 745006 WBS 03000

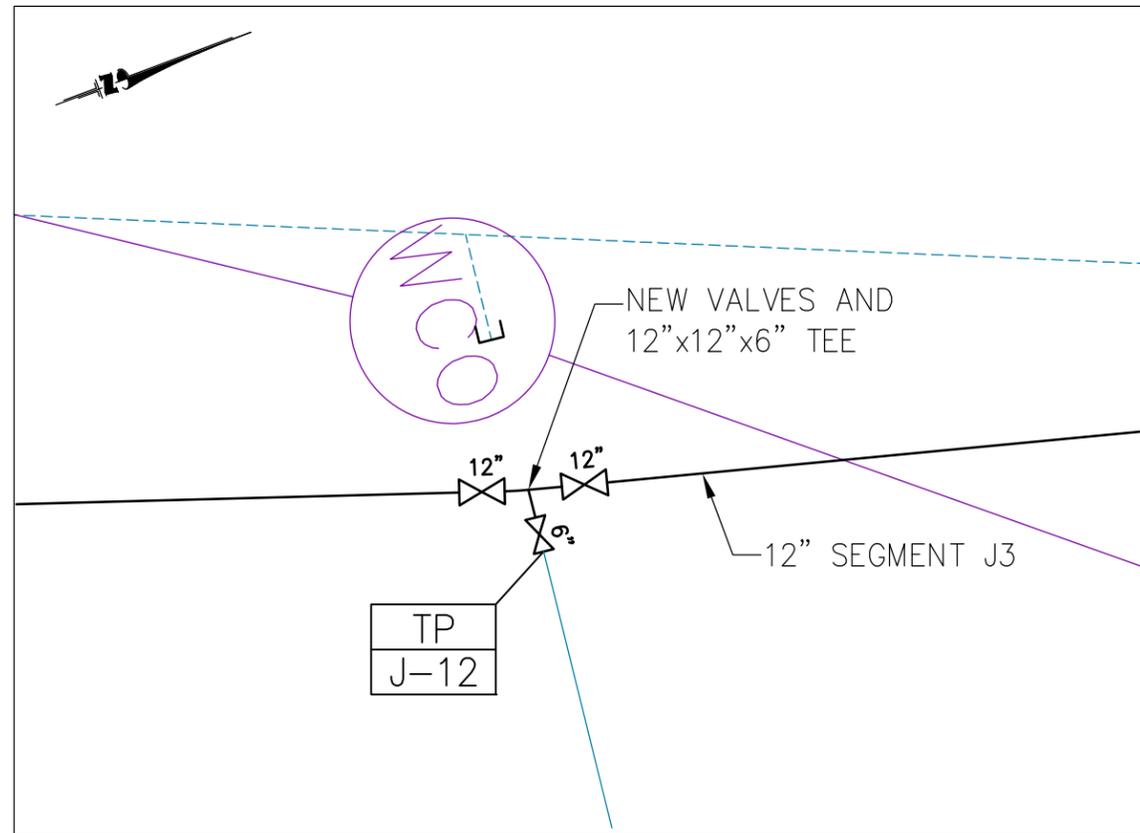
Drawing Title :
**INTERSECTION DETAILS FOR
SEGMENTS E (8") AND P (6")**

Designed : HCD	Drawn : JLH	Rev: 1
Checked : KMK	Approved :	
Scale : N.T.S.	Date : JANUARY 2009	Drawing No. : C-38

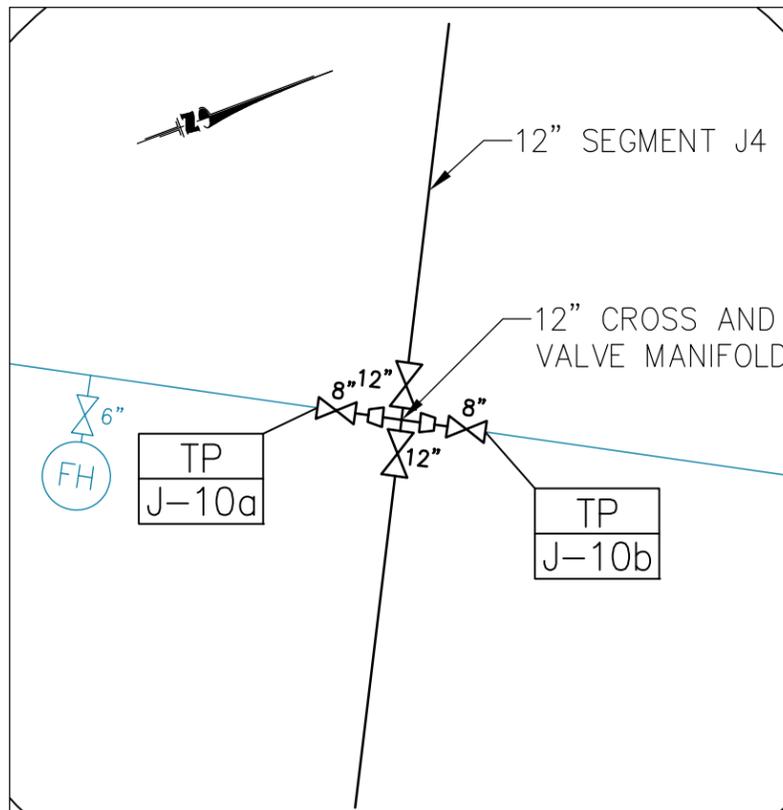
AS-BUILT
JANUARY 2009



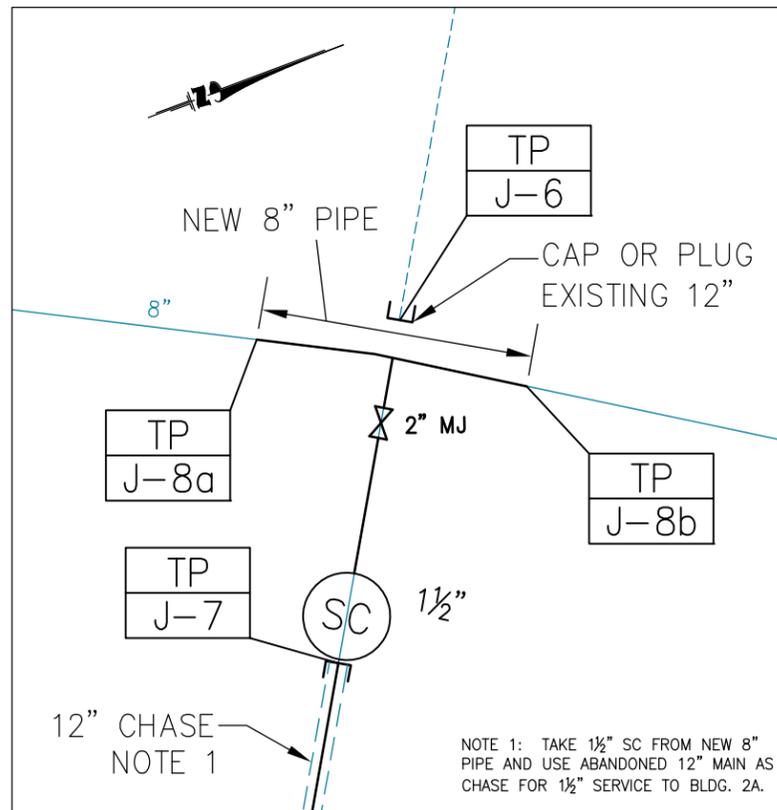
INTERSECTION DETAIL 1
C-09



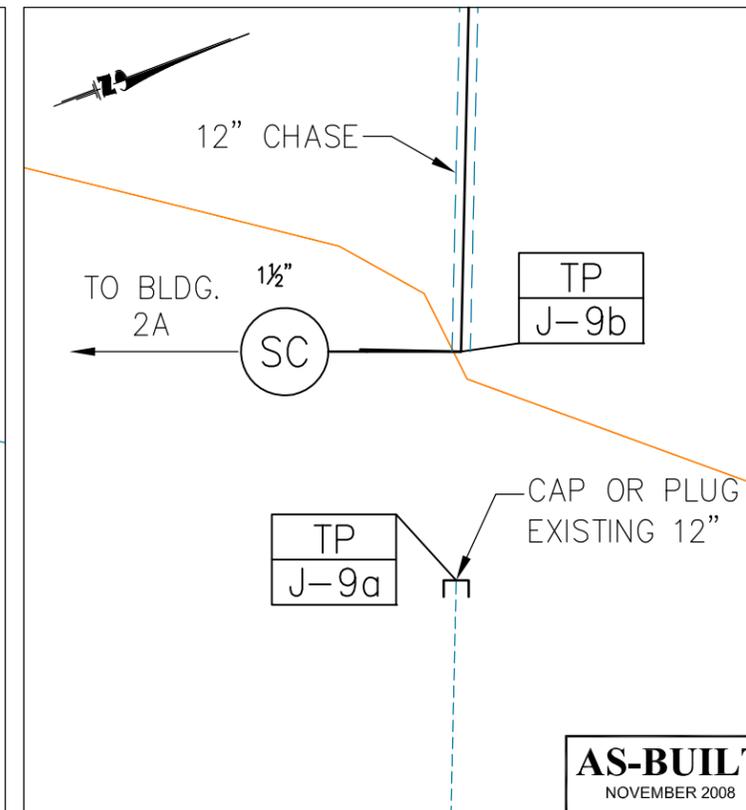
INTERSECTION DETAIL 2
C-09



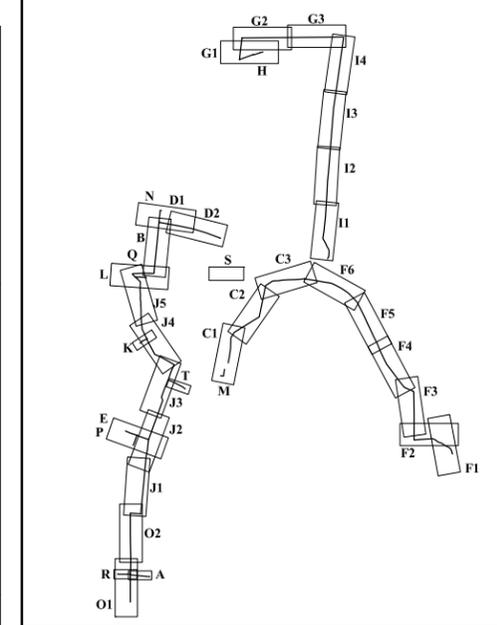
INTERSECTION DETAIL 3
C-10



INTERSECTION DETAIL 4
C-10



INTERSECTION DETAIL 5
C-10



- LEGEND**
- (FH) FIRE HYDRANT
 - (MH) MANHOLE
 - (FE) FLOWMETER
 - (AR) AIR RELEASE VALVE
 - ▽ REDUCER
 - ◇ GATE VALVE
 - BALL VALVE
 - ⊠ CHECK VALVE
 - ⊘ REMOVE PIPE
 - TP TIE POINT
 - GAS LINE
 - WASTEWATER LINE
 - BURIED ELECTRIC LINE
 - EX. WATER LINE
 - NEW WATER LINE
 - ABANDONED OR TO BE ABANDONED WATER LINE
 - - - MATCHLINE
 - (CA) CHLORINE ANALYZER
 - (BO) BLOWOFF VALVE
 - (SC) SERVICE CONNECTION
 - (FS) SADDLE CLAMP
 - (TP) TRENCH PLUG
 - POSSIBLE UTILITY CROSSING AREA

REV.	DESCRIPTION	BY:	DATE:
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0	ISSUED FOR CONSTRUCTION	HCD	12/2007

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**CAMP STANLEY STORAGE ACTIVITY
WATER SYSTEM REHABILITATION**

Contract No. FA8903-04-D-8675 Task Order No. 022

CONTRACTOR : **PARSONS** Job No. 745006 WBS 03000

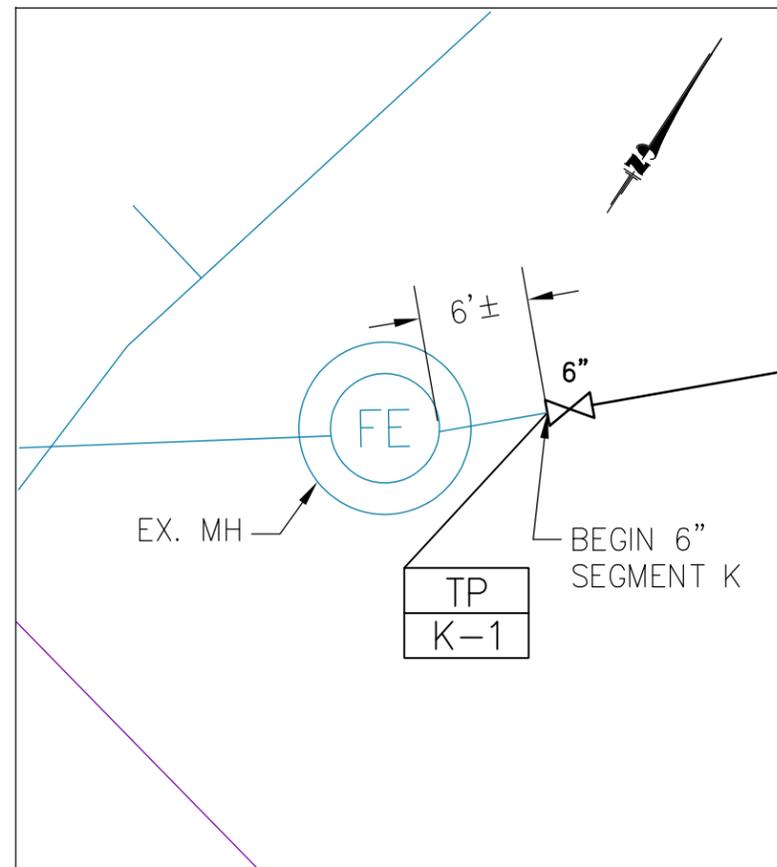
Drawing Title : **INTERSECTION DETAILS FOR SEGMENTS J3 (12") AND J4 (12")**

Designed : HCD Drawn : JLH Rev: 1

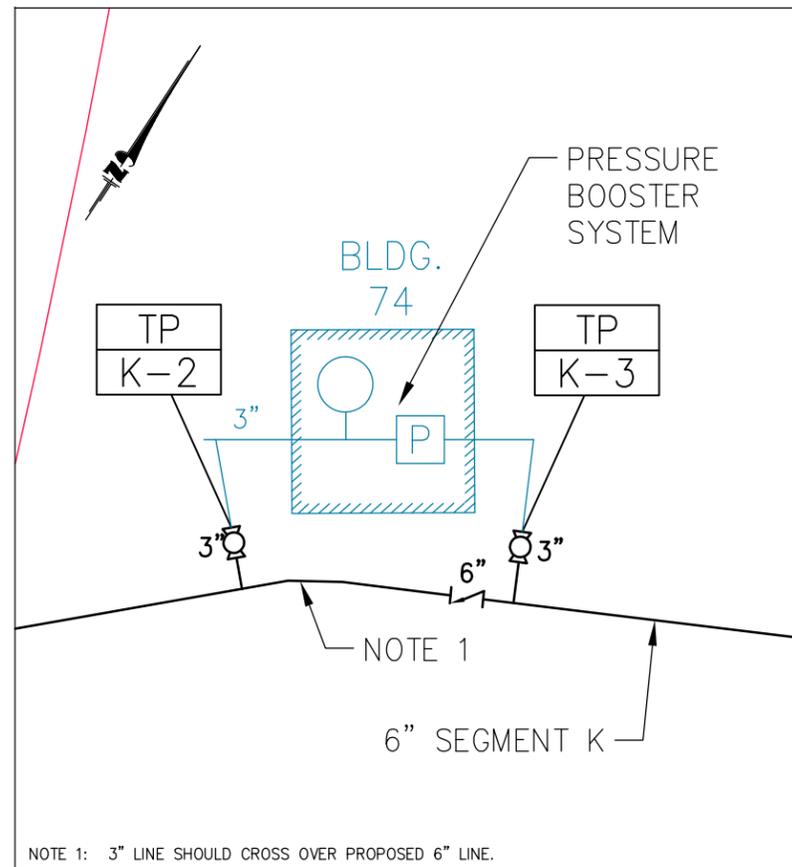
Checked : KMK Approved :

Scale : N.T.S. Date : NOVEMBER 2008 Drawing No. : C-39

AS-BUILT
NOVEMBER 2008

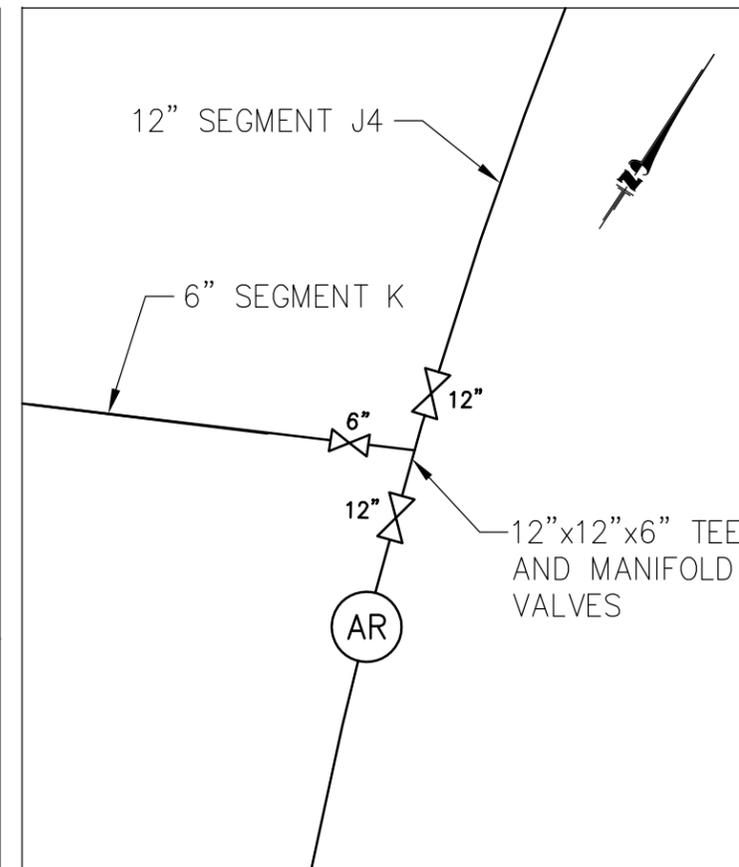


INTERSECTION DETAIL 1
C-11

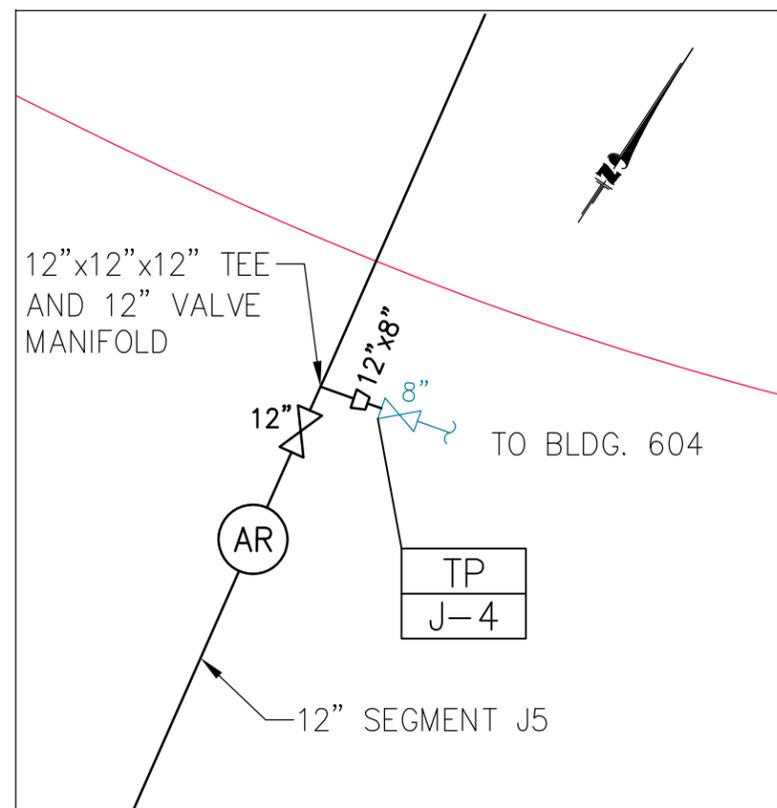


NOTE 1: 3" LINE SHOULD CROSS OVER PROPOSED 6" LINE.

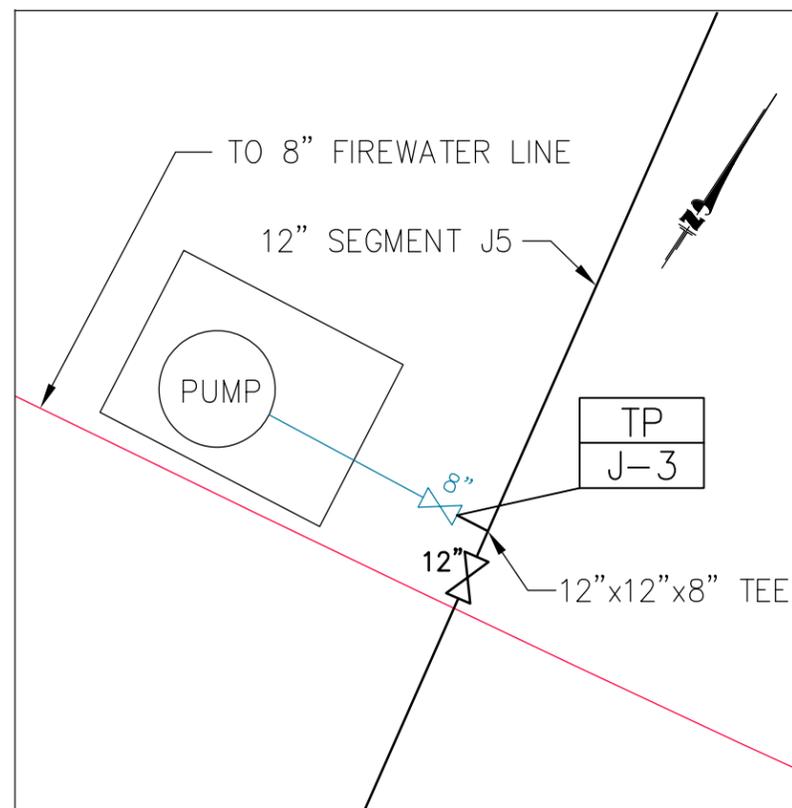
INTERSECTION DETAIL 2
C-11



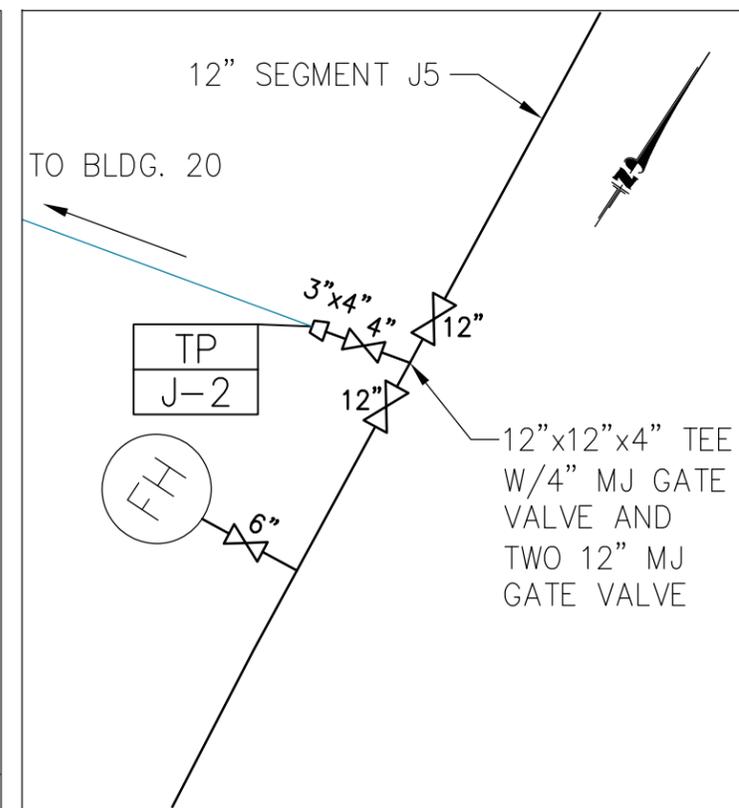
INTERSECTION DETAIL 3
C-10 C-11



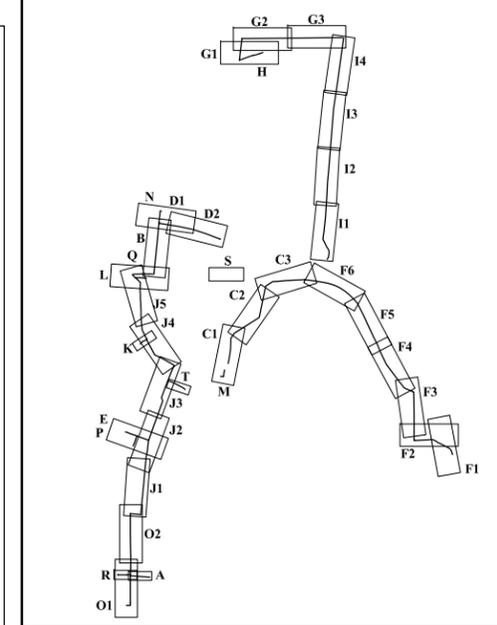
INTERSECTION DETAIL 4
C-12



INTERSECTION DETAIL 5
C-12



INTERSECTION DETAIL 6
C-12



LEGEND

(FH) FIRE HYDRANT	(CA) CHLORINE ANALYZER
(MH) MANHOLE	(BO) BLOWOFF VALVE
(FE) FLOWMETER	(SC) SERVICE CONNECTION
(AR) AIR RELEASE VALVE	(FS) FIRE STAND
◻ REDUCER	(TP) TRENCH PLUG
⊗ GATE VALVE	◻ POSSIBLE UTILITY CROSSING AREA
⊙ BALL VALVE	
✓ CHECK VALVE	
⊘ REMOVE PIPE	
TP TIE POINT	
— GAS LINE	
— WASTEWATER LINE	
— BURIED ELECTRIC LINE	
— EX. WATER LINE	
— NEW WATER LINE	
--- ABANDONED OR TO BE ABANDONED WATER LINE	
--- MATCHLINE	



1	AS-BUILT SET	HCD	1/2009
0	ISSUED FOR CONSTRUCTION	HCD	12/2007
REV.	DESCRIPTION	BY:	DATE:

REVISIONS

SCALES SHOWN ON THIS DRAWING ARE APPLICABLE ONLY TO D SIZE DRAWING

CAMP STANLEY STORAGE ACTIVITY WATER SYSTEM REHABILITATION

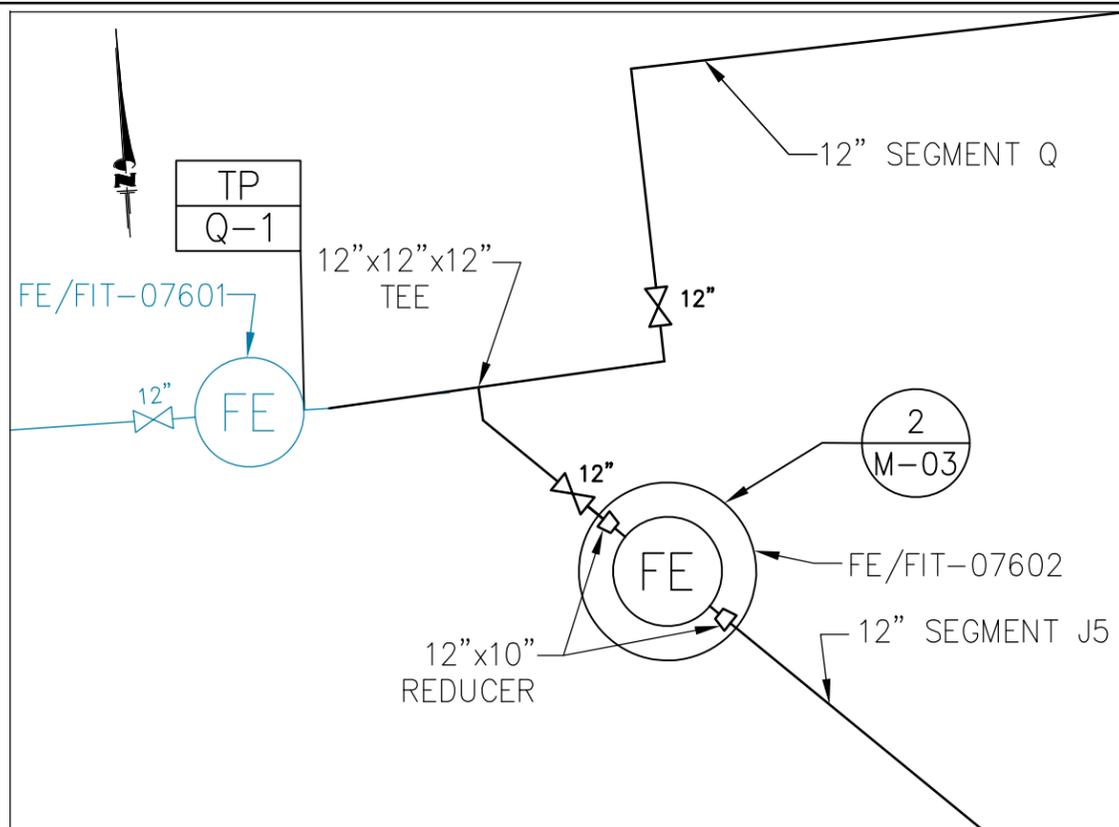
Contract No. FA8903-04-D-8675 Task Order No. 022

CONTRACTOR : **PARSONS** Job No. 745006 WBS 03000

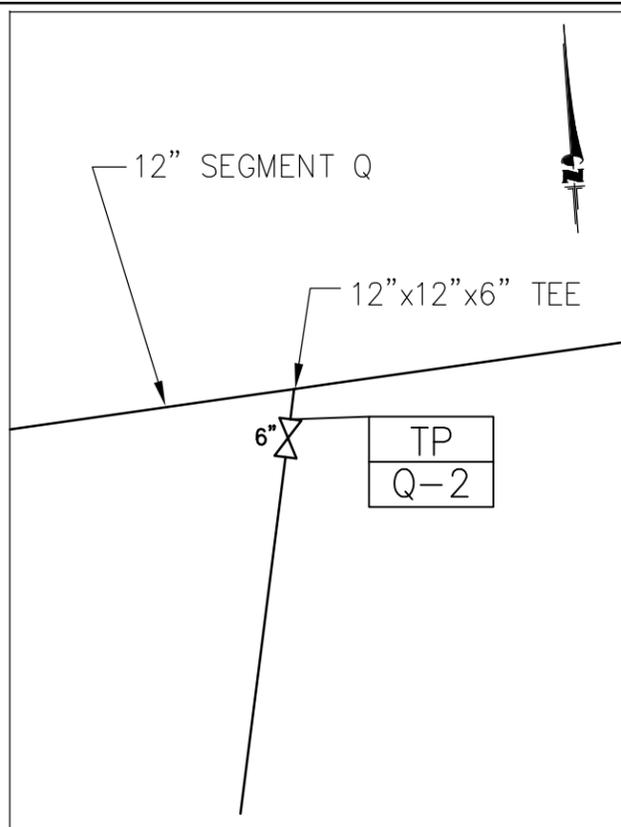
Drawing Title : **INTERSECTION DETAILS FOR SEGMENTS K (6") & J5 (12")**

Designed : HCD	Drawn : JLH	Rev: 1
Checked : KMK	Approved :	
Scale : N.T.S.	Date : JANUARY 2009	Drawing No. : C-40

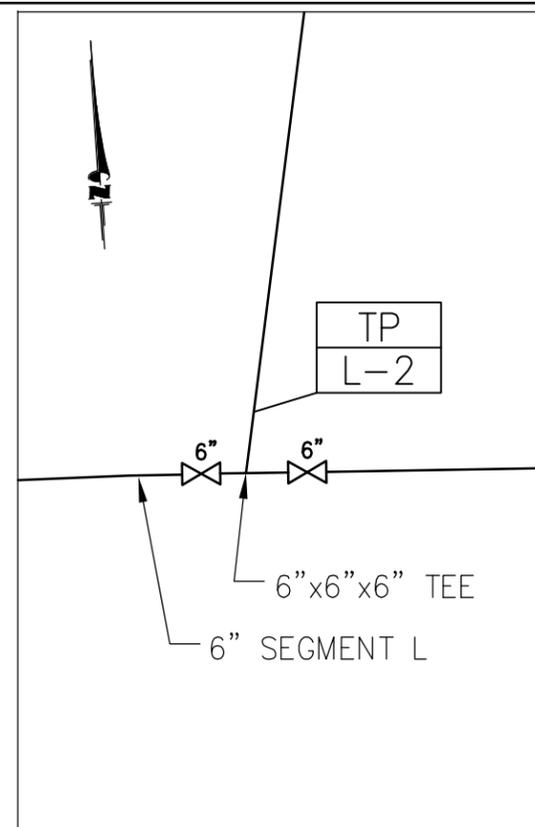
AS-BUILT
JANUARY 2009



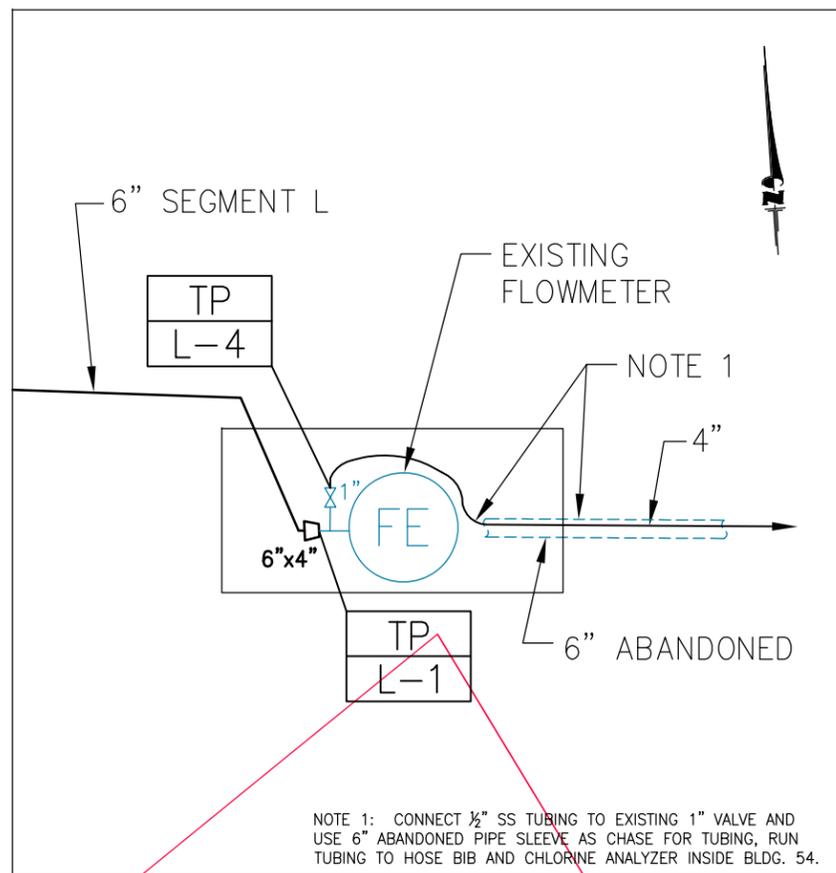
INTERSECTION DETAIL 1
C-12 C-13



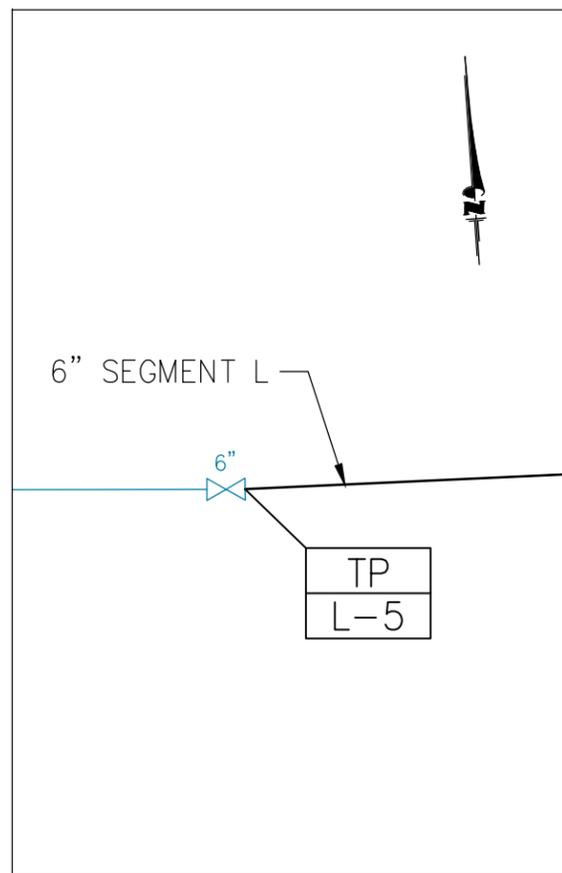
INTERSECTION DETAIL 2
C-13



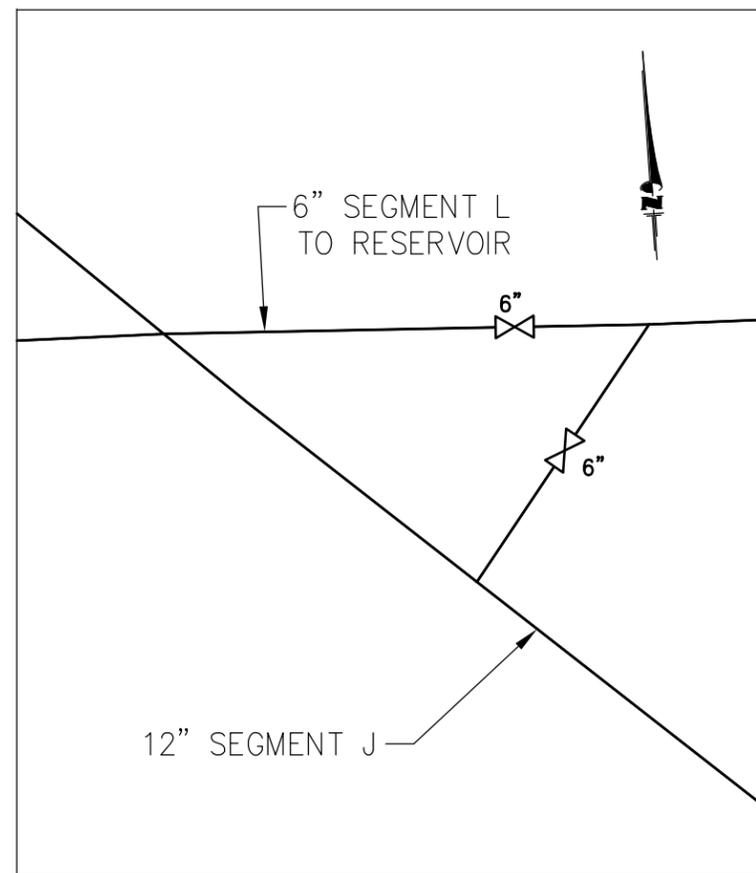
INTERSECTION DETAIL 3
C-13



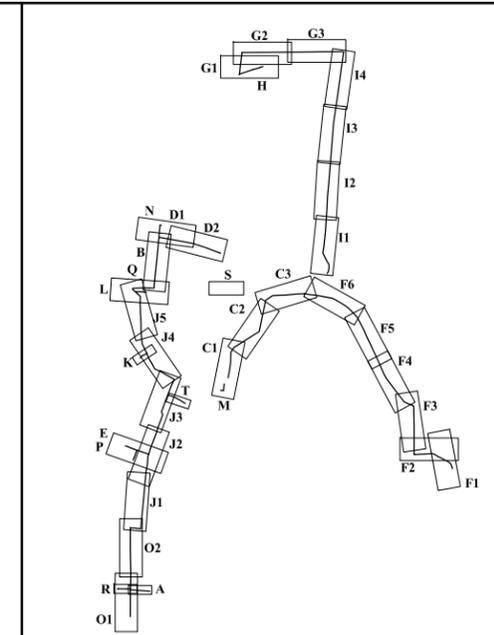
INTERSECTION DETAIL 4
C-13



INTERSECTION DETAIL 5
C-13



INTERSECTION DETAIL 6
C-13



- LEGEND**
- (FH) FIRE HYDRANT
 - (MH) MANHOLE
 - (FE) FLOWMETER
 - (AR) AIR RELEASE VALVE
 - ◻ REDUCER
 - ◻ GATE VALVE
 - ◻ BALL VALVE
 - ◻ CHECK VALVE
 - ◻ REMOVE PIPE
 - TP TIE POINT
 - GAS LINE
 - WASTEWATER LINE
 - BURIED ELECTRIC LINE
 - EX. WATER LINE
 - NEW WATER LINE
 - - - ABANDONED OR TO BE ABANDONED WATER LINE
 - - - MATCHLINE
 - (CA) CHLORINE ANALYZER
 - (BO) BLOWOFF VALVE
 - (SC) SERVICE CONNECTION
 - (FS) SADDLE CLAMP
 - (TP) TRENCH PLUG
 - POSSIBLE UTILITY CROSSING AREA

REV.	DESCRIPTION	BY:	DATE:
1	AS-BUILT SET	HCD	11/2008
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REVISIONS

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**CAMP STANLEY STORAGE ACTIVITY
WATER SYSTEM REHABILITATION**

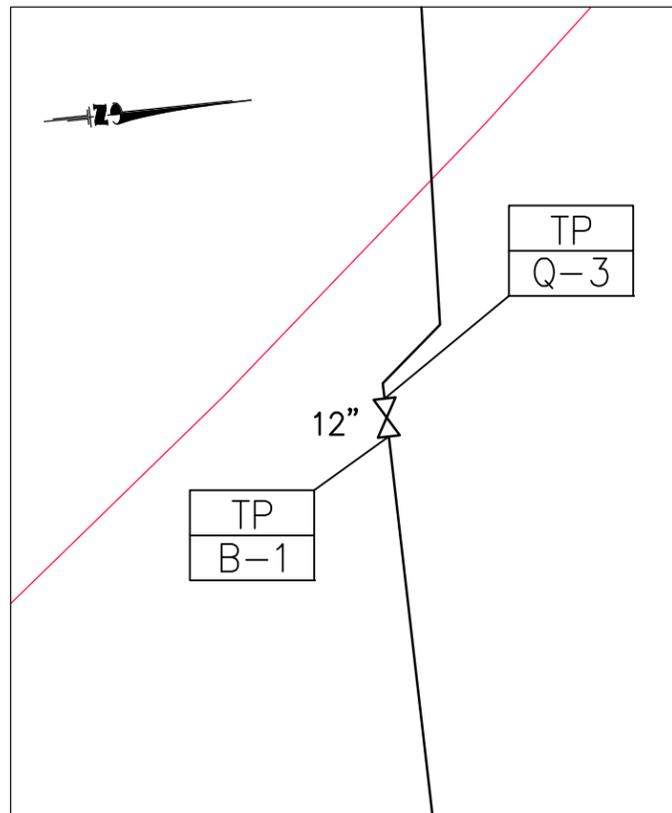
Contract No. FA8903-04-D-8675 Task Order No. 022

CONTRACTOR :
PARSONS Job No. 745006 WBS 03000

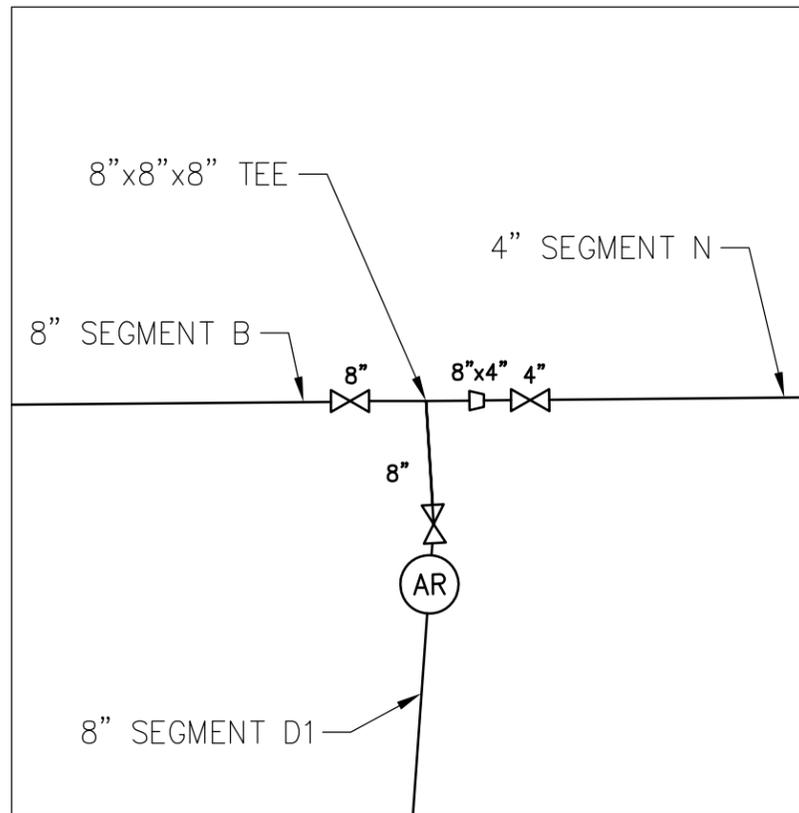
Drawing Title :
**INTERSECTION DETAILS FOR
SEGMENT L (6") AND
SEGMENT Q (12")**

Designed : HCD	Drawn : JLH	Rev: 1
Checked : KMK	Approved :	
Scale : N.T.S.	Date : NOVEMBER 2008	Drawing No. : C-41

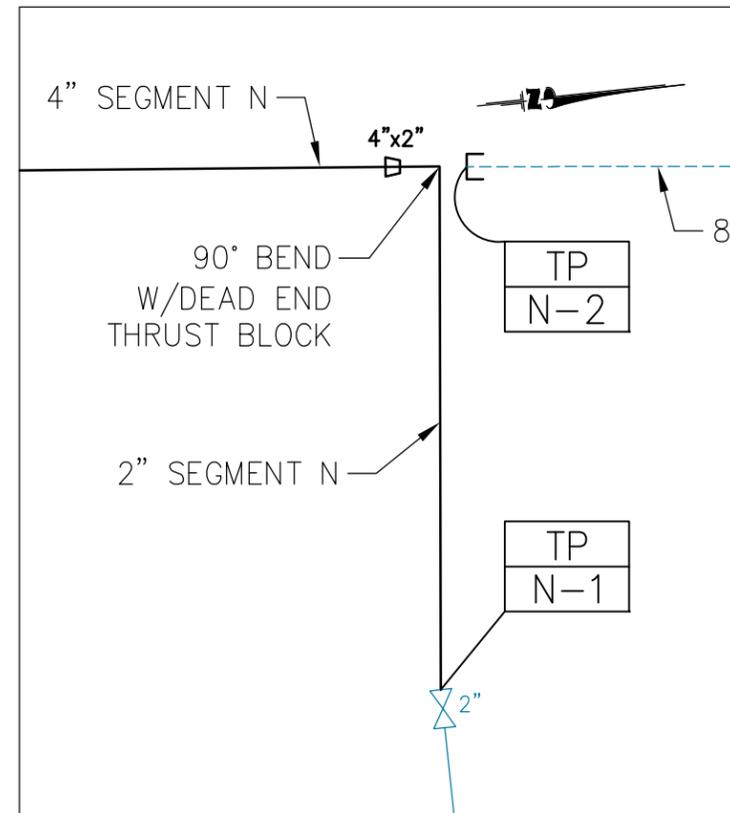
AS-BUILT
NOVEMBER 2008



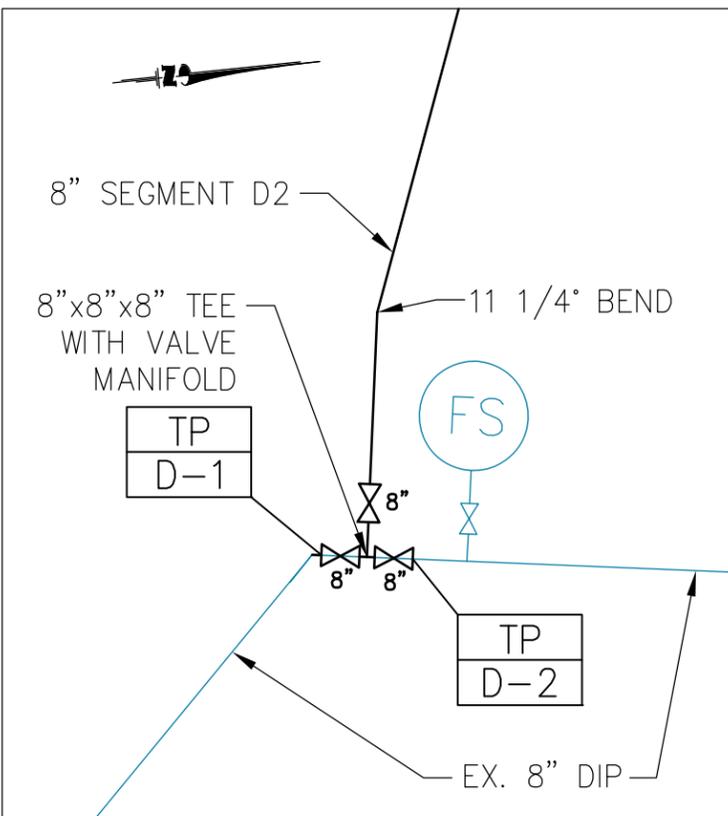
INTERSECTION DETAIL 1
C-14



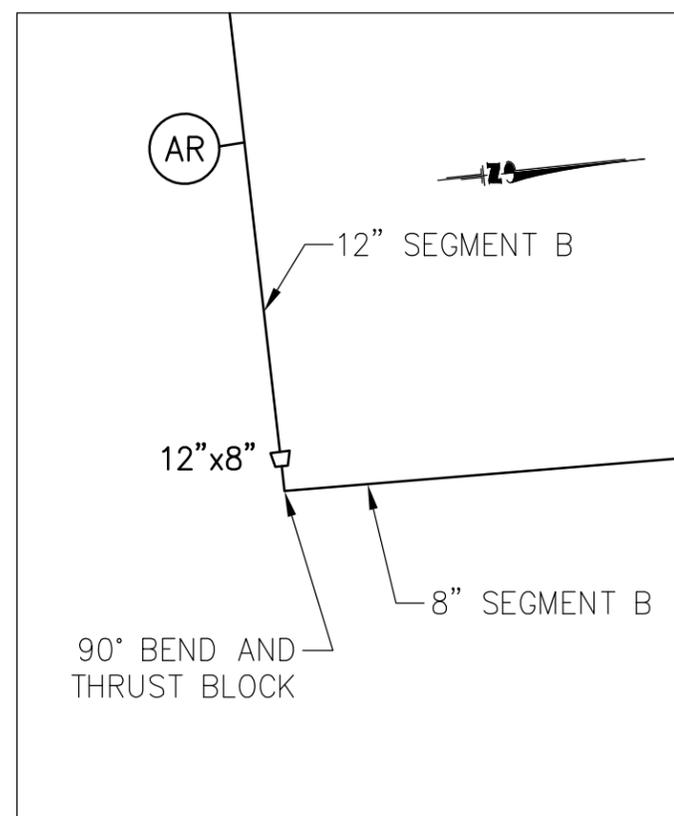
INTERSECTION DETAIL 2
C-14



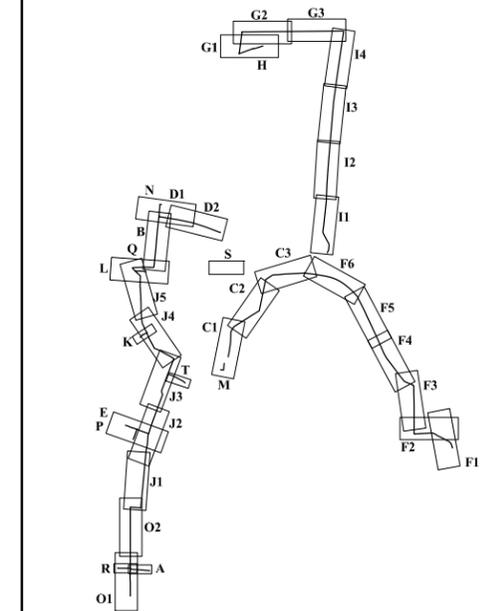
INTERSECTION DETAIL 3
C-15



INTERSECTION DETAIL 4
C-16



INTERSECTION DETAIL 5
C-14



LEGEND

- (FH) FIRE HYDRANT
- (MH) MANHOLE
- (FE) FLOWMETER
- (AR) AIR RELEASE VALVE
- ◻ REDUCER
- ⊗ GATE VALVE
- ⊙ BALL VALVE
- ⊗ CHECK VALVE
- (CA) CHLORINE ANALYZER
- (BO) BLOWOFF VALVE
- (SC) SERVICE CONNECTION
- (FS) FIRE STAND
- (TP) TRENCH PLUG
- ⚡ POSSIBLE UTILITY CROSSING AREA
- ⊘ REMOVE PIPE
- TP TIE POINT
- GAS LINE
- WASTEWATER LINE
- BURIED ELECTRIC LINE
- EX. WATER LINE
- NEW WATER LINE
- - - ABANDONED OR TO BE ABANDONED WATER LINE
- - - MATCHLINE

REV.	DESCRIPTION	BY:	DATE:
1	AS-BUILT SET	HCD	11/2008
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R E V I S I O N S

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**CAMP STANLEY STORAGE ACTIVITY
WATER SYSTEM REHABILITATION**

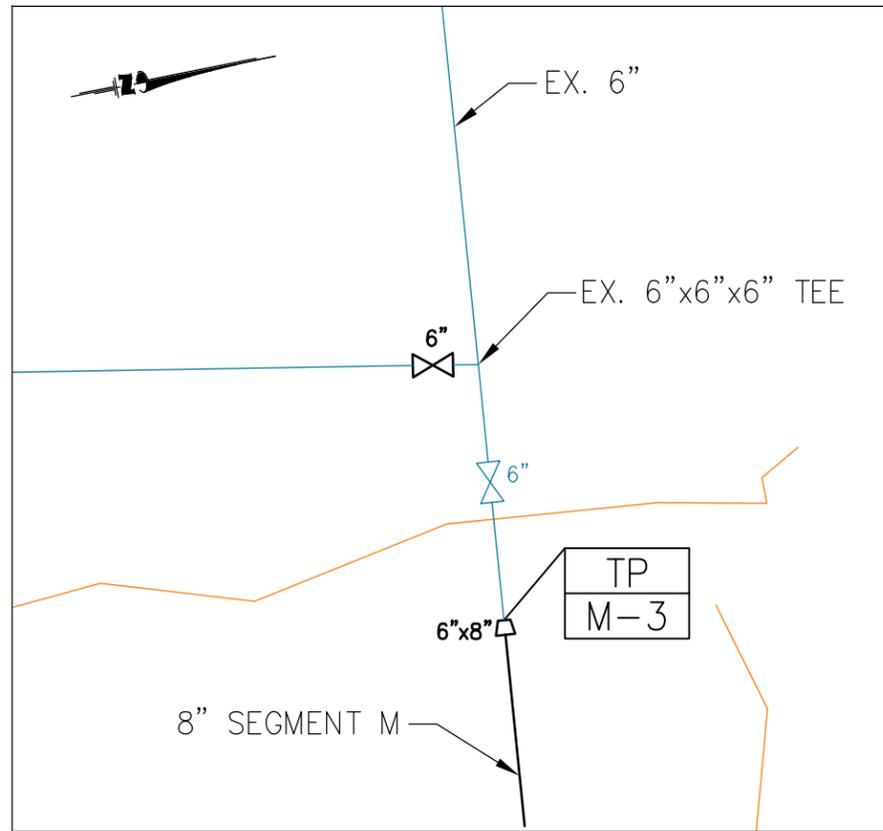
Contract No. FA8903-04-D-8675 Task Order No. 022

CONTRACTOR :
PARSONS Job No. 745006 WBS 03000

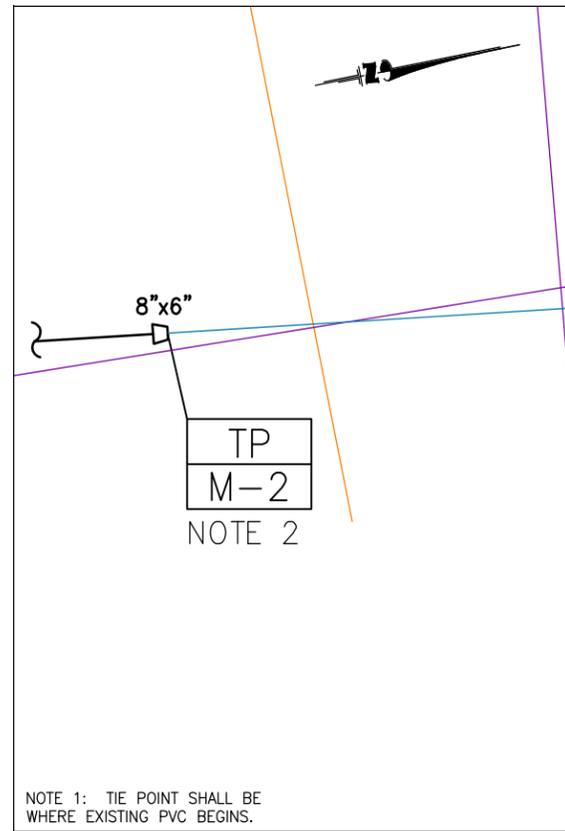
Drawing Title :
**INTERSECTION DETAILS FOR
SEGMENTS B (8"), D1 (8"), D2 (8"),
N (4"), AND T (8")**

Designed : HCD	Drawn : JLH	Rev: 1
Checked : KMK	Approved :	
Scale : N.T.S.	Date : NOVEMBER 2008	Drawing No. : C-42

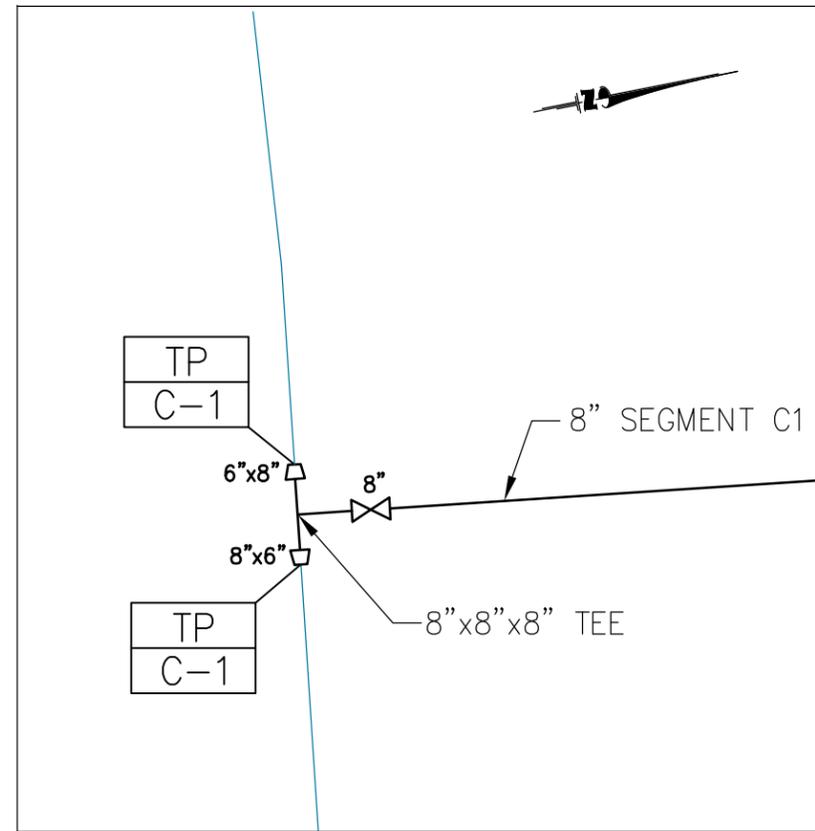
AS-BUILT
NOVEMBER 2008



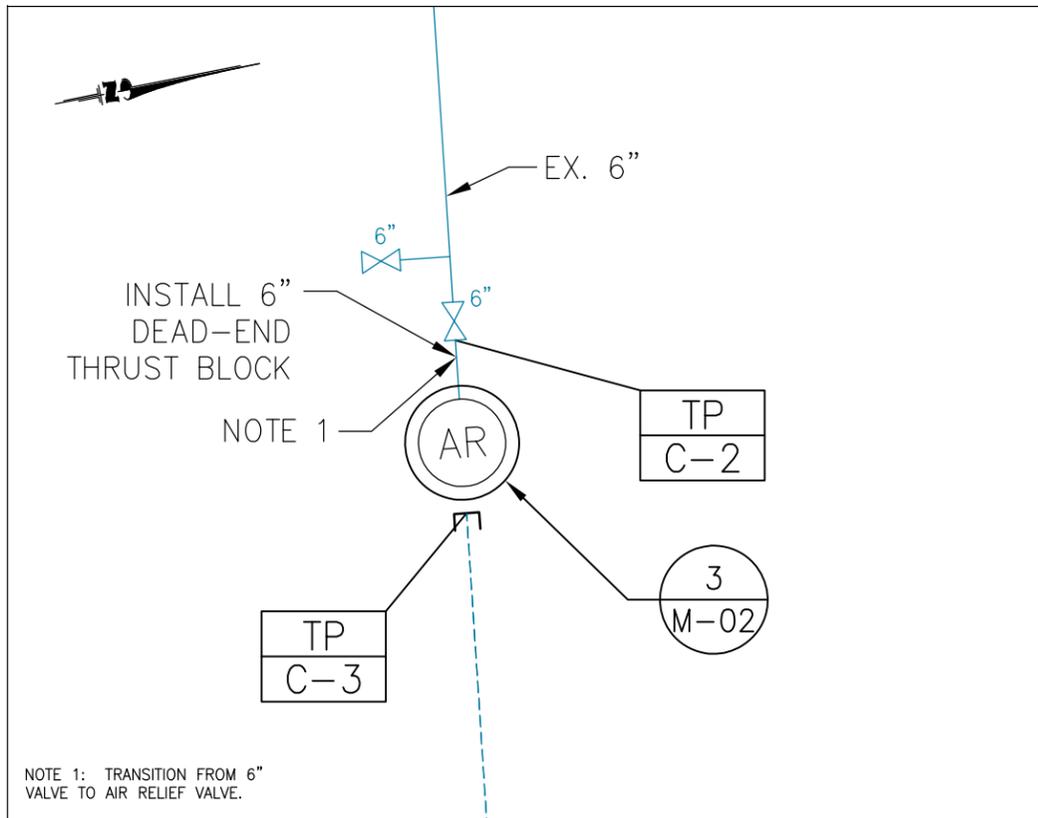
INTERSECTION DETAIL 1
C-17



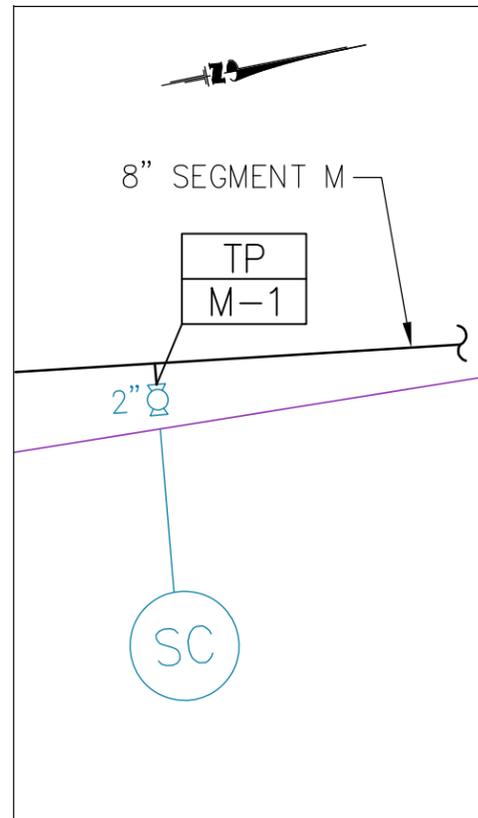
INTERSECTION DETAIL 2
C-17



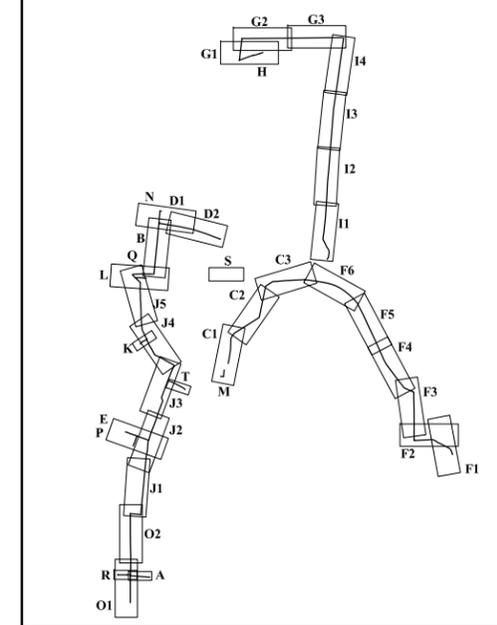
INTERSECTION DETAIL 3
C-17



INTERSECTION DETAIL 4
C-17



INTERSECTION DETAIL 5
C-17



- LEGEND**
- (FH) FIRE HYDRANT
 - (MH) MANHOLE
 - (FE) FLOWMETER
 - (AR) AIR RELEASE VALVE
 - ▽ REDUCER
 - ⊗ GATE VALVE
 - ⊙ BALL VALVE
 - ⊠ CHECK VALVE
 - ⊘ REMOVE PIPE
 - TP TIE POINT
 - GAS LINE
 - WASTEWATER LINE
 - BURIED ELECTRIC LINE
 - EX. WATER LINE
 - NEW WATER LINE
 - - - ABANDONED OR TO BE ABANDONED WATER LINE
 - - - MATCHLINE
 - (CA) CHLORINE ANALYZER
 - (BO) BLOWOFF VALVE
 - (SC) SERVICE CONNECTION
 - (FS) SADDLE CLAMP
 - (TP) TRENCH PLUG
 - ⊠ POSSIBLE UTILITY CROSSING AREA

REV.	DESCRIPTION	BY:	DATE:
1	AS-BUILT SET	HCD	11/2008
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REVISIONS

SCALES SHOWN ON THIS DRAWING ARE APPLICABLE ONLY TO D SIZE DRAWING

**CAMP STANLEY STORAGE ACTIVITY
WATER SYSTEM REHABILITATION**

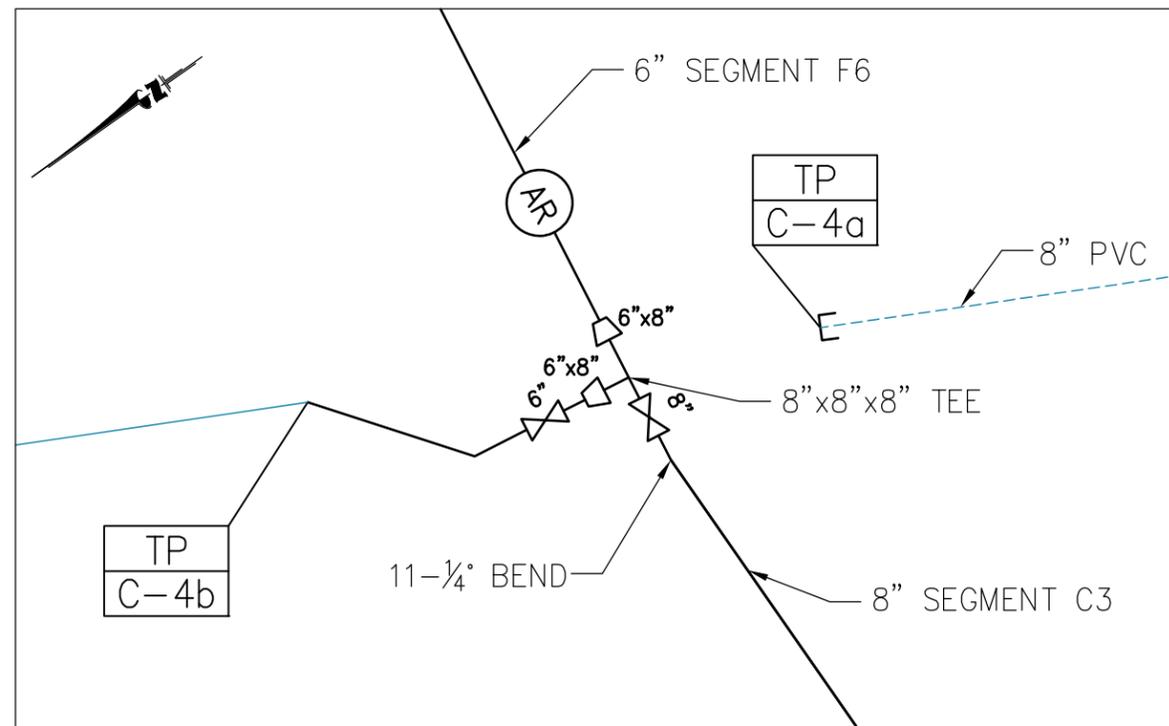
Contract No. FA8903-04-D-8675 Task Order No. 022

CONTRACTOR :
PARSONS Job No. 745006 WBS 03000

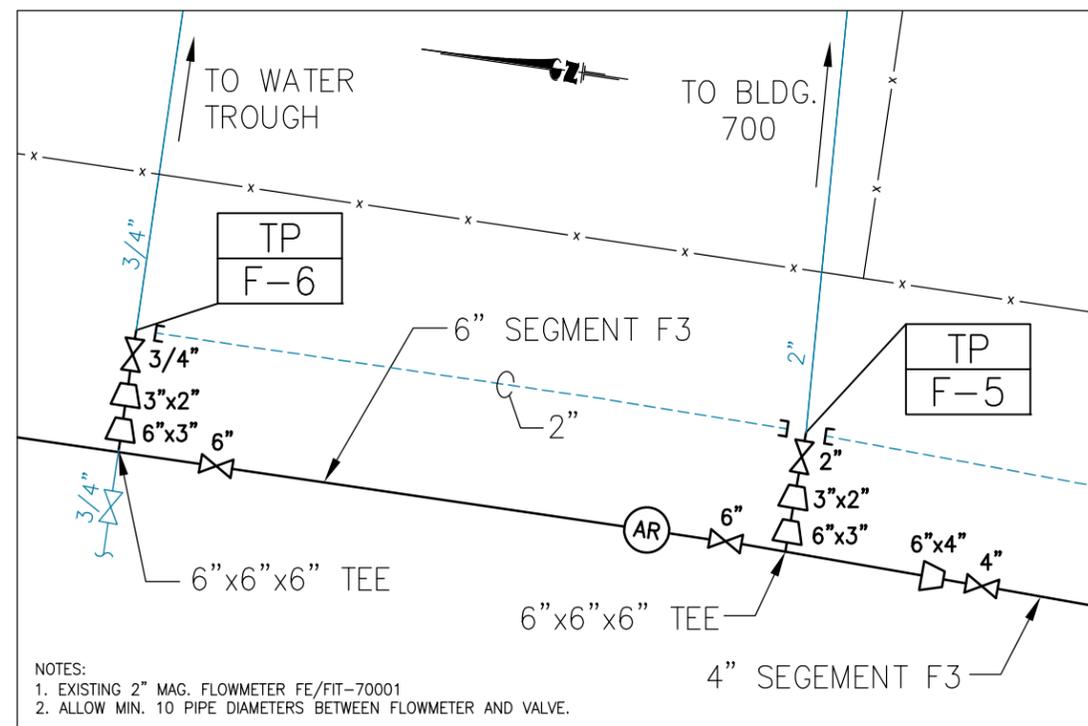
Drawing Title :
**INTERSECTION DETAILS FOR
SEGMENT M (8")
SEGMENT C1 (8")**

Designed : HCD	Drawn : JLH	Rev: 1
Checked : KMK	Approved :	
Scale : N.T.S.	Date : NOVEMBER 2008	Drawing No. : C-43

AS-BUILT
NOVEMBER 2008

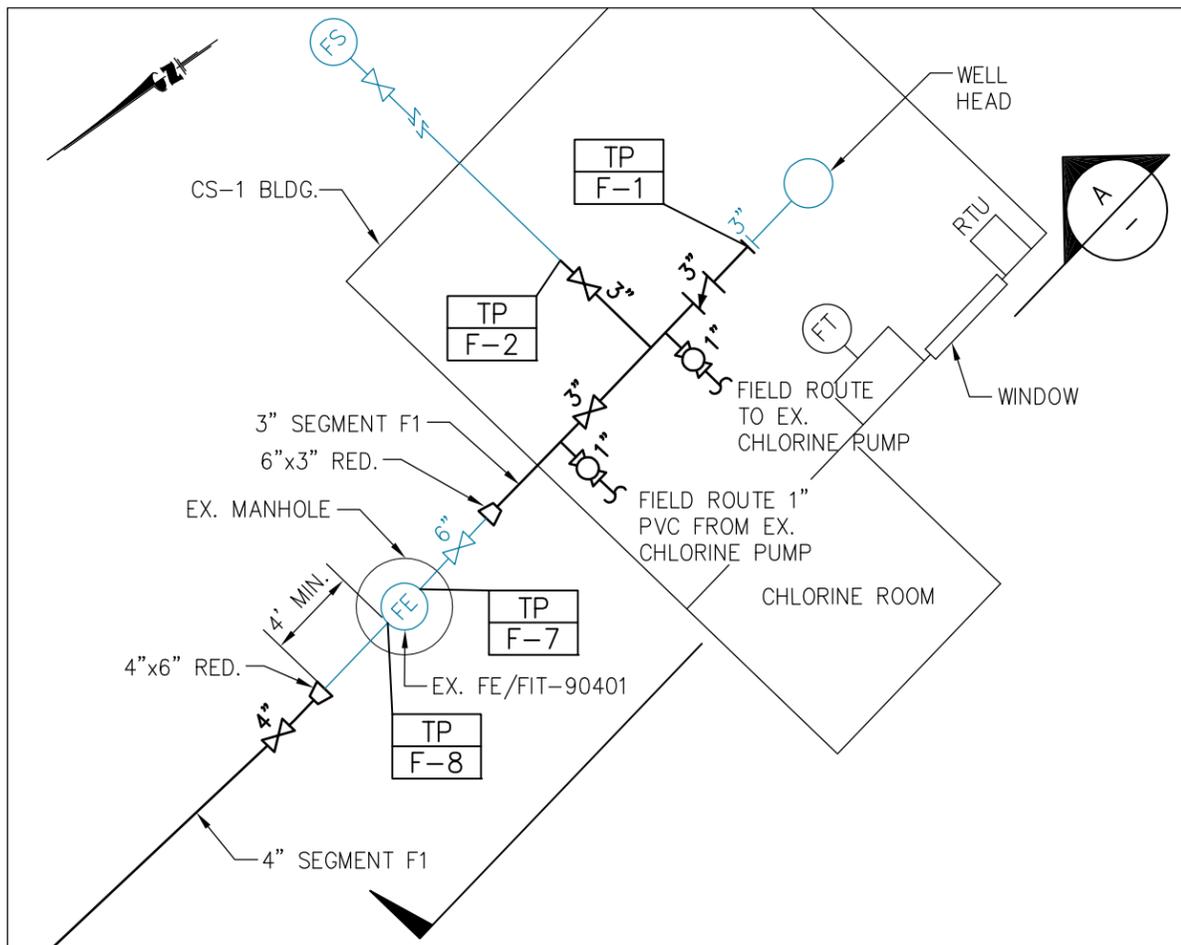


INTERSECTION DETAIL 1
C-19 C-20

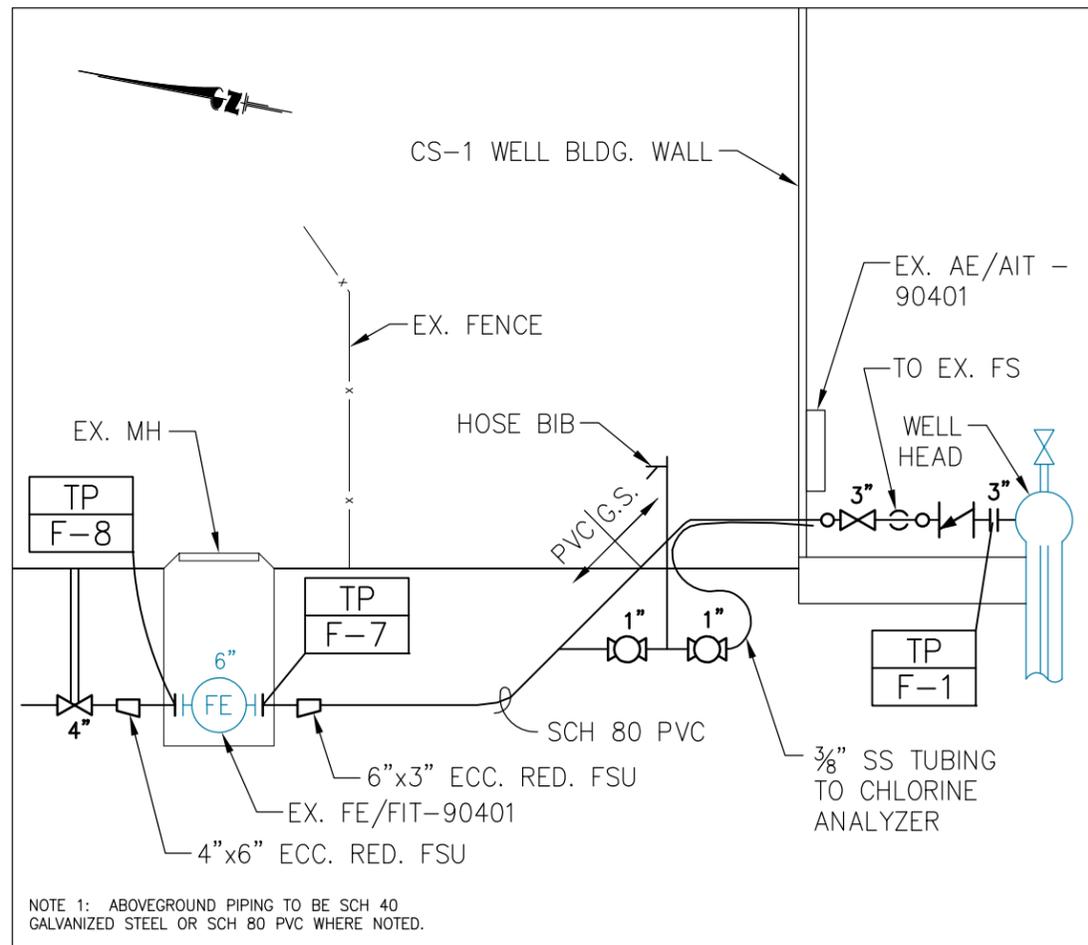


NOTES:
1. EXISTING 2" MAG. FLOWMETER FE/FIT-70001
2. ALLOW MIN. 10 PIPE DIAMETERS BETWEEN FLOWMETER AND VALVE.

INTERSECTION DETAIL 2
C-23

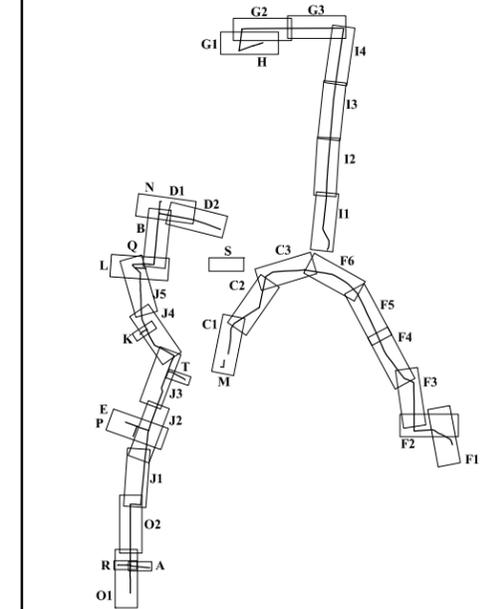


INTERSECTION DETAIL 3
C-25



NOTE 1: ABOVEGROUND PIPING TO BE SCH 40 GALVANIZED STEEL OR SCH 80 PVC WHERE NOTED.

INSTALLATION SECTION A



- LEGEND**
- (FH) FIRE HYDRANT
 - (MH) MANHOLE
 - (FE) FLOWMETER
 - (AR) AIR RELEASE VALVE
 - ▽ REDUCER
 - ⊗ GATE VALVE
 - ⊙ BALL VALVE
 - ⊣ CHECK VALVE
 - (REMOVE PIPE)
 - (TP) TIE POINT
 - GAS LINE
 - WASTEWATER LINE
 - BURIED ELECTRIC LINE
 - EX. WATER LINE
 - NEW WATER LINE
 - ABANDONED OR TO BE ABANDONED WATER LINE
 - MATCHLINE
 - (CA) CHLORINE ANALYZER
 - (BO) BLOWOFF VALVE
 - (SC) SERVICE CONNECTION
 - (FS) SADDLE CLAMP
 - (TP) TRENCH PLUG
 - POSSIBLE UTILITY CROSSING AREA

REV.	DESCRIPTION	BY:	DATE:
1	AS-BUILT SET	HCD	11/2008
0	ISSUED FOR CONSTRUCTION	HCD	12/2007

REVISIONS

SCALES SHOWN ON THIS DRAWING ARE APPLICABLE ONLY TO D SIZE DRAWING

CAMP STANLEY STORAGE ACTIVITY WATER SYSTEM REHABILITATION

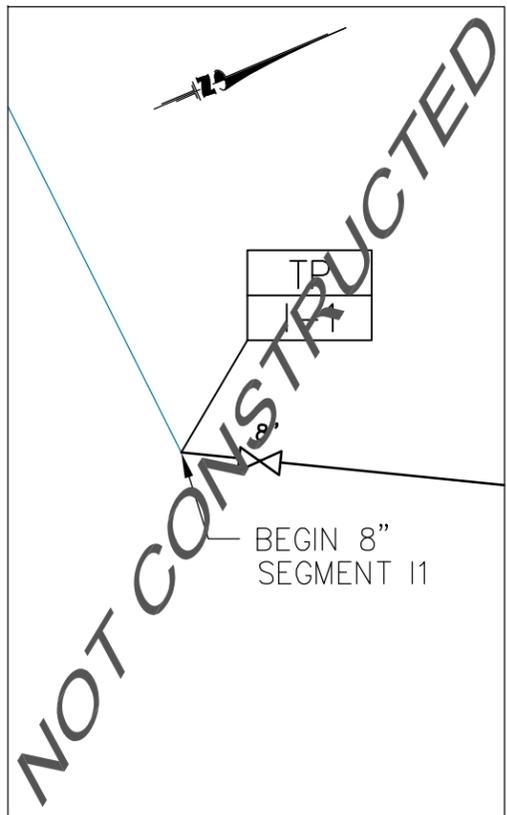
Contract No. FA8903-04-D-8675 Task Order No. 022

CONTRACTOR : **PARSONS** Job No. 745006 WBS 03000

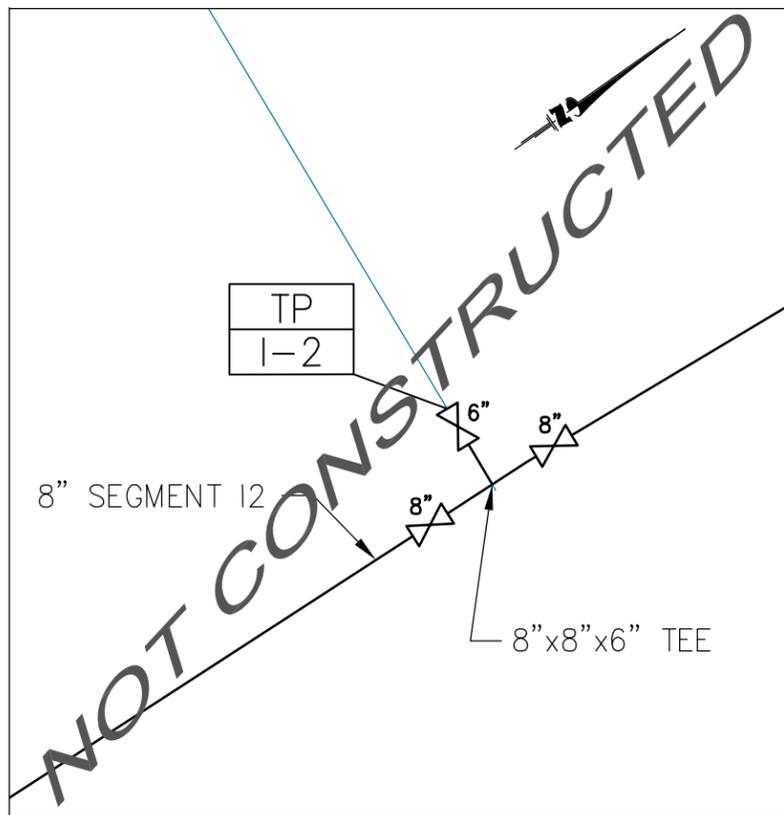
Drawing Title : **INTERSECTION DETAILS FOR SEGMENT C3 (8") SEGMENT F**

Designed : HCD	Drawn : JLH	Rev: 1
Checked : KMK	Approved :	
Scale : N.T.S.	Date : NOVEMBER 2008	Drawing No. : C-44

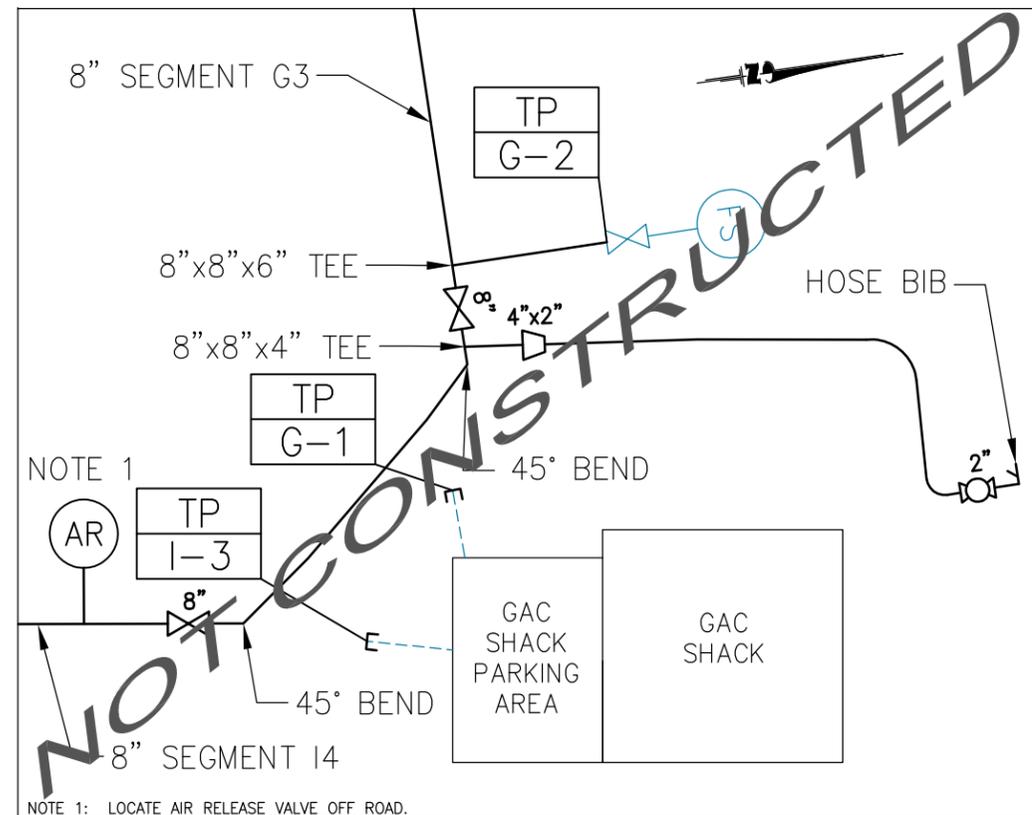
AS-BUILT
NOVEMBER 2008



INTERSECTION DETAIL 1
C-26

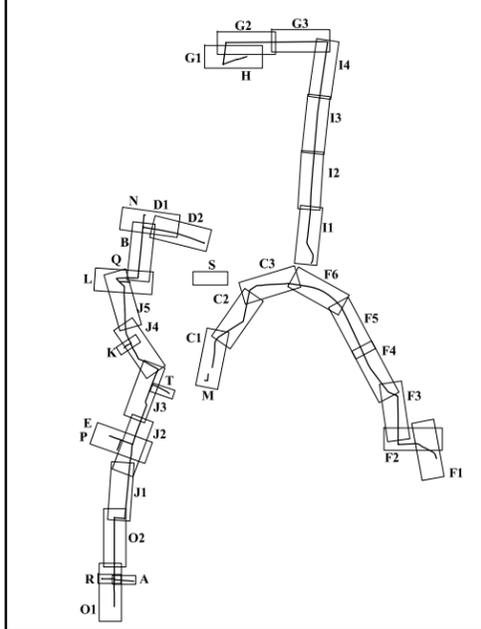


INTERSECTION DETAIL 2
C-27

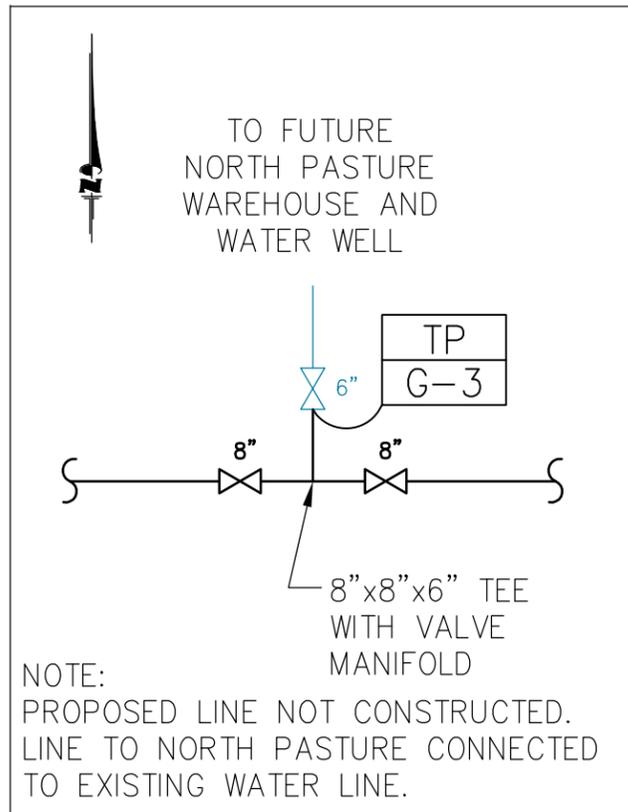


NOTE 1: LOCATE AIR RELEASE VALVE OFF ROAD.

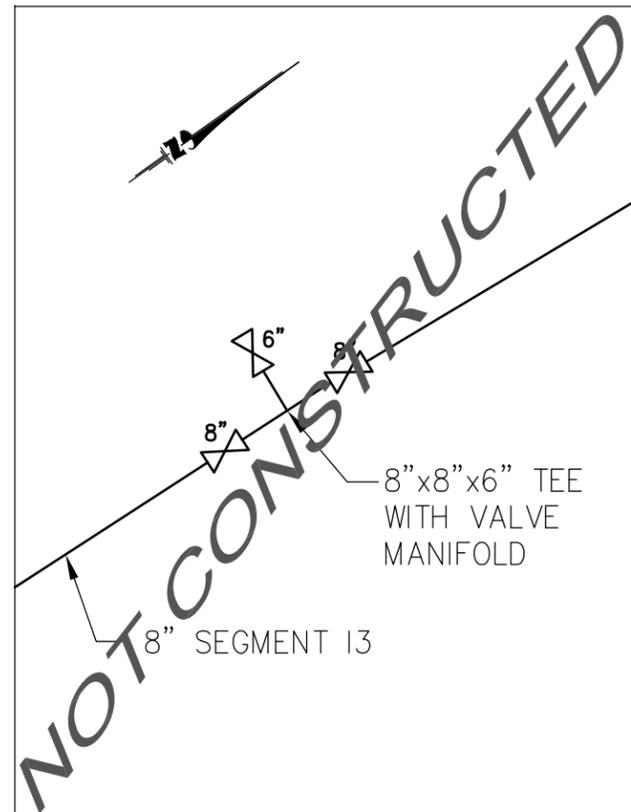
INTERSECTION DETAIL 3
C-29



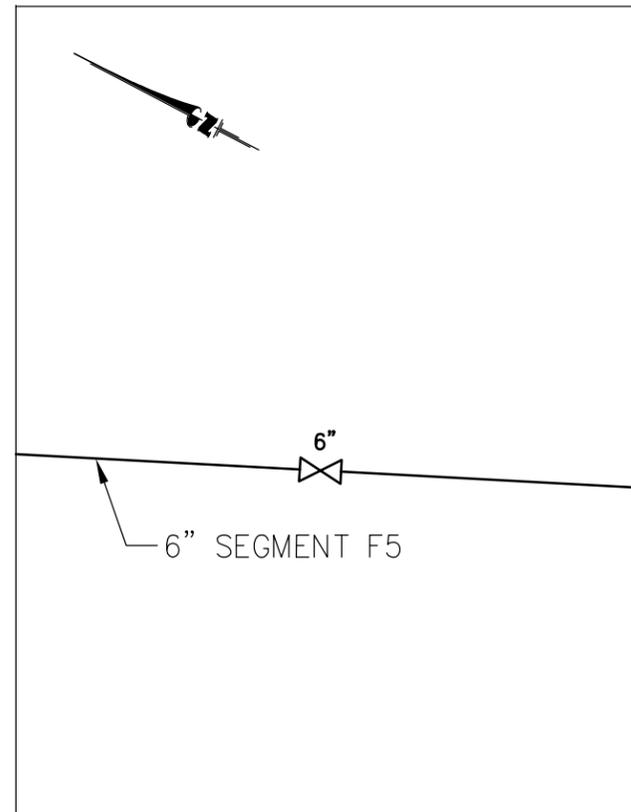
- LEGEND**
- (FH) FIRE HYDRANT
 - (MH) MANHOLE
 - (FE) FLOWMETER
 - (AR) AIR RELEASE VALVE
 - ▽ REDUCER
 - ⊗ GATE VALVE
 - ⊙ BALL VALVE
 - ⊘ CHECK VALVE
 - ⊘ REMOVE PIPE
 - TP TIE POINT
 - GAS LINE
 - WASTEWATER LINE
 - BURIED ELECTRIC LINE
 - EX. WATER LINE
 - NEW WATER LINE
 - - - ABANDONED OR TO BE ABANDONED WATER LINE
 - - - MATCHLINE
 - (CA) CHLORINE ANALYZER
 - (BO) BLOWOFF VALVE
 - (SC) SERVICE CONNECTION
 - (FS) FIRE STAND
 - (TP) TRENCH PLUG
 - POSSIBLE UTILITY CROSSING AREA



INTERSECTION DETAIL 4
C-31



INTERSECTION DETAIL 5
C-28



INTERSECTION DETAIL 6
C-21

AS-BUILT
NOVEMBER 2008

REV.	DESCRIPTION	BY:	DATE:
1	AS-BUILT SET	HCD	11/2008
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REVISIONS

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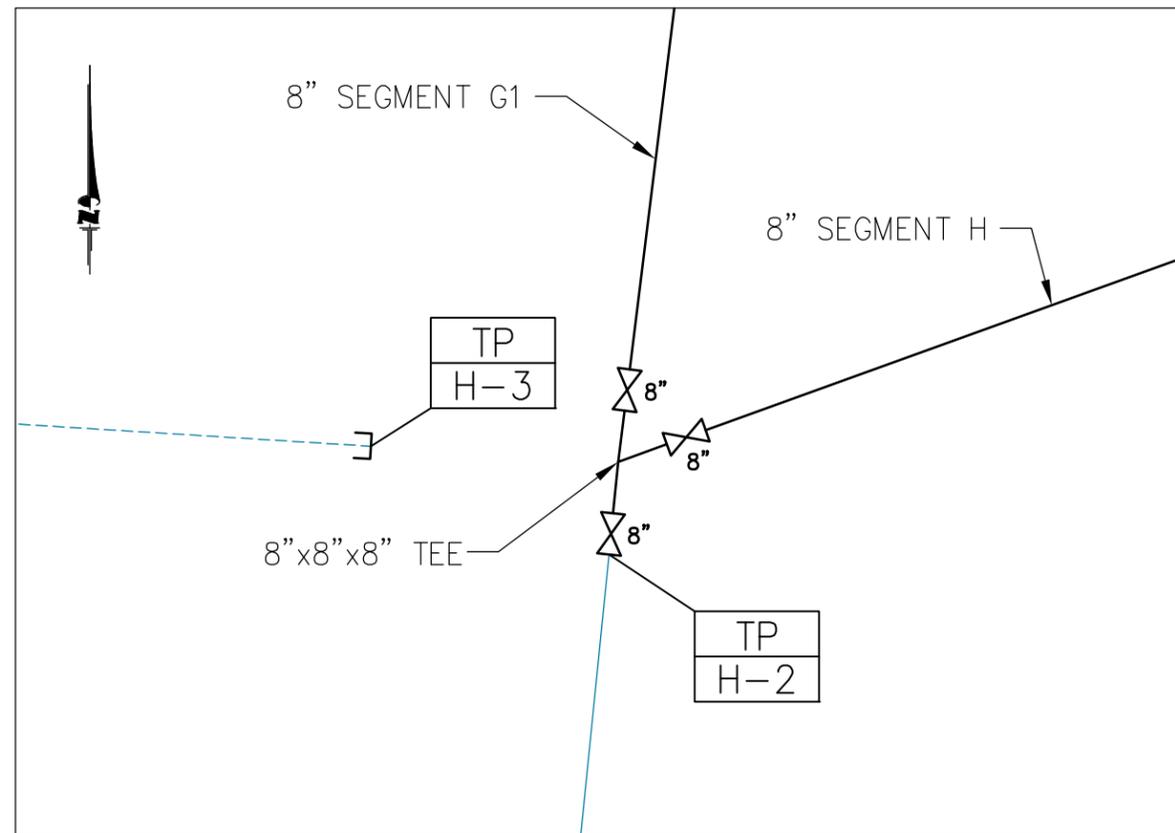
CAMP STANLEY STORAGE ACTIVITY
WATER SYSTEM REHABILITATION

Contract No. FA8903-04-D-8675 Task Order No. 022

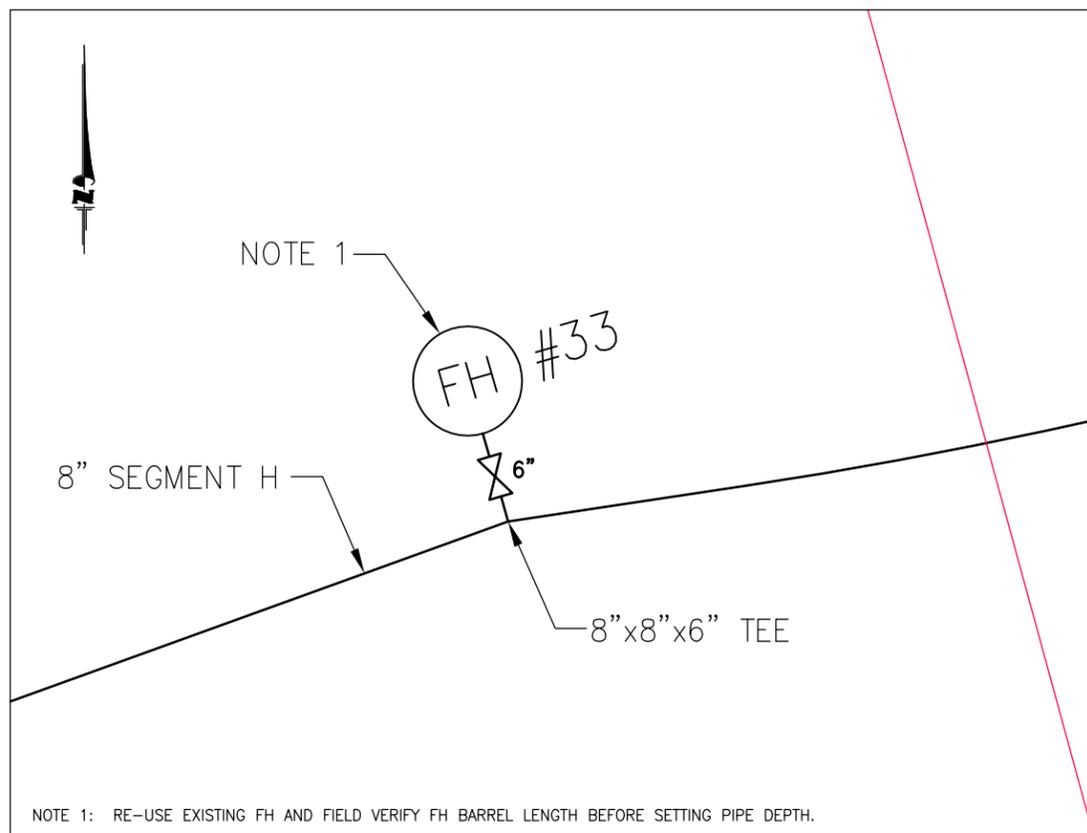
CONTRACTOR :
PARSONS Job No. 745006 WBS 03000

Drawing Title :
**INTERSECTION DETAILS FOR
SEGMENT I (8")
SEGMENT F (6")**

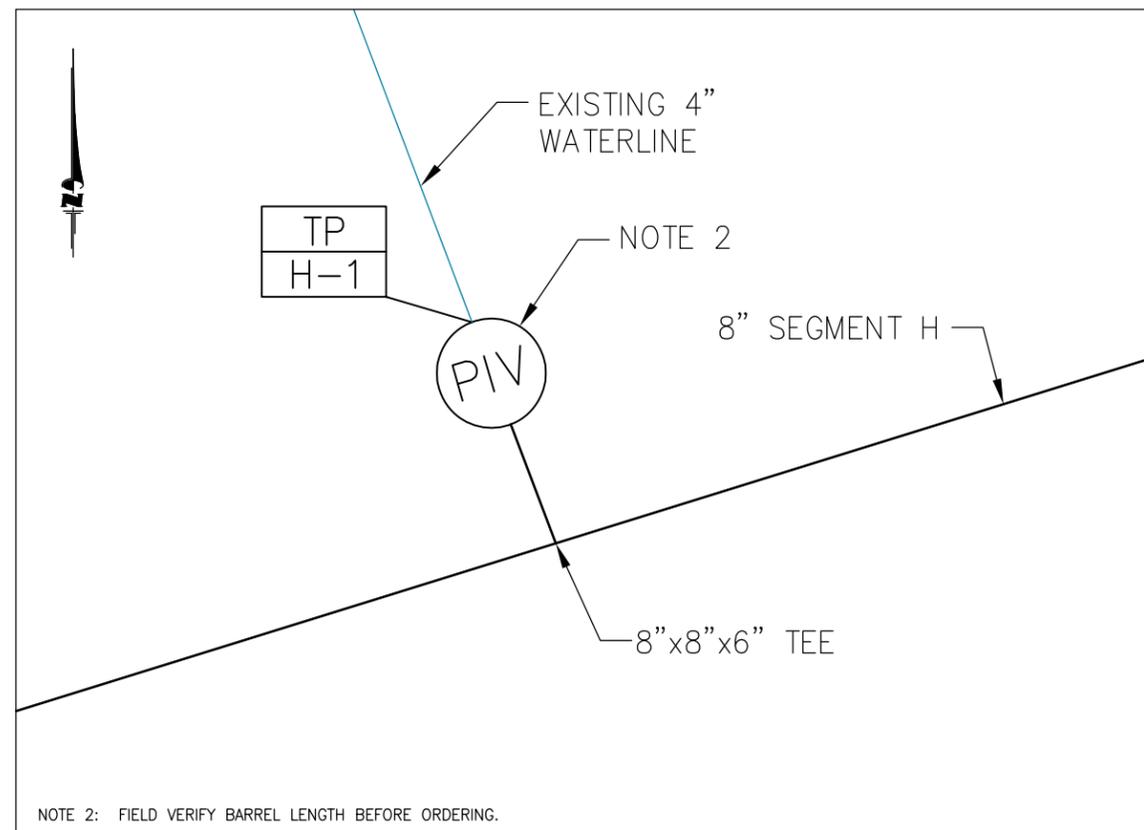
Designed : HCD	Drawn : JLH	Rev: 1
Checked : KMK	Approved :	
Scale : N.T.S.	Date : NOVEMBER 2008	Drawing No. : C-45



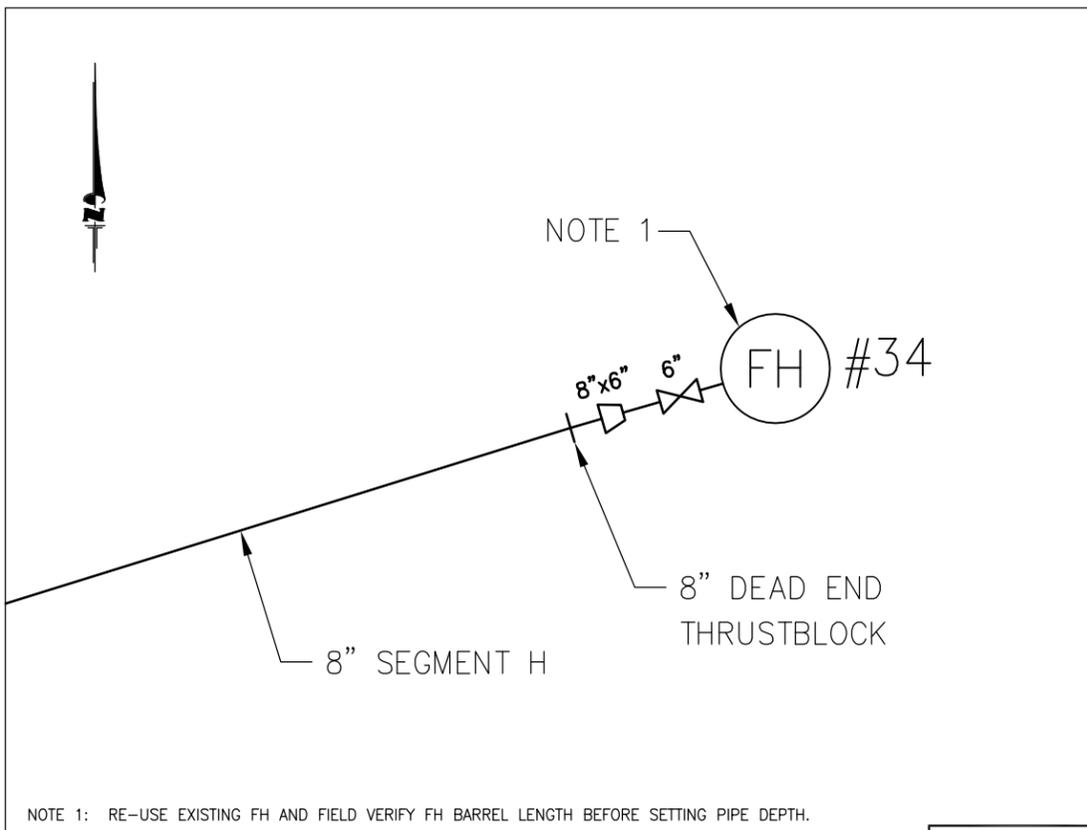
INTERSECTION DETAIL 1
C-32



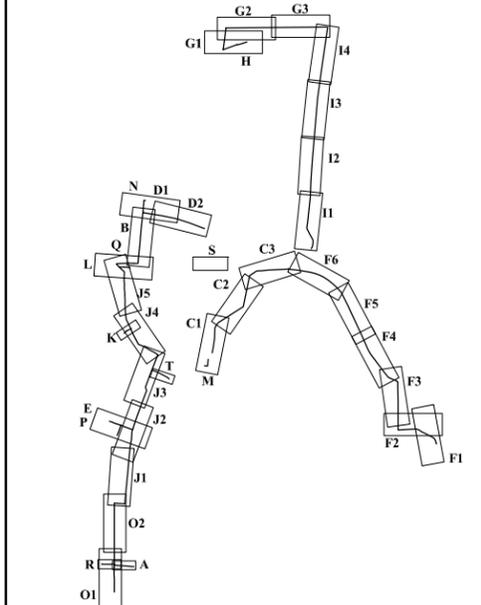
INTERSECTION DETAIL 2
C-32



INTERSECTION DETAIL 3
C-32



INTERSECTION DETAIL 4
C-32



- LEGEND**
- (FH) FIRE HYDRANT
 - (MH) MANHOLE
 - (FE) FLOWMETER
 - (AR) AIR RELEASE VALVE
 - ◻ REDUCER
 - ◻ GATE VALVE
 - ◻ BALL VALVE
 - ◻ CHECK VALVE
 - ◻ REMOVE PIPE
 - TP TIE POINT
 - GAS LINE
 - WASTEWATER LINE
 - BURIED ELECTRIC LINE
 - EX. WATER LINE
 - NEW WATER LINE
 - - - ABANDONED OR TO BE ABANDONED WATER LINE
 - - - MATCHLINE
 - (CA) CHLORINE ANALYZER
 - (BO) BLOWOFF VALVE
 - (SC) SERVICE CONNECTION
 - (FS) SADDLE CLAMP
 - (TP) TRENCH PLUG
 - ◻ POSSIBLE UTILITY CROSSING AREA

REV.	DESCRIPTION	BY:	DATE:
1	AS-BUILT SET	HCD	11/2008
0	ISSUED FOR CONSTRUCTION	HCD	12/2007

REVISIONS

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CAMP STANLEY STORAGE ACTIVITY
WATER SYSTEM REHABILITATION

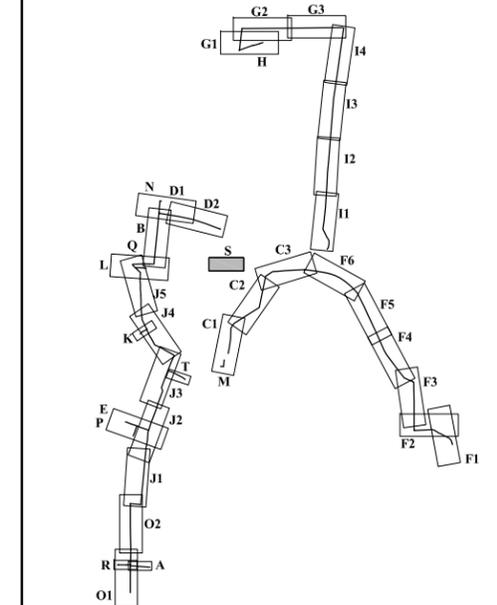
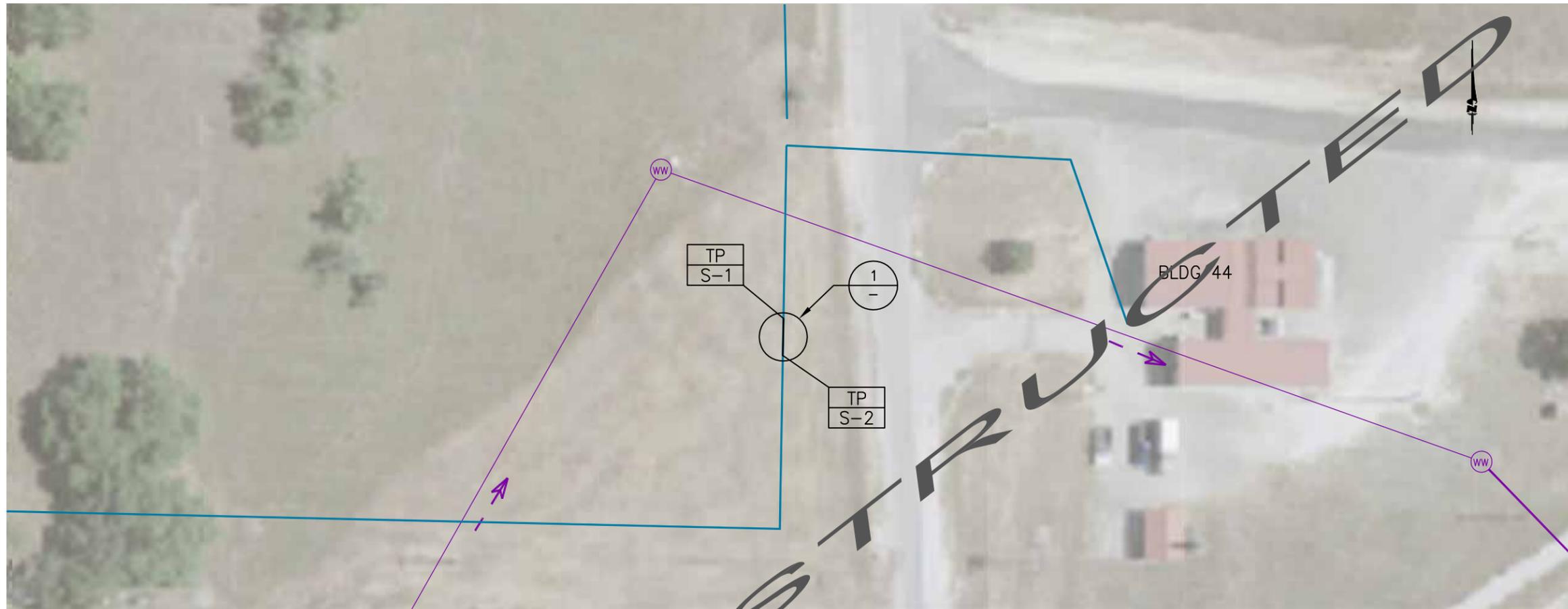
Contract No. FA8903-04-D-8675 Task Order No. 022

CONTRACTOR :
PARSONS Job No. 745006 WBS 03000

Drawing Title :
INTERSECTION DETAILS FOR SEGMENT H (8")

Designed : HCD	Drawn : JLH	Rev: 1
Checked : KMK	Approved :	
Scale : N.T.S.	Date : NOVEMBER 2008	Drawing No. : C-46

AS-BUILT
NOVEMBER 2008



LEGEND

(FH)	FIRE HYDRANT	(CA)	CHLORINE ANALYZER
(MH)	MANHOLE	(BO)	BLOWOFF VALVE
(FE)	FLOWMETER	(SC)	SERVICE CONNECTION
(AR)	AIR RELEASE VALVE	(FS)	FIRE STAND
▽	REDUCER	(TP)	TRENCH PLUG
⊗	GATE VALVE	▭	POSSIBLE UTILITY CROSSING AREA
⊙	BALL VALVE		
⊘	CHECK VALVE		
▨	REMOVE PIPE		
▭	TIE POINT		
—	GAS LINE		
—	WASTEWATER LINE		
—	BURIED ELECTRIC LINE		
—	EX. WATER LINE		
—	NEW WATER LINE		
- - -	ABANDONED OR TO BE ABANDONED WATER LINE		
- - -	MATCHLINE		

REV.	DESCRIPTION	BY:	DATE:
1	AS-BUILT SET	HCD	11/2008
0	ISSUED FOR CONSTRUCTION	HCD	12/2007

REVISIONS

SCALES SHOWN ON THIS DRAWING ARE APPLICABLE ONLY TO D SIZE DRAWING

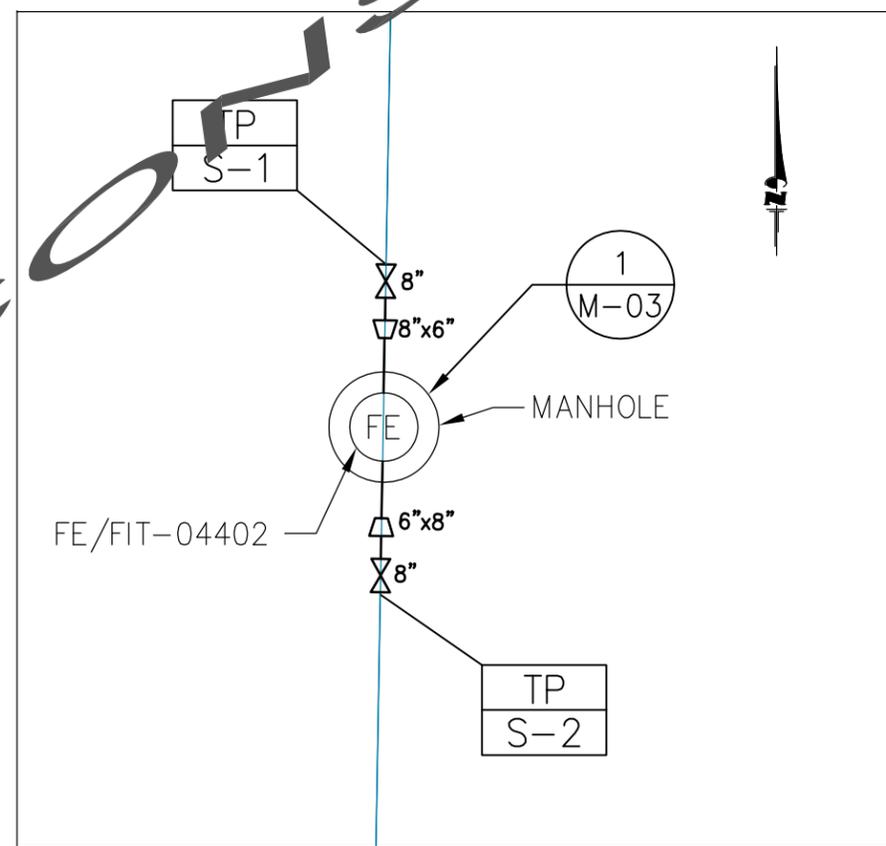
CAMP STANLEY STORAGE ACTIVITY
WATER SYSTEM REHABILITATION

Contract No. FA8903-04-D-8675 Task Order No. 022

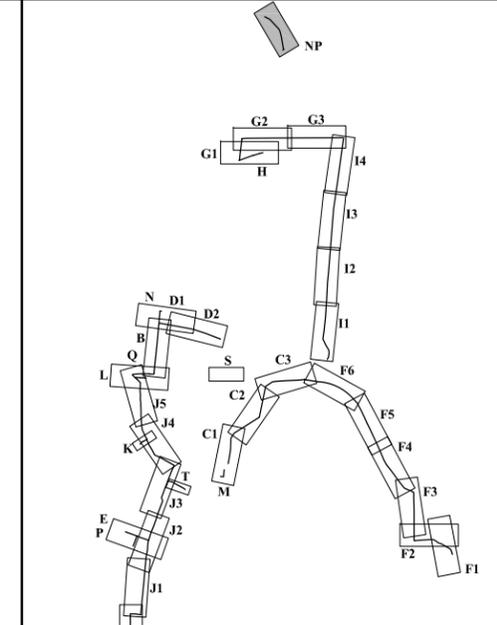
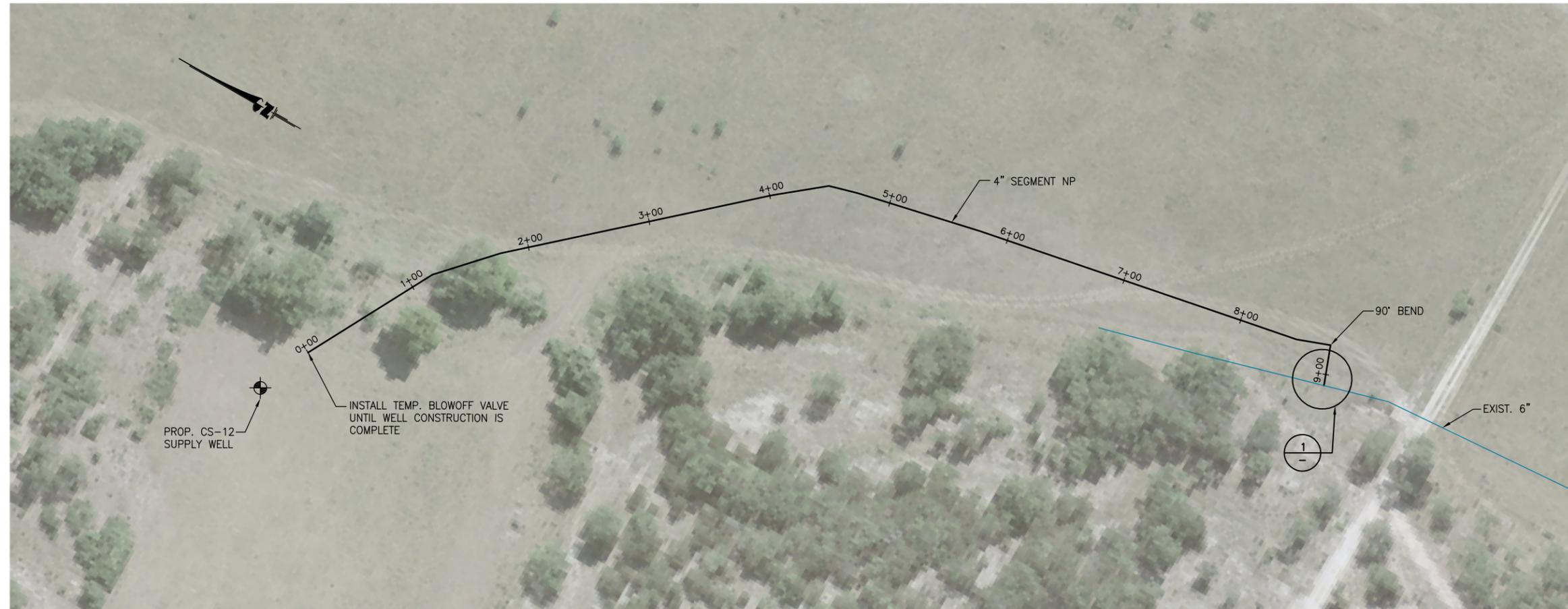
CONTRACTOR :
PARSONS Job No. 745006 WBS 03000

Drawing Title :
**PIPING PLAN AND DETAILS
FOR SEGMENT S**

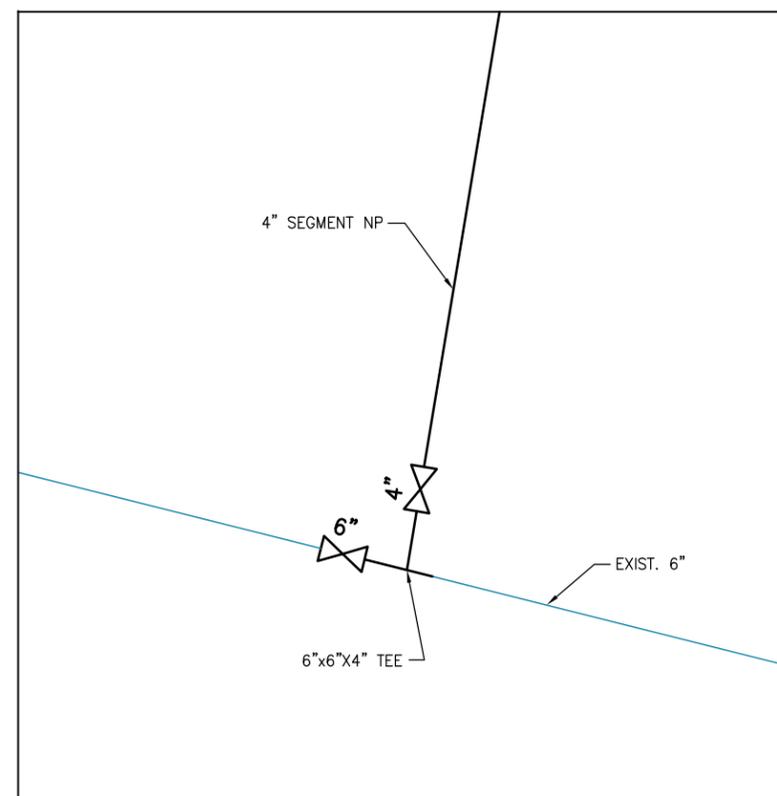
Designed : HCD	Drawn : JLH	Rev: 1
Checked : KMK	Approved :	
Scale : N.T.S.	Date : NOVEMBER 2008	Drawing No. : C-47



INTERSECTION DETAIL 1



- LEGEND**
- (FH) FIRE HYDRANT
 - (MH) MANHOLE
 - (FE) FLOWMETER
 - (AR) AIR RELEASE VALVE
 - ◻ REDUCER
 - ⋈ GATE VALVE
 - ⊙ BALL VALVE
 - ⌞ CHECK VALVE
 - ⊘ REMOVE PIPE
 - TP TIE POINT
 - GAS LINE
 - WASTEWATER LINE
 - BURIED ELECTRIC LINE
 - EX. WATER LINE
 - NEW WATER LINE
 - - - ABANDONED OR TO BE ABANDONED WATER LINE
 - - - MATCHLINE
 - CA CHLORINE ANALYZER
 - BO BLOWOFF VALVE
 - SC SERVICE CONNECTION
 - FS FIRE STAND
 - TP TRENCH PLUG
 - POSSIBLE UTILITY CROSSING AREA



INTERSECTION DETAIL (1/-)

REV.	DESCRIPTION	BY:	DATE:
1	AS-BUILT SET	HCD	11/2008
0	ISSUED FOR CONSTRUCTION	HCD	12/2007

REVISIONS

SCALES SHOWN ON THIS DRAWING ARE APPLICABLE ONLY TO D SIZE DRAWING

**CAMP STANLEY STORAGE ACTIVITY
WATER SYSTEM REHABILITATION**

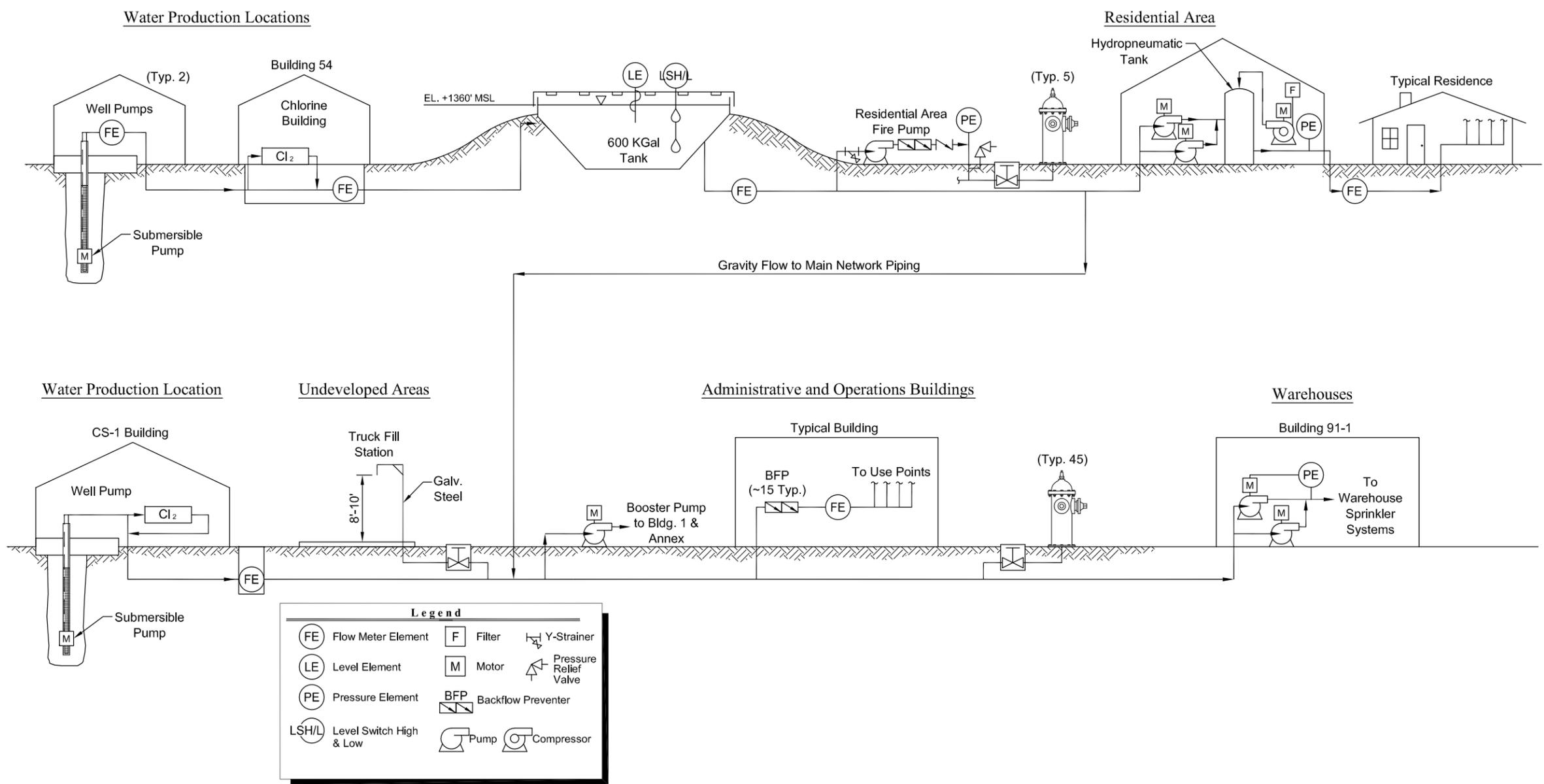
Contract No. FA8903-04-D-8675 Task Order No. 022

CONTRACTOR : **PARSONS** Job No. 745006 WBS 03000

Drawing Title : **PIPING PLAN
NORTH PASTURE SUPPLY WELL
SEGMENT NP (4")**

Designed : HCD	Drawn : JLH	Rev: 1
Checked : KMK	Approved :	
Scale : HORIZ. 1" = 50'	Date : NOVEMBER 2008	Drawing No. : C-48

AS-BUILT
NOVEMBER 2008



Legend

(FE) Flow Meter Element	(F) Filter	Y-Strainer
(LE) Level Element	(M) Motor	Pressure Relief Valve
(PE) Pressure Element	(BFP) Backflow Preventer	
(LSH/L) Level Switch High & Low	(Pump) Pump	(Compressor) Compressor

REV.	DESCRIPTION	BY:	DATE:
1	AS-BUILT SET	HCD	11/2008
0	ISSUED FOR CONSTRUCTION	HCD	12/2007

REVISIONS

SCALES SHOWN ON THIS DRAWING ARE APPLICABLE ONLY TO D SIZE DRAWING

**CAMP STANLEY STORAGE ACTIVITY
WATER SYSTEM REHABILITATION**

Contract No. FA8903-04-D-8675 Task Order No. 022

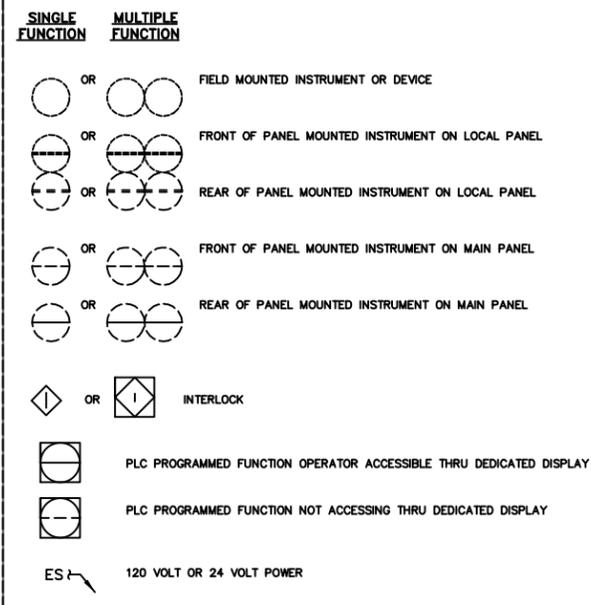
CONTRACTOR :
PARSONS Job No. 745006 WBS 03000

Drawing Title :
**PROCESS FLOW DIAGRAM
CAMP STANLEY STORAGE ACTIVITY
WATER SYSTEM**

Designed : HCD	Drawn : JLH	Rev: 1
Checked : KMK	Approved :	
Scale : N.T.S.	Date : NOVEMBER 2008	Drawing No. : G-01

AS-BUILT
NOVEMBER 2008

BASIC SYMBOLS

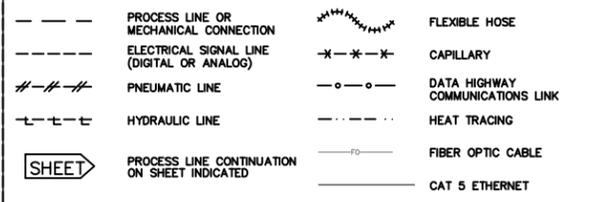


CODES AND ABBREVIATIONS

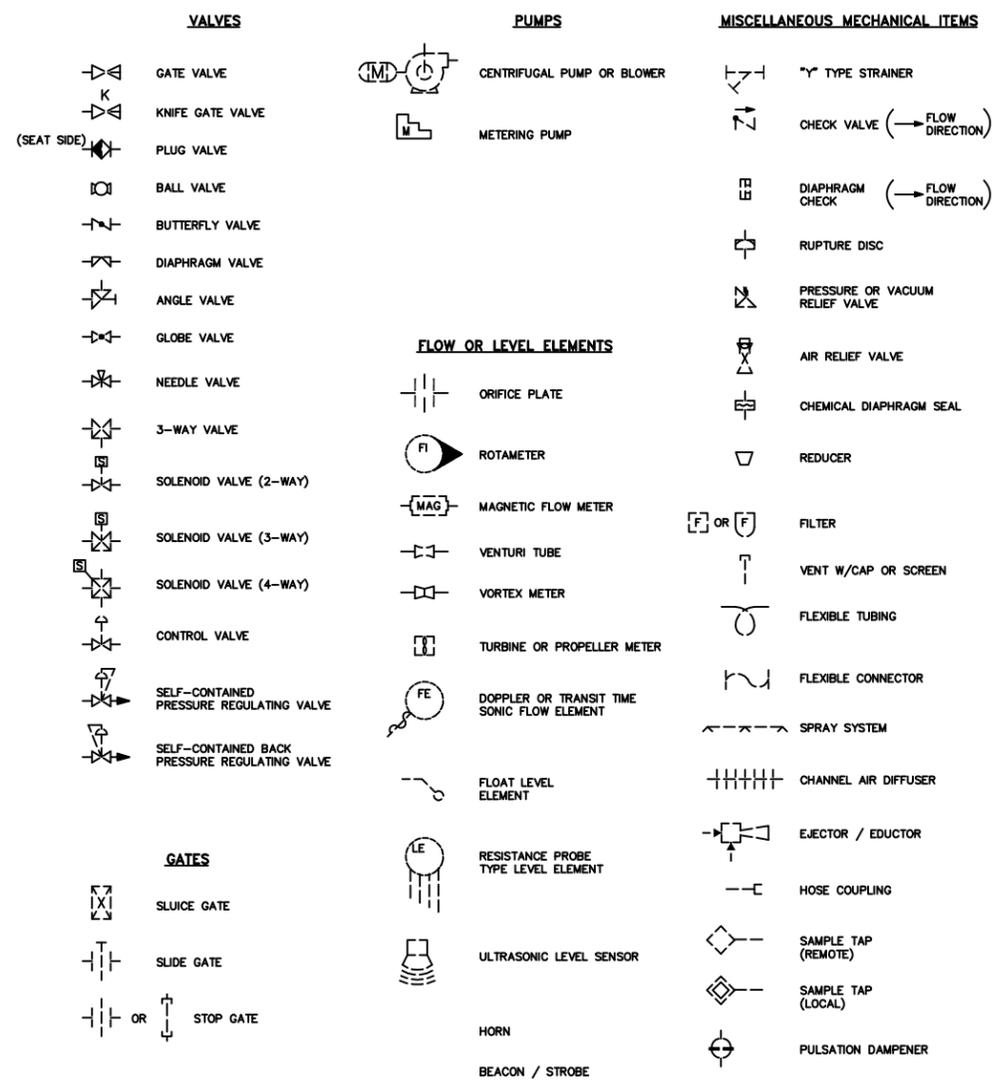
* SUPPLIED WITH ELECTRICAL OR MECHANICAL EQUIPMENT	Σ SUMMATOR
** SUPPLIED BY CONTRACTOR	⊖ SUBTRACTOR
S/D SHUTDOWN	√ SQUARE ROOT EXTRACTOR
O/R OVERRIDE	H HIGH SELECTOR
OAC OPEN-AUTO-CLOSE	L LOW SELECTOR
HOA HAND-OFF-AUTO	C CURRENT TO PNEUMATIC CONVERTER
MOA MANUAL-OFF-AUTO	NL NONLINEAR OR UNSPECIFIED
S/S START / STOP SELECTOR	M MULTIPLIER
O/C OPEN / CLOSE	D DIVIDER
O/O ON / OFF	
FOS FAST-OFF-SLOW	
LOS LOCK OUT STOP	
LAR LOWER-AUTO-RAISE	
L/R LOWER/RAISE	
F/R FORWARD/REVERSE	

HS CODES

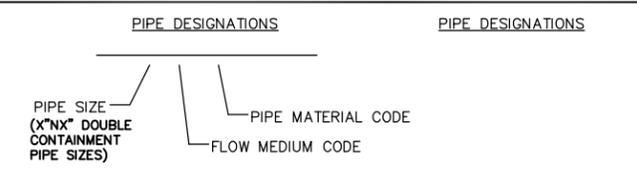
LINE CODES



PROCESS SYMBOLS

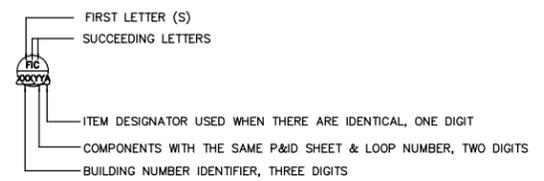


PIPE DESIGNATIONS



FUNCTION PREFIX SCHEDULE

LETTER	FIRST LETTER		SUCCEEDING LETTERS		
	MEASURED OR INITIATING VARIABLE	MODIFIER	READOUT OR PASSIVE FUNCTION	OUTPUT FUNCTION	MODIFIER
A	ANALYSIS		ALARM		
B	BURNER		PROGRAMMER		
C	CONDUCTIVITY (ELECTRICAL)			CONTROL	
D	DENSITY (MASS) OR SPECIFIC GRAVITY	DIFFERENTIAL		DIFFERENTIAL	
E	VOLTAGE (EMF)		PRIMARY ELEMENT		
F	FLOW RATE	RATIO (FRACTION)			
G	GAGING		GLASS	GAS	
H	HAND (MANUALLY INITIATED)				HIGH
I	CURRENT (ELECTRICAL)		INDICATE		
J	POWER	SCAN			
K	TIME OR TIME SCHEDULE			CONTROL STATION	
L	LEVEL		LIGHT (PILOT)		LOW
M	MOTOR	MOISTURE			MIDDLE OR INTERMEDIATE
N	VIBRATION	IGNITER			
O	OPERATION	OFFSET	ORIFICE (RESTRICTION)		
P	PRESSURE OR VACUUM		POINT (TEST CONNECTION)		
Q	QUANTITY OR EVENT	INTEGRATE OR TOTALIZE			
R	RADIOACTIVITY		RECORD OR PRINT		
S	SPEED OR FREQUENCY	SAFETY		SWITCH	
T	TEMPERATURE			TRANSMIT	
U	MULTI-VARIABLE	TREND	MULTI-FUNCTION	MULTI-FUNCTION	MULTI-FUNCTION
V	VISCOSITY	VIBRATION		VALVE DAMPER OR LOUVER	
W	WEIGHT, FORCE OR TORQUE		WELL	WATER	
X	SPECIAL (SEE SPEC.)		SPECIAL (SEE SPEC.)		
Y				RELAY OR COMPUTE	
Z	POSITION				DRIVE, ACTUATE OR UNCLASSIFIED FINAL CONTROL ELEMENT



REV.	DESCRIPTION	BY:	DATE:
1	AS-BUILT SET	HCD	11/2008
0	ISSUED FOR CONSTRUCTION	HCD	12/2007

REVISIONS

SCALES SHOWN ON THIS DRAWING ARE APPLICABLE ONLY TO D SIZE DRAWING

CAMP STANLEY STORAGE ACTIVITY WATER SYSTEM REHABILITATION

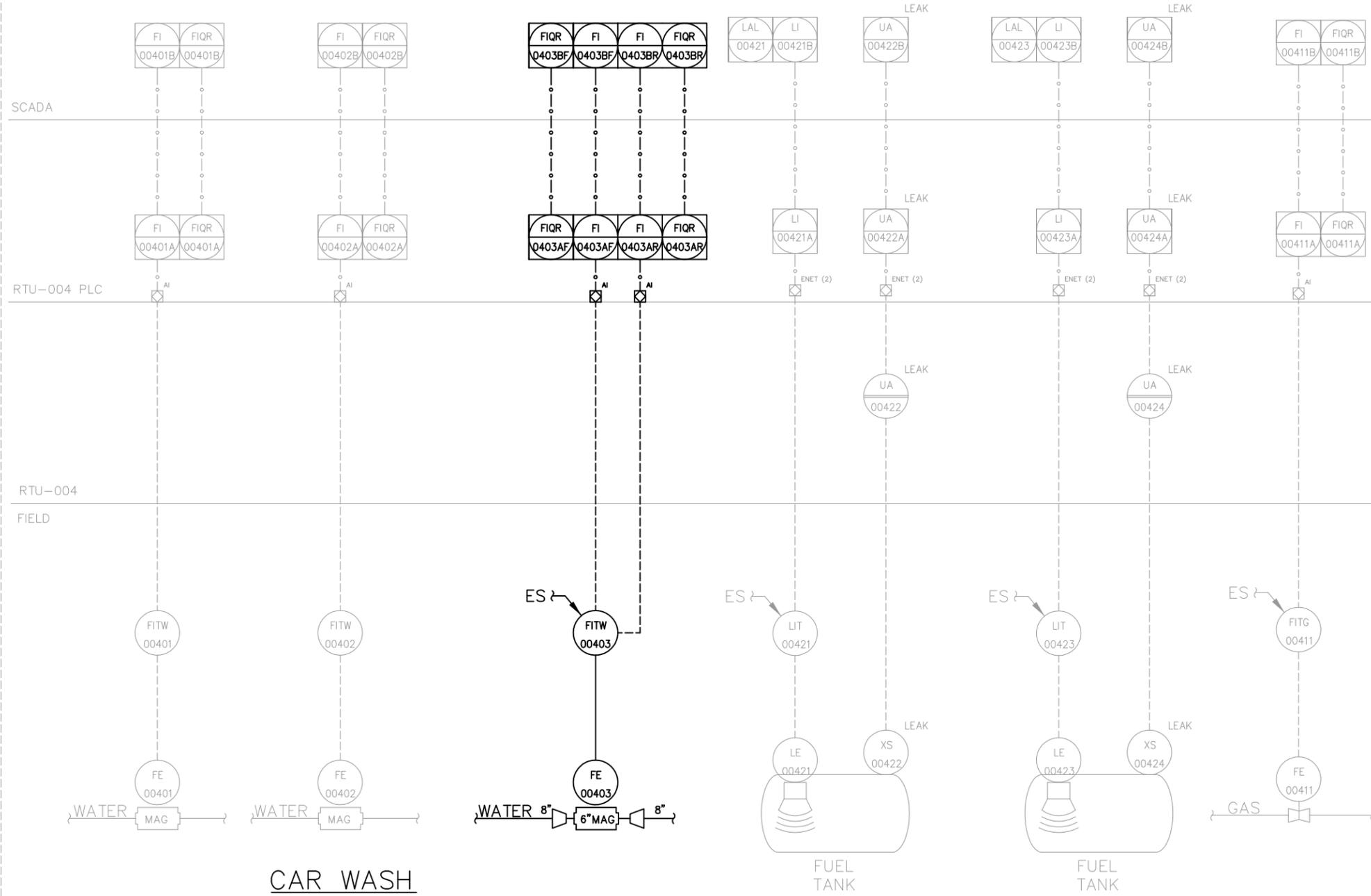
Contract No. FA8903-04-D-8675 Task Order No. 022

CONTRACTOR : **PARSONS** Job No. 745006 WBS 03000

Drawing Title : **PIPING AND INSTRUMENTATION DIAGRAM LEGEND**

Designed : HCD	Drawn : JLH	Rev: 1
Checked : KMK	Approved :	
Scale : N.T.S.	Date : NOVEMBER 2008	Drawing No. : I-01

AS-BUILT
NOVEMBER 2008



REV.	DESCRIPTION	BY:	DATE:
1	AS-BUILT SET	HCD	1/2009
0	ISSUED FOR CONSTRUCTION	HCD	12/2007

REVISIONS
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CAMP STANLEY STORAGE ACTIVITY
 WATER SYSTEM REHABILITATION
 Contract No. FA8903-04-D-8675 Task Order No. 022

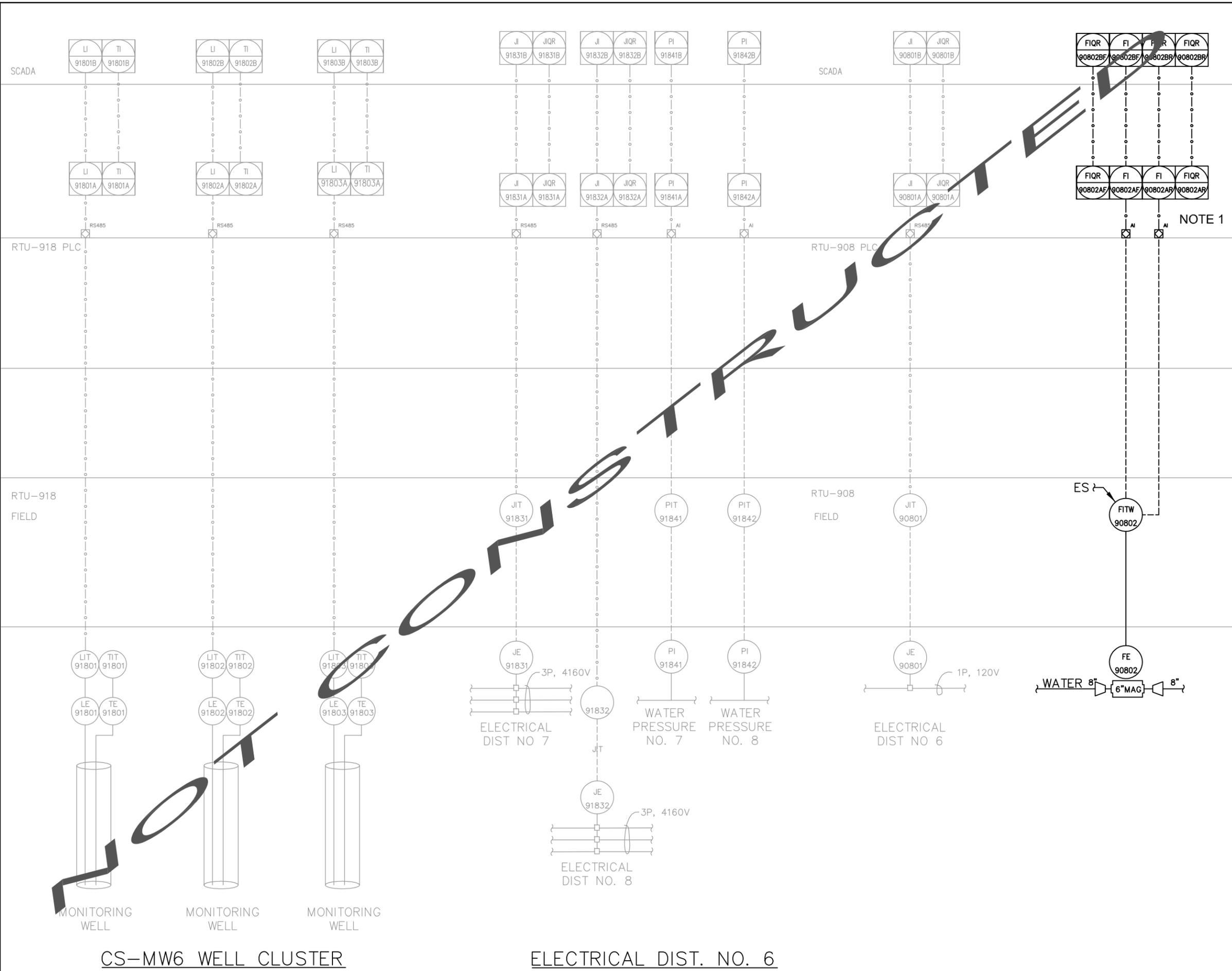
CONTRACTOR :
PARSONS Job No. 745006 WBS 03000

Drawing Title :
**PIPING AND INSTRUMENTATION
 DIAGRAM BLDG 4 (MOTOR POOL)**

Designed : HCD	Drawn : JLH	Rev: 1
Checked : KMK	Approved :	
Scale : N.T.S.	Date : JANUARY 2009	Drawing No. : I-02

AS-BUILT
 JANUARY 2009

BUILDING 4 – MOTOR POOL



NOTES

1. PROVIDE 2 ANALOG CARDS TO PROVIDE FORWARD AND REVERSE FLOW DATA TO SCADA.

NOTE 1

REV.	DESCRIPTION	BY:	DATE:
1	AS-BUILT SET	HCD	11/2008
0	ISSUED FOR CONSTRUCTION	HCD	12/2007

REVISIONS

SCALES SHOWN ON THIS DRAWING ARE APPLICABLE ONLY TO D SIZE DRAWING

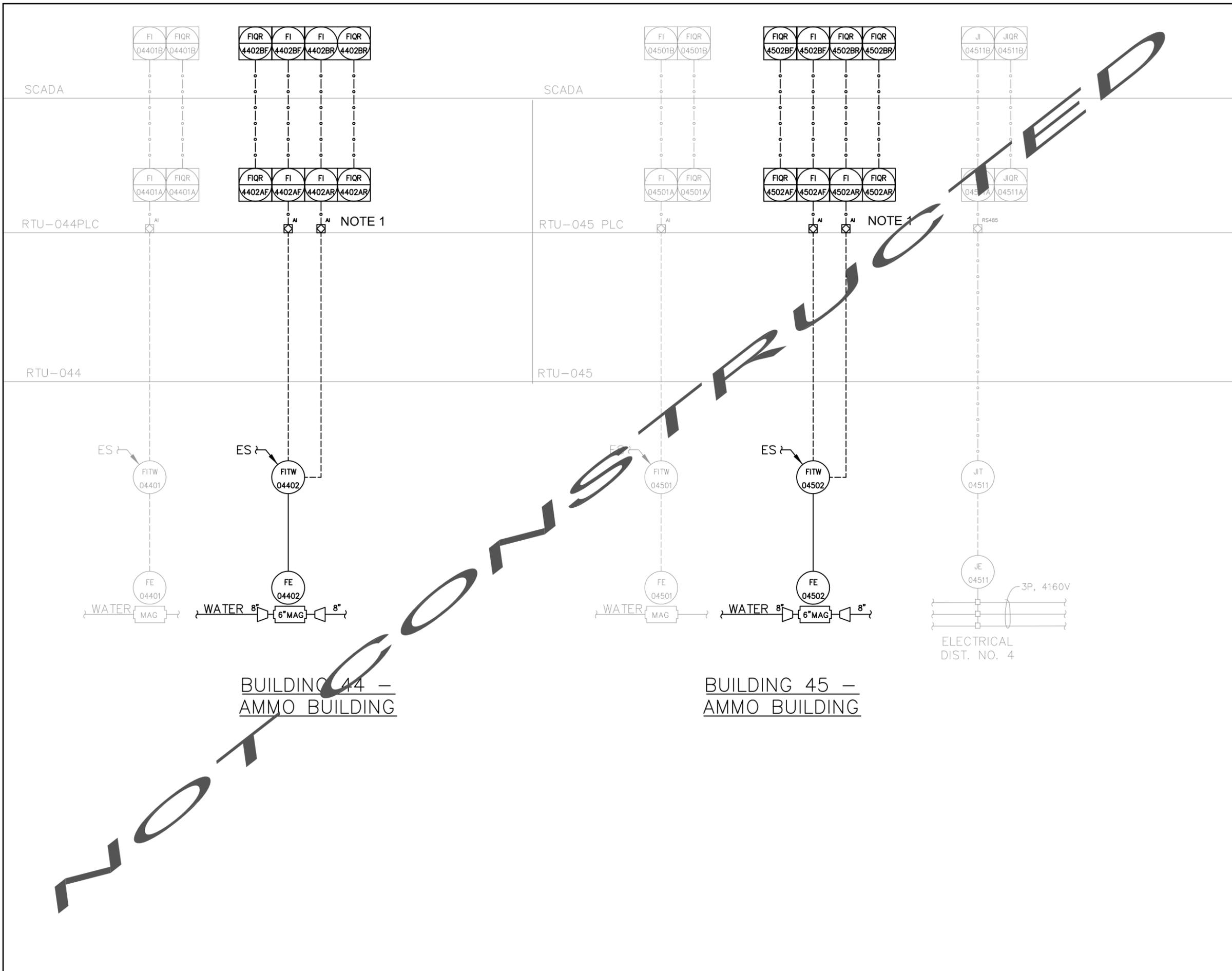
**CAMP STANLEY STORAGE ACTIVITY
WATER SYSTEM REHABILITATION**

Contract No. FA8903-04-D-8675 Task Order No. 022

CONTRACTOR :
PARSONS Job No. 745006 WBS 03000

Drawing Title :
**PIPING AND INSTRUMENTATION
DIAGRAM ED#6 & CS-MW8**

Designed : HCD	Drawn : JLH	Rev: 1
Checked : KMK	Approved :	
Scale : N.T.S.	Date : NOVEMBER 2008	Drawing No. : I-03



NOTES

1. PROVIDE 2 ANALOG CARDS TO PROVIDE FORWARD AND REVERSE FLOW DATA TO SCADA.

REV.	DESCRIPTION	BY:	DATE:
1	AS-BUILT SET	HCD	11/2008
0	ISSUED FOR CONSTRUCTION	HCD	12/2007

REVISIONS

SCALES SHOWN ON THIS DRAWING ARE APPLICABLE ONLY TO D SIZE DRAWING

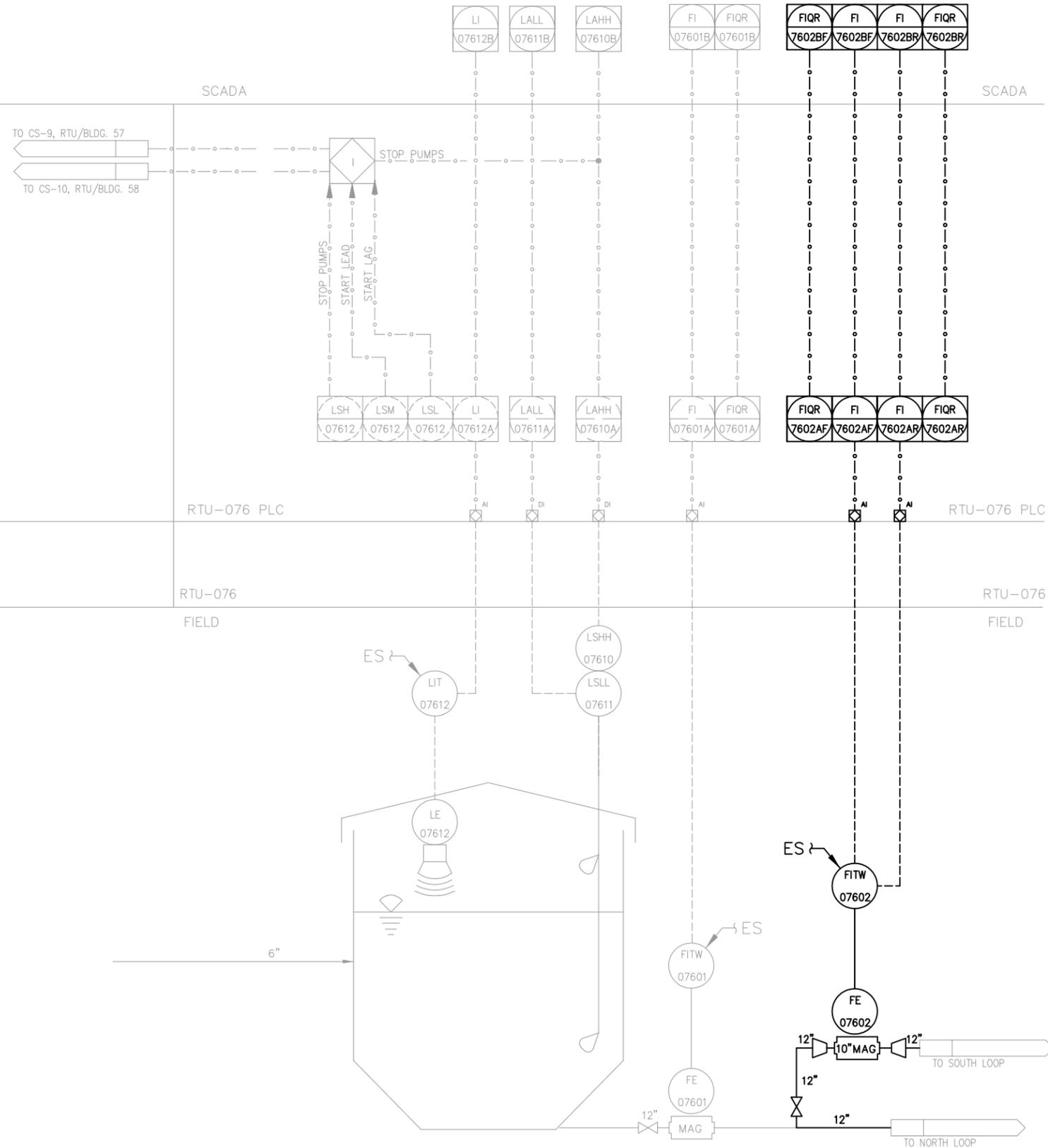
**CAMP STANLEY STORAGE ACTIVITY
WATER SYSTEM REHABILITATION**

Contract No. FA8903-04-D-8675 Task Order No. 022

CONTRACTOR :
PARSONS Job No. 745006 WBS 03000

Drawing Title :
**PIPING AND INSTRUMENTATION
DIAGRAM BLDGS 44 & 45 (AMMO)**

Designed : HCD	Drawn : JLH	Rev: 1
Checked : KMK	Approved :	
Scale : N.T.S.	Date : NOVEMBER 2008	Drawing No. : I-04



BUILDING 76 - STORAGE TANK

AS-BUILT
JANUARY 2009



REV.	DESCRIPTION	BY:	DATE:
1	AS-BUILT SET	HCD	1/2009
0	ISSUED FOR CONSTRUCTION	HCD	12/2007

REVISIONS

SCALES SHOWN ON THIS DRAWING ARE APPLICABLE ONLY TO D SIZE DRAWING

CAMP STANLEY STORAGE ACTIVITY
WATER SYSTEM REHABILITATION

Contract No. FA8903-04-D-8675 Task Order No. 022

CONTRACTOR :
PARSONS Job No. 745006 WBS 03000

Drawing Title :
**PIPING AND INSTRUMENTATION
DIAGRAM BLDG 76 (STORAGE TANK)**

Designed : HCD	Drawn : JLH	Rev: 1
Checked : KMK	Approved :	
Scale : N.T.S.	Date : JANUARY 2009	Drawing No. : I-05

NOTES

1. FIELD ROUTE 1/2" SS TUBING TO DRAIN. SUPPORT AND ANCHOR ALL ABOVEGROUND TUBING RUNS.
2. PROVIDE AIR GAP A MINIMUM OF 36" ABOVE FINISHED GRADE USING 2" x 3" PVC REDUCER OR EQUAL.
3. USE NEARBY STORM SEWER TO PROVIDE DRAIN. INSTALL AND CONNECT BELOW GRADE ABOUT 12". SAWCUT ASPHALT ~20' AND PATCH AFTER INSTALLING TUBING.
4. MOUNT CHLORINE RESIDUAL ANALYZER ON INTERIOR SOUTH WALL OF BLDG 93. ROUTE CONDUIT FROM AIT-09313 TO RTU-093 FOR CONNECTIVITY TO SCADA SYSTEM. FIELD LOCATE POWER DISTRIBUTION PANEL IN BLDG 93 TO PROVIDE POWER CIRCUIT FOR CHLORINE ANALYZER.
5. TIE-POINT FOR WATER SUPPLY TO ANALYZER MAY BE TAKEN EITHER FROM FROM SERVICE LINE OUTSIDE BUILDING OR SUPPLY LINE INSIDE BUILDING. USE 1/2" SS TUBING FROM TIE-IN CONNECTION TO ANALYZER. SUPPORT AND ANCHOR ALL ABOVEGROUND TUBING RUNS.



REV.	DESCRIPTION	BY:	DATE:
1	AS-BUILT SET	HCD	1/2009
0	ISSUED FOR CONSTRUCTION	HCD	12/2007

REVISIONS
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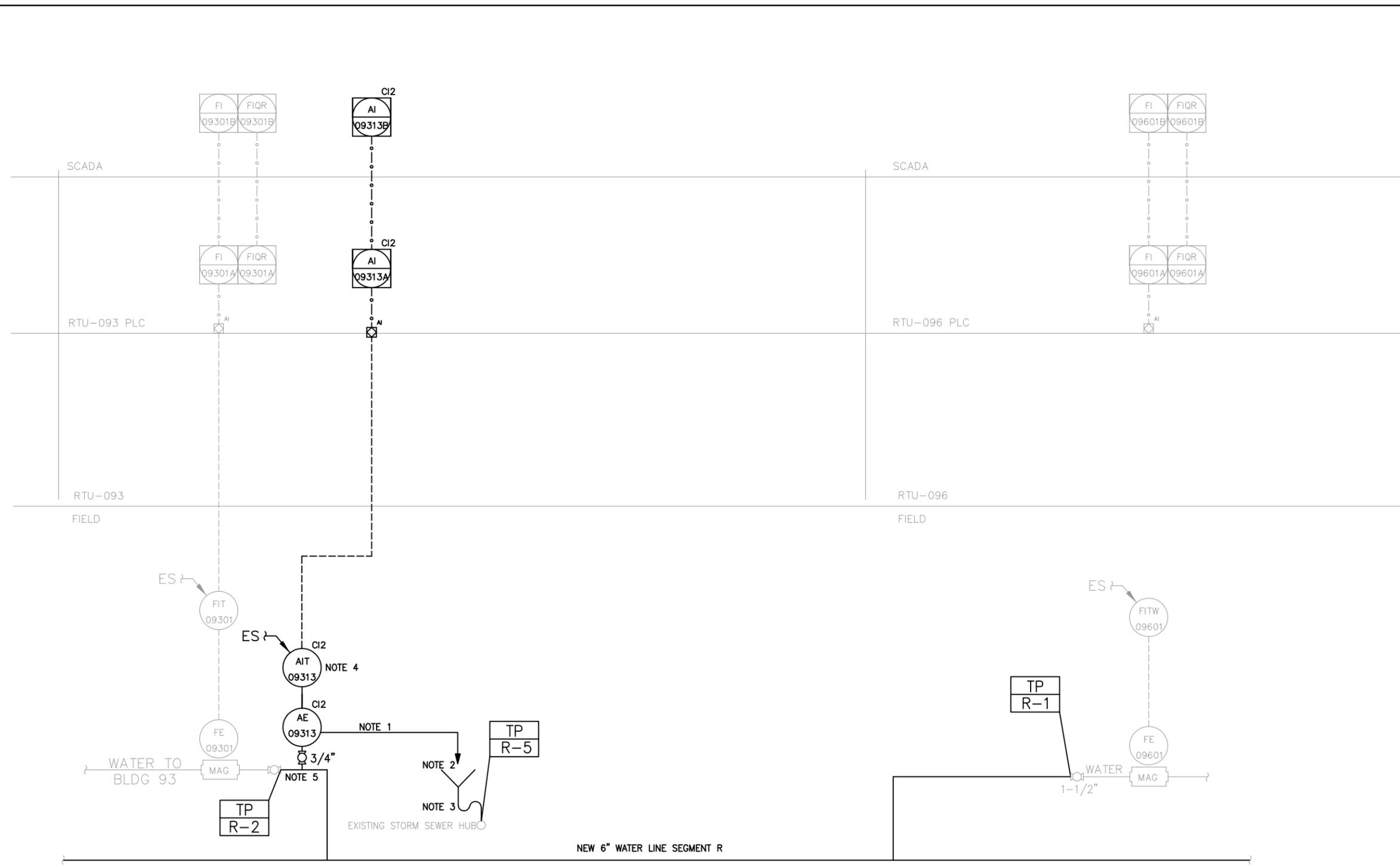
CAMP STANLEY STORAGE ACTIVITY
 WATER SYSTEM REHABILITATION
 Contract No. FA8903-04-D-8675 Task Order No. 022

CONTRACTOR :
PARSONS Job No. 745006 WBS 03000

Drawing Title :
**PIPING AND INSTRUMENTATION
 DIAGRAM BLDG 96 (WAREHOUSE)**

Designed : HCD	Drawn : JLH	Rev: 1
Checked : KMK	Approved :	
Scale : N.T.S.	Date : JANUARY 2009	Drawing No. : I-06

AS-BUILT
 JANUARY 2009

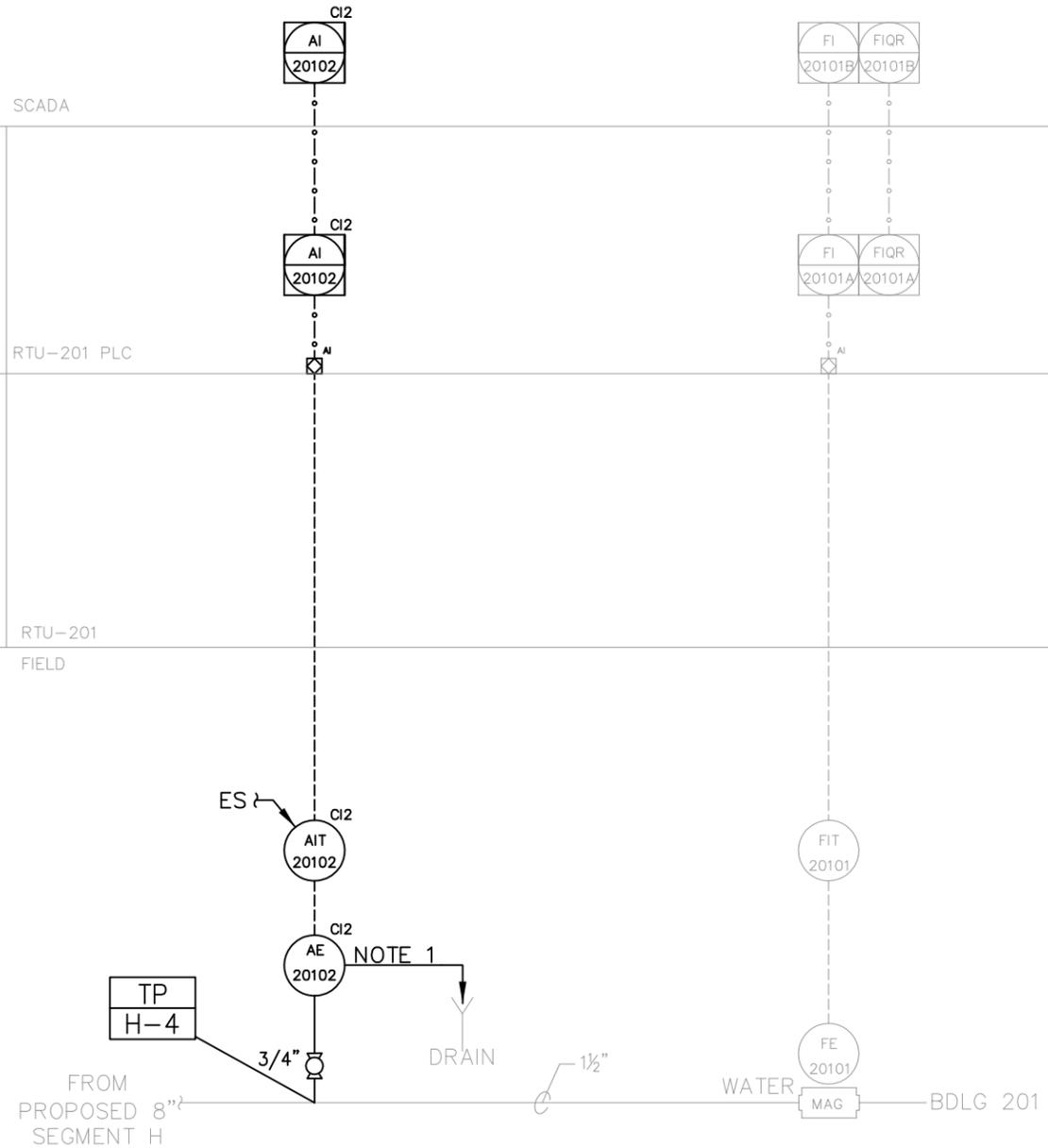


BUILDING 93 - WAREHOUSE

BUILDING 96 - WAREHOUSE

NOTES

1. FIELD ROUTE STAINLESS STEEL TUBING TO DRAIN.



BUILDING 201 –
UTILITY BLDG

REV.	DESCRIPTION	BY:	DATE:
1	AS-BUILT SET	HCD	11/2008
0	ISSUED FOR CONSTRUCTION	HCD	12/2007

REVISIONS

SCALES SHOWN ON THIS DRAWING ARE APPLICABLE ONLY TO D SIZE DRAWING

CAMP STANLEY STORAGE ACTIVITY
WATER SYSTEM REHABILITATION

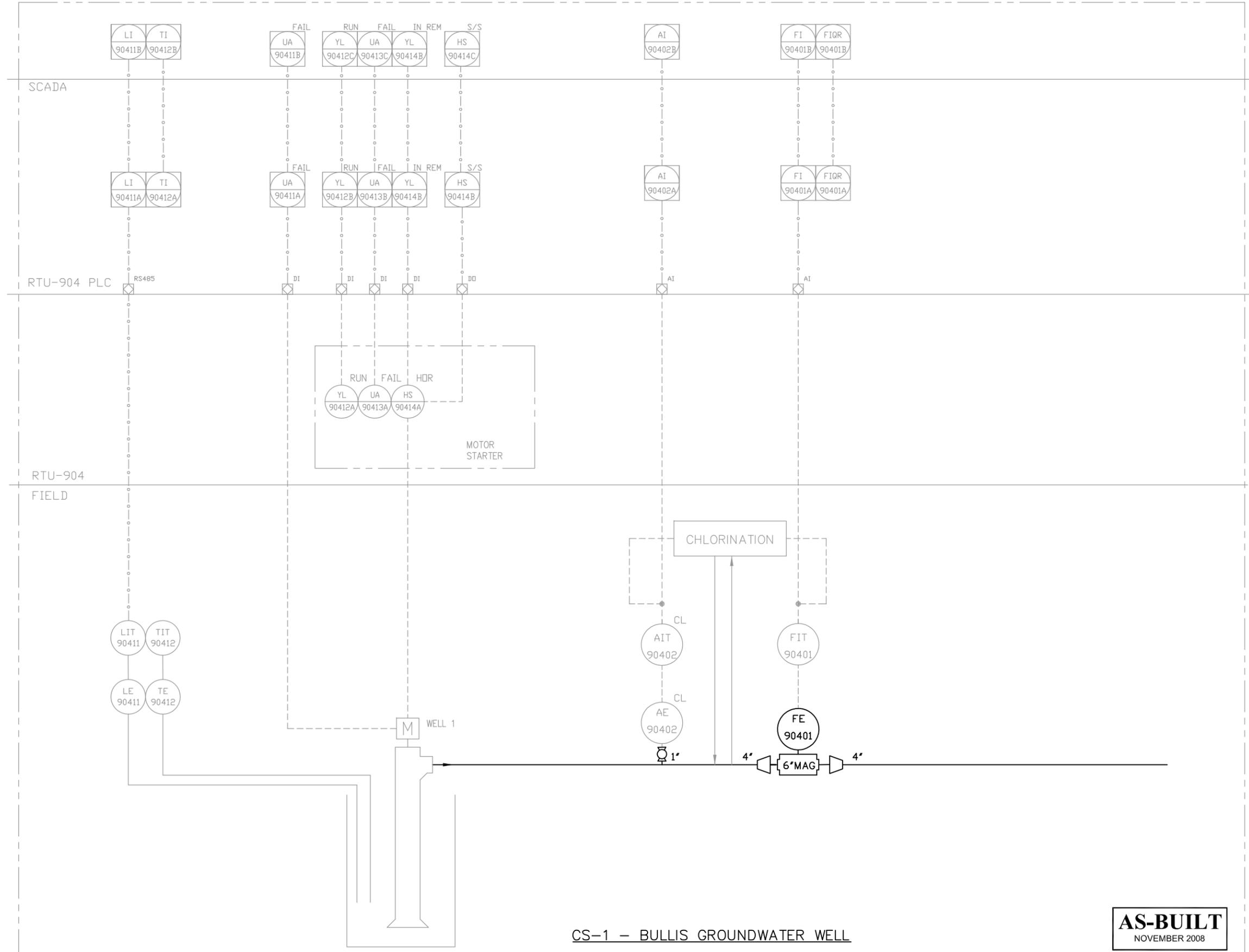
Contract No. FA8903-04-D-8675 Task Order No. 022

CONTRACTOR :
PARSONS Job No. 745006 WBS 03000

Drawing Title :
**PIPING AND INSTRUMENTATION
DIAGRAM BLDG 201 (UTILITY)**

Designed : HCD	Drawn : JLH	Rev: 1
Checked : KMK	Approved :	
Scale : N.T.S.	Date : NOVEMBER 2008	Drawing No. : I-07

AS-BUILT
NOVEMBER 2008



CS-1 - BULLIS GROUNDWATER WELL

AS-BUILT
NOVEMBER 2008

REV.	DESCRIPTION	BY:	DATE:
1	AS-BUILT SET	HCD	11/2008
0	ISSUED FOR CONSTRUCTION	HCD	12/2007

REVISIONS

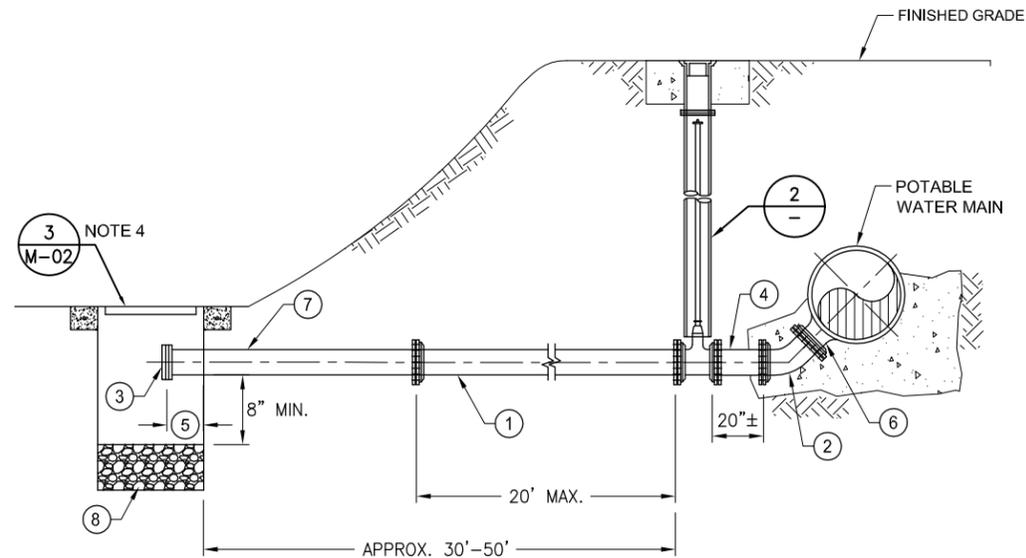
SCALES SHOWN ON THIS DRAWING ARE APPLICABLE ONLY TO D SIZE DRAWING

CAMP STANLEY STORAGE ACTIVITY
WATER SYSTEM REHABILITATION
Contract No. FA8903-04-D-8675 Task Order No. 022

CONTRACTOR :
PARSONS Job No. 745006 WBS 03000

Drawing Title :
**PIPING AND INSTRUMENTATION
DIAGRAM FOR CS-1 WATER WELL**

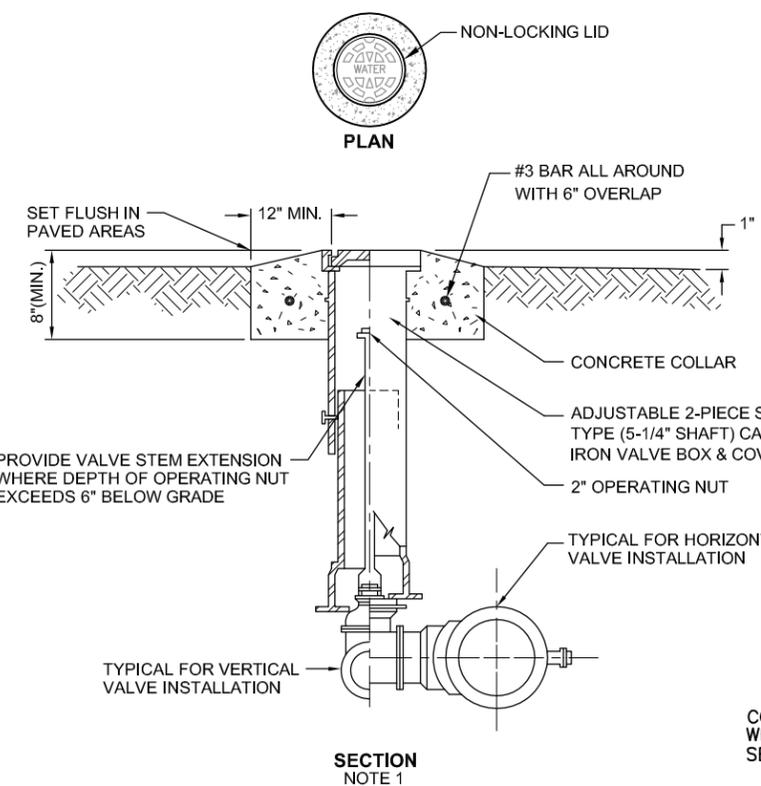
Designed : HCD	Drawn : JLH	Rev: 1
Checked : KMK	Approved :	
Scale : N.T.S.	Date : NOVEMBER 2008	Drawing No. : I-08



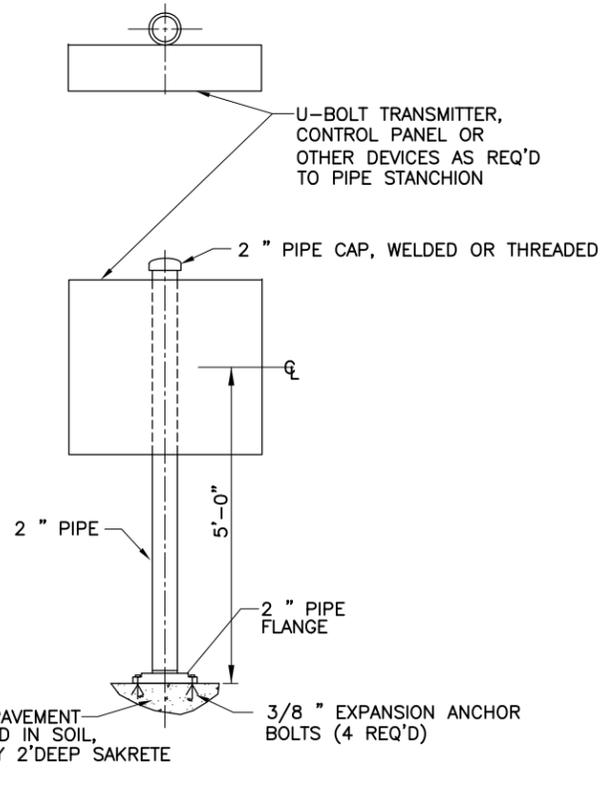
4" BLOW-OFF ASSEMBLY
SCALE: NONE
NOTE 1

ITEM NO	SIZE AND DESCRIPTION
①	4" DI PIPE, MJ x PE
②	4" DI 45° ELBOW, MJ x PE, W/ITH MEGALUG MECHANICAL RESTRAINT
③	UNI-FLANGE MODEL UFA2000 W/ BLIND FLANGE
④	4" DI SPOOL, PE x PE
⑤	MINIMUM 8" PROJECTION
⑥	12" x 12" x 4" TEE OUTLET WITH CONCRETE THRUST BLOCK
⑦	4" DI PIPE, PE x PE
⑧	12" DEEP DRAIN PIT W/ 1" ROCK

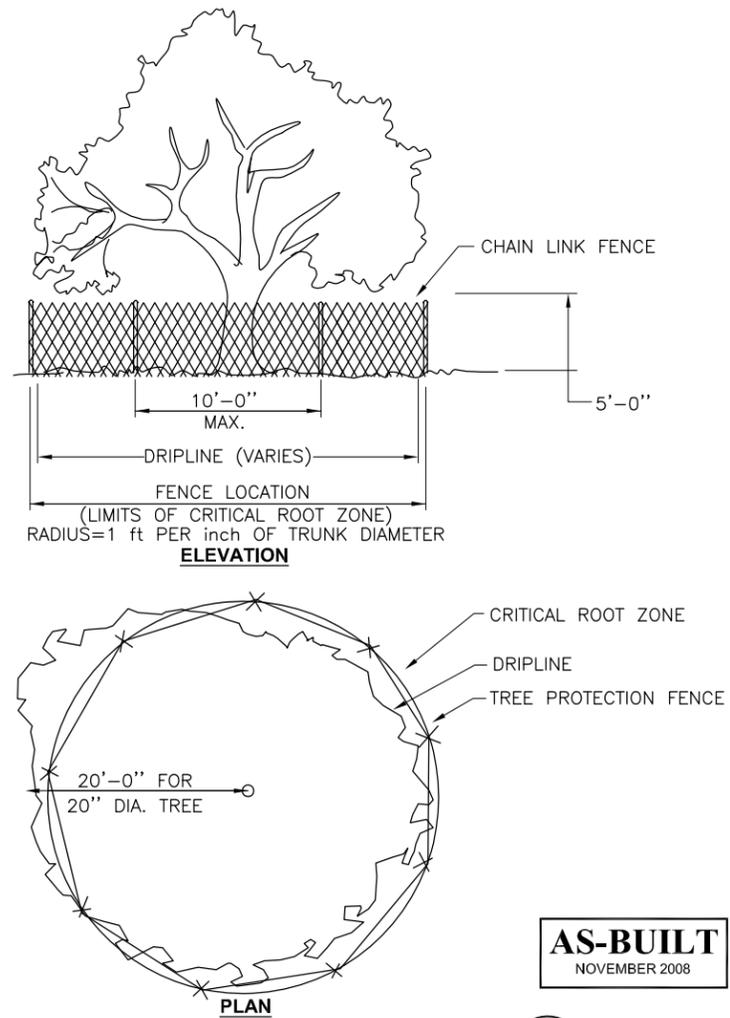
- NOTE:**
- WRAP ENTIRE ASSEMBLY IN 10-MIL POLYETHYLENE SHEET.
 - VALVES DEEPER THAN 60 INCHES REQUIRE A VALVE STEM EXTENSION.
 - EXTENSION STEMS SHALL NOT BE ATTACHED/BOLTED TO OPERATING NUT.
 - MANHOLE SHALL BE CONSTRUCTED IDENTICAL TO AIR RELEASE VALVE MANHOLE BUT WITHOUT THE AIR RELEASE VALVE AND WITHOUT 18" Ø STUBS.



VALVE, BOX AND COVER
SCALE: NONE



INSTRUMENT STANCHION
SCALE: NONE



TREE PROTECTION DETAIL
SCALE: NONE

REV.	DESCRIPTION	BY:	DATE:
1	AS-BUILT SET	HCD	11/2008
0	ISSUED FOR CONSTRUCTION	HCD	12/2007

SCALES SHOWN ON THIS DRAWING ARE APPLICABLE ONLY TO D SIZE DRAWING

CAMP STANLEY STORAGE ACTIVITY WATER SYSTEM REHABILITATION
Contract No. FA8903-04-D-8675 Task Order No. 022

CONTRACTOR : **PARSONS** Job No. 745006 WBS 03000

Drawing Title : **BLOWOFF ASSEMBLY, GATE VALVE WELL ASSEMBLY, INSTRUMENT STANCHION DETAIL AND TREE PROTECTION DETAIL**

Designed : HCD	Drawn : JLH	Rev: 1
Checked : KMK	Approved :	
Scale : N.T.S.	Date : NOVEMBER 2008	Drawing No. : M-01

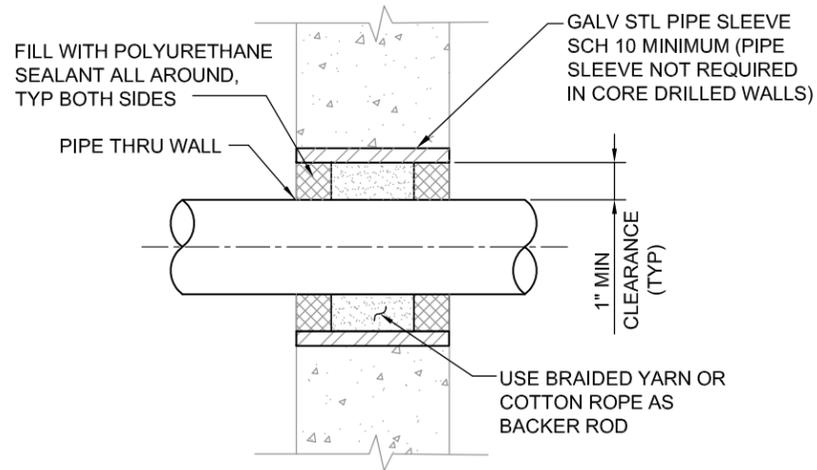
AS-BUILT
NOVEMBER 2008

NOTES

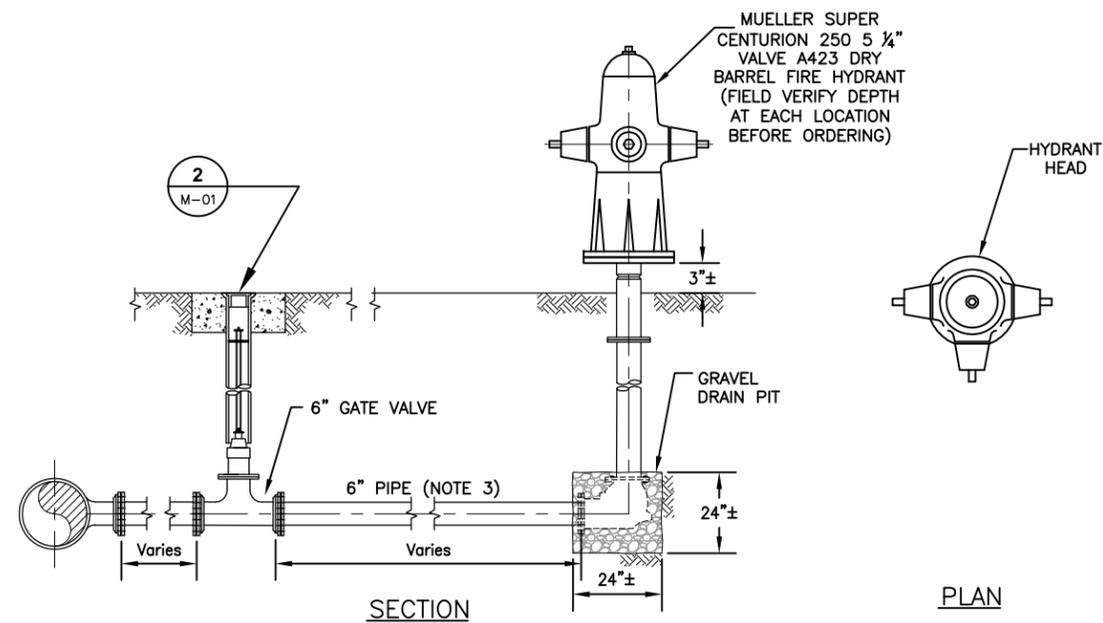
1. ALL TRENCHING AND CUT OR DAMAGED PAVEMENT SHALL BE RESTORED TO MATCH ORIGINAL CONDITIONS.
2. MOUNT FLOW CELL AND ANALYZER ON FIBERGLASS BACKBOARD SECURELY ATTACHED TO BUILDING WALL IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS. MOUNT SIGNAL CONVERTER SO SCREEN CENTERLINE IS 5"± ABOVE GRADE.
3. A WEATHER/SUN SHIELD SHALL BE PROVIDED FOR EACH CHLORINE ANALYZER LOCATED OUTDOORS.
4. FIELD ROUTE ANALYZER OUTLET TO OWNER APPROVED DRAIN LOCATION.
5. MOUNT ARV OFF-CENTER IN MANHOLE TO MAXIMIZE ENTRY SPACE FOR ARV MAINTENANCE.
6. MANHOLE COVER AND TOP OF CONCRETE TO BE FLUSH WITH FINISHED GRADE. MANHOLE COVER AND RING FLANGE (EAST JORDAN IRONWORKS V-1600-5 OR EQUAL).
7. TAP OR VIBRATE HDPE PIPE TO HELP SETTLE BACKFILL WHEN COMPACTING IN ACCORDANCE WITH SPECIFICATION SECTION 02221. COMPACT AROUND MANHOLES TO 90% STANDARD PROCTOR DENSITY. MINIMUM 18" OF BACKFILL REQUIRED FROM TRENCH SIDEWALLS.

FIRE HYDRANT DETAIL NOTES

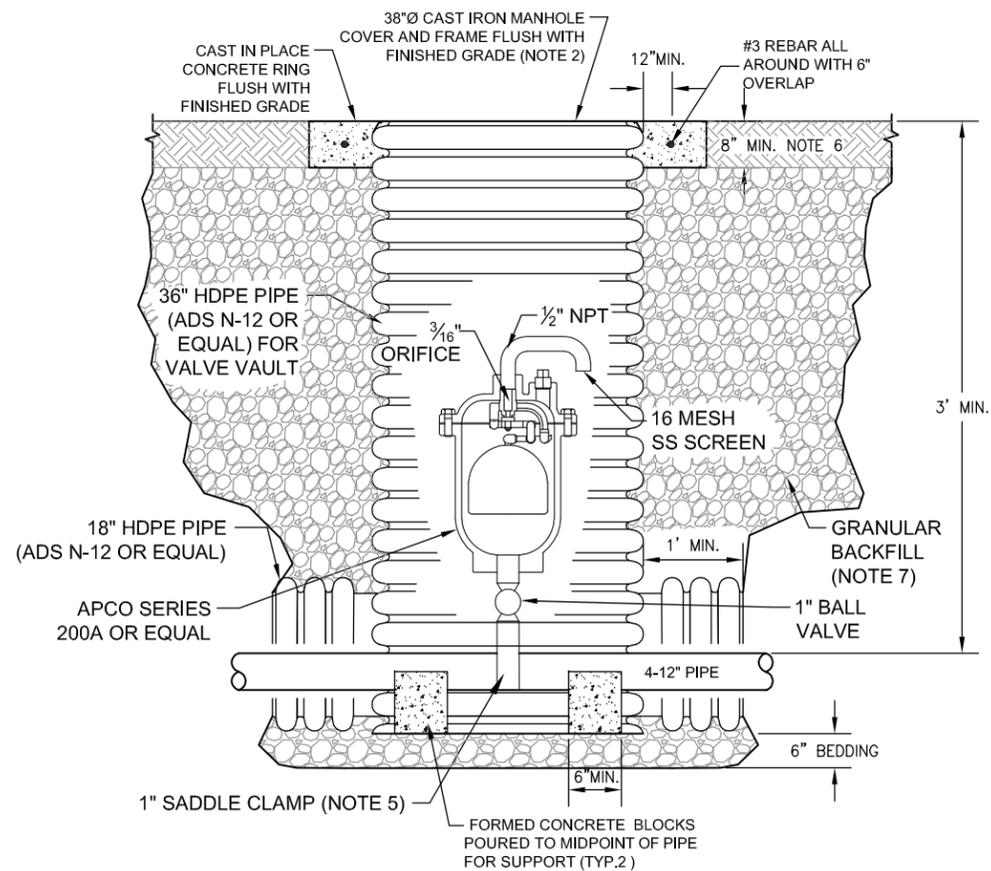
1. INSTALL MAIN-SIZED REDUCING TEE AS SHOWN ON THE INTERSECTION DETAILS AND PLAN AND PROFILE DRAWINGS.
2. HYDRANT LOCATIONS SHOWN ON DRAWINGS ARE APPROXIMATE. FIELD VERIFY PROPER ORIENTATION AND GET EXACT LOCATION FROM CONTRACTOR AND OWNER. LOCATE HYDRANT ACCORDINGLY, BUT AT LEAST 25 FEET FROM NEAREST BUILDING.
3. ALL FITTINGS SHALL BE MJ WITH MECHANICAL RESTRAINTS (MEGALUGS) INCLUDING WHEN DISTANCE FROM HYDRANT TO MAIN EXCEEDS 20' AND MULTIPLE SECTIONS OF PIPE ARE USED.
4. WRAP DUCTILE IRON PIPE, VALVES AND FITTINGS WITH 10 MIL POLYWRAP.
5. PROVIDE A GRAVEL DRAIN POCKET OR PIT AROUND HYDRANT SHOE.



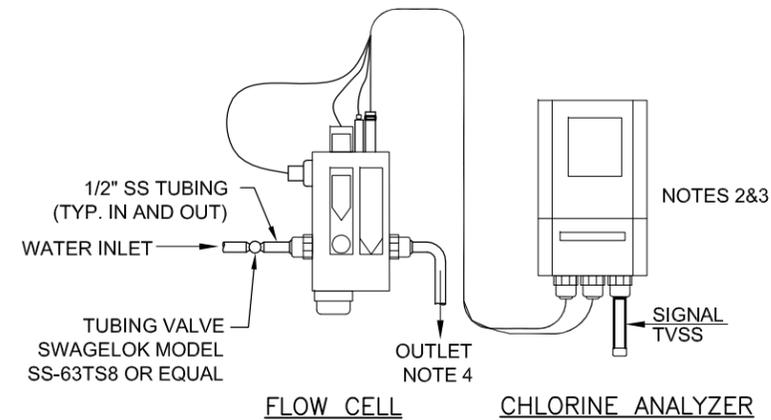
1 WALL PENETRATION
SCALE: NOT TO SCALE



2 FIRE HYDRANT DETAIL
SCALE: NOT TO SCALE



3 TYPICAL DETAIL AIR RELEASE VALVE
SCALE: NOT TO SCALE



4 CHLORINE ANALYZER DETAILS
SCALE: NOT TO SCALE

REV.	DESCRIPTION	BY:	DATE:
1	AS-BUILT SET	HCD	11/2008
0	ISSUED FOR CONSTRUCTION	HCD	12/2007

REVISIONS

SCALES SHOWN ON THIS DRAWING ARE APPLICABLE ONLY TO D SIZE DRAWING

CAMP STANLEY STORAGE ACTIVITY
WATER SYSTEM REHABILITATION

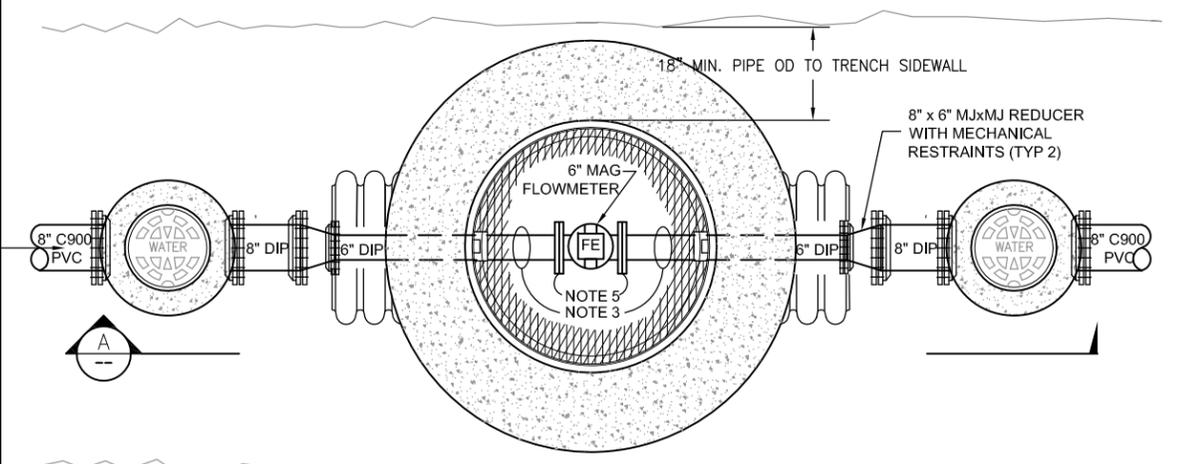
Contract No. FA8903-04-D-8675 Task Order No. 022

CONTRACTOR :
PARSONS Job No. 745006 WBS 03000

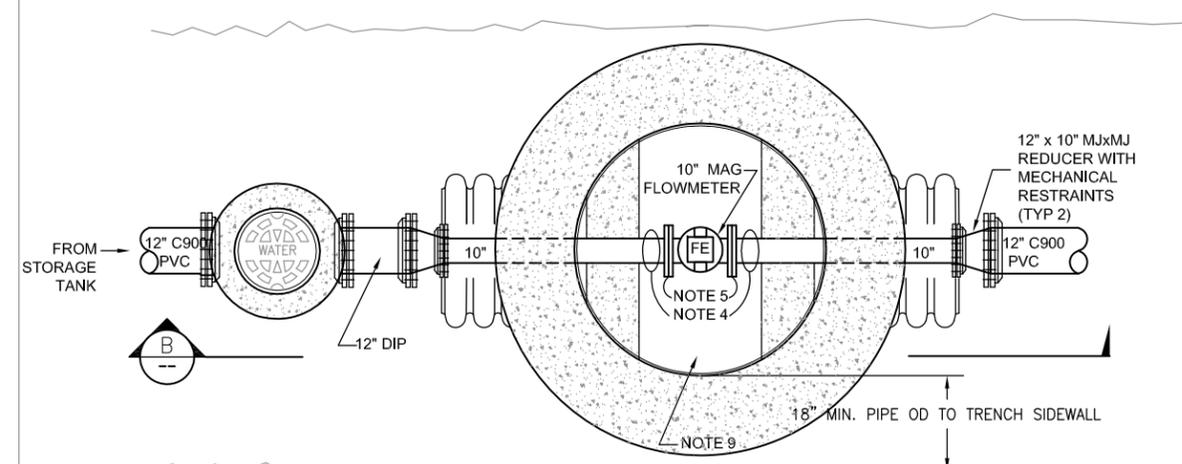
Drawing Title :
**WALL PENETRATION DETAIL,
HYDRANT DETAIL, ARV DETAIL,
AND CHLORINE ANALYZER DETAIL**

Designed : HCD	Drawn : JLH	Rev: 1
Checked : KMK	Approved :	
Scale : N.T.S.	Date : NOVEMBER 2008	Drawing No. : M-02

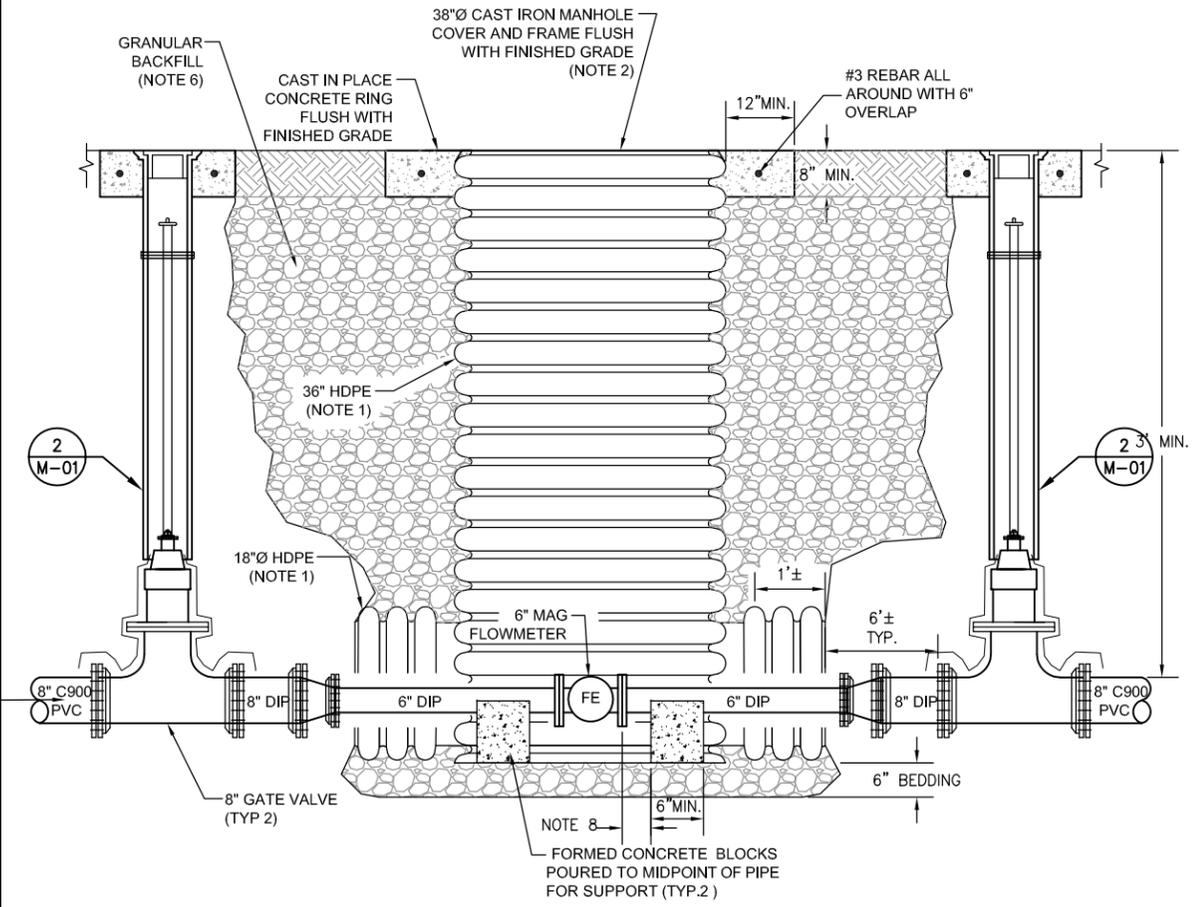
AS-BUILT
NOVEMBER 2008



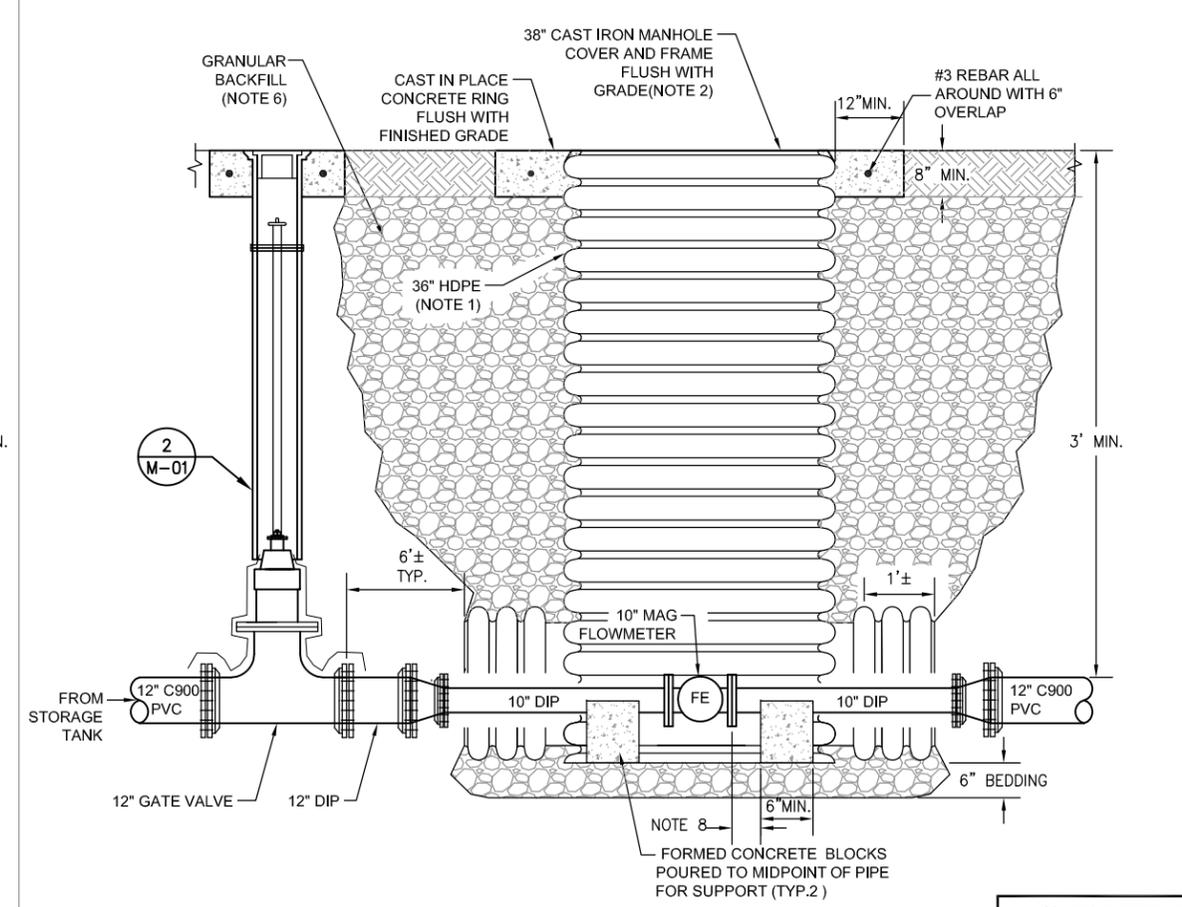
1 6" METER VAULT
N.T.S.



2 10" METER VAULT
N.T.S.



A SECTION
N.T.S.



B SECTION
N.T.S.

AS-BUILT
NOVEMBER 2008

6-inch Flowmeters					
FE TAG	CIVIL DWG	TIE PTS.	P&I DWG	DEMO DWG	DESCRIPTION
90802	C-09	J-10c, J-10d	I-03	X-07	Flowmeter west of Bldg 74
04402	C-47	S-1, S-2	I-04	X-27	Flowmeter west of Bldg 44
04502	C-26	In new line	I-04	N/A	Flowmeter east of Bldg 45
00403	C-17	In new line	I-02	N/A	Flowmeter west of Bldg 4

10-inch Flowmeter					
FE TAG	CIVIL DWG	TIE PTS.	P&I DWG	DEMO DWG	DESCRIPTION
07602	C-12	IN NEW LINE	I-05	N/A	Flowmeter in south branch of 12" main from Storage Tank

NOTES

1. ADS N-12 OR EQUAL DUAL WALL CORRUGATED PIPE INLET STRUCTURE.
2. GASKET-SEALED, UNBOLTED MANHOLE COVER AND RING FLANGE EAST JORDAN IRONWORKS CAT. NO. V-1600-5 OR EQUAL.
3. 6" DUCTILE IRON PIPE SPOOL, FLANGED BY PLAIN ENDS. USE MEGALUG MECHANICAL JOINT RESTRAINTS ON ALL MECHANICAL JOINTS.
4. 10" DUCTILE IRON PIPE SPOOL WITH FLANGED BY PLAIN ENDS. USE MEGALUG MECHANICAL JOINT RESTRAINTS ON ALL MECHANICAL JOINTS.
5. INSTALL GROUNDING RINGS IN ACCORDANCE WITH FLOWMETER MANUFACTURER'S INSTRUCTIONS.
6. TAP OR VIBRATE HDPE PIPE TO HELP SETTLE BACKFILL WHEN COMPACTING IN ACCORDANCE WITH SPECIFICATION SECTION 02221. COMPACT AROUND MANHOLES TO 90% STANDARD PROCTOR DENSITY. MINIMUM 18" OF BACKFILL REQUIRED FROM TRENCH SIDEWALLS.
7. WRAP ALL DUCTILE PIPE, VALVES AND FITTINGS IN 10MIL POLYWRAP.
8. ALLOW ADEQUATE SPACE FROM METER FLANGES FOR UNBOLTING.
9. MANHOLE COVER NOT SHOWN IN THIS VIEW.

REV.	DESCRIPTION	BY:	DATE:
1	AS-BUILT SET	HCD	11/2008
0	ISSUED FOR CONSTRUCTION	HCD	12/2007

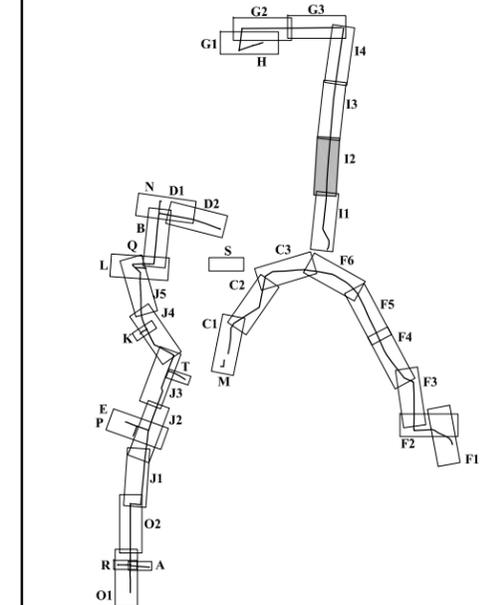
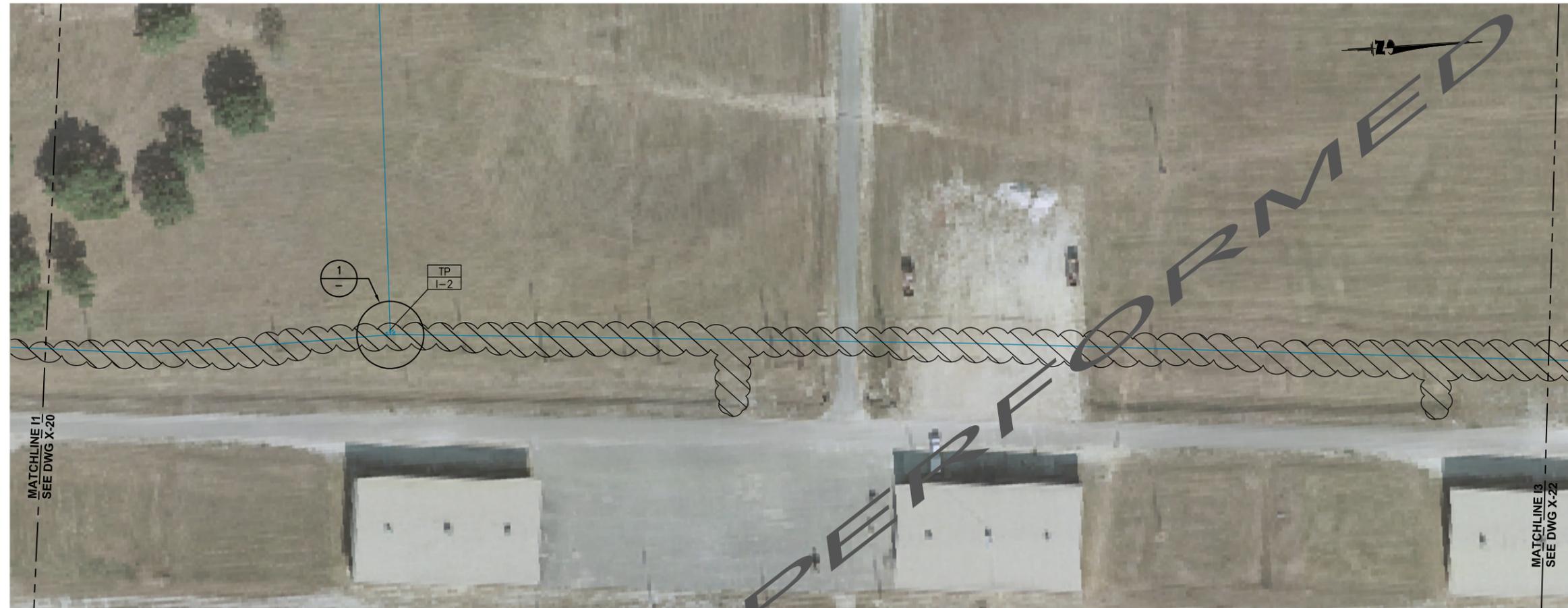
REVISIONS
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CAMP STANLEY STORAGE ACTIVITY
WATER SYSTEM REHABILITATION
Contract No. FA8903-04-D-8675 Task Order No. 022

CONTRACTOR :
PARSONS Job No. 745006 WBS 03000

Drawing Title :
METER VAULT DETAILS

Designed : HCD	Drawn : JLH	Rev: 1
Checked : KMK	Approved :	
Scale : N.T.S.	Date : NOVEMBER 2008	Drawing No. : M-03



- LEGEND**
- (FH) FIRE HYDRANT
 - (MH) MANHOLE
 - (FE) FLOWMETER
 - (AR) AIR RELEASE VALVE
 - ▽ REDUCER
 - ◇ GATE VALVE
 - ⊙ BALL VALVE
 - ⌞ CHECK VALVE
 - (CA) CHLORINE ANALYZER
 - (BO) BLOWOFF VALVE
 - (SC) SERVICE CONNECTION SADDLE CLAMP
 - (FS) FIRE STAND
 - (TP) TRENCH PLUG
 - ▭ POSSIBLE UTILITY CROSSING AREA
 - (Hatched) REMOVE PIPE
 - (TP) TIE POINT
 - (Orange) GAS LINE
 - (Purple) WASTEWATER LINE
 - (Red) BURIED ELECTRIC LINE
 - (Blue) EX. WATER LINE
 - (Black) NEW WATER LINE
 - (Dashed Blue) ABANDONED OR TO BE ABANDONED WATER LINE
 - (Dashed Black) MATCHLINE

REV.	DESCRIPTION	BY:	DATE:
1	AS-BUILT SET	HCD	11/2008
0	ISSUED FOR CONSTRUCTION	HCD	12/2007

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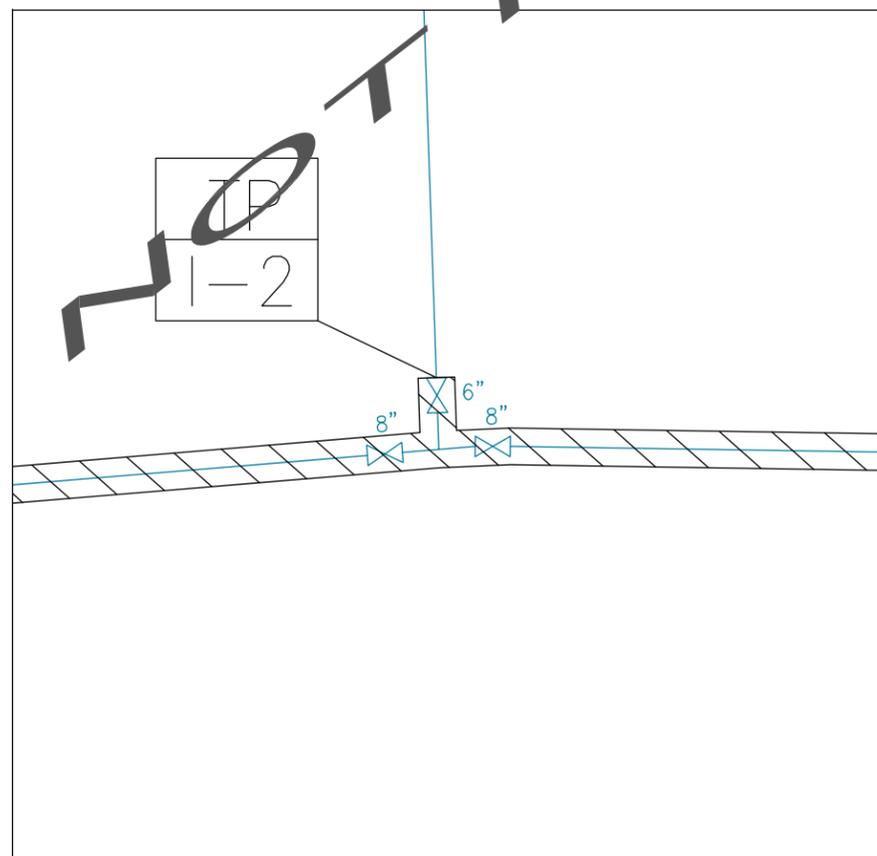
**CAMP STANLEY STORAGE ACTIVITY
WATER SYSTEM REHABILITATION**

Contract No. FA8903-04-D-8675 Task Order No. 022

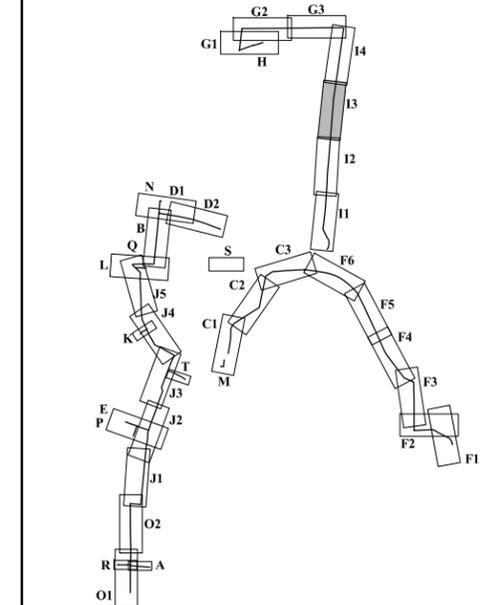
CONTRACTOR :
PARSONS Job No. 745006 WBS 03000

Drawing Title :
**DEMO PLAN AND DETAILS
SEGMENT I2**

Designed : HCD	Drawn : JLH	Rev: 1
Checked : KMK	Approved :	
Scale : N.T.S.	Date : NOVEMBER 2008	Drawing No. : X-21



DEMO DETAIL (1)



- LEGEND**
- (FH) FIRE HYDRANT
 - (MH) MANHOLE
 - (FE) FLOWMETER
 - (AR) AIR RELEASE VALVE
 - ◻ REDUCER
 - ◻ GATE VALVE
 - ◻ BALL VALVE
 - ◻ CHECK VALVE
 - (CA) CHLORINE ANALYZER
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 - (FS) FIRE STAND
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 - ◻ REMOVE PIPE
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 - - - MATCHLINE

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0	ISSUED FOR CONSTRUCTION	HCD	12/2007

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**CAMP STANLEY STORAGE ACTIVITY
WATER SYSTEM REHABILITATION**

Contract No. FA8903-04-D-8675 Task Order No. 022

CONTRACTOR :
PARSONS Job No. 745006 WBS 03000

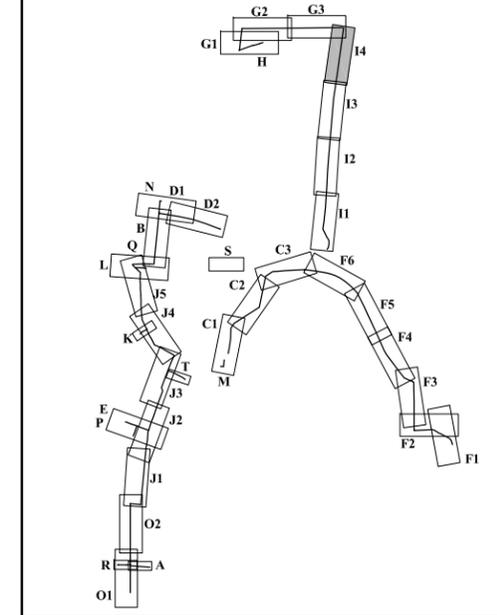
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**DEMO PLAN AND DETAILS
SEGMENT I3**

Designed : HCD	Drawn : JLH	Rev: 1
Checked : KMK	Approved :	
Scale : N.T.S.	Date : NOVEMBER 2008	Drawing No. : X-22

DEMO NOT PERFORMED



MATCHLINE I3
SEE DWG X-22



- LEGEND**
- (FH) FIRE HYDRANT
 - (MH) MANHOLE
 - (FE) FLOWMETER
 - (AR) AIR RELEASE VALVE
 - ◻ REDUCER
 - ◻ GATE VALVE
 - ◻ BALL VALVE
 - ◻ CHECK VALVE
 - ◻ REMOVE PIPE
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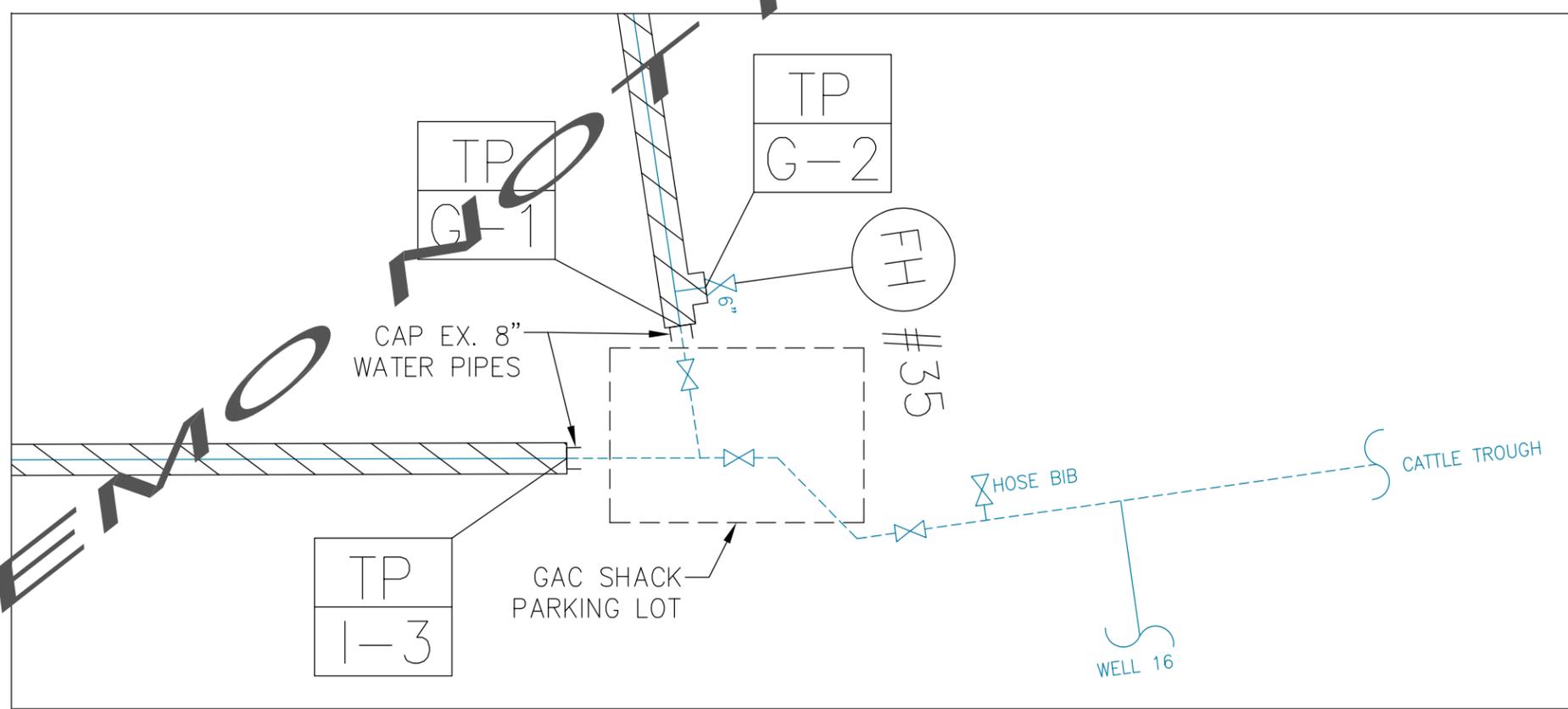
CAMP STANLEY STORAGE ACTIVITY
WATER SYSTEM REHABILITATION

Contract No. FA8903-04-D-8675 Task Order No. 022

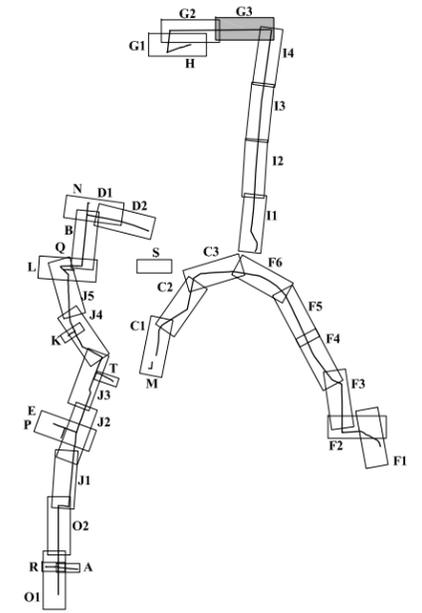
CONTRACTOR :
PARSONS Job No. 745006 WBS 03000

Drawing Title :
**DEMO PLAN AND DETAILS
SEGMENT I4**

Designed : HCD	Drawn : JLH	Rev: 1
Checked : KMK	Approved :	
Scale : N.T.S.	Date : NOVEMBER 2008	Drawing No. : X-23



DEMO DETAIL 1



LEGEND

- (FH) FIRE HYDRANT
- (MH) MANHOLE
- (FE) FLOWMETER
- (AR) AIR RELEASE VALVE
- ◁ REDUCER
- ⋈ GATE VALVE
- ⊙ BALL VALVE
- ⌞ CHECK VALVE
- ⊘ REMOVE PIPE
- TP TIE POINT
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- (CA) CHLORINE ANALYZER
- (BO) BLOWOFF VALVE
- (SC) SERVICE CONNECTION
- (FS) FIRE STAND
- (TP) TRENCH PLUG
- ⌞ POSSIBLE UTILITY CROSSING AREA

REV.	DESCRIPTION	BY:	DATE:
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CAMP STANLEY STORAGE ACTIVITY
WATER SYSTEM REHABILITATION

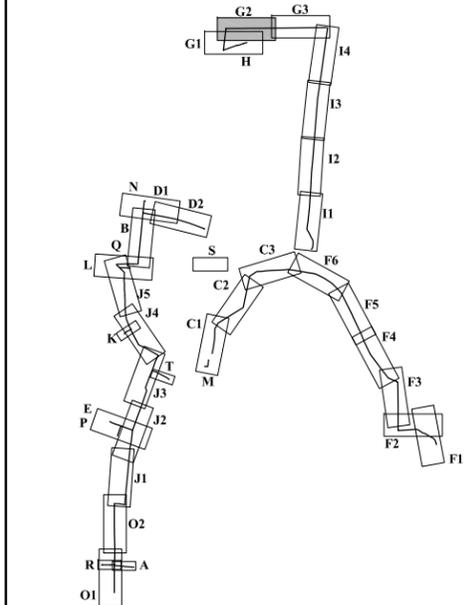
Contract No. FA8903-04-D-8675 Task Order No. 022

CONTRACTOR :
PARSONS Job No. 745006 WBS 03000

Drawing Title :
**DEMO PLAN AND DETAILS
SEGMENT G3**

Designed : HCD	Drawn : JLH	Rev: 1
Checked : KMK	Approved :	
Scale : N.T.S.	Date : NOVEMBER 2008	Drawing No. : X-24

DEMO NOT PERFORMED



- LEGEND**
- (FH) FIRE HYDRANT
 - (MH) MANHOLE
 - (FE) FLOWMETER
 - (AR) AIR RELEASE VALVE
 - ◻ REDUCER
 - ◻ GATE VALVE
 - ◻ BALL VALVE
 - ◻ CHECK VALVE
 - (CA) CHLORINE ANALYZER
 - (BO) BLOWOFF VALVE
 - (SC) SERVICE CONNECTION SADDLE CLAMP
 - (FS) FIRE STAND
 - (TP) TRENCH PLUG
 - ◻ POSSIBLE UTILITY CROSSING AREA

- (Hatched) REMOVE PIPE
- (TP) TIE POINT
- (Orange line) GAS LINE
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0	ISSUED FOR CONSTRUCTION	HCD	12/2007

R E V I S I O N S

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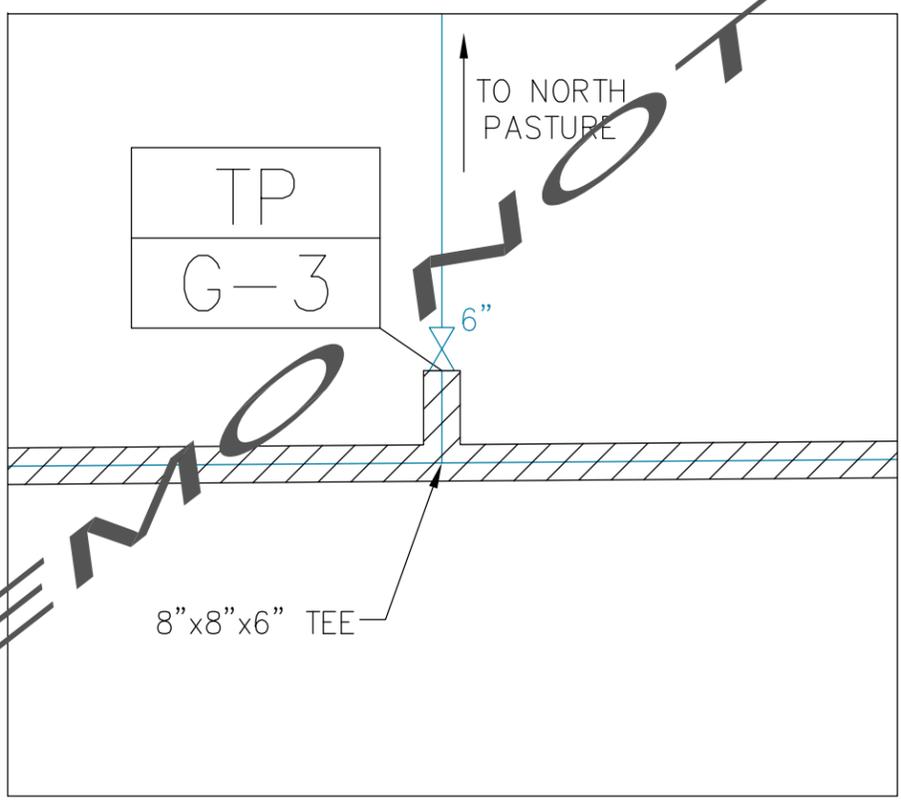
**CAMP STANLEY STORAGE ACTIVITY
WATER SYSTEM REHABILITATION**

Contract No. FA8903-04-D-8675 Task Order No. 022

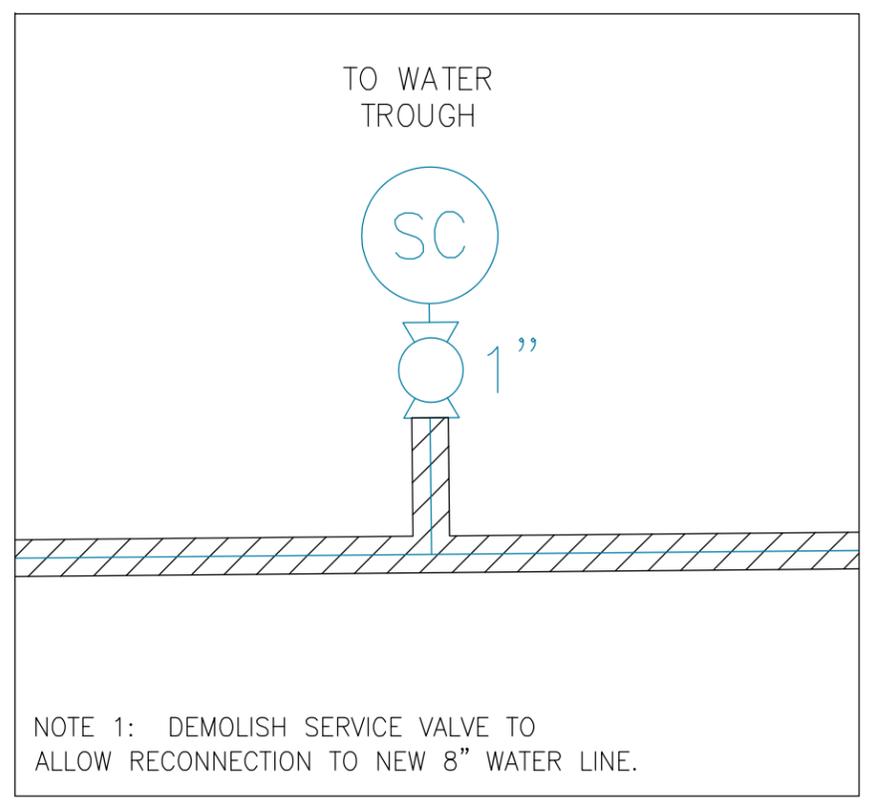
CONTRACTOR :
PARSONS Job No. 745006 WBS 03000

Drawing Title :
**DEMO PLAN AND DETAILS
SEGMENT G2 (8")**

Designed : HCD	Drawn : JLH	Rev: 1
Checked : KMK	Approved :	
Scale : N.T.S.	Date : NOVEMBER 2008	Drawing No. : X-25

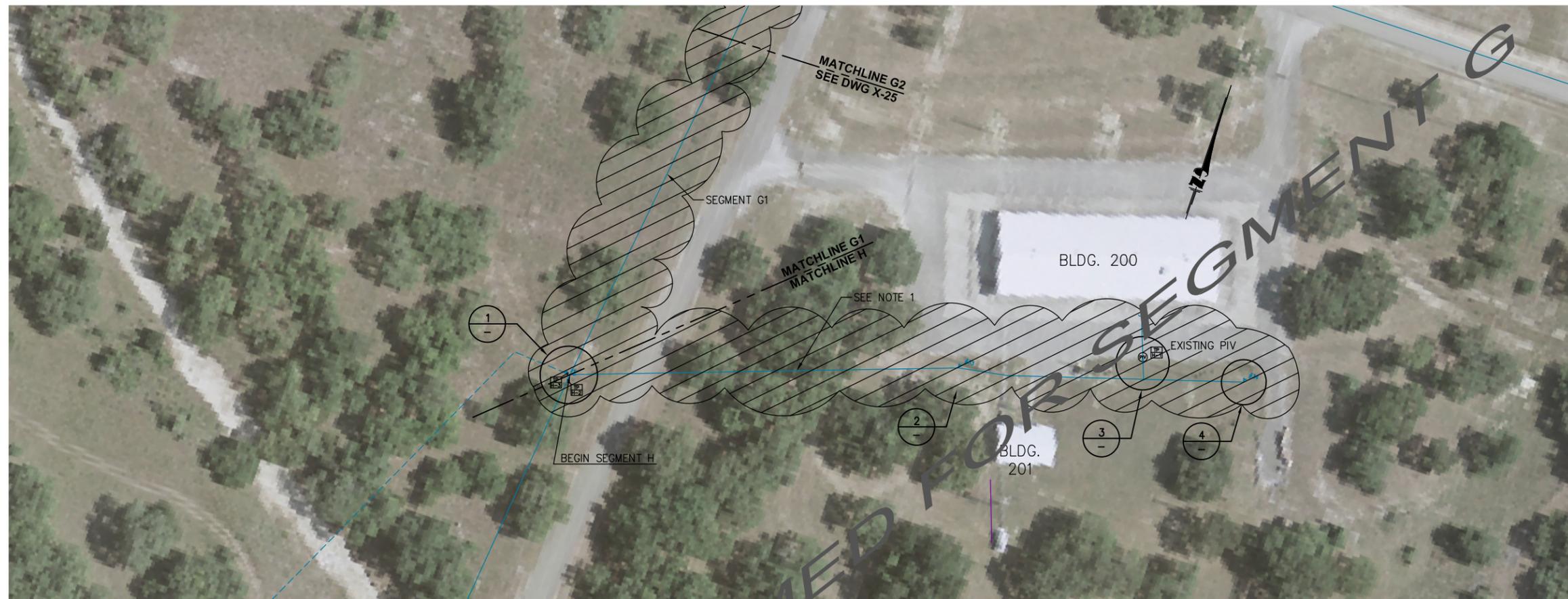


DEMO DETAIL 1

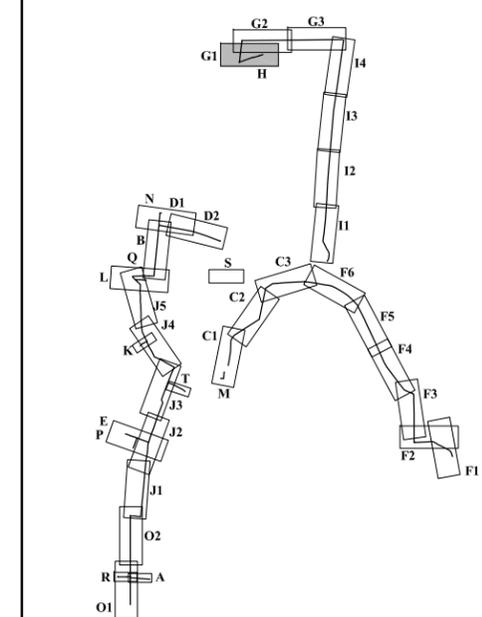


NOTE 1: DEMOLISH SERVICE VALVE TO ALLOW RECONNECTION TO NEW 8" WATER LINE.

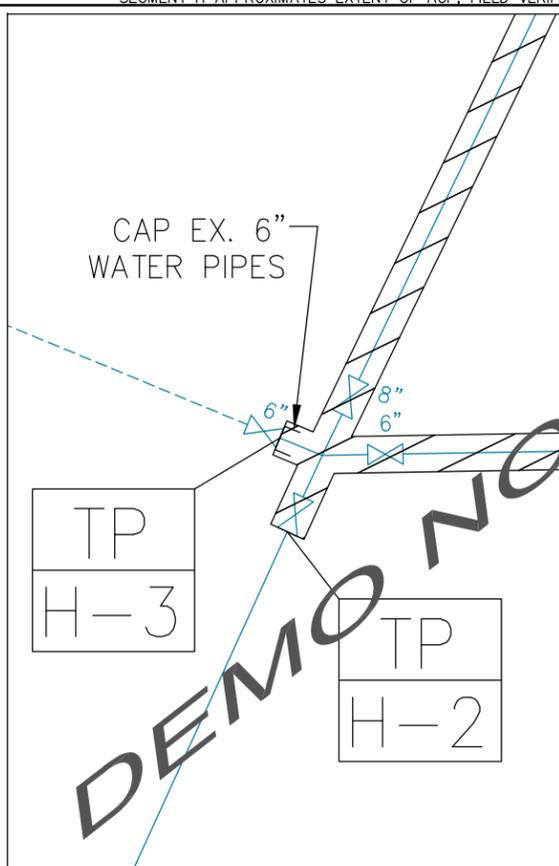
DEMO DETAIL 2



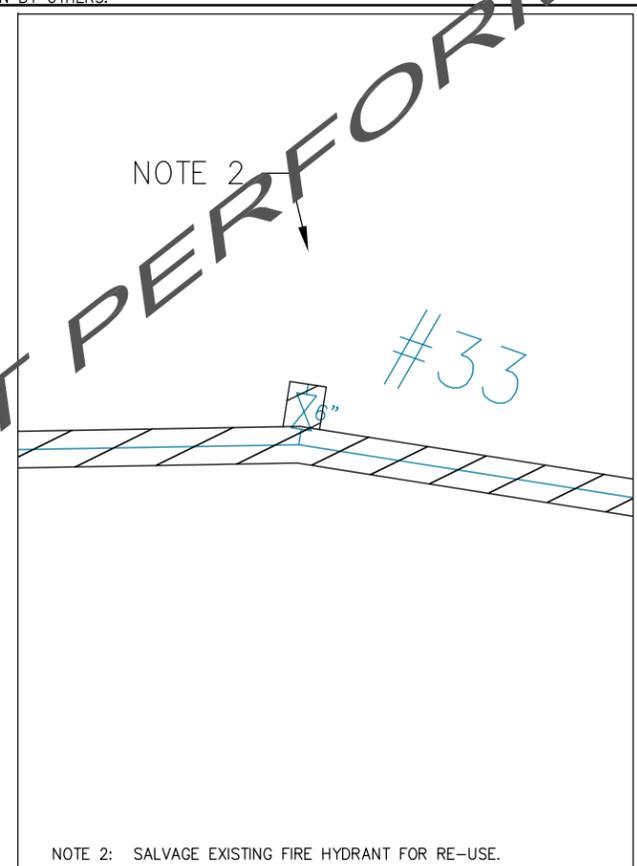
NOTE 1: DEMOLITION AND DISPOSAL OF ASBESTOS CEMENT PIPE BY OTHERS.
SEGMENT H APPROXIMATES EXTENT OF ACP. FIELD VERIFICATION BY OTHERS.



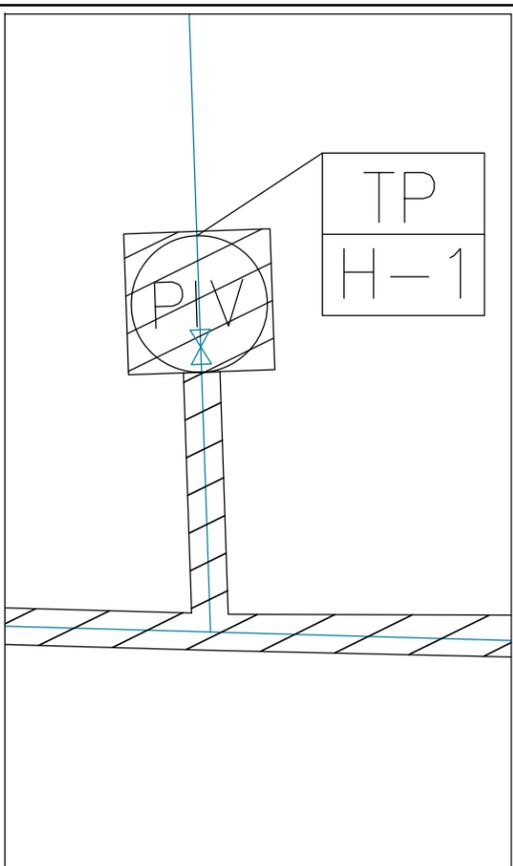
- LEGEND**
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 - (MH) MANHOLE
 - (FE) FLOWMETER
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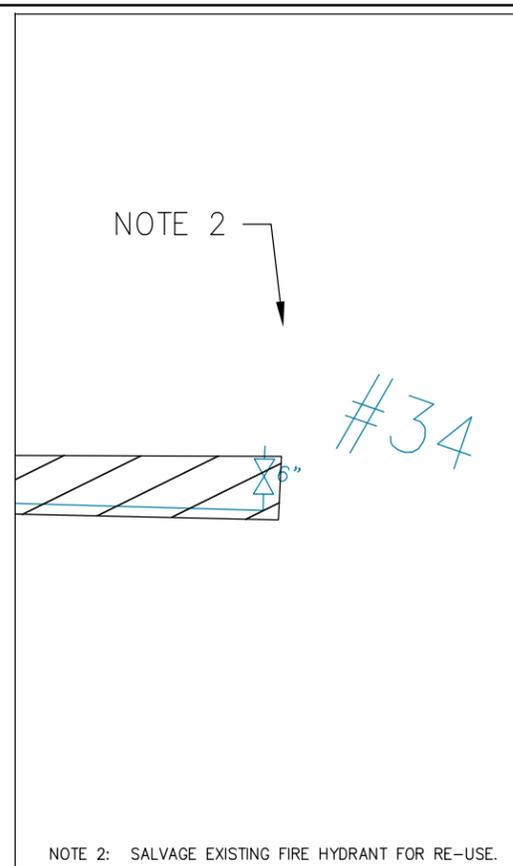
DEMO DETAIL 1



DEMO DETAIL 2



DEMO DETAIL 3



DEMO DETAIL 4

REV.	DESCRIPTION	BY:	DATE:
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0	ISSUED FOR CONSTRUCTION	HCD	12/2007

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CAMP STANLEY STORAGE ACTIVITY
WATER SYSTEM REHABILITATION

Contract No. FA8903-04-D-8675 Task Order No. 022

CONTRACTOR :
PARSONS Job No. 745006 WBS 03000

Drawing Title :
**DEMO PLAN AND DETAILS
SEGMENT G1
SEGMENT H**

Designed : HCD	Drawn : JLH	Rev: 1
Checked : KMK	Approved :	
Scale : N.T.S.	Date : NOVEMBER 2008	Drawing No. : X-26

**Specifications
for
Water System Rehabilitation Construction
at
Camp Stanley Storage Activity
Boerne, Texas**



**Prepared for:
Camp Stanley Storage Activity
Boerne, Texas
and
AFCEE/ERD QAE
Brooks City Base, Texas**

**FA8903-04-D-8675
Task Order 0022**

November 2008

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SPECIFICATIONS

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SECTION 01010 SUMMARY OF WORK

PART 1- DESCRIPTION

Camp Stanley Storage Activity (CSSA) is a secure military post located near Boerne, Texas. It operates a water treatment system that consists of three wells, a storage tank, a pumping and distribution system, and chlorination equipment. Distribution piping consists of ductile iron pipe (DIP), Cast Iron Pipe (CIP), Polyvinyl Chloride Pipe (PVC), and Asbestos Cement Pipe (ACP). Two of the system's wells pump into the storage tank while the third well pumps directly into the distribution system. The storage tank is located on a high point within the post property and is sufficient to deliver gravity-pressurized flow to the points of use. Hydropneumatic tank systems in the residential area supplement the gravity pressure for domestic use while booster pumps in warehouse area supplement the pressure and flow for fire protection.

The Work, for which these specifications apply, is a construction project providing improved water system capacity, pressure, and monitoring capabilities. Significant portions of the distribution system will be replaced with new PVC; in addition new pipelines will be added in several locations where the existing piping now serving those areas will be abandoned in place.

The Work is divided into tasks as follows: Mobilization, Waterline Removal and Disposal, Waterline Installation, Testing Services, Environmental Control Services, and Site Restoration. The Work of these tasks will be performed in serial phases rather than with parallel activities or with multiple crews working in several locations. This working arrangement is mandatory based on the Post Mission, accessibility requirements and the desire to minimize outages to one area at a time.

The Subcontractor shall provide Construction Services to Parsons Infrastructure and Technology Group (the Contractor) under the Contractor's prime contract with the Air Force Center for Engineering and the Environment (AFCEE) (Client) to support Camp Stanley Storage Activities (CSSA) (Owner), which is a US Army post in Boerne, Texas.

1.01 SUMMARY OF WORK

A. Mobilization/Demobilization:

1. Temporary Office Quarters: Subcontractor shall provide temporary office quarters at the work site with provisions for self-contained water supply and sanitation facilities. CSSA staff will identify location where Subcontractor shall set temporary office. Power may be available from a pole-mounted transformer with connection and step-down by the Subcontractor. The office quarters shall be sufficient to provide space for daily management of work by construction management staff and as a place where impromptu and formal field meetings can be held.
2. Subcontractor shall procure and transport all needed equipment, materials, labor to the site.
3. Contractor will designate to the Subcontractor the areas for laydown and storage. Subcontractor is responsible for managing storage area and for properly protecting stored materials and equipment.
4. Contractor will designate the staging and sequence of the work.
5. Subcontractor shall clean the work site at the end of each day's work. Upon project completion, the Subcontractor shall remove all trash and final clean all the work sites. Any surplus material shall be stockpiled onsite where directed by the Contractor.

B. Waterline Demolition and Disposal

1. Subcontractor shall locate existing water lines, and all utilities in the area of Work by use of detectors or potholing methods. Steps shall be taken to avoid, divert, and/or protect all utilities from damage during execution of this task. Subcontractor shall check all proposed paths of excavation with detectors or potholing methods to field verify no utilities or other interferences. Where interferences are suspected, but not known exactly, hand excavation shall be done to identify extent of interferences. Subcontractor shall be wholly and exclusively responsible for any liabilities borne out of utility damage. Such liabilities may

- include, but are not limited to, costs associated with repair of the utility line(s); and remediation and recovery of affected environments (water, soil, air).
2. For approximately 15,000 LF of CIP and DIP, Subcontractor shall excavate, disconnect line from existing service(s), remove, transport, and dispose or salvage the piping and ancillary items. Provide trench dewatering and shoring/bracing in accordance with OSHA regulation 29CFR1926.652 as necessary to perform the Work. Remove and stockpile pipeline backfill to a location designated by the Contractor.
 - a. All valves will be withdrawn and: 1) disposed; or 2) retained for reuse in the replacement pipeline. Valve disposition will be determined by the Contractor and CSSA during removal activities.
 - b. Stockpile and segregate extracted metal pipe, plastic pipe, and lead joint material at Contractor-designated areas onsite.
 - c. Subcontractor shall transport stockpiles to metal recycling facility or waste disposal facility as directed by Contractor. Subcontractor shall use waste disposal manifest forms prepared by CSSA.
 - d. Waste spoils from excavation activities shall be disposed by the Subcontractor either offsite or onsite for use as fill at locations designated by the Contractor's Construction Manager. Onsite disposition of construction spoils shall include grooming and grading of any material dropped at the designated site.
 - e. Supply ductile iron caps with mechanical joints for all pipes 4" diameter and larger that are to be abandoned in place. Alternatively, bell ends may be plugged with a DI plug or sawed off and secured with a mechanical joint DI cap. All ACP pipe to be abandoned in place shall have its openings secured with end caps, blind flanges, or low strength flowable fill or equal as approved by Contractor.
 - f. Procure and install approximately 21 Dry Barrel Fire Hydrants with isolation valves, mechanical joint restraints, and other associated items, as specified and indicated on the Drawings. In addition, approximately 4 existing Dry Barrel Fire Hydrants will be reused by removing them from service and reinstalling them in their new location complete with isolation valves, mechanical joint restraints, and other associated items as specified.
 3. Abandon approximately 1,850 LF ACP in place. Subcontractor shall disconnect the ACP pipe from existing service(s). No sawing, crushing, breaking, or any other activity that causes the release of friable asbestos material will be allowed.
 4. Subcontractor shall excavate, access, disconnect from existing service(s) and appurtenances, remove, transport, and dispose 550 LF ACP. No sawing, crushing, breaking, or any other activity that causes the release of friable asbestos material is authorized under this Contract. Subcontractor shall work carefully using minimal mechanized equipment and instead use hand labor to excavate and remove as feasible to avoid creating a friable asbestos waste.
 - a. The definition of friable asbestos material shall conform to EPA 40 CFR Part 61.150. Friable asbestos material is defined as any material that contains more than 1 percent asbestos that, when dry, can be crumbled, pulverized, or reduced to powder by hand pressure.
 - b. In the event Subcontractor creates a friable asbestos waste as defined herein, Subcontractor shall stop work immediately. Contractor will then retain an asbestos abatement contractor under separate contract to properly secure and dispose the damaged pipe at an approved disposal facility. All costs required to properly handle, containerize, transport, and dispose the damaged pipe including, but not be limited to, regulatory notice and permitting fees, supervision, personnel protective equipment costs, legal fees, equipment purchase or rental fees, and disposal costs required to comply with all governing regulations will be charged to the Subcontractor.

C. Waterline Installation

1. Subcontractor shall install new PVC AWWA standard C900 pipe with appurtenances. In addition, some 1" to 3" diameter Schedule 80 PVCP will be installed to provide service connections and small amounts of galvanized steel and stainless steel tubing will also be installed. All installed pipe, tubing and all other materials and equipment shall be new and shall be installed in newly constructed alignments or shall replace pre-existing DIP, CIP, ACP, or PVCP as shown by the Drawings. Appurtenances shall include mechanical joint restraints, thrust blocks, air release valves, blow off drains, resilient wedge gate valves, valve boxes, fire hydrants, electromagnetic flow meters, chlorine residual analyzers, and flowmeter vaults all with supporting hardware and power as needed. The projected sizes and estimated quantities of each item are called out on the Bid Form. New pipe shall have a standard dimension ratio of 18. The installation, location and specification of all items shall be as shown on the Drawings or described in the specifications. In general, pipe sizes shall include 4", 6", 8", 10" and 12" diameter pipe.
 - a. Pipe shall be placed in trenches from which old pipe is removed or in newly constructed trenches. Existing trenches shall be deepened as required by the drawings and specifications. All pipe placement shall conform to the following requirements, the drawings and Section 02221:
 - i. A minimum of 6" aggregate base bedding shall be used for all piping.
 - ii. Backfill in the pipe zone shall be a minimum of 6" above the crown of the pipe. Backfill shall also be compacted as specified.
 - iii. Tracer wire shall be placed directly on top of the pipe. In addition, marking tape shall be placed over the pipe centerline at 18" to 24" above the crown of pipe.
 - iv. At road crossings asphalt pavement or concrete shall be placed on the road base to match the existing surface.
 - b. Road and creek crossings shall be constructed as indicated on the drawings.
 - i. Road subgrade and asphalt pavement replacement will be as specified by Section 02512 and the Drawings.
 - ii. Original asphalt pavement will be sawcut to remove an envelope of pavement 1 foot beyond the limits of trenching.
 - iii. All original asphalt pavement within the sawcut region shall be removed from the roadway prior to trench excavation. The removed material will be transported and disposed at a Contractor-approved disposal facility.
 - iv. Where temporary road crossings are needed because of the duration that trench must be open exceeds 4 hours, or road cannot be closed even for short periods, sheet steel trench covers shall be used.
 - c. Service connections shall be provided as shown on the drawings. Any new service connections required, but not shown shall be field routed to nearest tie-in point as determined by the Contractor. Service connections consist of 1" to 2" saddles and same diameter Schedule 80 PVCP with solvent-welded joints.
 - d. Where water system shutdown will exceed 4 hours, provide temporary water supply to areas affected by the construction process. Supplied water shall be of the same or better quality and pressure than that supplied by the existing water system prior to construction. Contractor will submit method of temporary water supply to Contractor for review and approval prior to implementing the supply.
 - e. Install, test, and disinfect all pipelines as directed by the AWWA C651-05. Prior to performing the Work, provide a written description of the method, means, and controls to implement this testing and disinfection task of the Work. Subcontractor shall not begin this Work until it has received written approval of its plan to implement this standard.

- D. Environmental Controls
 - 1. Provide Dust Control during execution of the Work that complies with Section 01563.
 - 2. Provide all erosion control and stormwater runoff/run-on controls as required by Section 02750.
 - 3. The Subcontractor shall comply with all stormwater permit requirements.
 - a. Subcontractor shall coordinate with the Contractor to implement the Contractor's Stormwater Pollution Prevention Plan (SWPPP) as described by Section 02750 of these Specifications. The Subcontractor shall mitigate both run-on and run-off from the disturbed construction area throughout performance of the Work.
 - b. Subcontractor shall document and maintain records of: the extent of installation of all SWPPP products; date, time, description of all SWPPP maintenance activities; and the date, time, Contractor representative inspecting and approving SWPPP maintenance activities.
 - c. Subcontractor shall maintain a SWPPP Implementation log dedicated to all SWPPP activities at CSSA during prosecution of the Work and shall update this log as Work is performed. The log shall be kept in the Subcontractor office and shall be made available to the Contractor, Client, or TCEQ representative upon demand.
- E. All Work shall be performed in a safe manner and conforming to Contractor Health and Safety Plan (HSP), which shall be provided to Subcontractor upon contract award. Subcontractor shall prepare an Addendum to Contractor HSP that shows coordination, techniques, and protocols for Subcontractor compliance with Contractor's site specific HSP provisions. This includes daily tailgate safety meetings held with Subcontractor's employees and implementation of trench safety protocols required by OSHA regulations.
- F. The Subcontractor shall provide controls to safeguard open excavations including all barricades, warning signs, guard rails and other devices to prevent accidents.
- G. The Owner is taking primary responsibility for clearing and grubbing activities. All areas that need to be cleared and grubbed shall be coordinated and scheduled with the Owner and Contractor at least 1 week in advance of excavation work to allow Owner time to complete. All areas where minor clearing and grubbing needs to be done must be pre-approved by the Contractor and Owner personnel prior to work startup. No tree or shrub removal will be permitted without prior approval.
- H. The Subcontractor shall coordinate its work (other than clearing and grubbing requirements) at least 48 hours in advance with Contractor and CSSA staff as well as other contractors working in the area to maximize workflow and minimize disruptions to contracted work.
- I. Meetings
 - 1. The Contractor will hold a daily meeting with the Subcontractor at a place named by the Contractor. During this daily meeting, minutes from the prior days meeting may be read and approved or revised. The Subcontractor shall report work to be performed, compliance or deviation with scheduling, and any concerns that require coordination or discussion.
 - 2. The Contractor will maintain minutes of all meetings with the Subcontractor and will issue written versions of same to the Subcontractor in the form of email or hardcopy.
 - 3. Meeting notes will be maintained in a log entitled "Meeting Minutes" at the Contractor's on-site office.

1.02 RELATED SECTIONS

- A. Section 01025 – Measurement and Payment
- B. Section 01300 - Submittals
- C. Section 01563 – Dust Control
- D. Section 02040 – Demolition and Removal

- E. Section 02221 – Excavation, Trenching, Backfilling and Compaction
- F. Section 02512 – Base Course and Wearing Surface
- G. Section 02600 – Water Distribution System Piping, Valves and Ancillary Equipment
- H. Section 02666 - Water Line Cleaning, Testing and Disinfection
- I. Section 02750 - Stormwater Pollution Prevention Plan
- J. Section 13410 – Instrumentation and Monitoring Requirements
- K. Section 13420 – Monitoring Devices
- L. Section 16010 – General Electrical Requirements

1.03 REFERENCES

- A. ANSI/AWWA C605-05: Underground Installation of Polyvinyl Chloride Pressure Pipe and Fittings for Water
- B. ANSI/AWWA C651-05: Disinfecting Water Mains
- C. ANSI/AWWA C900-97: Polyvinyl Chloride Pressure Pipe and Fabricated Fittings, 4-inch to 12-inch for Water Distribution
- D. AWWA C153-00 – Ductile Iron Compact Fittings for Water Service
- E. Title 30 Texas Administrative Code, Chapter 290 Public Drinking Water
- F. 40 CFR 61.150 (40 CFR Part 61, Subpart M, National Emission Standard for Asbestos)
- G. Parsons CSSA Site Specific Health and Safety Plan
- H. Parsons Construction Quality Assurance Plan
- I. Texas Pollutant Discharge Elimination System (TPDES) Construction Stormwater Permit TXR150000
- J. Project Construction Stormwater Pollution Prevention Plan

1.04 PROJECT SPECIFICS

- A. CSSA is a secure military installation located near Boerne, Texas that generally provides restricted access to outside Subcontractors during the operating hours of 8:00 am to 4pm or 5pm Monday through Friday. However, access to this installation can be made available through one or more security gates that are guarded on a 24/7 basis if required and scheduled well in advance.
- B. The existing site water system has three in-service water wells, two disinfection facilities, a water storage tank and a distribution network. The system provides both potable and fire fighting water through its distribution network, generally by gravity pressure. Where higher local pressures are required, booster pumps in the warehouse area and hydropneumatic tank systems and booster pumps located in the residential area provide the required pressure.
- C. CSSA contracted Parsons (the Contractor) to design and manage construction of water system improvements. The Contractor's design for this project uses new SDR 18, Class 150 AWWA grade C-900 PVC pipe to be installed for new lines and replacement of existing lines. The existing distribution system includes a pipe network comprised by assorted diameters of DIP, CIP, ACP, and PVCP. The scope of this work will be to provide newly installed and replacement pipeline within this network.
- D. The Work shall be performed under a UNIT PRICE NOT-TO-EXCEED type contract. All work shall be performed in accordance with the successful bidder's Bid Form submittal. The Bid Form is part of the Subcontract Documents.
- E. The Work shall be performed in phases to permit continual operation of the water system; to comply with security requirements; and to coordinate with other contractors. Subcontractor is expected to propose a schedule that accommodates the site operating constraints while minimizing overall job costs.

- F. The construction plans and specifications, along with TCEQ regulations and AWWA standards shall be used to guide the Work.
1. The CSSA water system is permitted by the State of Texas as Public Water System Number 0150117. Subcontractor shall perform all work so as to maintain compliance with the terms and conditions of this permit as well as applicable requirements of Title 30 Texas Administrative Code, Chapter 290 Public Drinking Water.
 2. Subcontractor shall provide potable water using temporary tankage or other means during construction periods that interrupt user access to potable water. For purposes of this specification, potable quality is defined as water quality matching or exceeding the water produced by the existing water system. A minimum acceptable temporary system meeting will deliver 20 gallons per minute (or more) at a constant pressure of 60 psig at the point of temporary supply.
 3. Subcontractor shall maintain compliance with the TPDES Construction Stormwater Permit TXR150000 at all times by implementing Best Management Practice-type runoff and run-on preventatives in accordance with specification 02750 and the SWPPP.
- G. It is highly unlikely, but nevertheless not impossible that the Subcontractor will expose contamination during excavation activities. Potential contamination may include oil, solvents or other petroleum substances and possibly unexploded ordnance (UXO) (such as live ammunition, bombs, or mortar shells) or fragments of exploded ordnance. In the event any type of contamination is exposed or suspected, the Subcontractor shall immediately stop work at that location and notify the Contractor. See Contractor's Site Specific Health and Safety Plan for additional UXO details. Subcontractor shall arrange work schedule to ensure that the overall progress of the project is not hindered.**
- H. The Work will be divided into Segments and will be performed from the storage tank location outward (downstream) into the distribution system. The storage tank is located at the highest point in the distribution system. Water is distributed primarily by gravity pressure to downstream users. The Work must be segmented from high elevation segments to lower elevation segments to enable upstream tested segments to be used for convenient delivery of water for downstream hydrostatic testing, flushing, and disinfection.
- Conservation of water is desirable during testing and disinfection activities. Subcontractor shall strive to conserve water to the extent practicable. Conservation efforts at a minimum should comprise use of disinfection waters for hydrostatic testing, and flush water should be recovered and integrated into strategies for dust control.
- I. Existing utility data shown on the drawings is provided for information only. Although these data are shown as accurately as known, much is not available and what is available cannot be assumed completely accurate. Subcontractor shall field verify utility locations and other potential interferences within the limits of the construction work by use of detectors and or potholing methods. Subcontractor shall coordinate with Contractor's Construction Manager to receive digging permits. Subcontractor shall not begin excavation until digging permit is in-hand and Subcontractor shall also comply with all conditions of the digging permit.
- J. Note: The Owner or the Contractor will use survey instruments or a Global Positioning System device to provide horizontal and vertical control for all Work throughout the project. Coordinate data obtained from either of these sources shall be placed on the redlined drawing set provided for as-built drawings. The Subcontractor shall coordinate and support these efforts so that the data are collected before trenches are backfilled.

1.05 SUBCONTRACTOR'S USE OF SITE

- A. The Work location is an active military installation requiring entry through one or more security gates. The Subcontractor shall provide to the Contractor a detailed construction schedule based on the required sequence of construction. This schedule should highlight major periods of concern such as mobilization, major periods for shipment, hydraulic testing, and power outages. This schedule will require CSSA coordination and approval prior to Work activities.

- B. The Subcontractor shall not soil CSSA or public roadways due to Subcontractor operations. If, in the opinion of the Contractor, the Subcontractor's operations result in dirty conditions, the Subcontractor, upon notification by the Contractor, shall take all necessary steps to clean or repair roads and thoroughfares at no extra cost.
- C. Construction operations and Site facilities are confined within the Site boundaries as shown on, or within the limits of the Drawings. Subcontractor will take necessary safety precautions while working on and along site roadways.
- D. The Subcontractor shall safeguard all structures and property along the pipeline routes and shall provide all shoring or supports necessary to preserve their stability.
- E. The Subcontractor shall determine from field detection and verification activities, the positions of all existing underground services shown on the drawings (within the dig zone) and shall maintain, protect, or divert them as required.
- F. Subcontractor is prohibited from entering restricted areas on post and from entering onto private property surrounding CSSA during performance of this Work.
- G. The Subcontractor shall not display advertisements anywhere on post or in proximity to the post related to this project, but Subcontractor's normal company signage on project vehicles is allowed.
- H. The Subcontractor shall submit a list for approval of all second-tier Subcontractors, manufacturers, and suppliers it proposes to use for all minor subcontracts, purchased materials, and equipment supplied, respectively, for completion of the Work.

1.06 HEALTH AND SAFETY

- A. The Subcontractor shall prepare an addendum to the Contractor Site Specific Health and Safety Plan (HSP) to implement work and take all necessary measures to ensure the health and safety of personnel on the site during the project work. However, the Subcontractor's addendum shall not relax any of the Contractor's Site-Specific Safety Plan provisions.
- B. All Subcontractor personnel shall wear identifying clothing or hats at all times while on Post. Subcontractor's personnel shall also wear high visibility vests at all times while working along roads or while controlling traffic. All Subcontractor vehicles shall be marked to identify company.

1.07 QUALITY CONTROL

- A. The Subcontractor shall perform quality control for its work during construction, start-up, and commissioning phases in accordance with Contractor's Construction Quality Assurance Plan (CQAP). Subcontractor shall file with Contractor written notice that it has read, agrees with and will support the callouts and commitments of the CQAP. This notice shall be filed with the Contractor prior to beginning the Work.

1.08 WORKING HOURS

- A. Work shall be performed during standard CSSA work days which are 8:00 am to 4:00 or 5:00 pm Monday through Friday. Subcontractor shall request deviations, if necessary, from these working hours at least 48 hours in advance.

1.09 SUBCONTRACTOR ONSITE FACILITIES

- A. Subcontractor shall provide a construction office with portable sanitary facilities on site as needed at the designated location. At a minimum, it will provide suitable protected space for daily document storage and retrieval as well as meetings with Contractor or Owner.

1.10 WARRANTY

- A. Subcontractor shall warrant all new materials, equipment and labor for one year after date of final system acceptance by the Contractor. Subcontractor shall submit a warranty letter (upon final acceptance by Contractor) acknowledging date and warranty duration.

1.11 SUBMITTALS

- A. Subcontractor shall provide submittals for review and approval per Section 01300.

1.12 REGULATORY COMPLIANCE

- A. Subcontractor shall comply with any manifests and permits required for the Work by governing jurisdictions not covered under existing CSSA or Contractor Contracts and permits. Contractor has made best efforts to cover all related regulatory filings in submittals required under these specifications and the Contract Terms for the Work. Subcontractor is not held harmless from regulatory requirements that are not named in this set of specifications or in the Contract Terms. Compliance with such unstated requirements shall be considered integral to the unit pricing provided in the Bid Form and shall not be priced nor paid for as a separate line item.

PART 2 - PRODUCTS**2.01 MATERIALS**

- A. All procured materials and equipment shall conform to the requirements called out by the drawings and specifications. All materials and equipment, except where materials are specifically designated for reuse, shall be new and in good condition at the time of installation. If materials or equipment appear damaged, used or weathered due to improper storage, Contractor reserves the right to reject these items and have them replaced with new items at no additional cost.

PART 3 - EXECUTION**3.01 COMPLIANT WORK**

- A. Execution of the Work as outlined herein shall proceed with a signed contract and the requisite bonding fulfillment.
- B. Provide delivery and provisioning of Subcontractor offices and sanitary facilities in areas approved by the Contractor. Utility power for offices can be taken from a pole-mounted transformer. Coordinate with the Contractor and CSSA to locate a suitable transformer and arrangements for connection. Subcontractor shall supply the labor and materials needed to connect to utility power.
- C. Provide delivery, installation, and maintenance of best management practices for fugitive dust and stormwater controls during performance of work as required by Sections 01563 and 02750.
- D. Provide restoration of all disturbed areas to original or better condition than when Work began. This includes, but is not limited to, the following:
1. Restoration of all landscaping including hydromulching with indigenous grass seed, periodic fertilization, replacement, patching, and watering to ensure viability of placed stock.
 2. Restoration of all damaged or demolished pavement to original or better condition so that pavement cuts match existing grade, and compaction and surfaces are equivalent to, or better than the existing.

3.02 TESTING, COMMISSIONING AND START-UP

- A. Testing, commissioning and start up pipeline and appurtenances.
1. Subcontractor shall perform pipeline flushing, pressure tests, pipeline disinfection, and confirmation disinfection tests as required by Contractor-approved implementation plan for AWWA C651-05 and Section 02666 of these specifications. Contractor will witness the tests and provide written acceptance of the test results prior to release of payment for this item. Payment will include only the unit cost per segment cited in Attachment 1 Bid Form for each completed pipe segment. No additional payment will be made in the event flushing, pressure testing and disinfection testing must be performed iteratively to achieve satisfactory results.
 2. Subcontractor shall provide geotechnical testing and report on all backfilled areas for sufficient compaction as required by Sections 02221 Excavation, Trenching, Backfilling and Compaction.

3. Subcontractor shall provide geotechnical testing and report on all pavement subgrades to assure adequate compaction and compliance with 02512 Base Course and Wearing Surface.
- B. Include the services of a factory representative where required in the specifications. Test equipment and materials for compliance with the specifications, adjust as necessary and repair or replace any defective work. Additional testing, inspection, and removal and reinstallation may also be required. Such measures will be at the expense of the Subcontractor and will not be considered sufficient reasons for extensions of time.
- C. Provide manufacturers manuals and guidance in electronic format and hardcopy as requested by the Owner. This request will not exceed more than 5 hardcopies of each manufacturer manual or pamphlet.

3.03 NON-COMPLIANT OR DEFECTIVE WORKS

- A. When any part of Work is known to be defective or suspected to be defective, the Subcontractor shall submit proposals as soon as possible to the Contractor for his approval for further testing, opening up, inspection, repair or removal and replacement. Such measures will be at the expense of the Subcontractor.
- B. Subcontractor shall implement the plan to bring work into compliance with contract documents.

END OF SECTION

SECTION 01025
MEASUREMENT AND PAYMENT

PART 1 GENERAL

1.01 SCOPE

- A. This Section covers measurement and payment for completion of the Work as described in Section 01010 and the Contract Documents.

1.02 GENERAL

- A. The total Bid Price shall cover all Work required by the Contract Documents. All costs associated with the proper and successful completion of the Work, including furnishing all materials, equipment, supplies, and appurtenances; providing all construction, equipment, and tools; and performing all necessary labor and supervision to fully complete the Work, shall be included in the unit prices bid. All Work not specifically set forth as a pay item in the Bid Form shall be considered component and included within the prices bid.

1.03 RELATED SECTIONS

- A. Section 01010 – Summary of Work
B. Section 01300 – Submittals
C. Section 01563 – Dust Control
D. Section 02040 – Demolition and Removal
E. Section 02221 – Excavation, Trenching, Backfilling and Compaction
F. Section 02512 – Base Course and Wearing Surface
G. Section 02600 – Water Distribution System Piping, Valves and Ancillary Equipment
H. Section 02666 – Water Line Cleaning, Testing and Disinfection
I. Section 02750 – Storm Water Pollution Prevention Plan (SWPPP)
J. Section 13410 – Instrumentation and Monitoring Requirements
K. Section 13420 – Monitoring Devices
L. Section 16010 – General Electrical Requirements

1.04 REFERENCES

- A. 40 CFR Part 61, Subpart M, Asbestos NESHAP

1.05 ESTIMATED QUANTITIES

- A. All estimated quantities stipulated in the Bid Form or other Contract Documents are approximate and are to be used only:
1. For estimating the probable cost of the Work, and
 2. For the purpose of comparing the bids submitted for the Work.

The actual amounts of work done and materials furnished under unit price items may differ from the estimated quantities. The basis of payment for work and materials will be the actual amount of work done and materials furnished. Subcontractor agrees that he will make no claim for damages, anticipated profits, or otherwise on account of any difference between the amounts of work actually performed and materials actually furnished and the respective estimated amounts.

1.06 EXCAVATION AND TRENCHING

- A. The unit price bid for each item of Work which involves excavation or trenching shall include all costs for such Work. Direct payment shall be made for excavation or trenching that is:
 - 1. Required beyond the original excavation limits or trenching for pipelines being replaced; and
 - 2. Required for new pipeline routes as shown by the Contract documents.
- B. The unit price bid for which involves excavation or trenching shall be based on and shall include earth excavation throughout, from ground surface to the trench bottom as excavated, regardless of the location, extent, or quantity of rock which may be encountered. In the event solid rock is encountered such that a rock saw is required to efficiently cut the trench, then payment will be according to the unit price bid for trenching through rock.

1.07 WATERLINE REMOVAL

- A. All waterline removal shall be measured along the centerline of the pipe removed, inclusive of all appurtenances, up to the terminal connection or blinding. Payment shall be made per the unit price on the Bid Form. The unit price bid shall be all inclusive of the labor materials, equipment, transportation, trenching, and excavation that may be required to remove the old waterline, excavate, transport, and stockpile the bedding used for the pipe.
- B. No extra payment will be provided for removal of ACP as a regulated waste. The Subcontractor shall carefully remove all ACP in such a way as to keep from forming friable asbestos-containing waste as defined under 40CFR 61.150. The Subcontractor shall be the generator of such waste if a friable waste condition is created. Any extra costs created by development of a friable waste will be the sole responsibility of the Subcontractor.

1.08 WATERLINE INSTALLATION

- A. The unit price for each size of pipe shall cover furnishing and installation and shall include all trenching and backfill; pipe; fittings; jointing materials; pipe embedment, including furnishing embedment material; pipe laying; and laying of all other appurtenant items.
- B. The measurement of the length of each installed pipeline or run of pipe of each size will begin and end at:
 - 1. The end of the pipe where it connects to existing pipe, fittings, or valves; or terminates at the end of a dead-end run.
 - 2. The center line intersection of run and branch on tees, crosses, or laterals where a branch line is connected under this Contract.
- C. Each pipeline size shall be measured in the same way and shall include the end-to-end continuous length inclusive of all fittings and valves installed between the ends of each line. Measured lengths of any reducers and increasers will be divided equally between the connected pipe sizes.
- D. Hydrant connective piping shall be measured for payment from the center of the main to the hydrant shoe.

1.09 SWPPP

Payment for SWPPP components will include all labor, materials, and transportation, to satisfactorily implement, maintain, and dispose of SWPPP products related to the SWPPP and section 02750. Payment shall be based on the unit pricing supplied in the Bid Form as reported in Appendix 1 of Section 01010 Summary of Work. Unit prices reported in the Bid Form shall be interpreted to be all inclusive to perform the work items stated. No other qualifying payments shall be made.

1.10 DUST CONTROL

Payment for dust control will be based on plan acceptance by the Contractor followed by satisfactory implementation by the Subcontractor. The payment for the plan will be based on the unit pricing provided in Appendix 1 of Section 01010 Summary of Work.

1.11 MISCELLANEOUS UNIT PRICE ITEMS

- A. The Bid Form unit prices for these items will include all costs of materials, transport, placement, and maintenance required to provide the item and complete the work associated with that item. The unit price for these items does not include cost sharing with other items on the Bid Form (either shown or implied) and shall be measured based solely on the unit pricing provided.
1. LF (linear foot) items include pipelines, flexible mulch logs, and similar linear items. The lineal length of the installed or removed pipe or similar linear item shall be measured along the centerline of the pipe, trench, ditch, mulch log, whether straight or curved. Payment for LF items will be at the Bid Form unit price, and will include full compensation for furnishing all of the labor, materials, and equipment required to install or remove the item.
 2. LS (lump sum) items include tasks that cannot be easily segregated into smaller subtasks or which individually constitutes a complete task. Items such as preparation of plans, mobilization/demobilization, and cleaning. Payment for LS items will be at the Bid Form unit price, and will include full compensation for furnishing all of the labor, materials, and equipment required to complete the task.
 3. SQ FT (square foot) or SY (square yard) items include paving, filter cloth, Compost Manufactured Topsoil, etc. Measurement shall be based on the horizontal area of the item completed. Payment for such items will be at the Bid Form unit price and will include full compensation for furnishing all labor, materials, and equipment required to install the item.
 4. CY (cubic yard) items include concrete, soil amendment, rip rap, etc. Measurement shall be on the basis of the volume of the item completed. Payment for CY items will be at the Bid Form unit price, and will include full compensation for furnishing all of the labor, materials, and equipment required to install the item.
 5. EA (each) items include individual equipment and like items such as valves, hydrants, tapping sleeves, etc. Measurement shall be on the basis of a count of each assembly completed. Payment for EA items will be at the Bid Form unit price and will include full compensation for furnishing all labor, materials, and equipment required to install each item.
 - i. Note: Payment for implementation of testing and disinfection procedures can be made only after the satisfactory completion of each segment. Test results shall form the criteria for releasing payment acknowledging that the testing and disinfection procedures implemented at each segment were indeed in compliance with plan requirements.
 - ii. Note: Payment for implementation of control measures (dust and erosion) shall be made at the completion of the project. The Contractor's discretion shall form the criteria for releasing payment acknowledging that the control measures implemented at each segment met plan requirements.
 6. GAL (gallon) items are measured by their volume and will be paid based on a given volume and concentration, where specified. Payment for chemical products such as hypochlorite solution or polyacrylates (palliatives) is typically compensated by volumetric measure. They will be at the Bid Form unit price, and will include full compensation for furnishing all labor, materials, and equipment required to contain, haul, mix, dilute or apply them.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01300 SUBMITTALS

PART 1- DESCRIPTION

1.01 SUMMARY

This Section consolidates the submittals anticipated for this project in the following sections.

1.02 RELATED SECTIONS

- A. Section 01010 Summary of Work
- B. Section 01025 Measurement and Payment
- C. Section 01563 Dust Control
- D. Section 02040 Demolition and Removal
- E. Section 02221 Excavation, Trenching, Backfill, and Compaction
- F. Section 02512 Base Course and Wearing Surface
- G. Section 02600 Water Distribution Piping, Valves and Ancillary Equipment
- H. Section 02666 Waterline Cleaning, Testing, and Disinfection
- I. Section 02750 Stormwater Pollution Prevention Plan (SWPPP)
- J. Section 13410 Instrumentation and Monitoring Devices
- K. Section 13420 Monitoring Devices
- L. Section 16010 General Electrical Requirements

1.03 SUBMITTALS LISTING

Submittals developed from performance of the Work of this project are summarized below by reference section number.

Reference Section	Submittal Description
01010 Part 1.04, paragraph E	Proposed Construction Schedule
01010 Part 1.04 paragraph J	Redlined As-Built Drawings
01010 Part 1.05 paragraph H	List of all Subcontractors, manufacturers, and suppliers it proposes to use for all subcontracts, purchased materials, and equipment supplied, respectively, for completion of the Work
01010 Part 1.06 paragraph A	Health and Safety Plan Addendum
01010. Part 1.07 paragraph A	Written notice of agreement and support of Contractor CQAP
01010 Part 1.10 paragraph A	Warranty Letter
01010 Appendix 1	Bid Form

Reference Section	Submittal Description
01563.1.03 paragraph B	Dust Control Plan
02040 Part 1.04 paragraph A	Demolition Method Statement
02040.Part 3.03 paragraph E	On-site running log of all disconnected utilities
02221 Part 3.02 paragraph A	Trench Safety Plan
02221 Part 3.13	Geotechnical test results
02512 Part1.04 paragraphs A-B	Sieve analyses Approval of materials
02512 Part 2	Asphalt Source, description of batch plant, Mix design in accordance with Texas Department of Transportation (TX-DOT) 341 and supported by evidence of mix design procedure, complete aggregate analysis, Marshall curves, mixing and placing temperatures, test results copies, waybills and delivery tickets
02666 Part 1.05	Piping Cleaning, Testing, and Disinfection Plan
02666 Part 1.05	Inspection report for pipe cleaning, testing, and disinfection
02666 Part 3.02 paragraph C.6	Daily Reports for pipe pressure testing results
02666 Part 3.03 paragraph C.2	Daily bacteriological test results
02666 Part 3.03 paragraph C.4	Photos and test kit analyses from field evaluation of chlorine concentrations
02666.Part 3.04 paragraph A.1.a	Certification of no Coliform organisms and acceptable bacteriologic conditions in the water system piping
02750.Part 1.05 paragraph A,D; Part 3.05	Provide SWPPP sign for NOI per spec; collaborate with Contractor to secure NOI form for lamination on sign
02750.Part 1.05 paragraph C	Provide site inspector qualifications written in SWPPP implementation booklet; along with maintenance logs for SWPPP features.
13410.Part 1.05	P&IDs; Panel arrangement and layout drawings, Panel wiring drawings and schematics, Panel I/O point wiring and connection, Instrumentation Loop Diagrams; Record Diagrams; Validation and start-up certificates; O&M Manuals
13410 Part 1 paragraph 1.06 B	Equipment listing with tag#, function, description, manufacturer, model no, and serial no.
13410 Part 2	Provide maintenance materials and spare parts as specified
13410 Part 2	Provide special tools, software, and calibration equipment.

Reference Section	Submittal Description
13410 Part 3 paragraph 3.05D	Certification of successful SCADA subsystem validation
13420.Part 1 paragraph 1.03.A-K	ESDS, Manufacturer's Product Data, Parameter Configuration Data Sheets, Manufacturer Installation Instructions, Manufacturer Manuals, Shop Drawings, Compliance Certificates, Certified Test reports, Installation Details, Instrument Calibration Reports, O&M Manuals
13420.Part 3 paragraph 3.05	Instrument Calibration Reports
16010.Part 1 paragraph 1.04B	Manufacturers' Qualifications
16010.Part 1 paragraph 1.05	Shop Drawings, Materials Lists, Technical Data Manuals

END OF SECTION

SECTION 01563 DUST CONTROL

PART 1 GENERAL

1.01 SUMMARY

- A. Requirements, methods, and materials for controlling dust resulting from surface disturbance activities, pressure blasting, and demolition.
 - 1. Disturbance of ground surface where activity will result in dust becoming airborne or transported off-site:
 - 2. Disturbance of a paved surface by grinding, milling, or other alteration:
 - 3. Trenching in rock or excavating during extremely dry conditions
- B. Accumulations of dust produced by construction activities will be assumed to be a threat to the Edwards Aquifer and will be controlled as called out herein and in Section 02750.
- C. Related sections:
 - 1. Section 01010 Summary of Work
 - 2. Section 01300 Submittals
 - 3. Section 02040 Demolition and Removal
 - 4. Section 02221 Excavation, Trenching, Backfilling and Compaction. Includes clearing, grubbing, excavation, rough grading, and other surface disturbing activities associated with this work.
 - 5. Section 02512– Base Course and Wearing Surface
 - 6. Section 02750 – Stormwater Pollution Prevention Plan

1.02 DEFINITIONS

- A. Palliative Agent: Agent applied to disturbed soil to mitigate and control dust.
- B. Surface disturbance: Disturbance of ground, soil, or paved surface from its pre-existing conditions.
- C. Transported material: Dust moved off-site by wind, water erosion, truck spillage, and tracking by vehicles.

1.03 MITIGATIVE MEASURES

- A. Provide palliative agent at the source and time of dust generation
 - 1. Apply water or alternative palliative agent during trenching in amounts that keep dust controlled but not enough to cause ponding or runoff within the trench.
 - 2. Provide truck washing station near a point of loading or prior to exit onto public roadways
 - 3. Cover debris or excavated material while being stored or transported by truck.
 - 4. Provide periodic sprinkling of cleared areas
- B. Provide a written Dust Control Plan for Contractor approval to implement appropriate mitigative measures during the conduct of the Work.

PART 2 PRODUCTS

2.01 DUST CONTROL PALLIATIVE AGENTS

- A. Acceptable types:
 - 1. Water used from recycled flush water or dechlorinated disinfection test water
 - 2. Resinous petroleum based emulsion not harmful to plants; Coherex as manufactured by Witco, or equal.
 - 3. Calcium Chloride or Magnesium Chloride solution

4. Other type agent to mitigate dust as approved by Contractor.
- B. Formulation, dilution, and application rate: As recommended by manufacturer for specific limestone dust control.

PART 3 EXECUTION

3.01 DUST CONTROL

- A. Implement approved Dust Control Plan specified in Part 1, Section 1.03.B above
- B. Use method or combination of methods listed below and approved by Contractor to prevent dust from becoming airborne and being transported off-site:
 1. Phasing: Minimize disturbed areas to coincide with specific phase of work. Follow Contractor sequence and coordinate work. Begin construction activities at one end and proceed to next area by providing buffer area where shifting soil can be arrested.
 2. Restricting vehicles: Use signs and other traffic controls to limit speed and access of job site vehicles. Limit speed to 10 MPH maximum. Restrict vehicle traffic in dust stabilized areas.
 3. Excavated material: Keep out of active traffic lanes. Immediately remove excavated material deposited in roadways by erosion or spillage and stockpile onsite or dispose offsite. Cover loads transported.
 4. Watering: Use sprinkler system or water truck with spray boom to wet disturbed area daily and at intervals required to adequately control dust.
 5. Palliative agents: Apply dust palliative agent to stabilize soils after earthwork is completed and to sandy soils where watering is ineffective. Do not use palliative agent that would be in any way detrimental to vegetation. All palliative agents shall be approved by the Owner.
 6. Use other approved methods that substantially and effectively reduce transported material or emission of dust into atmosphere.

END OF SECTION

SECTION 02040
DEMOLITION AND REMOVAL

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section specifies requirements for demolition and removal of existing pipelines and appurtenances.
 - 1. Removal of existing pipes, valves, manholes, and fire hydrants.
 - 2. Sealing existing pipelines which are not to be removed.
 - 3. Cutting into existing structures to make connections to new and existing work.
 - 4. Removal of existing protective coatings from concrete surfaces to permit resurfacing, patching and recoating of surfaces.
 - 5. Removal or salvage of designated mechanical equipment.
 - 6. Removal from site and disposal of trash, debris, demolished materials and salvable materials.
 - 7. Handling all flows, protection of existing and new work from damage.
- B. Removal and disposal of any hazardous material relating to or associated with demolition or new work.

1.02 RELATED SECTIONS

- A. Section 01010 - Summary of Work.
- B. Section 01025 – Measurement and Payment
- C. Section 01563 – Dust Control
- D. Section 02221 – Excavation, Trenching, Backfilling and Compaction
- E. Section 02600 – Water Distribution System Piping, Valves and Ancillary Equipment

1.03 GENERAL REQUIREMENTS

- A. Demolition shall include removal of designated below-grade structures foundations, piles and pipes, valves, boxes, manholes, and removal of any bedding material.
- B. The Drawings are based on existing record drawings and may not show all items to be removed. The Subcontractor shall examine the site before bidding to review conditions and determine the actual extent of demolition required. The Subcontractor shall also take note that there are existing utility encumbrances that must be located by a utility survey prior to beginning demolition work.
- C. The use of explosives will not be permitted.
- D. The Subcontractor shall conform to applicable codes for demolition work, safety of structures, and shall control dust during performance of the Work.
- E. The Subcontractor shall notify affected utility companies and relevant authorities before starting work and comply with their requirements.
- F. The Subcontractor shall obtain required permits from the governing authorities and pay for all associated licenses, permits and inspections required by these authorities.
- G. The Subcontractor shall conform to applicable Contractor Health and Safety Plan procedures if potentially hazardous or contaminated materials are suspected or discovered.
- H. Use of Facilities
 - 1. The Subcontractor shall conduct selective demolition work in a manner that will not interfere with normal post operations. This may require temporary facilities to be constructed as necessary, at no cost to the Contractor, to comply with this provision.
 - 2. The Subcontractor shall provide at least 72 hours advance notice to the Contractor for those activities which impact normal post operations. No demolition shall be started without prior approval of Contractor.
- I. Conditions of Facilities Requiring Demolition

1. Existing facilities will continue to be used for their intended purpose until turned over to the Subcontractor for rehabilitation.

1.04 SUBMITTALS

- A. The Subcontractor shall prepare a method statement which details all aspects of the proposed demolition and associated work. The method statement shall be approved by the Contractor before any demolition work starts. The method statement shall incorporate the following items:
 1. Detailed description of the methods and equipment to be used for each operation as well as proposed sequence of demolition operations.
 2. Safety precautions required to ensure the safety of the workers, members of the public, and users of adjacent facilities or properties.
 3. The removal, protection and transportation of salvable materials.
 4. Coordination of the demolition work with other work in progress, and with any existing facility operations.
 5. Shut down schedule of equipment and disconnection sequence of the utilities involved.
 6. Accurate record of disconnected services and utilities

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.01 INSPECTION

- A. The Subcontractor shall inspect each area before performing any demolition work.
- B. The Subcontractor shall ascertain that the property to be demolished lies within the project area as shown on the drawings.

3.02 PREPARATION

- A. The Subcontractor shall provide interior and exterior shoring, bracing and support as necessary to prevent movement, settlement or collapse of both, facilities to be demolished and adjacent facilities which are designated to remain. The Subcontractor shall stop all demolition work and notify the Contractor immediately, if the stability of the facilities which are to remain appears to be in danger. If required, extra support shall be provided by the Subcontractor as deemed necessary by the Contractor.
- B. Temporary barricades and other forms of protection shall be provided to safeguard personnel from open excavations and utilities, and other facilities which are to remain.
- C. The Subcontractor shall maintain and protect utilities which are to remain against damage during demolition.
- D. The Subcontractor shall provide bypass connections where necessary to serve occupied portions of facilities.
- E. The Subcontractor shall notify the Contractor at least 24 hours before shutting down any utility service. Do not shut down any utilities without prior approval of the Contractor.
- F. Dewatering shall be performed as needed to maintain a safe working environment and to keep existing water utilities from contamination sources.

3.03 DEMOLITION

- A. General
 1. The Subcontractor shall support or reinforce existing construction that is weakened by demolition.
 2. Subcontractor shall completely backfill voids and below grade holes resulting from demolition work. Backfill shall comply with requirements specified in Section 02221.
 3. The Subcontractor shall keep the spread of dust to a minimum by sprinkling rubbish with water as required or promptly disposing debris offsite.
 4. The Subcontractor shall maintain adequate fire protection, including extinguishers and operative water-hose lines during demolition activities.

- B. Traffic Control
 - 1. Demolition work and debris removal operations shall be carried out in such a manner that minimizes interference with roads, streets, walks and/or other adjacent facilities.
 - 2. The Subcontractor shall provide alternative routes around closed or obstructed traffic routes as directed by the Contractor.
 - 3. The Subcontractor shall not close, block or otherwise obstruct roads or facilities without written permission from the Contractor.
- C. Pipes, Utilities and Conduits
 - 1. The appropriate locations of pipes and conduits are generally shown on the Drawings. The pipe or conduit shall be removed back to the tie point location, typically a valve, or to another location as shown on the drawings. Seal all remaining pipe ends as directed by the Contractor.
 - 2. All pipes or conduits which are encountered and which are not shown on the Drawings shall be brought to the attention of the Contractor.
 - 3. Pipes, conduits, utilities, etc., shall be rerouted as indicated on the Drawings or carefully cut and permanently capped.
 - 4. Utility lines not specifically noted for disposition, but which are encountered in the Work shall be capped, extended, protected or reworked as necessary for completion of the work as directed by the Contractor.
- D. If unanticipated mechanical, electrical, or structural elements are encountered which interfere with intended demolition or construction activities, the Subcontractor shall investigate and measure both the nature and extent of the conflict.
 - 1. The Subcontractor shall submit a detailed written report to the Contractor.
 - 2. Pending Contractor's decision on how to proceed, the Subcontractor may rearrange the demolition schedule as approved by the Contractor to continue job progress without delay.
- E. The Subcontractor shall keep an accurate, up-to-date record of all disconnected and reconnected utilities. Upon completion of the work, the Subcontractor shall provide redline drawings indicating the size, depth, location, type of utility, and also the date and time of reconnection.

3.04 DISPOSITION OF MATERIALS

- A. All materials resulting from the demolition work, except those specifically identified to be salvaged, shall become the Subcontractor's responsibility for proper disposal. Excavated materials that served as backfill for the existing trenches will remain the property of CSSA and shall be reused if deemed suitable to backfill the trenches after the proposed pipes are installed. Spoils not needed or not deemed suitable for backfill may be disposed onsite at a location designated by the Contractor's Construction Manager. Spoils disposed onsite shall be groomed and graded where material is deposited.
- B. The Subcontractor shall remove debris, rubbish, dust, fluids and other demolition materials not intended for salvage from the project site by transporting and legally disposing of the materials off site to a waste disposal facility approved by the Contractor and the Texas Commission on Environmental Quality. The Subcontractor shall pay all costs associated with transport and disposal.
- C. Burning of removed materials by the Subcontractor will not be permitted.

3.05 CLEANUP AND REPAIR

- A. The Subcontractor shall remove tools, equipment, demolished materials and protective devices from the site upon completion of demolition work, and leave all areas clean to the satisfaction of the Contractor.
- B. The Subcontractor shall restore all remaining structures, surfaces and facilities which may have been damaged during demolition work to their original condition as required by the Contractor.

END OF SECTION

SECTION 02221
EXCAVATION, TRENCHING, BACKFILL AND COMPACTION

PART 1 GENERAL

This work shall consist of the excavation, backfilling, and compaction of trenches for placement of waterlines and appurtenances. When the terms "Backfill" or "Trench Backfill" are used herein, they shall be construed to mean one or more of the types of backfill specified below under Part 2, Materials.

In general, all pipe material laid under provisions of this contract shall be considered flexible pipe. Backfill and compaction requirements will vary based on the ground surface use as follows: natural ground, road crossing, or creek crossing.

1.01 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

U.S. ARMY CORPS OF ENGINEERS MANUAL

EM 385-1-1	Safety and Health Requirements
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AMERICAN SOCIETY OF TESTING AND MATERIALS (ASTM) PUBLICATIONS

C 698-91	Standard Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 5.5-lb Rammer and 12-in. Drop, (Standard Proctor)
C 1387-05	Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
D 1556-00	Density of Soils In-Place by the Sand-Cone Method
D 1557-78	Test Methods-Method of Test for the Moisture-Density Relations of Soils and Soil Aggregate Mixtures using 10 lb. (4.54-kg.) Rammer and an 18 in. Drop
D 2167-94	Density of Soil In-Place by the Rubber Balloon Method (R 2001)
D 2217-85	Wet Preparation of Soil Samples for Particle-Size Analysis and Determination of Soil Contents (R 1998)
D 2487-06	Classification of Soils for Engineering Purposes
D 3740	Evaluation of Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction
D 4318-05	Liquid Limit, Plastic Limit and Plasticity Index of Soils

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS

T-307-99	Standard Method of Test for Determining the Resilient Modulus of Soils and Aggregate Materials (R 2003)
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1.02 DEFINITIONS**A. SATISFACTORY MATERIALS**

Satisfactory materials shall consist of any material classified by ASTM D 2487 as GW, GP, SP, ML, and SW. Materials classified as CL, SP-SM, GP-GM, GM or GC are also satisfactory provided they contain moisture content suitable for the intended use.

B. UNSATISFACTORY MATERIALS

Unsatisfactory materials are those that do not comply with the requirements for satisfactory materials. Unsatisfactory materials include but are not limited to those materials containing roots and other organic matter, trash, debris, frozen materials and stones larger than 2 inches, and

materials classified in ASTM D 2487 as PT, OH, and OL. Unsatisfactory materials also include man-made fills and refuse.

C. COHESIONLESS AND COHESIVE MATERIALS

Cohesionless materials shall include materials classified in ASTM D 2487 as GW, GP, SW, and SP. Cohesive materials include materials classified as GC, SC, ML, CL, MH, and CH. Materials classified as GM and SM will be identified as cohesionless only when the fines are nonplastic. Liquid limit and plasticity index shall be determined in accordance with ASTM D 4318 using ASTM D 2217, Procedure B.

D. ROCK

Rock is defined as boulders or large masses measuring 1/2 cubic yard or more and materials that cannot be removed without systematic drilling or blasting. Examples of rock environments that may be encountered include the following:

1. Consolidated material in ledges,
2. Bedded deposits,
3. Unstratified masses and conglomerate deposits, and
4. Below-ground concrete structures that exceed 1/2 cubic yard in volume (excludes pavements)

E. UNSTABLE MATERIAL

Unstable material shall consist of materials too wet or unconsolidated to properly support the waterline or appurtenant structure.

F. SELECT GRANULAR MATERIAL

Select granular material shall consist of well-graded sand, gravel, crushed gravel, or crushed stone composed of hard, tough and durable particles, and shall contain not more than 10 percent by weight of material passing a No. 200 mesh sieve and not less than 95 percent by weight passing a 1-inch sieve. The maximum allowable aggregate size shall be 1-1/4 inches, or the maximum size recommended by the pipe manufacturer, whichever is smaller.

G. DEGREE OF COMPACTION

Degree of compaction shall be expressed as a percentage of the maximum density obtained by the Standard Proctor test procedure presented in ASTM C 698-91.

H. FOUNDATION

Foundation in the context of this specification refers to the supporting ground at the base of trench excavation. The character of this material shall be of sufficient strength to support the loading of the waterline and traffic loads. Any material judged unsuitable for this purpose shall be removed, replaced and compacted as specified.

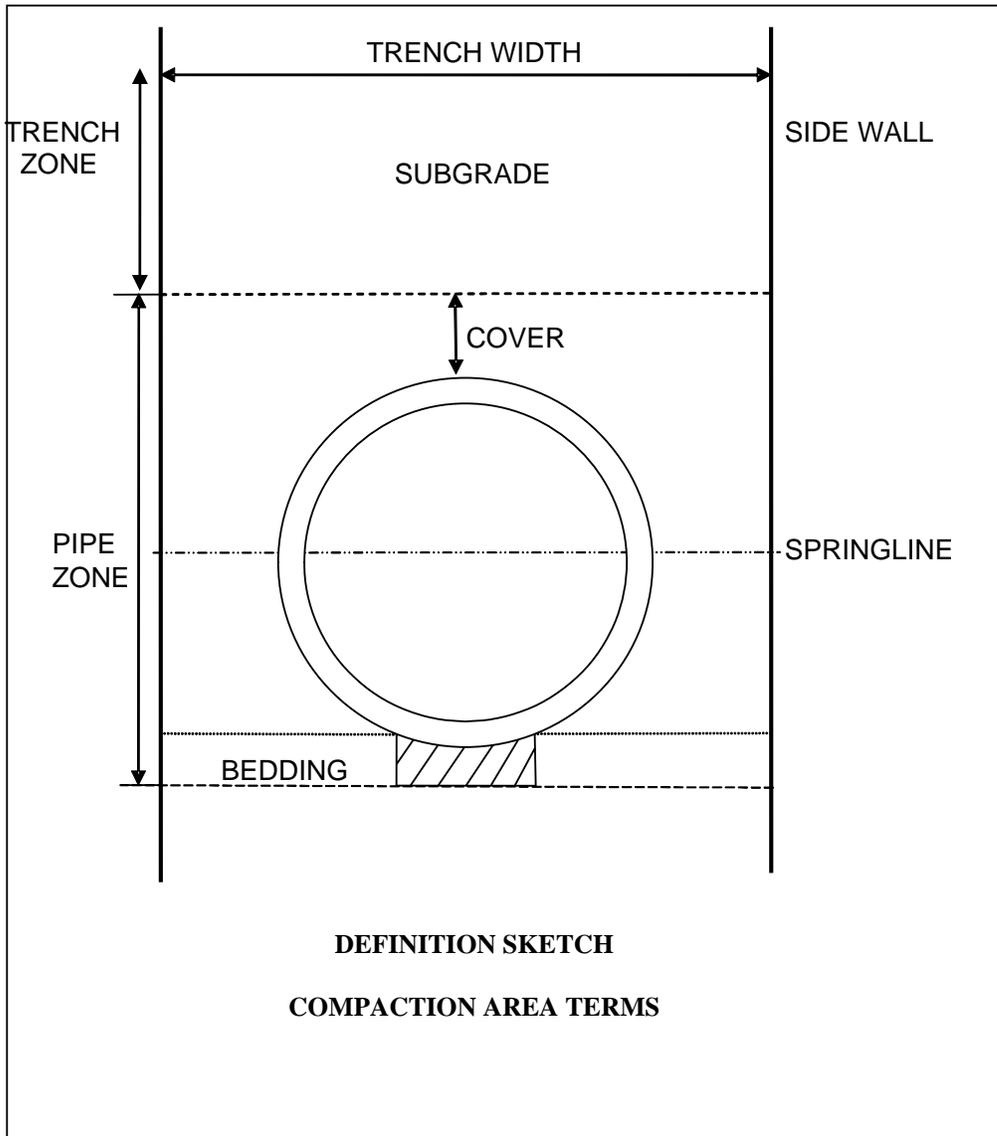
I. BEDDING

Bedding material (see definition sketch) shall be used to bring the trench bottom to the required grade and shall normalize any irregularities in elevation that would otherwise disrupt uniform pipe support over the length of the waterline.

1.03 RELATED SECTIONS

- A. Section 01010 – Summary of Work
- B. Section 01025 – Measurement and Payment
- C. Section 01300 - Submittals
- D. Section 01563 – Dust Control
- E. Section 02040 – Demolition and Disposal
- F. Section 02512 –Base Course and Wearing Surface

G. Section 02600 – Water Distribution System Piping, Valves and Ancillary Equipment



PART 2 MATERIALS

2.01 GENERAL

The material placement in the pipe zone area must first comply with the requirements of Table 1, which presents material screening requirements with respect to pipe diameter.

Table 1 – Pipe Zone Maximum Particle Size for Backfill

Nominal Pipe Size (in)	Maximum Particle Size (in)
2 to 4	1/2
6 to 8	3/4
10 to 12	1
Manhole piping	1-1/2

2.02 GRANULAR BACKFILL

Granular backfill shall consist of natural sand or a mixture of sand with gravel. Broken Portland cement concrete and bituminous type pavement will be permitted, subject to the gradation limits specified herein. The granular backfill material shall have a sufficient amount of fine material to fill the voids between the coarser aggregate. In addition, the material shall conform to Table 2 requirements.

Table 2 – Granular Gradation

Sieve Sizes	Percentage Weight Passing
3"	100
½"	75-100
No. 4	35-100
No. 16	25-100
No. 200	5-15

The plasticity index of select granular backfill shall conform to Table 3 requirements.

Table 3 – Plastic Limits

Percentage by Weight Passing 200 Sieve	Plasticity Index Maximum
0.1 to 3.0	15
3.1 to 4.0	12
4.1 to 5.0	9
5.1 to 8.0	6
8.1 to 11.0	4
11.1 to 15.0	3

2.03 SELECT BACKFILL

Select backfill shall be of a quality acceptable to the Contractor and may consist of imported or suitable native material from excavations. The top lift of select backfill shall be of topsoil similar in nature and depth to the topsoil of the surrounding area except where pavement or gravel surfaces are to be installed. Select backfill shall also be free from rocks ≥ 6 inches in diameter, as well as organic materials, rubbish, and debris.

- A. Stones or lumps exceeding 3 inches shall not be used within the zones 12 inches or less from a structure, 12 inches or less from the finish subgrade in unpaved areas, or 16 inches or less below the pavement in paved areas.

2.04 SAND BACKFILL

- A. Sand backfill shall consist of natural sand or a mixture of sand with gravel or stone and conform to the following gradation requirements:

Table 4 - Sand Backfill Gradation

Sieve Sizes	Percentage of Weight Passing
3/8"	100
No. 4	80-100
No. 200	5-20

- B. The plasticity index of the material shall be as specified in Table 3 for granular backfill.

- C. The soluble sulfate content shall not exceed 0.3 percent by dry weight of soil.

2.05 FLEXIBLE BASE BACKFILL

- A. Flexible base backfill shall conform to the gradation shown by Table 5 subject to the limits called out by Table 6.

Table 5 – Flexible Base Gradation Acceptance Limits

Sieve Sizes	Percentage by Dry Weight Passing Sieve
1 Inch	100
3/4 Inch	90-100
No. 4	35-65
No. 16	15-40
No. 200	2-10

Table 6 – Flexible Base Acceptance Limits

Quality Control Test	Test Method	Requirements
Sieve Analysis	ASTM C136-05	Table 5 above
Liquid Limit	ASTM D4318-05	35 Maximum
Resistance (R Value) or Resilient Modulus	ASTM D 2844	78 Minimum for road base
	AASHTO T 307	35,000 psi minimum for road base

2.06 TRACER WIRE/MARKING TAPE

- A. Provide tracer wire and marking tape for every foot of water line installed per Section 02600.

PART 3 EXECUTION

3.01 EXCAVATION

- A. Excavation of every description and of whatever substances encountered shall be performed to the elevations and grades shown by the Drawings.
- B. Rock excavation shall include removal and disposition of material defined as rock in paragraph 1.02 DEFINITIONS.
- C. Earth excavation shall include removal and disposal of material not classified as rock.
- D. Material satisfactory for backfilling shall be stockpiled during excavation in an orderly manner.
 1. At a distance from the banks of the trench equal to 1/2 the depth of the excavation, but no closer than 2 feet (minimum spacing).
 2. Excavated material not required or not satisfactory for backfill shall be removed from the work area as directed by the Contractor and stockpiled or disposed on a daily basis.
 3. Excess satisfactory materials shall not be mixed with unsatisfactory materials.
 4. Unsatisfactory materials shall not cover available suitable materials, or be disposed in such a way that interferes with subsequent borrow operations.
 5. The Subcontractor shall provide all grading, construction of temporary diversions, ditching, and pumping facilities to prevent surface water from flowing into the excavations. This shall include, but not be limited to, diversion of flash flood waters at creek crossings.

6. Any water accumulating within a trench excavation shall be removed before placing bedding, backfill or pipe.
7. Unauthorized over-excavation shall be backfilled in accordance with paragraph BACKFILLING at no additional cost to the Contract.

3.02 TRENCH EXCAVATION

- A. Excavation including the manner of supporting excavation and provisions for access to trenches, shall comply with the current OSHA trench safety requirements and US Army Corps of Engineers Manual EM 385-1-1 Safety and Health Requirements. Practices and procedures shall be described in advance by the Subcontractor in a Trench Safety Plan. Trench Safety Plan shall be submitted for Contractor's review and approval.
- B. The Subcontractor shall furnish, place, and maintain all supports and shoring that may be required for the sides of the excavation.
- C. The Subcontractor shall provide egress points from trench no more than 25 feet from furthest worker in trench.
- D. The Contractor shall be responsible for any damage to property due to interruption or diversion of storm or wastewater because of his operations. The Contractor may require the Subcontractor to backfill the excavation and re-excavate when the work can be completed expeditiously, if project delays exist due to influences under the control of Subcontractor and CSSA operation will be affected. In the event such rework is required, Subcontractor shall perform this work at no additional cost to the Contract.

3.03 TRENCH BOTTOM PREPARATION

- A. Trench bottoms shall be accurately graded to provide uniform haunch bearing over the length of the pipe. Bell holes shall be excavated to the necessary size at each joint or coupling to eliminate point bearing. Stones 3 inches in diameter or greater shall be removed to avoid point bearing.
- B. Minimum trench widths shall be equal to 1.5 times outside diameter of the pipe plus 12 inches, unless otherwise directed by the Contractor.
- C. Maximum Trench widths shall be determined by the Contractor based on the method and means of waterline installation. In general, the maximum trench width shall not exceed 42 inches unless otherwise approved by the Contractor.

3.04 REMOVAL OF UNYIELDING MATERIAL

Where over-excavation has not occurred and unyielding material is encountered in the bottom of the trench, such material shall be removed 6 inches below the required grade and replaced with granular material as specified in Part 2 of this specification.

3.05 REMOVAL OF UNSTABLE MATERIAL

Where unstable material is encountered in the bottom of the trench, such material shall be removed to the depth directed and replaced to the proper grade with select granular material as specified in Part 2 of this specification. When removal of unstable material is required due to the fault or neglect of the Subcontractor, the material shall be excavated by the Subcontractor at no additional cost to the Contract.

3.06 EXCAVATION FOR APPURTENANCES

Excavation for manholes and valve boxes shall be sufficient to permit placement and removal of forms for the full length and width of appurtenance footings and foundations. Rock shall be cleaned of loose debris and cut to a firm surface either level, stepped, or serrated, as shown or as directed.

3.07 STOCKPILES

- A. Stockpiles of satisfactory and wasted materials shall be placed and graded as specified. Stockpiles shall be kept in a neat and well drained condition, giving due consideration to drainage at all times.
- B. The ground surface at stockpile locations shall be cleared, grubbed, and sealed by rubber-tired equipment, unless otherwise specified by the Contractor.

- C. Excavated satisfactory and unsatisfactory materials shall be stockpiled separately.
- D. Stockpiles of satisfactory materials shall be protected from contamination that may destroy the quality and fitness of the stockpiled material. If the Subcontractor fails to protect the stockpiles and any material becomes unsatisfactory, such material shall be removed and replaced with satisfactory material from approved sources at no additional cost to the Contract.
- E. Contractor shall approve all locations of stockpiles. The Subcontractor shall acquire Contractor approval of stockpile locations prior to beginning the Work.

3.08 BACKFILL--GENERAL

- A. Backfill shall not be dropped directly upon any pipe or component in a manner that causes damage or that displaces the pipe or component from the design alignment and grade.
- B. Backfill shall not be placed around or upon any structure until the concrete has attained sufficient strength to withstand the loads imposed
- C. Backfill around water retaining structures shall not be placed until the structures have satisfactorily passed water tightness tests. Backfilling shall only be performed on water retaining structures filled with water.
- D. Backfill shall be placed after all water is removed from the excavation and the trench sidewalls and bottom have dried sufficiently to a moisture content suitable for compaction (+/- 2% of optimum moisture content).
- E. Backfill shall be placed evenly in layers not exceeding 6 inches loose thickness for compaction by hand-operated vibratory compactors, and 8 inches loose thickness for other than hand-operated machines, unless otherwise specified.

3.09 TRENCH BACKFILL

- A. Trench backfill shall be defined by the following zones as depicted in the definition sketch provided in Part 1: Bedding, Pipe Zone, and Trench Zone.
- B. Backfill provided in the Pipe Zone (see definition sketch) shall be granular backfill only as defined in Part 2 of this section. No mixing of backfill types within the pipe zone will be permitted.
- C. Trench zone backfill shall be select backfill or flexible base as shown by the Drawings.
- D. Trenches extending beneath roadways or parking areas shall be backfilled to an elevation that corresponds with the requirements of Section 02512, Base Course and Wearing Surface and the Drawings.

3.10 TRENCH PLUGS

- A. Concrete trench plugs shall be placed in trenches with bottom slopes greater than 25 percent and where indicated on the drawings.
- B. Trench plugs shall be placed at a maximum spacing of 20 ft on a sustained slope greater than 25%.
- C. Concrete trench plugs shall be made of Type N 2000 psi concrete per ASTM C-150 or better.
- D. Trench plugs shall be installed across the full cross-section of the pipe backfill and keyed into the trench walls as shown on the Drawings.

3.11 COMPACTION REQUIREMENTS

All compaction performed in completion of the Work shall conform to density requirements of Table 7 as tested in accordance with ASTM C 698-91.

Table 7: Compaction Requirements

Compaction Setting	Compaction % Standard Proctor Density
Pipe Embedment Backfill	Vibratory plate (2 passes)
Trench zone backfill beneath pavements or structures, including trench plugs	95
Trench zone backfill not beneath pavements or structures, including trench plugs	80
Embankments and fills beneath pavements and structures	90
Embankments and fills around manhole structures	90
Backfill beneath structures and hydraulic structures	95
Topsoil	80

3.12 SPECIAL REQUIREMENTS**A. WATER LINES**

Trenches shall be of a depth to provide a minimum cover of 3 feet unless noted otherwise on the Drawings.

B. TRACER WIRE/MARKING TAPE

Tracer wire/marketing tape shall be installed per manufacturer's recommendations and as indicated in specification 02600 Water Distribution System Piping, Valves and Ancillary Equipment, section 2.01 paragraph A.3.

3.13 GEOTECHNICAL TESTING

Geotechnical testing shall be the responsibility of the Subcontractor. All tests shall be logged as they are performed or received from the laboratory and copies/reports of same shall be immediately provided to the Contractor. A standard form shall be used to report results: test no. id, pipe segment identification, media sampled, coordinates for test sample or location, name of test, associated standard(s) used, range of acceptance, actual results, and date/time of test (if in the field), person performing the test.

A. TESTING FACILITIES

Tests shall be performed by an approved commercial testing laboratory. Approval of testing facilities shall be based on compliance with ASTM D 3740.

B. MOISTURE-DENSITY RELATIONS

Laboratory tests for moisture-density relations shall be determined in accordance with ASTM D 1557. A mechanical tamper may be used, provided the results are correlated with those obtained by the referenced hand tamper or ASTM D 1557, Method D. Field in-place density shall be determined in accordance with ASTM D 1556 or D 2167. Trenches improperly compacted shall be reopened to the depth directed, then refilled and compacted to the density specified at no additional cost to the Contract.

C. FREQUENCY OF TESTING

1. Subcontractor shall provide compaction testing for each 200 LF of pipe backfilled in each 2 feet of vertical depth within the trench. (For example, if the backfill depth is nominally 4.5 feet, 2 tests will be required along the 200-foot length within the first and second 2 foot depth range, respectively). The Contractor's inspector will designate the location of the test.
2. Subcontractor shall provide one test per lift of trench backfill at each road crossing. The Contractor's inspector will designate the location of the test.

END OF SECTION

SECTION 02512
BASE COURSE, WEARING SURFACE AND PAVEMENT

PART 1 GENERAL

1.01 SUMMARY

This section specifies the requirements for base course application and resurfacing of paved and unpaved roads where trench cuts or other construction activities disturbed and thus require repair of existing roads surfaces.

1.02 RELATED SECTIONS

- A. SECTION 01010 Summary of Work
- B. SECTION 02221 Excavation, Trenching, Backfilling and Compaction

1.03 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by number and title only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM) PUBLICATIONS

- ASTM C 131-81 Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
- ASTM C 136-84 Sieve Analysis of Fine and Coarse Aggregates
- ASTM D 75-82 Sampling Aggregates
- ASTM D 422-63 Particle-Size Analysis of Soils (R 1972)
- ASTM D 1556-64 Density of Soil In-place by the Sand-Cone Method
- ASTM D 1557-78 Moisture Density Relations of Soils and Soil Aggregate Mixtures Using a 20-Pound Rammer and 18-Inch Drop
- ASTM D 2167-66 Density of Soil in Place by the Rubber Balloon Method
- ASTM D 4318-83 Liquid Limit, Plastic Limit and Plasticity Index of Soils
- ASTM E 11-81 Wire-Cloth Sieves for Testing Purposes
- ASTM E 548-79 Generic Criteria for Use in the Evaluation of Testing and Inspection Agencies

1.04 SUBMITTALS

- A. SIEVE ANALYSIS
Before starting work, at least one sample of each aggregate gradation, subbase, base, and gravel wearing surface course materials shall be tested in accordance with ASTM C 136 and ASTM D 422 on sieves conforming to ASTM E 11. Test results shall verify that the material complies with the specifications.
- B. APPROVAL OF MATERIALS
Source of materials shall be off-site and be selected well in advance of the time that materials will be required in the work. Test results from samples shall be submitted for approval not less than 30 days before the material is required for the work.

1.05 SAMPLING AND TESTING

- A. GENERAL REQUIREMENTS
Sampling and testing shall be performed by an approved commercial testing laboratory or by facilities furnished by the Contractor. Approval of testing facilities shall be based on compliance

with ASTM E 548, and no work requiring testing shall be permitted until the facilities have been inspected and approved. Tests shall be performed in sufficient numbers and at the locations and times directed to insure that materials and compaction meet specified requirements. Copies of test results shall be furnished.

B. SAMPLES

Aggregate samples for laboratory tests shall be taken in conformance with ASTM D 75.

C. TESTING

Testing frequency shall conform to the following.

1. Field Density

Field density tests shall be in accordance with ASTM D 1556 or D 2167.

2. Sieve Analysis

Gravel wearing surface course materials shall be tested in accordance with ASTM C 136 and ASTM D 422 on sieves conforming to ASTM E 11. Results shall verify that the material complies with the specifications. When the source of materials is changed or deficiencies are found, the analysis shall be repeated and the material already placed shall be retested to determine the extent of unacceptable material. All in-place unacceptable material shall be replaced.

3. Liquid Limit and Plasticity Index

Liquid limit and plasticity index shall be in accordance with ASTM D 4318.

4. Smoothness

Measurements for deviation from grade and cross section shown shall be taken in successive positions parallel to the road centerline with a 10-foot straightedge. Measurements shall also be taken perpendicular to the road centerline at 50-foot intervals.

5. Thickness

Thickness of the aggregate course shall be measured at intervals in such a manner as to ensure one measurement for each 500 square yards of course. Measurements shall be made in 3-inch-diameter test holes penetrating each course.

6. Wear Tests

Wear tests shall be performed in accordance with ASTM C 131.

7. Laboratory Density

Tests shall provide a moisture-density relationship for each aggregate type. Tests shall be conducted in accordance with ASTM D 1557, method D.

1.06 WEATHER LIMITATIONS

Aggregate courses shall not be constructed when the atmospheric temperature is less than 35 degrees F. Aggregate courses shall not be constructed on subgrades that are frozen or contain frost. If the temperature falls below 35 degrees F, completed areas shall be protected against any detrimental effects of freezing.

1.07 STOCKPILING MATERIALS

Materials, including approved material available from excavation and grading, shall be stockpiled in the manner and at locations designated by the Contractor or the Owner. Before stockpiling of material, storage sites shall be cleared, drained, and leveled. Materials obtained from different sources, and the different types shall be physically segregated at the stockpile location.

PART 2 PRODUCTS**2.01 AGGREGATES**

Aggregates shall consist of crushed stone or crushed gravel, angular sand, or other approved materials. Aggregates shall be durable and sound, free from lumps of clay, organic matter, objectionable coatings, and other foreign material. Material retained on a No. 10 sieve shall be known as coarse aggregate; that passing the No. 10 sieve shall be known as binder material.

A. COARSE AGGREGATE

Coarse aggregates, consisting of angular fragments of uniform density and quality, shall have a percentage of wear not to exceed 50 percent after 500 revolutions when tested in accordance with ASTM C 131. The amount of flat and elongated particles shall not exceed 30 percent. A flat particle is one having a ratio of width to thickness greater than 3, and an elongated particle is one having a ratio of length to width greater than 3. The crushed gravel shall conform to the following requirements and shall be mandatory for the entire job.

1. Crushed Gravel

Crushed gravel shall be manufactured from gravel particles 50 percent of which by weight are retained on the maximum size gradation sieve specified.

B. BINDER MATERIAL

Binder material shall consist of screenings, angular sand, or other finely divided mineral matter processed or naturally combined with the coarse aggregate. Liquid-limit and plasticity-index requirements shall apply to any component that is blended to meet the required gradation and shall also apply to the completed course. The portion of any component or of the completed course passing the No. 40 sieve shall be either nonplastic or have a liquid limit not greater than 35 and a plasticity index range from 4 to 9.

C. GRADATION

Requirements for gradation specified shall apply to the completed Gravel Wearing Course Table 1. The aggregates shall be continuously graded within the following limits:

TABLE 1
BASE COURSE AND WEARING SURFACE COURSE

Sieve Size	% Passing (weight or volume)
1-1/2 inch	100
1 inch	90-100
3/4 inch	--
3/8 inch	50-85
No. 4	35-65
No. 10	25-50
No. 40	15-30
No. 200	5-10

2.02 ASPHALT CONCRETE

Hot-mixed, hot-laid bituminous paving mixture per ASTM D3515, type "D" mix. Asphalt concrete shall be purchased from sources with an approved batch mixing plant.

TABLE 2
MASTER GRADING

Sieve size	% Passing (weight or volume)
1/2	100
3/8	85-100
no. 4	50-70
no. 10	32-42
no. 40	11-26
no. 80	4-14
no. 200	1-6(washed sieve analysis is used)

Asphalt binder shall be 4.8 to 6.5% of AC-20.

B. PRIME COAT.

Prime coat shall be cutback asphalt MC-30, per ASTM 2027

C. TACK COAT

Tack coat shall be a diluted emulsified asphalt, SS-1 or CSS-1, per ASTM D 977.

PART 3 EXECUTION

3.01 CONSTRUCTION

A. GENERAL REQUIREMENTS

Adequate drainage shall be provided during the entire period of construction to prevent water from collecting or standing on the area. Line and grade stakes shall be provided as necessary for control. Grade stakes shall be in lines parallel to the centerline of the area under construction and suitably spaced for string lining.

B. PREPARATION OF SUBGRADE

Ruts or soft, yielding spots, areas having inadequate compaction, and deviations of the surface from requirements specified shall be corrected. Finished subgrade shall not be disturbed by traffic or other operations and shall be maintained in a satisfactory condition until course is placed.

C. MIXING AND PLACING

Materials shall be mixed and placed in such a manner as to obtain uniformity of the aggregate course material and at a uniform optimum water content for compaction. Contractor shall make such adjustments in mixing or placing procedures or in equipment to obtain the true grades, to minimize segregation and degradation, to reduce or accelerate loss or increase of water, and to insure a satisfactory aggregate course.

D. LAYER THICKNESS

The compacted thickness of the wearing surface shall be as indicated. When a compacted layer of 6 inches is specified, the material may be placed in a single layer. When a compacted thickness of more than 6 inches is required, no layer shall exceed 6 inches nor be less than 3 inches when compacted.

E. COMPACTION

Each layer of aggregate course (including shoulders) shall be compacted. Water content shall be maintained at optimum. Density of compacted mixture shall be at least 95 percent of ASTM C 698 maximum density. Rolling shall begin at the outside edge of the surface and proceed to the

center, overlapping on successive trips at least one-half the width of the roller. Alternate trips of the roller shall be slightly different lengths. Speed of the roller shall be such that displacement of the aggregate does not occur. Areas inaccessible to the rollers shall be compacted with mechanical tampers, and shall be shaped and finished by hand methods.

3.02 PAVING METHODS

- A. Asphalt concrete pavement may be manually placed and spread.
- B. A prime coat shall be added to the subgrade followed by the placement of two layers of hot-mixed asphalt, a base course and surface course. A tack coat shall be placed between asphalt layers. Asphalt shall not be placed in layers greater than 3 inches each.

3.03 PAVING PREPARATION

- A. The subgrade shall be prepared as specified in Section 02221 for flexible base.
- B. The subgrade shall be smooth and free of foreign matter.

3.04 PAVING PLACEMENT

- A. A prime coat shall be applied at a rate of 0.20 to 0.50 gal. per sq. yd., over compacted flexible base. Apply material to penetrate and seal, but not flood, surface. Cure and dry as long as necessary to attain penetration and evaporation of volatile.
- B. A tack coat shall be applied to contact surfaces of asphalt. Existing asphalt shall be saw cut before applying tack coat. Feathered or ragged edges will not be allowed. Distribute tack coat material at rate of 0.05 to 0.15 gal. per sq. yd. of surface.
- C. Make joints between successive days' work, to ensure continuous bond between adjoining work. Construct joints to have same texture, density, and smoothness as other sections of hot-mixed asphalt course. Clean contact surfaces and apply tack coat.
- D. Perform finish rolling until roller marks are eliminated and course has attained required density.

3.05 FIELD QUALITY CONTROL

- A. General: Testing in-place hot-mixed asphalt courses for compliance with requirements for thickness and surface smoothness shall be done at Subcontractor's expense. Repair or remove and replace unacceptable paving as directed by Contractor at Subcontractor's expense.
- B. A minimum of one test for gradation and density shall be taken for every 1,000 feet of trench work or 500 square yards of paved area.
- C. Asphalt Concrete Testing. Samples of the asphalt concrete will be taken randomly by the Contractor and tested to ensure the aggregate gradation, asphalt percentage and stability conform to the approved mix design. If samples differ significantly from the mix design, the affected portion must be replaced or overlaid with a proper mix, at the Subcontractor's expense. A field density less than 95% will not be accepted. Placement area determined to have field densities less than 95% shall be removed and replaced at Subcontractor's expense.
- D. Thickness: In-place compacted thickness tested in accordance with ASTM D 3549 will not be acceptable if exceeding following allowable variations:
 - 1. Base Course: Plus or minus 1/2 inch.
 - 2. Surface Course: Plus or minus 1/4 inch.
- E. Surface Smoothness: Test finished surface of each hot-mixed asphalt course for smoothness, using 10-foot straightedge applied parallel with and at right angles to centerline of paved area. Surfaces will not be acceptable if exceeding the following tolerances for smoothness:
 - 1. Base Course Surface: 1/4 inch.

2. Wearing Course Surface: 3/16 inch.
3. Crowned Surfaces: Test with crowned template centered and at right angle to crown. Maximum allowable variance from template is 1/4 inch.

3.06 PROTECTION OF PAVEMENT

No vehicular traffic shall be allowed on pavement for a minimum of 6 hours after final rolling, or until pavement has cured, which ever is longer.

3.07 DISPOSAL OF UNSATISFACTORY MATERIALS

Removed in-place materials that are unsuitable for stabilization; material that is removed for the required correction of defective areas; and waste material and debris shall be disposed offsite at Contractor-approved disposal facility.

END OF SECTION

SECTION 02600**WATER DISTRIBUTION SYSTEM PIPING, VALVES AND ANCILLARY EQUIPMENT****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Pipe and fittings for potable water mains and fire water lines.
- B. Valves, fire hydrants and other accessories.

1.02 RELATED SECTIONS

- A. Section 01010 – Summary of Work
- B. Section 02221 – Excavation, Trenching, Backfilling and Compaction
- C. Section 02666 - Waterline Cleaning, Testing, and Disinfection.

1.03 REFERENCES

- A. AASHTO T180 - Moisture-Density Relations of Soils Using a 10-lb (4.54 kg) Rammer and 18-in. (457 mm) Drop.
- B. ASTM D698 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5 lb. (2.49 Kg) Rammer and 12 inch (304.8 mm) Drop.
- C. ASTM D1557 - Test Methods for Moisture Density Relations of Soils and Soil-Aggregate Mixtures Using 10 lb (4.54 Kg) Rammer and 18 inch (457 mm) drop.
- D. ASTM D1785 – Polyvinyl Chloride (PVC) Plastic Pipe, Schedule 40, 80, and 120.
- E. ASTM D2855 - Making Solvent-Cemented Joints with Polyvinyl Chloride (PVC) Pipe and Fittings.
- F. ASTM D3017 - Test Methods for Moisture Content of Soil and soil-Aggregate Mixtures.
- G. AWWA C105-05 – Polyethylene Encasement for Ductile-Iron Pipe Systems
- H. AWWA C153-00 – Ductile Iron Compact Fittings for Water Service
- I. AWWA C500 - Gate Valves, 3 through 48 in NPS, for Water and Sewage Systems.
- J. AWWA C502 - Dry Barrel Fire Hydrants.
- K. AWWA C508 - Swing-check Valves for Waterworks Service, 2 in through 24 in NPS.
- L. AWWA C509 - Resilient Seated Gate Valves 3 in through 12 in NPS, for Water and Sewerage Systems.
- M. AWWA C605-05 – Underground Installation of Polyvinyl Chloride (PVC) Pressure Pipe and Fittings for Water.
- N. AWWA C651-05 - Disinfecting Water Mains.
- O. AWWA C900-97 - Polyvinyl Chloride (PVC) Pressure Pipe, 4 inch (100 mm) through 12 inch (300 mm), for Water Distribution.
- P. Title 30 Texas Administrative Code, Chapter 290 Public Drinking Water
- Q. National Sanitation Foundation (NSF) Standard 60 Drinking Water Chemicals.
- R. National Sanitation Foundation (NSF) Standard 61- Drinking Water Components.

1.04 QUALITY ASSURANCE

- A. Perform work in accordance with the above standards and the Contract Documents.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store, protect and handle products in such a manner as to insure delivery to the trench in a clean, sound, undamaged condition.
- B. Deliver and store valves and other accessories in original shipping containers with labeling in place.

PART 2 PRODUCTS

2.01 WATER PIPE

- A. All pipes below ground shall be PVC Pipe: AWWA C900 Class 150 SDR 18 Polyvinyl Chloride (PVC) Pressure Pipe, 4 inches through 12 inches in diameter, for Water Distribution; ASTM D1785, Schedule 80 for all pipe less than 4 " diameter.
 - 1. Pipe fittings 4 inches through 12 inches in diameter shall be Compact Ductile Iron Fittings for Water Service per AWWA C153-00. Ductile iron fittings shall be cement-mortar lined with a 1 mil external asphaltic coating. Ductile Iron Fittings shall have mechanical joint ends unless specified differently on the drawings. Gaskets for mechanical joints and flanges shall be synthetic rubber.
 - 2. Pipe fittings less than 4 inches in diameter shall be for PVC Schedule 80 pipe.
 - 3. Marking Tape/Tracer Wire: Provide two products, a detectable marking tape and a tracer wire detectable conductor. Marking tape shall bear a continuous printed inscription in large letters on both sides "**Caution: Buried Potable Water Pipe Below**". Tape shall be APWA color coded BLUE. Tape shall be acid and alkali-resistant polyethylene film, 6 inches wide with minimum thickness of 0.005 inches. Tape shall contain foil or wires to allow detection from the ground surface 3 to 5 feet above the elevation of the tape. Detectable Underground Marking Tape, Pro-line Safety Products (800-554-3424) or equal.
Tracer Wire shall be a minimum 12 gauge solid copper wire, type THHN. Wire shall be selected to enable detection when the wire is buried up to 6 feet deep. The wire and wire connectors shall be specifically manufactured for locating underground utilities. The wire shall be encased in a PVC jacket to protect it from corrosion. Tracer Wire, Pro-line Safety Products (800-554-3424) or equal.
- B. All pipe above ground shall be galvanized steel: ASTM865-03—Standard Specification for Threaded Couplings, Steel, Black or Zinc-Coated (Galvanized) Welded or Seamless, for Use in Steel Pipe Joints

2.02 CHECK VALVES - 4 INCHES to 12 INCHES

- A. AWWA C508, Swing check, gravity operated, iron body valve with rubber disc facing and mechanical joint ends. Mueller Model A-2602-20.

2.03 GATE VALVES - 3 INCHES to 12 INCHES

- A. AWWA C509, Mueller Resilient Wedge Model 2360, with left hand opening, copper alloy stem (ASTM B98-C66100/H02) and position indicators.

2.04 BALL VALVES - UP TO 2 INCHES

- A. Milwaukee Valve Model BA100, meeting NSF 61; Bronze body, 2-piece, standard port, 600 psig WOG, stainless steel ball, PTFE seats, T-handle, NPT threaded ends. Ball valves to be installed as isolation valves at line size on each and every service connection.

2.05 BUTTERFLY VALVES - FROM 2 INCHES TO 12 INCHES

- A. AWWA C504, iron body, bronze disc, resilient seat, lug ends, ten position lever handle.

2.06 AIR RELEASE VALVES

- A. APCO Valve and Primer Corporation Series 200A Air Release Valve or equal. Orifice shall be 3/16-inch in diameter with inlet 1-inch NPT. Outlet shall have a 180 degree gooseneck vent with a 16 mesh stainless steel screen covering the vent opening.

2.07 FIRE HYDRANTS

- A. Procure and provide Mueller Super Centurion 250, 5-1/4" Main Valve, A423, Dry Barrel, with standard mechanical joint, two 2-1/2" National Standard Hose Thread Hose Nozzles 180° apart and in the same plane as the pump nozzle: opening direction: counterclockwise.
- B. Hydrant Extensions: Procure appropriate barrel lengths to match pipe depth and ground surface requirements.
- C. Hose and Streamer Connection: Sizes to match CSSA existing.
- D. Finish: one coat water reducible alkyd enamel primer enamel—black. Exterior above ground —one coat short oil alkyd high gloss in color required by CSSA.

2.08 PIPING ACCESSORIES

- A. Use MEGALUG Series 2000PV mechanical joint restraints as manufactured by EBAA Iron, Inc. (or equal).
- B. Provide one Mueller Model A-20806 Vertical post indicator valve (PIV). Field verify existing PIV to provide new PIV of same size (existing PIV is either 4-inch or 6-inch valve), opening direction: counterclockwise.
- C. Procure and install service saddle clamps (NSF approved for use in potable water) of the required size (4-inch through 12-inch mains) and appropriate service size (3/4-inch through 2-inch) for AWWA C900 pipe. Use service saddles with outlets tapped for Female Iron Pipe Thread (FIPT). Mueller H-13000 Series or equal.
- D. 10 mil polyethylene plastic wrap per AWWA C105-05 shall be provided for each and every ductile-iron fitting, valve and ductile-iron accessory supplied.
- E. Use 2-piece screw type cast iron valve boxes with 5-1/4" shafts, EJIW 8550 Series or equal.
- F. Use non-locking cast iron lids for valve boxes, EJIW 6800 Valve box Drop Lids or equal.
- G. Use ASTM A325-07 bolts and studs.
- H. Use ASTM A563 nuts Grade C3 or DH3.
- I. Use Pipeline Seal & Insulator Inc. pipe spacer model S8G-2 and end seal model W Wrap-around to install 6-inch diameter SDR 18 C900 PVC in existing 15-inch diameter SDR 35 sewer pipe (ASTM D-3034). Install spacers a maximum of 7 feet on center for entire casing (sleeve) length a maximum of 12 inches from both casing ends. Overall casing length is approximately 120 feet. No substitutes allowed for these accessories.

PART 3 EXECUTION**3.01 EXAMINATION**

- A. Verify that building service connection and municipal utility water main size, location, and invert are as indicated. Where discrepancies exist, notify Contractor.

3.02 PREPARATION

- A. Cut pipe ends square, ream pipe and tube ends to full pipe diameter, remove burrs.
- B. Remove scale and dirt on inside and outside before assembly.
- C. Prepare pipe connections to equipment with flanges or unions.

3.03 BEDDING AND BACKFILL

- A. See Section 02221 Excavation, Trenching, Backfill and Compaction

3.04 INSTALLATION - PIPE

- A. Install pipe according to AWWA C605-05.
- B. Route pipe in straight line or as indicated on the Drawings.
- C. Install 1-1/2" saddle clamps on top of pipe where needed to facilitate pressure testing, disinfection and sampling activities performed under Section 02666.
- D. Install service saddle clamps 90 degrees from vertical (top) at size indicated on drawings.
- E. Air release valve locations shown on the drawings are approximate. Install air release valves at high point closest to location shown. Mount air release valves on ball valves connected to saddle clamps and provide 180 degree gooseneck for outlet. Manholes should be offcenter over air release valves to allow adequate space for personnel to access valves.
- F. Slope water pipe and position blow-off valve where indicated on the drawing.
- G. Install mechanical joint restraints (MEGALUGS) at changes of direction: tees, reducers, shut-off valves, and dead-ends, in sizes to match attached pipes and appurtenances.
- H. Install thrust blocks at tees, elbows (bends), changes in pipe direction greater than 11 degrees and as indicated on the drawings.
- I. Establish elevations of buried piping to ensure not less than 3 ft of cover, unless approved by the Contractor.
- J. Place tracer wire directly on top of non-metallic pipe line in a continuous manner with special wire connectors for application to match wire size and type. Use wire connectors at every junction (end of one spool and beginning of next spool) and at every intersection (tee, cross, and service connection).
- K. Install detectable marking tape 18 to 24" above crown of pipe.
- L. Encase all ductile-iron fittings, valves and other ductile iron accessories in polyethylene plastic wrap per AWWA C105-05.

3.05 INSTALLATION - VALVES AND HYDRANTS

- A. Set valves on solid foundation.
- B. Center and plumb valve box over valve. Set box cover 6" above finished grade in natural and gravel areas and flush with finished grate in paved areas.
- C. Set hydrants plumb; locate pump nozzle perpendicular to and facing roadway.
- D. Set hydrants with nozzles at least 20 inches above ground.
- E. Locate isolation valve minimum of 4 feet from hydrant.
- F. Provide a drainage pit 36 inches square by 24 inches deep filled with 2 inches washed gravel. Encase hydrant shoe in gravel to 6 inches above drain opening. Do not connect fire hydrant drain opening to sewer.

3.06 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

- A. Flush, pressure test and disinfect system per AWWA C651-05 and section 02666.

3.07 FIELD QUALITY CONTROL

- A. Field inspection and testing shall be done under the supervision of the Contractor.
- B. If tests indicate work does not meet specified requirements, remove work, replace and retest.

END OF SECTION

**SECTION 02666
WATERLINE CLEANING, TESTING, AND DISINFECTION**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Cleaning and flushing potable water piping system
- B. Testing potable water piping system
- C. Disinfecting potable water piping system
- D. Placing potable water system in operation

1.02 RELATED SECTIONS

Section 02600 - Water Distribution System Piping, Valves & Ancillary Equipment

1.03 REFERENCES

- A. AWWA C651-05 Disinfecting Water Mains forms a part of these specifications. Unless otherwise indicated, use the version in effect on the date of request for quotation. Bring any conflicts between specifications, drawings, and the referenced documents to the attention of the Contractor, in writing, for resolution before taking any related action. Where differences exist between codes and standards, the one affording the greatest protection against pipeline and water contamination shall apply.
- B. ANSI/AWWA B300 Standards for Hypochlorites
- C. National Sanitation Foundation (NSF) Standard 60 Drinking Water Chemicals
- D. National Sanitation Foundation (NSF) Standard 61 Drinking Water System Components

1.04 ABBREVIATIONS

- A. CT Coliform Bacteria Test
- B. HPC Heterotrophic Plate Count

1.05 SUBMITTALS

- A. Submit a plan detailing cleaning, testing, and disinfection procedures. Upon completion, submit inspection and test reports.
- B. Submit certificates in accordance with the requirements of section 01010.

PART 2 PRODUCTS

2.01 CHEMICALS

Hypochlorite chemicals used to disinfect piping system shall comply with NSF Standard 60.

PART 3 EXECUTION

3.01 CLEANING AND FLUSHING WATER-PIPING

- A. General:
 - 1. Prior to testing, clean and flush all water-piping including new water mains, service lines and branch connections, to remove foreign material.
 - 2. Continue flushing until water leaving pipe is clear.
 - 3. Discharge of chlorinated water shall comply with Attachment A: Cleaning and Disinfection of Water Mains.

- B. Preparation:
 - 1. Swab and/or spray the interior of pipe and fittings to remove any dirt or other materials that may have entered the pipeline.
 - 2. Ensure that adequate quantities of water are available and used to produce required velocities for flushing.
- C. Procedure:
 - 1. Use upstream reservoir water or designated recycled water to flush all piping.
 - 2. Clean and flush mains in accordance with AWWA C651-05 at the recommended velocities.
 - 3. Thoroughly flush the piping system by fully opening every outlet.

3.02 PRESSURE TESTING REQUIREMENTS

- A. General:
 - 1. Prior to acceptance and initial operation, inspect and hydrostatically test each piping segment to ensure that the design, materials, fabrication, and installation are in accordance with the requirements of these specifications.
 - 2. Test piping prior to being enclosed, covered-up, or treated externally with insulation, tape wrapping, mastic coating, and like treatments.
 - 3. Notify the Contractor at least 8 hours prior to testing, and conduct tests in the presence of a Contractor Representative.
 - 4. Use of super-chlorinated water is acceptable for hydrostatic testing purposes to conserve water.
 - 5. Piping systems shall show no pressure loss, unless noted otherwise, while being tested. When leakage or other defects are located, repair or replace the affected portion of the piping system and retest. In the event repairs, replacement, or additions are made following the pressure test, retest the affected piping. In the case of very minor repairs, replacement, or additions, the Contractor may, solely at its discretion, omit retesting provided precautionary measures are taken to assure sound construction.
- B. Preparation:
 - 1. Test Connections:
 - a. All test connections shall be fitted with saddle clamps or equal. Pressure ratings shall be equal or exceed 150psi.
 - b. Install line blinds at or near connections to existing systems. Wherever a line blind is used, it shall be of the self-indicating type and shall have a red-painted lug protruding beyond the flange in such a way as to clearly indicate their presence. Number all line blinds to keep track of their use and ensure their removal after work is completed.
 - 2. Where it is not practical to install line blinds, cap all piping within 2 feet of the point of connection to existing pipe until all flushing and testing is completed. Make the final tie-in and test at line operating pressure.
 - 3. Trenches may be partially backfilled prior to testing. However, Subcontractor shall leave as much trench open as possible until all testing is completed to the satisfaction of the Contractor. Center load slip-jointed pipes between couplings prior to testing; joints shall remain exposed.
- C. General Test Procedures:
 - 1. Test piping system as a complete unit or in logical sections as construction progresses. Ensure that valves or blind flanges used as isolation devices between sections and subjected to the test pressure can safely withstand the test pressure, including the valve-closing mechanism.

2. All valves shall be in full-open position during the test, except for valves used to isolate piping sections. Do not include any components (gauges, relief valves, instrumentation, and like items) as part of the tests that are not rated for the testing pressure.
 3. Do not attempt to modify a piping system when it is pressurized, including tightening leaking joints. Do not repair, replace, or retighten leaking joints or components until the line pressure has been reduced to static pressure.
 4. Measure test pressure with a manometer or with a pressure-measuring device designed and calibrated to read, record, or indicate the maximum test pressure. Record any pressure loss due to leakage during the pressure test period while the system is pressurized but isolated from the pressure source.
 5. The maximum allowable test pressure for all piping shall be 150psi gauge for a 24-hour duration.
 6. Prepare test records of inspection and all tests performed. Indicate which portions of the piping system are in accordance with these specifications. Briefly document test procedures, instruments and media used, and test pressures. Before requesting final approval of a piping installation, submit copies of the test records for Contractor approval.
- D. Special Procedures:
1. Hydrostatically test all piping segments at 150 psig pressure for 24 hours.
 2. Measure the amount of leakage in piping at the specified test pressure by pumping from a calibrated container. For new piping systems, the amount of leakage shall not exceed 2 quarts per hour per 100 gaskets or joints without regard to pipe diameter.

3.03 DISINFECTION PROCEDURES

- A. General: After the systems are properly tested and shown to be free from leaks, disinfect all piping systems, including new water mains, service lines, and branch connections, in accordance with AWWA C651-05 before placing into service. A disinfection test will be required, including a coliform bacteria (CT) test and Heterotrophic Plate Count Test (HPC).
- B. Preparation:
1. Ensure that the systems have been thoroughly cleaned and flushed.
 2. If necessary, install test connections at the ends of the lines to eliminate any dead ends.
- C. Procedure:
1. Complete the disinfecting procedure using a Contractor-approved method that complies with AWWA C651-05.
 2. To determine the disinfecting procedure's effectiveness, take at least one set of CT and HPC samples from each 1,000 feet of new water main, one set from the end of the line, and one set from each branch. If CT is found or if HPC exceeds 500 colony forming units per mL, evaluate the situation and perform necessary corrective action (including reflushing and further disinfection) at no additional cost to the Contractor. Continue daily sampling (24 hour intervals) until two consecutive negative samples are recorded (CT values are negative and HPC values are 500 or less). Submit all laboratory tests to the Contractor on the day of receipt from the laboratory.
 3. Special Conditions: If trench water enters the main during construction, or, if in the opinion of the Contractor, excessive quantities of dirt have entered the main, then BT and HPC samples shall be taken at intervals of approximately 200 feet from the location of line found to have excessive dirt. The location of line having excessive dirt shall be located. Samples shall be taken at 16 hour intervals after final flushing has been completed. If positive samples are found, further flushing, disinfection, and testing shall continue per paragraph C2 above. Submit all laboratory test results to the Contractor on the date of receipt from the laboratory.

4. When the disinfecting procedure is complete, flush the system with potable water until testing with a Contractor-approved test kit shows a residual disinfectant concentration less than the maximum residual disinfectant concentration allowable in the water system. Submit photos and reports that confirm satisfactory completion of this requirement to the Contractor on the day tests are performed.

3.04 PLACING WATER PIPING IN OPERATION

- A. When the work of cleaning, testing, and disinfecting is complete, and Subcontractor has obtained Contractor approval, place the water piping into operation as follows:
 1. Water Piping Systems:
 - a. Submit certification showing an acceptable bacteriological quality and the absence of coliform organisms in the water piping system.
 - b. Complete all final connections; install blind flanges at test connections; remove line blinds and replace with ring spacers.
 - c. Complete backfill and compaction of trenches.
 - d. Open all valves, including vents, and fill piping system with water to place into operation.
 - e. While filling the pipe, open fire hydrants to allow air to escape the system. Close hydrants when full flow is observed indicating complete expulsion of air.

3.05 ATTACHMENTS

The following Attachments form a part of this specification (Attachment A, A-1, A-2 and A-3, pages 5 through 9).

END OF SECTION

ATTACHMENT A
DISINFECTION PROCEDURE WHEN INSTALLING NEW AND CUTTING INTO EXISTING WATER
MAINS

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1.0 PURPOSE AND SCOPE / SYSTEM INTRODUCTION

The basic disinfection procedure shall consist of:

1. Preventing contaminating materials from entering the water main piping.
2. Remove, by flushing or other means, those materials that may have entered the water mains.
3. Chlorinate any residual contamination that may remain and flush the chlorinated water from the main.
4. Protect the existing distribution system from backflow due to hydrostatic pressure test and disinfection procedures.
5. Determining the bacteriological quality of the water by laboratory test.
6. Returning the water main to the active distribution system.

2.0 REFERENCES

AWWA C651-05

AWWA B300

NSF 60

Title 22 CCR, Section 64421

3.0 PREREQUISITES / GENERAL SAFETY REQUIREMENTS

Employees shall wear required personnel protective equipment when handling chemicals: rubber gloves, splash shields, mono-goggles and protective aprons.

4.0 SPECIAL EQUIPMENT, SUPPLIES, AND EFFORT

All repair materials shall be suitable for use in potable water.

4.1 PACKING MATERIALS

Yarning or packing material shall consist of molded or tubular rubber rings, rope of treated paper, or other approved materials. Materials such as jute or hemp shall not be used. Packing material shall be handled in a manner that avoids contamination.

4.2 SEALING MATERIALS

No contaminated material or any material capable of supporting prolific growth of microorganisms shall be used for sealing joints. Sealing material or gaskets shall be handled in a manner that avoids contamination. The lubricant used in the installation of sealing gaskets shall be suitable for use in potable water. All shall be delivered to the job in closed containers and shall be kept clean.

5.0 INSTRUCTIONS

The following procedures apply primarily when existing mains are wholly or partially dewatered. After the appropriate procedures have been completed the existing main may be returned to service prior to completion of bacteriological testing in order to minimize the time customers are out of water. Leaks or breaks that are repaired with clamping devices while the mains remain full of pressurized water present little danger of contamination and require no disinfection.

5.1 TRENCH TREATMENT

When an existing main is opened either by accident or by design, the excavation will likely be wet and may be badly contaminated. Liberal quantities of hypochlorite applied to

open trench areas will lessen the danger from such pollution. See Attachment A-1 for amounts of chlorine to use for disinfection.

5.2 CLEANING AND SWABBING

Any open pipe shall have the dirt removed and the interior pipe surface swabbed with a 1 percent hypochlorite disinfecting solution. (1 percent solution is made by diluting 1 part of 12.5 percent sodium hypochlorite solution with 12 parts of water). If, in the opinion of the Client or Contractor, the dirt remaining in the pipe will not be removed by the flushing operation, then the interior of the pipe shall be cleaned by mechanical means in conjunction with the application of a 1 percent hypochlorite disinfecting solution to the interior pipe surface. The cleaning method used shall not force mud or debris into the interior pipe-joint spaces.

5.3 FLUSHING

Thorough flushing is the most practical means of removing contamination introduced during repairs. If valve and hydrant locations permit, flushing toward the work location from both directions is recommended. Flushing shall be started as soon as repairs are completed and shall be continued until discolored water is eliminated.

5.4 SLUG CHLORINATION

When practical, in addition to the procedures above, the section of main in which the break is located shall be isolated, all service connections shut off, and the section flushed and slug chlorinated. The slug method consists of adding chlorine (see Attachment A-1) in the main, completely filling the main to eliminate all air pockets, flushing the main to remove particulates, and slowly flowing through the main a slug of water dosed with chlorine to a concentration of 100 mg/L. The slow rate of flow ensures that all parts of the main and its appurtenances will be exposed to the highly chlorinated water for a period of not less than 3 hours. If needed, the dose may be increased to as much as 300 mg/L, and the contact time reduced to as little as 15 minutes. After chlorination, flushing shall be resumed and continued until discolored water is eliminated, and the chlorine residual is less than the source water maximum allowable residual.

5.5 SAMPLING

Bacteriological samples shall be taken after repairs are completed to provide a record for determining the procedure's effectiveness. If the direction of flow is unknown, then samples shall be taken on each side of the main break.

5.6 DISPOSING OF CHLORINATED WATER

Special provisions exist for the disposal of chlorinated water at CSSA. Please refer to Attachment A-2, "Procedure for the Release of Water to the Environment." To neutralize the chlorine residual remaining in the water, please see Attachment A-3 for dechlorinating chemicals.

**ATTACHMENT A-1
CHLORINE FOR DISINFECTION**

Sodium or calcium hypochlorite of chlorine may be used in the disinfection operation at CSSA.

Sodium hypochlorite (bleach) conforming to ANSI/AWWA B300 and NSF 60 is available in liquid form in plastic containers ranging in size from 5 to 55 gallon drums. Sodium hypochlorite concentrations are typically available between 5.25 and 15 percent by weight. In terms of available chlorine, the equivalent weight of sodium hypochlorite is divided by 2 since 2 electrons are reduced for every molecule of sodium hypochlorite oxidized, which is equivalent to half a molecule of chlorine (1 atom of chlorine). Therefore, a 15% solution has $15 \times (35.45/37.23) = 14.3\%$ available chlorine. The approximate chlorine residual and the volume of sodium hypochlorite at several concentrations for a volume of 1 million gallons of water are provided in the table below. Note: care must be taken to control conditions and length of storage to minimize its deterioration.

Example Amounts of Sodium Hypochlorite to Add per Million Gallons of Water

Chlorine Residual (mg/L)	5.25% Sodium Hypochlorite (gallons)	10% Sodium Hypochlorite (gallons)	15% Sodium Hypochlorite (gallons)
10	200	110	70
25	500	260	175
50	1000	530	350
100	2000	1050	700
250	5000	2630	1750

**ATTACHMENT A-2
PROCEDURE FOR THE RELEASE OF WATER TO THE ENVIRONMENT**

Accidental or emergency release of potable water	<ol style="list-style-type: none"> 1) Prevent water from entering storm drain when possible. 2) If release under 1000 gallons, no notifications required unless water leaves site boundaries 3) If release over 1000 gallons, or leaves site boundary, notify Client Environmental Manager.
Planned water	<ol style="list-style-type: none"> 1) Prevent water from entering storm drain. 2) If release under 1000 gallons, no notifications required. 3) If release under 10,000 gallons in uncontaminated area, notify Environmental Manager. 4) If release is over 10,000 gallons, obtain permission from Client Environmental Manager before releasing.
Planned release of super-chlorinated water	<ol style="list-style-type: none"> 1) Release any volume to the sanitary sewer, or 2) Trap, dechlorinate, and release water to ground following the procedures above for a planned release of potable water.

ATTACHMENT A-3
NEUTRALIZATION OF CHLORINATED WATER

The chlorine residual of all water being disposed shall be neutralized by treating with any one of several chemicals. The approximate amount of chemicals required to neutralize various residual chlorine concentrations in 1 million gallons of water are provided in the following table:

Dechlorinating Chemical Required

Residual Chlorine mg/L	Sodium Bisulfate (NaHSO ₃)		Sodium Sulfite (Na ₂ SO ₃)	
	lb	kg	lb	kg
5	61	28	74	34
20	244	111	296	135
40	489	222	592	269
80	978	444	1184	538
200	2444	1111	2961	1346

SECTION 02750

STORMWATER POLLUTION PREVENTION PLAN

PART 1 GENERAL

This Section describes the required documentation and compliance to be implemented by the Subcontractor before and during construction operations. This work shall comply with the terms and conditions of the TCEQ issued TPDES General Permit Number TXR150000, issued by the TCEQ on March 5, 2003.

1.01 SECTION CONTENTS

- A. Regulatory compliance requirements
- B. Best Management Practices (BMPs) applicable to construction

1.02 REFERENCES

- A. Section 01563 – Dust Control
- B. Section 02221 – Excavation, Trenching, Backfill, and Compaction
- C. Section 02600 – Utility Distribution Systems
- D. Section 02666 – Waterline Cleaning, Testing, and Disinfection
- E. Test Methods for the Examination of Composting and Compost,” published by the United States Department of Agriculture and the USCC

1.03 DEFINITIONS

- A. BMP—Schedules of activities, prohibitions of practices, maintenance procedures, and structural controls, which prevent or reduce the discharge of pollutants. BMPs also include treatment requirements, operating procedures, and practices to control construction site runoff, spills or leaks, waste disposal, or drainage from raw material storage areas.
- B. NOI & NOT—Notice of Intent and Notice of Termination for TPDES permits. NOI is a written submission to the TCEQ executive director from an applicant requesting coverage under a general permit. A NOT is a written submission to the TCEQ executive director from a permittee authorized under a general permit requesting termination of coverage. These forms are applicable to construction projects greater than or equal to 5 acres.
- C. Permittee—An operator authorized under the state general permit. Authorization may be gained through submission of a NOI, construction site notice, or by meeting the requirements for automatic coverage to discharge storm water runoff and certain non-storm water discharges.
- D. Pollution—(from Chapter 26 Texas Water Code) The alteration of the physical, thermal, chemical, or biological quality of, or the contamination of, any surface water in the state that renders the water harmful, detrimental, or injurious to humans, animal life, vegetation, or property or to public health, safety, or welfare, or impairs the usefulness or the public enjoyment of the water for any lawful or reasonable purpose.
- E. SWPPP—Storm Water Pollution Prevention Plan—a plan that seeks to eliminate or mitigate pollution of water by implementation and maintenance of best management practices through the course of construction and project closeout.
- F. TPDES General Permit—The Texas Commission on Environmental Quality issued a Texas Pollutant Discharge Elimination System General Permit No. TXR150000, dated March 5, 2003. This permit, backed by federal authorizations, empowers the state of Texas to implement EPA Region VI requirements for stormwater quality management through a permitting process. Compliance with all provisions of the TPDES general permit is required.

The TCEQ requirements for this project pertain to large construction activities of five acres or more, which this project will have. A disturbance area greater than 10 acres is expected.

1.04 CONTRACTOR AND SUBCONTRACTOR RESPONSIBILITIES

- A. Contractor will submit a NOI and \$100 application fee. Subcontractor shall collaborate with Contractor to provide signage and posting of NOI at gate, conduct inspections and maintain BMPs, and file a Notice of Termination (NOT) upon project completion.
- B. Contractor shall provide signatures of a corporate Officer for the NOI, Construction Site Notice, NOT, and any other forms or applications as required by TPDES General Permit TXR150000.
- C. A designated Contractor's corporate officer shall also provide a letter to delegate authorization to its site superintendent. The superintendent will be responsible for conducting site inspections that require a signed compliance certification. Subcontractor site inspectors shall supply their qualifications for their respective roles and maintain them onsite at the Subcontractor office in a SWPPP implementation booklet.
- D. Through coordination with the Contractor, Subcontractor shall prepare and erect a SWPPP sign per requirements of the TPDES general permit, and described in Part 3 of this specification. Subcontractor shall post this sign at the entrance to CSSA as directed by the Contractor and Client.
- E. Subcontractor shall contact Contractor to review anticipated site controls prior to commencing site-disturbing activities, to ensure that any unusual circumstances or unforeseen site conditions with regard to erosion and sedimentation have been addressed.
- F. Subcontractor shall provide all materials, labor, equipment and services required to implement, maintain and monitor all erosion and sediment controls in compliance with the SWPPP. These controls shall remain in operation until project completion and reestablishment of the site, or as directed by the Contractor. The work shall include, but not be limited to the following:
 - 1. All structural controls as shown or specified, including erosion control flexible mulch logs, erosion control compost and mulch seed mats, compost manufactured topsoil, dust control as called out by section 01563 , and stabilized construction entrance
 - 2. All non-structural controls as shown or specified, including temporary or permanent vegetation, mulching, geotextiles, preservation of vegetative buffer strips, preservation/protection of existing trees and other mature vegetation.
 - 3. All modification and revisions to SWPPP necessary to meet changing site conditions as the work progresses.
 - 4. All maintenance and repair of structural and non-structural controls until project closeout or otherwise directed by the Contractor.
 - 5. The Subcontractor shall inspect all BMP's at regular intervals as specified in the SWPPP for this project. Use standard Inspection forms for each inspection. Record all deficiencies of site controls, and take immediate action to correct any deficiencies recorded. Keep and maintain records of inspections current and on file, available for review by EPA, TCEQ, and CSSA.
 - 6. Removal of all structural and non-structural controls, but only after soil stabilization is achieved.
 - 7. Coordinate with Contractor to ensure filing of NOT by Contractor within 30 days of final stabilization being achieved.

PART 2 BEST MANAGEMENT PRACTICES

BMPs implemented for the Work shall include, but not be limited to, source control. Source control means managing pollution at the source of generation rather attempting to control it after generation. In CSSA waterline work, sediment fines will be exposed during clearing and grubbing work. Additional sediment fines will be exposed through excavation and spoils stockpiling. The following BMPs shall be used:

2.01 EROSION CONTROL FLEXIBLE MULCH LOGS

- A. Containment Mesh—Provide 8” nominal diameter logs constructed of high density polyethylene netting. HDPE fibers should be 1,500 to 2,000 psi yield strength in 12-15 mil diameter sizes. Netting should be woven to have 5/16” to 3/4” “pulled square” openings.
- B. Core Material—Provide a wood-based mulch ground from local brush supplies or imported. Material may be compost, mulch, aspen excelsior wood fibers, chipped site vegetation, agricultural rice or wheat straw, coconut fiber, 100% recyclable fibers, or any other acceptable material. No more than 5% of the material is permitted to escape from the containment mesh. Mulch shall be mixed in a ratio of 1:3, fine to coarse material. Fine material should have particle sizes between 1/4” to 1/2” while coarse particles should fall within a range of 1” to 3”. Stuff containment mesh densely so logs do not deform.
- C. Bundling—Logs may be bundled together to act as a single unit to increase weight, density of filtration media, or obstruction to sheet flows.

2.02 EROSION CONTROL COMPOST (ECC)

- A. Compost Development-- Furnish compost that has been produced by aerobic decomposition of organic matter and meets the requirements of Table 2.02T1 Compost feedstock may include, but is not limited to, leaves and yard trimmings, biosolids, food scraps, food processing residuals, manure or other agricultural residuals, forest residues, bark, and paper. Ensure compost and wood chips do not contain any visible refuse, other physical contaminants, or any substance considered harmful to plant growth. Do not use materials that have been treated with chemical preservatives as a compost feedstock or as a wood chips. Do not use municipal solid waste compost. Provide compost meeting all applicable 40 CFR Part 503 standards for Class A biosolids and TCEQ health and safety regulations as defined in the TAC 332, including the time and temperature standards in Subchapter B, Part 23. Also, meet the requirements of the US Composting Council (USCC) Seal of Testing Assurance (STA) program.

**Table 2.02T1
Physical Requirements for Compost**

Property	Test Method	Requirement
Particle Size	TMECC ¹ 02.02-B, “Sample Sieving for Aggregate Size Classification”	95% passing 5/8 in 70% passing 3/8 in.
Heavy Metals Content	TMECC 04.06, “Heavy Metals and Hazardous Elements”: 04.06-As, Arsenic 04.06-Cd, Cadmium 04.06-Cu, Copper 04.06-Pb, Lead 04.06-Hg, Mercury 04.06-Mo, Molybdenum 04.06-Ni, Nickel 04.06-Se, Selenium 04.06-Zn, Zinc	Pass
Soluble Salts	TMECC 04.10-A, “1:5 Slurry Method, Mass Basis”	5.0 dS/m maximum ²
pH	TMECC 04.11-A, “1:5 Slurry pH”	5.5–8.5

Property	Test Method	Requirement
Maturity	TMECC 05.05-A, "Germination and Root Elongation"	> 80%
Organic Matter Content	TMECC 05.07-A, "Loss-On-Ignition Organic Matter Method"	25–65% (dry mass)
Stability	TMECC 05.08-B, "Carbon Dioxide Evolution Rate"	8 or below
Fecal Coliform	TMECC 07.01-B, "Fecal Coliforms"	Pass

Notes for Table 2.02T1:

1. "Test Methods for the Examination of Composting and compost," published by the United States Department of Agriculture and the USCC.
 2. A soluble salt content up to 10.0 dS/m for compost used in compost manufactured topsoil will be acceptable.
- B. Documentation—Before delivery of compost, provide quality control documentation that includes the following:
1. Feedstock by percentage in the final compost product;
 2. A statement that compost meets state and federal health and safety requirements;
 3. A statement that compost has met time and temperature requirements;
 4. A copy of the producer’s STA certification; and
 5. A copy of the laboratory analysis, performed by an STA-certified lab, verifying that the compost meets the requirements of Table 2.02T1
- C. Seed Requirements—Use a blend of indigenous grass types only as provided by the following TxDOT summary of recommended pure grass seed applied per acre in the San Antonio area on clay-type soils:

Table 2.02T2 Grass Application Rates	
Native Grass	Application Rate (lbs/acre)
Green Springletop	0.3
Sideoats Grama	3.6
Bermuda	2.4
Buffalo-TopGun	1.6

The Contractor may specify modification of this blend based on site-specific circumstances and range management objectives of CSSA.

2.03 COMPOST-MANUFACTURED TOPSOIL (CMT)

- A. Use compost that complies with the characteristics called out in section 2.02 of this specification.
- B. Use seed as stipulated in section 2.02 C.
- C. CMT may be used in lieu of ECC at subcontractor’s option. Apply compost to slopes less than 3H : 1V that are not subject to flash flooding and that contain at least a nominal soil thickness of 6”.

2.04 GEOTEXTILE

- A. Fabric—shall be a nonwoven, polypropylene, polyethylene, or polyamide fabric with non-raveling edges. It shall be non-biodegradable, inert to most soil chemicals, ultraviolet

resistant, unaffected by moisture and other weather conditions, and permeable to water while retaining sediment. Fabric shall be 36-60 inches wide, with a minimum weight of 4.5 oz/yd.

2.05 TRIANGULAR FILTER DIKES

- A. Dikes shall be used on surfaces where Erosion Control Mulch Logs cannot practically be used. Examples might include swales receiving upstream stormwater flows.
- B. Dike Structure—shall be constructed using exterior 6-gauge galvanized steel mesh having nominal 1.5-2" nominal openings and 60 inches wide, folded into a triangular form. Each side shall be 18 inches with an overlap of 6 inches. Interior to the steel mesh will be a layer of geotextile 60 inches wide and 4.5 oz/yd minimum followed by clean open graded crushed rock in sizes 3" to 5" diameter.
- C. Dike Ties—shall be metal shoat rings or standard wire/cable ties for attachment of wire mesh to itself, and for attachment of geotextile fabric to wire mesh.

PART 3 EXECUTION

3.01 APPLICATION OF EROSION CONTROL FLEXIBLE MULCH LOGS

- A. Placement—Install erosion control mulch logs near the downstream perimeter of a disturbed area to intercept sediment from sheet flow. Incorporate erosion control logs into the erosion control measures used to control sediment in areas of higher flow. Install, align, and locate the erosion control logs as specified below, as shown on the plans, or as directed.
- B. Suitable lengths—Mulch log lengths should not exceed 100'. Secure erosion control logs in a method adequate to prevent displacement as a result of normal rain events and to the satisfaction of the Contractor and such that flow is not allowed under the logs..
- C. Staking—Stake mulch logs using wooden stakes for soil or metal stakes for rock environments and should be overlapped 1' and tied off.
- D. Maintenance-- Inspect and maintain the erosion control logs in good condition (including staking, anchoring, etc.). Maintain the integrity of the control, including keeping the logs free of accumulated silt, debris, etc., until permanent erosion control features are in place, or the disturbed area has been adequately stabilized. Stabilize the areas damaged by the removal process. Repair or replace damaged logs as required and as directed by the Contractor. Temporarily remove and replace logs as required to facilitate work. Remove sediment and debris when accumulation affects the performance of the devices; after a rain; and when directed by the Contractor. Dispose of sediment and debris at an approved site in a manner that will not contribute to additional siltation.
- E. Removal—remove erosion control logs from the job site after filing NOT with the executive director of TCEQ or as directed by the Contractor.

3.02 EROSION CONTROL COMPOST (ECC)

- A. Seed application—determine combined weight of seeds to be applied by calculating the area to be covered by the weight per acre shown by Table 2.02T2. Measure the tabulated weight of each seed type to be applied and combine all seeds into a common vessel. Take 75% of the volume and mix the seeds into the ECC mixture to be applied until a homogeneous mixture is obtained.
- B. Placement—Coordinate with earthwork and backfilling crews to cause fine grading to be completed 1.5 inches below target elevations. At completion of fine grading, apply ECC using a blower truck or spreader to create a 3-inch minimum thickness of compost over all fine graded disturbed areas. (Prohibit motorized vehicles from traveling on ECC until the first mowing event.) Uniformly distribute the remaining 25% volume of seed to the top of the existing placed ECC material. Lightly rake the seed into place until there is about ¼"

coverage on the topical seed. Good soil and compost contact with the seed is essential for good grass production.

- C. Watering—water thoroughly but lightly to avoid ponding. Keep compost area damp for approximately 2 weeks or until grass sprouts. Water as required to maintain grass growth a minimum of 6 weeks after sprouting while reducing overall water consumption to 1" of water applied per 3 week duration. Subcontractor can use fire hydrant water for watering, however, coordinate usage schedule with Contractor and Client prior to use.
- D. Maintenance—replace any damaged or dead grass immediately with damp compost plugs impregnated with grass seed as described above.

3.03 COMPOST-MANUFACTURED TOPSOIL (CMT)

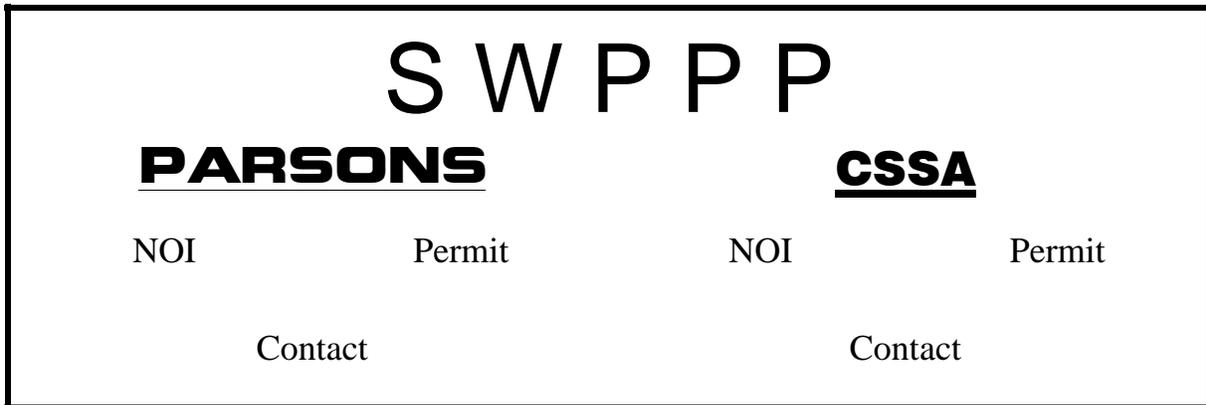
- A. Use this option only if nominal topsoil thickness in the disturbed area is greater than 6 inches deep and ground slopes are less than 3 Horizontal to 1 Vertical.
- B. Compact soil deeper than 1.5 inches below target grade to compaction levels required by Section 02221 of these specifications.
- C. Prepare 75:25 homogeneous CMT consisting of topsoil and prefabricated compost (volume basis) by processing in place, blending on-site, or blending offsite and returning with product compost. All replaced topsoil must conform to the particle size requirements from Table 2.02T1 of this Specification. All compost shall conform to the testing and reporting requirements as specified in Part 2 of this specification.
- D. Homogenize grass seed into CMT and place mixture to a minimum thickness of 3" above previous finished grade (a total 1.5" above finished grade). Place and stake erosion control logs at the downstream perimeter as specified in section 3.01.
- E. Watering—water thoroughly but lightly and avoid ponding effects. Keep CMT area damp for approximately 2 weeks or until grass sprouts. Taper watering schedule as required to maintain grass growth a minimum of 6 weeks after sprouting while reducing overall water consumption to 1" of water applied per 3 week duration.
- F. Maintenance—replace any damaged or dead grass immediately with damp compost plugs impregnated with grass seed as described above. Maintain plugs until replacement grass is established.

3.04 SUBCONTRACTOR OPERATING PROCEDURES

- A. Equipment Cleaning—Equipment must be cleaned in a manner that does not create any discharge of cleaning agents, paints, oil or solvents to a storm sewer or waterway. Soaps and detergents must never be discharged to the ground. Cement handling equipment must be rinsed in a contained area and there must be no drainage off-site.
- B. Pressure Washing—Pressure washing performed at CSSA will only use water. Discharges of trucks shall only be performed at truck washing stations where drainage is controlled and flows to a contained area. If a sheen can be visually detected on rinsate water, the water will have to be discharged to an offsite location or (subject to receipt of approvals from CSSA EHS) to an approved sanitary sewer.
- C. Equipment tires and equipment shall be rinsed before leaving the site if they are muddy or excessively dusty. All vehicles must exit through a stabilized construction entrance consisting of cleaned and graded 5" to 8" crushed rock.

3.05 SIGN POSTING REQUIREMENTS

- A. Construction of and hanging of a SWPPP sign is required for compliance with TCEQ general stormwater permit. Prior to beginning work, a the Subcontractor shall erect such a sign at CSSA entrance bearing the following characteristics:



- B. Sign Characteristics-- Exterior grade $\frac{3}{4}$ " plywood, cut 4' x 4', with red painted letters, on a white painted background
- C. Sign Mount—Mount Fence on Designated Entrance to CSSA as directed by Contractor
- D. SWPPP—Lettering shall be 10" painted letters, centered and located 3" from the top of the sign.
- E. Contractor/Owner: Lettering shall be 3" painted letters, located 4" below the bottom of SWPPP lettering and centered on each half of the sign
- F. NOI/ Permit/Contact—All information shall be contained by 8-1/2 x 11" forms issued by TCEQ and placed as shown on the sign. Forms shall be laminated with lamination extending beyond the edges of the document onto the sign.

3.06 DUST CONTROL

- A. The Subcontractor shall apply water sprinkling and/or palliatives to ensure dust is not transmitted during construction. Mitigative measures shall conform to Section 01563 of these specifications. Payment for dust control shall be according to the unit prices provided in Appendix 1: Bid Form of Section 01010.
- B. Subcontractor shall ensure that the rock pad or retention basin erected for equipment washdown does not become a source for blowing dust during the project

3.07 WASTE MANAGEMENT ACTIVITIES

- A. The Subcontractor shall ensure that no airborne waste material from its operations leaves the site of construction. This includes but is not limited to all paper, aluminum, Styrofoam, plastic, and drink and/or food containers.
- B. The Subcontractor shall ensure that no concrete tailings or cement waste is left onsite after daily work. During daily work, all mixing and spreading shall consider the potential of a runoff event and ensure that such wastes are temporarily stored outside the floodplain. No impoundments used to manage cement wastes shall be allowed within the floodway of the project. The floodway shall be defined by creek bed outlines, drifts, floral distress from recent flood events, or watermarks from historical flood events.
- C. The Subcontractor shall maintain its fueling station at a location designated by the Contractor. Stored petroleum based lubricants and fuels shall be double contained. The Subcontractor shall clean up all spills or incidental leaks as they occur at its cost. Standing water shall not bear a petroleum smell or visible sheen. Any such water and or contamination shall be removed by the Subcontractor and disposed at Contractor-approved location.

END OF SECTION

SECTION 13410
INSTRUMENTATION AND MONITORING REQUIREMENTS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: The general requirements for new field devices that will be added to enhance monitoring of the potable water system at Camp Stanley Storage Activity (CSSA).
- B. In general, the instrumentation and monitoring requirements consist of 5 electromagnetic flowmeters and 2 chlorine analyzers, all providing continuous monitoring to the existing SCADA system. The new instruments shall be located in proximity to existing RTUs that will serve to collect device output and report the status to the SCADA system for use by facility personnel.
- C. Related Sections:
 - Section 01010 - Summary of Work
 - Section 13420 – Monitoring Devices
 - Section 16010 – General Electrical Requirements

1.02 REFERENCES

- ANSI - American National Standards Institute
- IEEE - Institute of Electrical and Electronics Engineers
- NEMA - National Electrical Manufacturers Association
- ISA - The International Society for Measurement and Control
- NIST - National Institute of Standards and Technology

1.03 DEFINITIONS

- A. The following words have the defined meanings when used in these Specifications and on the Drawings.
 - 1. Enclosure - A cabinet, box, or control panel of standard or custom manufacture used to house controls, instruments, and or SCADA components.
 - 2. Programmable Logic Controller: A rugged industrial type computer which requires applications software and is typically used to monitor and control process equipment and related instrumentation.
 - 3. Input/Output (I/O): The real world interface between the PLC and the process equipment and instrumentation. Examples include analog inputs, analog outputs, discrete inputs, and discrete outputs.
 - 4. Operator Workstation (OW) - A personal computer (PC) or other graphic display device used as the man machine interface between the SCADA and the operating personnel.
 - 5. Local Control Panel (LCP) - A panel, as described in Division 13 or shown on the Drawings, containing selector switches, pilot lights, and or other operator interface devices, controls, and equipment. May contain PLC and I/O hardware.
 - 6. Unit Control Panel (UCP) - A LCP specified and provided with an item of process equipment (by the process equipment manufacturer).

1.04 GENERAL REQUIREMENTS

- A. Provide and install new instruments to perform the intended monitoring functions as shown on the Drawings and described in the specifications, including:
 - 1. Labor, materials, plant facilities and equipment, and performance of all Work necessary to manufacture, assemble, install, program, calibrate, test, start-up, and demonstrate instrument functionality both locally and remotely at the SCADA system.
 - 2. The new devices are shown on the Drawings and specified in the level of detail necessary to convey the intended functions.
 - 3. The SUBCONTRACTOR shall integrate the new devices into the existing SCADA system to the level necessary to obtain approval through submittals and shall then install, test, start-up, and demonstrate complete functionality.
 - 4. The components provided, including primary measuring, indicating, transmitting, receiving, recording, totalizing, and alarming devices and appurtenances, shall be completely compatible with the existing SCADA system.
- B. Installation Design:
 - 1. Coordinate and provide the exact requirements of the selected instruments.
 - 2. Additional devices, I/O, logic, and Work may be required (beyond what is shown on the plans or specified herein) to achieve the functional results required by the new monitoring devices. Provide at no additional cost.
 - 3. Any and all Work required to incorporate products other than those specified in Division 13 shall be provided at no additional cost.
 - 4. Products provided other than those specified in Division 13, shall provide the same (or better) level of performance as those specified. Level of performance shall be based solely on the opinion or evaluation of the Contractor. Unsatisfactory equipment shall be removed and replaced at no additional cost.
 - 5. Provide replacement products and related replacement Work at no additional cost.
- C. Provide the instruments, devices, accessories, and related Work as required by Section 13420 - Monitoring Devices.
- D. Provide project start-up, commissioning and training.
- E. Coordinate interface requirements with equipment and existing SCADA system.

1.05 SUBMITTALS

- A. Provide as-built information in electronic format as follows:
 - 1. Provide on CD.
 - 2. Provide the following in AutoCAD file format
 - a. Panel arrangement and layout drawings
 - b. Panel wiring drawings and schematics
 - c. Panel I/O point wiring and connection
 - d. Loop drawings
 - 3. Provide the following in Adobe PDF file format:
 - a. Equipment Specification Data Sheets
 - b. Parameter Configuration Data Sheets
 - c. Instrument calibration reports
- B. The following general guidelines shall be used in preparing submittals:
 - 1. Submittals shall be made in complete sets indexed by specification number.
 - 2. Provide a written description of the items being submitted.

3. Manufacturer's specification or data sheets shall be clearly marked to delineate the options or styles to be furnished. Options or equipment not being provided shall be neatly crossed-out.
 4. Submittals shall reference assigned equipment and device tag numbers.
 5. Submittals not following these requirements will be returned without review.
- C. The following submittals shall be provided for the project:
1. Process and Instrumentation Diagrams:
Update Contractor provided P&ID's in accordance with ISA Standard ANSI/ISA-S5.5 (1985).
 2. Instrumentation Loop Diagrams:
Prepare loop diagrams in accordance with ISA Standard ANSI/ISA-S5.4 (1991).
 3. Record Drawings - Drawings shall be a record of work as actually constructed and shall be labeled as "Record"
 4. Validation and Start-up certificates
 5. Operation and Maintenance Manuals - The manuals shall include the following in addition to requirements listed elsewhere:
 - a. The following identification shall be on the cover: the words "Water System Operation and Maintenance Manual", the SUBCONTRACTOR's name, and the contract number.
 - b. Names, addresses, and telephone numbers of each subcontractor installing equipment and the local representatives for each provided item of equipment and each system.
 - c. A table of contents with the manual assembled accordingly. Tab sheets shall be placed before each section.
 - d. Any large drawing sheet shall be folded in or placed in pockets.
 - e. As-built drawings of revised RTUs, PLC and I/O enclosures. All interconnecting wiring, cables, power sources, modules, terminal numbers, I/O points, and relays shall be shown. Corresponding terminals from within other vendor's equipment shall be shown.
 - f. As-built graphic displays, functions, alarm list, and alarm setpoints.
 - g. Equipment specification data sheets for each instrument and item of equipment.
 - h. Manufacturers' product data sheets, installation instructions, operations and maintenance manuals, and complete users, programming, and other manuals for each item of equipment.
 - i. Recommended spare parts list
 6. After installation is complete, update the manuals to reflect any changes which occurred during installation and deliver balance of manuals to Owner.

1.06 QUALITY ASSURANCES

- A. General Qualifications:
1. The installation including mounting, calibration, validation, start-up, operational testing, and training shall be performed by qualified personnel, possessing necessary equipment and experience to perform the work.
 2. The devices shall be by the manufacturer specified and shall be integrated in a manner similar required for integration with into the existing SCADA system.
 3. The equipment, level of detail, and new equipment and their installation shall be consistent with all codes, regulations and good engineering practices.
 4. Performance shall be guaranteed.
- B. Submittals:
As a minimum, submittals shall include:
1. A listing of the items and instruments for this Division.
 2. Identify each by tag number, description, function, manufacturer, model number and serial number.

3. Provide descriptive literature and indicate whether item is as specified or a proposed equal. Items identified as equals shall be accompanied by a comparative listing of the published specifications for the specified item and the proposed item.
4. List of personnel assigned to this project

1.07 COORDINATION

- A. The equipment supplied shall be selected, designed, and coordinated for proper operation with other items of equipment recently installed as part of the site-wide SCADA system.
- B. Obtain manufacturer's technical information for items of equipment not provided with, but directly connected to, the SCADA system. Provide the necessary coordination and components necessary to allow correct signal interfaces between this equipment and the SCADA system.
- C. Equipment shall be designed and installed in full conformance with the drawings, specifications, and the recommendations of the equipment manufacturer and the related processes equipment manufacturers. Conflicts shall be presented to the Contractor for resolution before proceeding. Conflicts shall be resolved without additional cost to the Owner or Contractor.
- D. Coordination with other subcontractor's and equipment suppliers, as well as supervision of installation, shall be provided for the duration of the project.

1.08 ENVIRONMENTAL CONSIDERATIONS

- A. All instrument devices shall be rated for normal operating performance with varying operating conditions over the following minimum environmental conditions.
- B. Unless specifically intended for such service, instruments and equipment shall be protected and isolated from vibration, temperature extremes, radiant heat, rain or falling water, and similar adverse conditions. Provide enclosures; sun and rain shields, etc. as required to protect the equipment.
- C. Project Conditions: Outdoor Areas
Ambient Temperature: 0 to 120 °F.
Ambient Relative Humidity: 5 to 100 percent.
Weather: Rain, sleet, snow, ice, condensing fog, wind, and sun.

1.09 WARRANTY

- A. The SUBCONTRACTOR shall warrant the integrated monitoring devices to function as intended and to be free from defects in design, workmanship, and materials for a period of ONE YEAR from the date of acceptance by the Contractor. If within the warranty period the Work fails to meet the provisions of this warranty, the SUBCONTRACTOR shall promptly correct any defects, including non-conformance with the contract documents, by adjustment, repair, or replacement of all defective parts or materials.
- B. The warranty period shall begin on the date of Acceptance by the Contractor and shall end one year later.
- C. Field services shall be furnished by the SUBCONTRACTOR without cost for the correction of any defects.
- D. This warranty shall be extended to cover all repairs and replacements furnished under the warranty and the period of the warranty for each such repair or replacement shall be one year after installation or completion.
- E. The SUBCONTRACTOR will be given an opportunity to confirm the existence of the defect but he shall not delay the correction while making such determination.

- F. If within ten calendar days after the Owner has notified the SUBCONTRACTOR of a defect, failure, or abnormality in the work, the SUBCONTRACTOR has not started to make the necessary repairs or adjustments, the Owner is hereby authorized to make the repairs or adjustments or to order the work to be done by a third party, the cost of the work to be paid by the SUBCONTRACTOR.
- G. In the event of any emergency where, in the judgment of the Owner, delay would cause serious loss or damage, repairs or adjustments may be made by the Owner utilizing a third party selected by the Owner, without advance notice to the SUBCONTRACTOR, and the cost of the work shall be paid by the SUBCONTRACTOR.
- H. This warranty shall not replace or limit manufacturer's warranties that may extend beyond one year.

PART 2 - PRODUCTS

2.01 MAINTENANCE MATERIALS AND SPARE PARTS

- A. Provide in manufacturer's original containers labeled to completely describe contents and equipment for which it is furnished. Spare parts shall consist of the following basic items:
 - 1. One of each type of plug-in unit, etched or printed circuit board assembly.
 - 2. One spare Input/Output card.
 - 3. One spare PLC processor, memory, and communication card.
 - 4. One year supply of expendable items.
 - 5. One spare of each type of special termination and interconnecting cable used.
- B. Tools, software, and calibration equipment as needed.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Inspect each instrument and piece of equipment for damage, defects, completeness, and correct operation before installing.

3.02 PREPARATION

- A. Ensure that installation areas are clean and that other construction is completed prior to installing instruments and equipment.
- B. Protect instrumentation, enclosures, and other devices from damage until Substantial Completion occurs.

3.03 SEPARATION

- A. Maintain separation between power conductors and signal conductors to prevent signal interference.

3.04 TRANSIENT VOLTAGE SURGE SUPPRESSION (TVSS)

- A. TVSS shall be provided for both instrument power supplies and signal lines.

3.05 INSTRUMENT VALIDATION AND START-UP

- A. Validate and start-up the instruments in coordination with the requirements of Division 1. The same personnel shall be present for the duration of the system validation and start-up as described below.
- B. Schedule the new instrument validation and start-up with the availability and start-up schedule of the new piping system.

- C. The new instruments shall undergo a Pre-operational Component Inspection and a Component Validation. In general, the Pre-operational Component Inspection and Component Validation shall include:
1. Pre-operational Component Inspection:
 - a. The new devices shall be operated and thoroughly checked-out by the SUBCONTRACTOR prior to the Pre-operational Component Inspection.
 - b. A visual inspection of all equipment, instruments, control panels, graphic displays, and other installations made.
 - c. A demonstration of the proper calibration and operation of all field instruments and control panels.
 2. Component Validation:
 - a. The SCADA system Component Validation shall not begin until successful Component Validations have been completed for the related process equipment provided by other manufacturers.
 - b. Demonstrate the function of each input signal. Initiate the input signal at the device in the field or at the appropriate item of equipment and verify the proper response by the SCADA system (for example, simulate an analog input and verify the proper display at a local control panel indicator or on the appropriate graphic display).
 - c. Demonstrate the function of each output signal. Initiate the output signal at the SCADA system and demonstrate the proper response in the field or at the appropriate item of equipment.
 - d. Validate each loop by simulating inputs at the first element in loop (i.e., sensor) at 10 percent, 50 percent, and 90 percent of span, or on/off and verifying loop output devices (i.e., indicator, alarm, etc.).
 - e. Make provisional settings on alarms and other process related parameters.
 - f. Verify that alarms and graphic displays operate in accordance with the requirements of the specifications, process, and process equipment.
 3. Submit certification that the Pre-operational component Inspection and Component Validation was successfully performed.
- D. After the new equipment has successfully completed the Pre-operational Component Inspection and Component Validation, it shall be demonstrated as part of the Subsystem Validation. In general, the Subsystem Validation shall include:
1. Demonstration of the SCADA system in conjunction with all subsystem related process equipment and components.
 2. Demonstrate all control sequences for the various equipment and components under simulated process conditions or with non-process fluids.
 3. Demonstration of all modes of operation using the hot-back-up processor or other back-up equipment and systems. Including successful switch-overs and switch-backs to and from the back-up equipment and systems.
 4. Submit certification that the Subsystem Validation was successfully performed.

3.06 INSTRUCTION OF OWNER'S PERSONNEL

- A. Provide the services of a factory trained and field experienced instrumentation engineer to conduct group training for the control system. The training for the instrumentation and control systems shall be divided into two categories:
1. Field instrument training - Field instrument training shall include a total of 1 working day to instruct the Owner's representatives on the following:
 - a. Location, maintenance and calibration of field devices.
 - b. Addressing I/O cabinet locations, points monitored, communications, and device programming techniques.

END OF SECTION

SECTION 13420
MONITORING DEVICES

PART 1 – GENERAL

1.01 SUMMARY

- A. Provide field mounted process instrumentation, auxiliary equipment, accessories, and supplies.
- B. Related Sections:
 - 1. Section 01010 – Summary of Work.
 - 2. Section 13410 - Instrumentation and Monitoring Requirements.

1.02 REFERENCES

- A. ANSI - American National Standards Institute.
- B. IEEE - Institute of Electrical and Electronics Engineers.
- C. NEMA - National Electrical Manufacturers Association.
- D. ISA - The International Society for Measurement and Control.
- E. S20 - Specification Forms for Process Measurement and Control Instruments, Primary Elements, and Control Valves.
- F. NIST - National Institute of Standards and Technology.

1.03 SUBMITTALS

- A. Equipment Specification Data Sheets (ESDS), including:
 - 1. Separate ESDS for each instrument.
 - 2. Use ESDS as cover sheet for related item submittal information.
 - 3. All information required to reorder an exact duplicate of the original item from the manufacturer.
 - 4. The assigned tag number. Note: More than one tag numbered item may be included on a sheet.
 - 5. Calibration information.
 - 6. Manufacturer's part number (this shall not be considered as a substitute for any of the required statement of specifications).
 - 7. Panel, breaker or power source from which item will receive power (coordinate with Contractor and Client to verify locations).
 - 8. Provide above information and information as described in ISA S20 on ISA S20 sheets or in similar format.
- B. Manufacturer's Product Data.
 - 1. Provide complete manufacturer's product data for each item of equipment.
 - 2. Clearly identify options being provided.
 - 3. Neatly strike out options not being provided.
- C. Parameter Configuration Data Sheets.
 - 1. Provide for each item of equipment that requires parameters (software settings, dip switches, jumpers, and the like) to be configured for proper operation.
 - 2. Provide blank sheets with initial submittal and complete sheets during installation, calibration, and start-up.
 - 3. Include As-Built sheets with Operations and Maintenance Manuals.

- D. Manufacturer's Installation Instructions.
- E. Manufacturer's User, Programming, and other related manuals.
- F. Shop Drawings: provide Shop Drawings showing assembly of equipment and related accessories.
- G. Certificates of Compliance.
- H. Certified Test Reports.
- I. Installation Details, showing:
 - 1. Proposed mounting methods.
 - 2. Sample, impulse, and process connection tubing routing, valving, and supports.
 - 3. Installation materials and hardware.
- J. Instrument Calibration Reports.
- K. Operations and Maintenance Manual.

1.04 QUALITY ASSURANCE

- A. Manufacturer.
 - 1. Monitoring devices shall be manufactured by a firm regularly and currently engaged in the design and manufacture of similar equipment.
 - 2. Equipment furnished shall be new and of current design and technology.
 - 3. A preference shall be given to equipment of a single manufacturer, where the equipment in question conforms to these specifications.
- B. Maintainability.
 - 1. Equipment shall be designed and installed for ease of maintenance and repair, and access to critical parts shall not require a major disassembly.
 - 2. Internal field adjustments where permitted or required herein shall be easily accessible upon removal of a panel or cover.
- C. Minimum Quality.
 - 1. Materials and installation shall be better than or equal to installations provided for the recent SCADA system including compliance with all electrical codes and standards.
 - 2. Capacities and ranges shall not be less than that indicated on the Drawings or specified.
- D. Similar Items.
 - 1. Equipment of the same type shall be products of the same manufacturer (and model number when applicable).
- E. Electronic Equipment.
 - 1. Provide solid state equipment to the extent practicable.
 - 2. Select components of construction for their suitability and reliability.
 - 3. Employ adequate component derating to preclude failures because of transients and momentary overloads reasonably expected in normal operation in an industrial facility.
 - 4. Design units to operate without forced cooling, unless it is an integral part of the device.

PART 2 – PRODUCTS

2.01 BI-DIRECTIONAL MAGNETIC FLOW METERS

- A. Provide loop powered magnetic flow meters with ANSI Class 150 flanged ends to measure liquid flow with integral dampening, DC coil excitation, grounding rings and additional features as follows:

1. Materials of construction: Epoxy coated cast aluminum, cast iron, or steel body with lined 304 stainless steel flow tube, carbon steel flanges, Hastelloy C electrodes, 316L SS grounding rings and either a polypropylene, hard rubber, or polyurethane liner.
 2. Output signal: Two 4-20 mA dc capable of transmission into at least an 750-ohm load at 24-vdc, linear with flow. One output shall indicate the flow in a forward direction of flow and one indicating the reverse direction of flow. Provide control cards to enable 2 analog outputs (for both forward and reverse flow conditions) to SCADA system except for 3-inch well flowmeter.
 3. Operating temperatures:
 - a. Process fluid: Up to 140°F.
 - b. Ambient: -4 to +140°F.
 4. Accuracy: 1-percent of flow rate, or better.
 5. Repeatability: 0.1-percent of full scale, or better.
 6. Rangeability: 100 to 1, or better. Process signal to be set to zero when flow rate is less than 1-percent of full scale.
 7. Provide empty pipe detection option to drive output to zero when electrodes are uncovered.
 8. Meter Body Enclosure rating: NEMA 6 with remote converter, suitable for Class I, Division 2 areas.
 9. Signal converter and connecting cables:
 - a. Provide remote signal converter and connecting cables for below ground installations. Connect flowtube and converter with cables of appropriate length for conductivity of water metered.
 - b. With local LCD display, programming buttons, and conduit entries.
 - c. Stanchion mounted remote converter in NEMA 4X enclosure.
- B. Manufacturer / model number: Endress + Hauser
- a. 6" and 10" magmeters, Proline Promag 53W, see Table 13420A

2.02 CHLORINE RESIDUAL ANALYZER

- A. Power Input: Analyzers shall be the fully isolated 2-wire or 4-wire type with power supply of 120 V plus or minus 10 percent, 60 Hz plus or minus 5 percent.
- B. Signal Output: Outputs shall be current regulated 4-20 mA dc, capable of driving 0 to 600 ohms.
- C. Ambient Conditions: Analyzers shall be suitable for continuous automatic on-line analysis of the indicated parameter under the conditions indicated.
 1. Equipment shall operate satisfactorily in ambient temperatures between 0 and 120°F or shall be provided with isothermal enclosures so accuracies will not exceed 1 % of span.
 2. Process fluid temperatures will range between 40 and 100°F unless indicated otherwise.
- D. Sensor: Residual chlorine analyzers shall be the internally buffered sensor type designed to measure free chlorine in a continuous sample of water without the use of a reagent. Sample piping shall include self-flushing "Y" strainers and pressure reducing valves. Samples shall not pass through housings containing electronics. Each analyzer shall be fitted with calibration connections.
- E. Transmitter: The transmitter shall produce an isolated current output proportional to chlorine residual. Sensitivity shall be 0.01 mg/L; accuracy shall be plus and minus 2 percent of reading or 0.01 mg/L, whichever is greater. Field-selectable ranges between 0-0.5 mg/L and

0-6 mg/L shall be available. A local LCD indicator scaled in mg/L residual chlorine shall be provided. The microprocessor and other components shall be provided with battery backup to retain set points, calibration, and other information during extended power outages. Each analyzer shall be provided in a NEMA 4X cabinet. All materials in the analyzer system shall be corrosion resistant and suitable for environments containing chlorine vapors.

- F. All electrodes, fittings, and transmitters on analyzers shall be products of Endress + Hauser.
- G. Manufacturers and model numbers: Endress + Hauser, see Table 13420A for details.

2.03 IDENTIFICATION

- A. All monitoring devices shall be identified by nameplates, when panel mounted, or identification tags when field mounted.
- B. Nametags shall be provided to clearly identify each device by tag number.
 - 1. Emboss information on stainless steel tag and securely attach to the instrument.
 - 2. Tags shall be attached to a normally non-removable part on the device with stainless steel jack chain and shall be plainly visible to a standing observer.
 - 3. The identification tags shall be MS-955 as manufactured by Marking Services (1-800-234-0135) or approved equal.

2.04 PROCESS CONNECTIONS

- A. Provide the following basic materials for process connections.
 - 1. Process connections shall include, as close as practical to the point of connection, a tight closing block valve suitable for the maximum process pressure, temperature, and process fluid involved.
 - 2. Process connections shall include a union or flanged connection located to facilitate disassembly of the connection and device removal without interrupting process operation.
 - 3. Impulse tubing and tubing fittings for impulse lines shall be ½-inch 316 stainless steel. Tubing fittings shall be compression type as manufactured by Swagelok.
 - 4. All tubing bends shall be tool made.
 - 5. Tubing Supports. Impulse lines shall be supported by fastening to struts with a tubing clamping system or shall be installed in aluminum tube trays (channels/angles).
 - 6. Process connections shall include waste to drain lines.

2.05 SIGNAL ISOLATORS, CONVERTERS, CONDITIONERS AND SUPPRESSORS

- A. Provide signal isolators, converters, and conditioners to obtain the required system performance as follows:
 - 1. Insure that input-output signals of all instruments and process equipment are compatible.
 - 2. To insure sufficient loop impedance.
 - 3. Unless otherwise specified or specifically approved otherwise, signals between field equipment and panels shall be 4 to 20 mAdc.
 - 4. Mount the signal isolators, converters, and conditioners behind control panels or in the field (in an appropriately rated enclosure) at point of application.
- B. Rochester Instrument Systems Series 1300, or approved equal.
- C. Provide transient voltage surge suppression for signal pairs from each device using Emerson EDCO SS64 or approved equal.

2.06 SPECIAL TOOLS AND ACCESSORIES

- A. Furnish special tools, instruments, and accessories needed to maintain monitoring devices.

- B. Furnish lifting, handling, and mounting devices for the instrument components when required.

PART 3 – EXECUTION

3.01 PRE-INSTALLATION

- A. Ensure installation areas are clean and that major construction is completed prior to installing monitoring devices.

3.02 INSTALLATION

- A. Field mounted monitoring devices shall be installed, calibrated, and started up in strict compliance with the manufacturer's requirements and recommendations.
- B. Install flowmeter manufacturer's grounding rings and instrument device according to installation instructions for flowmeters installed in plastic pipe. Install transition piping to meet manufacturer's upstream and downstream straight runs requirements. Provide and install flanges to convert from DIP sizes to Class 150 ANSI.
- C. Install signal isolators, converters, conditioners, suppressors and transmitters. Connect transmitters to the SCADA system via existing RTU(s).
- D. Conflicts between the manufacturer's requirements and recommendations and these specifications or Drawings shall be presented to the Contractor for resolution before any affected work is started.
- E. Furnish the services of authorized factory representative trained and experienced in the installation of the monitoring devices to perform the following:
 - 1. Provide direction during installation to insure the monitoring device installation is in accordance with the manufacturer's requirements.
 - 2. Be present when the monitoring devices are first put into operation.
 - 3. Inspect, check, adjust as necessary, and approve the installation.
 - 4. Calibrate the monitoring devices, in accordance with the Specifications herein, until all trouble or defects are corrected and the installation and operation are acceptable.
 - 5. Prepare and submit the Manufacturer's Certified Report.
- F. Process connections shall be as follows:
 - 1. Process connections for pressure instruments shall be as short as practical and shall be installed with a minimum slope of 1-inch per foot (1:12) downward toward the instrument in liquid systems and upward toward the instrument in gaseous systems.
 - 2. If preferred direction of slope cannot be maintained, submit for approval an installation configuration utilizing traps, drains, and/or vents at high and low points which will ensure freedom from mixed phase offset effects and provide ease of purging or draining.
 - 3. Provide fill tee fittings and sediment collection legs with blow-down valves where applicable.
 - 4. Drain lines from chlorine analyzers shall be routed to nearest sewer line or to location as directed by the Contractor.

3.03 MOUNTINGS

- A. Mount and install monitoring device as shown on the installation details.
- B. Where not shown, mount according to standard practices for installation of such instrumentation using floor or wall mounted pipe stanchions per manufacturer's recommendations.
- C. Equipment specified for field mounting shall be suitable for direct pipe stand mounting.

- D. Non in-line indicators, and equipment with calibration adjustments or requiring periodic inspection, shall be mounted not lower than 3 feet nor higher than 5 feet above walkways, platforms, and catwalks.
- E. When several related instruments are to be mounted in the same vicinity, mount on fabricated racks fastened to main instrument pipe stand. Overall assembly to be logically laid out and assembled leaving room for maintenance, calibration, and electrical connections.

3.04 FACTORY TESTS AND CALIBRATION

- A. All field mounted monitoring devices shall be factory tested by the manufacturer to assure satisfactory performance prior to shipment to the job site.
- B. Include calibration to the actual range and conditions of use.

3.05 INSTRUMENT CALIBRATION

- A. Provide the services of factory-trained instrumentation technicians with the proper tools and equipment to field calibrate each instrument to its specified accuracy in accordance with the manufacturer's specifications and instructions for calibration.
- B. Each instrument shall be calibrated at 10 percent, 50 percent, and 90 percent of span using test instruments to simulate inputs and read outputs that are rated to an accuracy of at least 5 times greater than the specified accuracy of the instrument being calibrated.
- C. Test instruments shall have accuracy's traceable to the National Institute of Standards and Technology (NIST), as applicable. Provide specifications for calibration instruments used.
- D. The Contractor shall be given 48 hours notice and the opportunity to witness the calibration.
- E. Instrument Calibration Report.
 - 1. Submit a written report to the Contractor on each instrument certifying that it has been calibrated to its published specified accuracy.
 - 2. Record data on prepared forms.
 - 3. This report shall include the following for each instrument:
 - a. Facility identification (Name, location, etc.).
 - b. Loop identification (Name and function).
 - c. Instrument tag and serial numbers.
 - d. Zero and full scale calibration limits in the proper engineering units.
 - e. Test mode or type of test.
 - f. Input values or settings.
 - g. Expected outputs and tolerances.
 - h. Actual readings.
 - i. Defects noted, corrective action required, and corrections made.
 - j. Explanations or special notes as applicable.
 - k. Date of actual calibration.
 - l. Tester's certification with name and signature.

END OF SECTION

**TABLE 13420A
MONITORING DEVICE LIST**

P&ID	LOCATION TAG-NO	INSTRUMENT	I/O	RTU	RANGE/SIZE	SPEC'N	MANUFACTURER	MODEL	LOCATION	Notes
	BLDG. 4									
I-02	FE/FIT-00403	WATER FLOW METER	AI	004	6-inch	13420-2.01	ENDRESS + HAUSER	Promag 53W	8" Main	Flowtube underground
	ED#6									
I-03	FE/FIT-90802	WATER FLOW METER	AI	908	6-inch	13420-2.01	ENDRESS + HAUSER	Promag 53W	8" Main	Flowtube underground
	BLDG. 44									
I-04	FE/FIT-04402	WATER FLOW METER	AI	044	6-inch	13420-2.01	ENDRESS + HAUSER	Promag 53W	8" Main	Flowtube underground
	BLDG. 45									
I-04	FE/FIT-04502*	WATER FLOW METER	AI	045	6-inch	13420-2.01	ENDRESS + HAUSER	Promag 53W	8" Main	Flowtube underground
	BLDG. 76									
I-05	FE/FIT-07602	WATER FLOW METER	AI	076	10-inch	13420-2.01	ENDRESS + HAUSER	Promag 53W	12" Main	Flowtube underground
	BLDG. 93									
I-06	AE/AIT-09313	CHLORINE RESIDUAL TRANSMITTER	AI	093	0-6 mg/L free chlorine	13420-2.02	ENDRESS + HAUSER	CCM253-EK1105		Mount on south ext. wall of Bldg 93
		FLOW ASSEMBLY					ENDRESS + HAUSER	CCA250-B1		
		MEASURING CELL					ENDRESS + HAUSER	CCS140		
		MEASURING CABLE					ENDRESS + HAUSER	CPK9-NAA1B		
	BLDG. 201									
I-07	AE/AIT-20102	CHLORINE RESIDUAL TRANSMITTER	AI	201	0-6 mg/L free chlorine	13420-2.02	ENDRESS + HAUSER	CCM253-EK1105		
		FLOW ASSEMBLY					ENDRESS + HAUSER	CCA250-B1		
		MEASURING CELL					ENDRESS + HAUSER	CCS140		
		MEASURING CABLE					ENDRESS + HAUSER	CPK9-NAA1B		
	NOTES:									
	1. Vendor supplied instruments may not be listed.									
	2. All 6" and 10" flowmeters shall be provided with 2 analog cards to allow forward and reverse flow output to the SCADA system.									
	3. All applicable equipment with remote transmitters are to include adequate cable from the element to the transmitter, 15 feet minimum.									

**SECTION 16010
GENERAL ELECTRICAL REQUIREMENTS**

PART 1 - GENERAL

1.01 SCOPE

- A. The electrical work includes furnishing all material, equipment, components, and labor for a complete electrical installation.
- B. This section summarizes the general requirements for electrical work.

1.02 RELATED SECTIONS AND DRAWINGS

- A. Section 01010 – Summary of Work
- B. Section 01300 – Submittals
- C. Section 13410 – Instrumentation and Monitoring Requirements
- D. Section 13420 – Monitoring Devices

1.03 DEFINITIONS

- A. Provide: Furnish, completely install, and connect.
- B. Product Data: Catalog cuts, schematics, and descriptive literature.
- C. Shop Drawings: Factory-prepared specific to the installation.
- D. Indicated: Shown on the Contract Drawings.
- E. Noted: Indicated or specified elsewhere.

1.04 QUALITY ASSURANCE

- A. Provide complete electrical installation in accordance with the latest revised edition of National Electrical Code (NFPA 70), Life Safety Code (NFPA 101), and in accordance with all applicable state and local laws, ordinances, and codes. Obtain all necessary permits and have all work inspected by appropriate authorities having jurisdiction (AHJ).
- B. Qualifications of Manufacturers. Furnish manufacturer's electrical equipment of the types and sizes specified which have successfully operated for not less than the past 2 years except where specific types are named by manufacturer and catalog number or designation under other Sections of Division 16.
- C. Codes and Standards. Provide electrical equipment and materials, including installation, conforming to the following codes and standards, as applicable. The equipment and materials shall bear labels to indicate manufacturing conformance to the specified standards, or equal. Where two or more codes or standards are at variance, conform to the more restrictive requirement.
 - 1. NFPA 70; National Electrical Code (NEC).
 - 2. American National Standards Institute (ANSI).
 - 3. American Society for Testing and Materials (ASTM).
 - 4. Institute of Electrical and Electronics Engineers (IEEE).
 - 5. Insulated Cable Engineers Association (ICEA).
 - 6. National Electrical Manufacturers Association (NEMA).
 - 7. National Electrical Testing Association (NETA), Section 16T, Electrical Acceptance Tests.
 - 8. National Fire Protection Association (NFPA).
 - 9. Occupational Safety and Health Act (OSHA).
 - 10. Underwriters' Laboratories, Inc. (UL).
 - 11. NFPA 101, Life Safety Code.

1.05 SUBMITTALS**A. Shop Drawings**

1. Submit, for the Contractor's approval, shop drawings to the extent required in this Section and other Sections.
 2. Complete equipment descriptive, operation, and installation data shall be submitted with the shop drawings. Shop drawings shall be clear, neat, orderly, legible, and in the final format. Hand-drawn sketches, redrawn copies of contract drawings, and other preliminary type drawings are not acceptable and will be rejected without review. Shop drawings shall include the following.
 - a. Dimensions and weights of equipment.
 - b. Nameplate data, including the nameplate material, heights of letters, inscriptions, and method of mounting.
 - c. Details showing enlarged views of small parts when required.
 - d. Arrangements of equipment and nameplates.
 - e. Plans showing the equipment assembly, space requirements, conduit hub sizes, clearances, and locations for conduits and anchor bolts.
 - f. Elevations showing all parts, devices, components and nameplates, positions and arrangements of the equipment. Show as many elevations as necessary to clearly depict component and device arrangements.
 - g. Schematic and elementary wiring diagrams, of each unit of each equipment, showing numbered terminal points, numbered wires, and numbered interconnections to other equipment and remote devices.
 - h. Connection wiring diagrams of each unit of each equipment, showing numbered terminal points, numbered wires, and numbered interconnections to other equipment and remote devices.
 - i. Include numbering of external wiring in the instruction manual.
 - j. Complete catalog information of all parts and components of electrical equipment. Equipment, components and materials shall be clearly identified as to which exact item is being submitted.
 - k. Symbols and Legend sheet to describe all symbols used on shop drawings.
- B. Re-submittals. When a re-submittal is required, the Manufacturer shall submit all previously accepted material in addition to the corrected or added information. It is intended that each re-submittal be a complete and stand-alone document.
- C. Materials List. Submit material lists, for the OWNER's review and approval, within 30 days of Notice to Proceed. Include all products described in Division 13, including the equipment described in shop drawings. List only those products named in the Contract Documents or approved substitutions.
- D. Technical Data. Submit descriptive and instruction manuals to the extent required under this Section and other Sections of Division 13.

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Delivery. Deliver electrical materials and equipment in manufacturers' original cartons or containers with seals intact, as applicable.

PART 2 - PRODUCTS**2.01 MATERIALS AND EQUIPMENT**

- A. Provide new materials and UL listed equipment as required to complete all indicated and specified electrical work, including incidental items inferable from the contract documents that are necessary to complete the work. Provide materials and equipment of latest design that are the standard products of established manufacturers. For uniformity, only one manufacturer is acceptable for each type of product. Manufacture individual parts to standard sizes and gauges so that repair parts can be installed in the field. Make like parts of duplicate units interchangeable.
- B. Indoor Equipment. Enclosures for electrical equipment installed in electrical and control rooms shall be rated NEMA 1 or NEMA 12.
- C. Outdoor Equipment. Enclosures for outdoor electrical equipment shall be weatherproof, NEMA 4X or NEMA 6, unless otherwise indicated.
- D. Factory Finishes. Unless otherwise specified, the sheet metal surfaces of equipment enclosures shall be phosphatized and coated with a rust-inhibiting primer. Over the primer, apply a corrosion resistant baked enamel finish on the interior and exterior metal surfaces. The color shall be ANSI No. 49 medium light gray. Furnish hardware with a corrosion resistant finish. Finish cast iron outlet bodies, boxes, covers, and fittings with cadmium zinc electroplate covered with aluminum cellulose lacquer. In corrosive areas, all surfaces of rigid steel conduit, cast metal boxes, cast metal outlet bodies, covers, fittings, supports, and clamps shall have a PVC coating bonded to the outer surface, and the hardware shall be Type 316 stainless steel. Sheet metal enclosures, in corrosive areas, shall have an outer coating of corrosion resistant epoxy.
- E. All conduit used for outdoor flowmeter and analyzer installation shall be 1-inch diameter rigid metal conduit (galvanized steel). Conduit used inside buildings to provide power or signal connectivity to RTUs may be Intermediate Metal/Metallic Conduit (IMC).
- F. Prohibited Materials. Aluminum conductors, cast "pot metal" conduit fittings, and set screw conduit couplings and connectors are not acceptable.

2.02 SOURCE QUALITY CONTROL

- A. Factory Tests. Factory tests are required for all electrical equipment and assemblies. Perform factory tests in accordance with the applicable codes and standards specified for the equipment.
- B. Factory Inspection. OWNER or the designated representative, may inspect fabricated electrical equipment at the factory. Notify OWNER in sufficient time so factory inspection can be arranged. Factory inspection shall be made after manufacturer has performed satisfactory checks, adjustments, tests, and operations. Approval of equipment at the factory only allows the manufacturer to ship the equipment to the site, and does not constitute final acceptance.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. The complete installation is to be accomplished by skilled electrical tradesmen, with certified or suitably qualified individuals performing all special systems installation and testing. All workmanship shall be of the highest quality. The electrical installation shall be left in a neat, clean condition ready for use. Work or finished conditions deemed sub-standard work will be rejected. Any portions of the work rejected as above shall be immediately repaired and/or replaced as required to satisfy the CONTRACTOR and the requirements of the contract.

- B. Bury underground conduit a minimum of 6 inches below ground surface. Bury conduit under roads a minimum of 24 inches below the road surface. Seal underground and outdoor conduit ends to provide water resistance.
- C. All junction boxes shall be sealed for water resistance.
- D. Schedule the work and cooperate with all trades to avoid delays, interferences, and unnecessary work. If any conflicts occur which necessitate departures from the Contract Drawings and Specifications, details of departures and reasons shall be submitted immediately for the Engineer's consideration.

3.02 CERIFICATION AND TESTS

- A. Prior to request for final review, test all systems and repair or replace all defective work. Certify that all electrical systems are complete and operational.
- B. At the time of final review of electrical work, demonstrate the operation of electrical systems. Furnish labor, apparatus, and equipment for systems demonstration.
- C. After final review and acceptance, turn over to the CONTRACTOR all keys for electrical equipment locks. Present to the CONTRACTOR or the CONTRACTOR's designated representative, demonstrations and verbal instructions for proper operation and maintenance of the electrical equipment and systems.

END OF SECTION 16010