

South Carolina Department of Transportation

File:

Project ID Number: P027114

Project Name: I-85 Widening Improvements Mile Marker 80 to 96

County: Spartanburg & Cherokee

Preliminary Utility Report

EXECUTIVE SUMMARY

This is the **Preliminary Utility Report** for the proposed widening and interchanges improvements for I-85 from Mile Marker 80 to 96 in Spartanburg and Cherokee County. This is a Utility Deliverable for Scope of Services 12 UTILITY COORDINATION .4 PRELIMINARY UTILITY REPORT to provide (Preliminary Utility Information Sheet):

1. A list of all utilities
2. Assessment of prior rights
3. Assessment of impacts with cost as can be best
4. Information on existing SCDOT infrastructure
5. Determination of the feasibility of early utility relocation and recommendations for including “in-contract” relocations

Infrastructure Consulting and Engineering (ICE) is the Utility Coordination consultant. CH Engineering performed the Subsurface Utility Engineering Quality Level “C” & “B” for this project and provided the Utility Sheets.

Utility Contacts were identified by using SC811 membership for Spartanburg and Cherokee Counties, Spartanburg UCC member list and field investigation for witness post. The Contact List follows this Executive Summary and the 18 utility owners in alphabetical order.

January 8, 2015 SCDOT Utility Office sent the “Introduction to Consultant” letter to affected utility owners that ICE is under contract to perform Design Build Preparation Services to include utility coordination (UC) and subsurface utility engineering (SUE) for the Project.

February 11, 2015 the Initial Joint Utility Coordination (IJCUM) meeting was held during the Spartanburg Utility Coordination Committee (UCC) monthly meeting to introduce the Project to all utilities in Spartanburg and Cherokee County. Approximately 65 utility representatives attended. During this initial meeting each utility owner identified the location of utility facilities, evaluated impacts, and discussed collecting system maps/GIS/As-Built plans and the schedule for design to Design/Build procurement to construction.

October 14, 2015 the next Joint Utility Coordination meeting was held during the Spartanburg Utility Coordination Committee (UCC) monthly meeting. Approximately 60 utility representatives attended. Each utility was provided a copy of Preliminary Plans for the Right of Way and Subsurface Utility Engineering QLB data Utility Sheets to review for errors to existing Utility Sheets and provide comments/corrections back to CH Engineering to revise for Preliminary Plan submittal. Theresa Hodge (CECS) was also there to discuss and provide Preliminary Bridge Plans to replace the CSX Bridge over I-85 and review requirements for NO COST or Utility Agreement relocation packets. All utilities with facilities in the Project limits

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were informed to identifying impact/conflict with their facilities to begin planning, design, budgeting and scheduling for relocations FY 2016.

December 1, 2015 all utility owners with facilities in the Project corridor were invited to the PUBLIC HEARING held in Gaffney High School to come prior to the HEARING to review the displays and follow up with any impact/conflict questions. Approximately 30 utility representatives attended.

Starting with the aerial utilities and following with underground utilities, below is an overview of project utility facilities:

CELL TOWERS – There are many cell towers along I-85 and three are inside the survey limits of the Project; two **American Tower** (ATC Wind Hill RD and ATC Cannon Campground RD) and one **Crown Castel** (CCT Cannon Campground RD). The AT Wind Hill RD tower is outside the proposed cul-de-sac for Wind Hill RD and realignment of SC329 (Victory Trail RD). The phone cables (AT&T, Spirit) feeding this tower will need to be relocated. Scheduling the splice/cutover window with the carriers using the tower will be a critical scheduling factor. The Cannon Campground towers and phone cables are not in conflict with the Project. ATC & CCT have prior right by easement outside present SCDOT ROW.

Electric Transmission – **DUKE Energy Carolinas** electric transmission facilities are in the project limits crossing I-85. There is a 100kVA crossing beside the CSX proposed bridge replacement sta.895+00. The following crossings; 44kVA sta.1610+00, 100kVA sta. 1611+00, 44kVA sta. 1615+00 and 230kVA sta. 1625+00, the transmission structures are outside present SCDOT ROW and not in conflict. Vertical clearance of conductors will need to be verified. DUKE Energy Carolinas has prior rights by easement outside present SCDOT ROW.

Electric Distribution – **Broad River Electric Cooperative (BREC), DUKE Energy Carolinas and Gaffney Board of Public Works (GBPWS)** have single and three phase distribution throughout the Project on wood poles. The wood poles are outside and inside present SCDOT ROW. DUKE Energy has KCI Technologies under contract to develop relocation plans. BREC and GBPWS have identified conflicts and will continue relocation planning with Design/Build Team UC. All three electric distribution owners have prior rights for poles outside present SCDOT ROW and combined relocation estimate is \$3,000,000.00. The Utility Sheets have a pole data sheet.

CABLE TV (CATV) – **Charter Communications** has aerial and under CATV cables in the Cowpens and Gaffney area of I-85. Charter will follow DUKE Energy or GBPWS relocation

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plans. Charter does NOT have prior rights by aerial join use attachment agreements and County franchise agreement.

Telecommunication Data Transmission – Level3, AT&T (Toll) and PalmettoNET (Spirit) have fiber optic cables for toll/data/long distance transmission telecommunications. Level3 is buried along S39 (Macedonia & Green River RD) crossing I-85 sta. 1230+00. AT&T (Toll) is buried and crosses I-85 sta. 1266+00 in a 4-inch and 10-inch steel ducts. Spirit cable follows SC18 (Shelby HWY) to Wind Hill Rd American Tower. Level3 and Spirit and inside present SCDOT ROW by encroachment permit and do NOT have prior rights. AT&T (Toll) is outside present SCDOT ROW and has prior rights except for crossing I-85.

Telecommunication Local Phone Service – AT&T (aka BellSouth) provides local phone, internet, TV and Data telecommunication through the Project Corridor. AT&T has two service centers involved, Spartanburg (MM80 to Pacolet River) and Charlotte (Pacolet River to MM96). The Spartanburg Center is currently completing relocation design for proposed CSX RR Bridge replacement and submitting Utility Agreement to CECS. The Charlotte Center has contracted with TELCIS to review and design relocation for the remaining Project conflicts.

Natural Gas Distribution – Piedmont Natural Gas (PNG) has various size steel and plastic natural gas high pressure pipeline and distribution gas mains throughout the Project Corridor along the Frontage Roads for commercial, business and residential service. There is a pipeline regulator station on Dewberry RD (I-85 sta. 944+00LT) and gas line crossings I-85 at sta. 914+00, 944+00 (PL), 1368+00, 1399+00, 1407+00, 1509+00, 1558+00, and 1610+00. PNG is currently in preliminary relocation design for the proposed CSX RR Bridge replacement and will submit Utility Agreement to CECS. Pipeline is outside present SCDOT ROW in an easement having prior rights excepting the I-85 crossing and distribution gas mains are inside present SCDOT ROW and do NOT have prior rights.

Water – Spartanburg Water & Sanitary Sewer District (SWSSD), Macedonia Water Works, Grassy Pond Water Company, Gaffney Board of Public Works and SCDOT have water service districts through the Project corridor. There are various size ductile and PVC water mains along the Frontage Roads and crossing I-85. Most of these lines are inside present SCDOT ROW by encroachment and do NOT have prior rights. SWSSD does have a 16-inch water line and pump station in their easement outside present SCDOT ROW from I-85 sta. 919+00LT to sta. 968+00LT. SCDOT has a 2-inch water service line for I-85 Northbound Rest area. Water line relocation work is recommended to be included with the Design/Build Contract.

Sanitary Sewer – Spartanburg Water & Sanitary Sewer District (SWSSD), Gaffney Board of Public Works (GBPW) and SCDOT have gravity and force main sanitary sewer in several

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sections along I-85. SWSSD operates and maintains the Cowpens sanitary sewer system. SCDOT has a 4-inch to 6-inch sanitary sewer force main for both I-85 Southbound and Northbound Rest Areas. Sanitary sewer relocation work is recommended to be included in the Design/Build contract.

Bulk Transmission Pipelines – No pipelines facilities are in the project limits.

RAILROAD – The **CSXRR** bridge replacement is a separate design consultant (Trans Systems) and their utility coordination sub-consultant is CECS.

Detailed information regarding each utility is provided in the follow utility folders with SCDOT Introduction to Consultant letter, Preliminary Utility Information Sheet, Utility facility information, (System Map, GIS, As-Build, Utility Sheet markup, etc.):

American Tower (Cell Tower)

AT&T (Local)

AT&T (Toll/Data/Long Distance)

Broad River Electric Cooperative (Electric Distribution)

Charter Communications (CATV)

Crown Castle (Cell Tower)

Duke Energy Carolinas (Electric Distribution)

DUKENET (now Time Warner Business Cable (Data)

DUKE Energy Carolinas (Electric Transmission)

Gaffney Board of Public Works (Electric Distribution, Water, Sanitary Sewer)

Grassy Pond Water Company (Water)

Level3 (Toll/Data)

Macedonia Waterworks (Water)

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PalmettoNET (Spirit Communications) (Toll/Data/Long Distance)

Piedmont Natural Gas (Gas Pipeline & Gas Distribution)

SCDOT (Water and Sanitary Sewer)

Spartanburg Water and Sanitary Sewer District (Water, Sanitary Sewer)

Subsurface Utility Engineering (SUE) Utility Sheets

SCDOT I-85 Widening MM80to96 Spartanburg Cherokee County Project ID P027114 - Utility Prior Rights, Impact/Conflict, Estimated Relocation Cost SCDOT & Utility

Utility	Prior Rights	IMPACT/CONFLICT	SCDOT \$	UTILITY \$	TOTAL \$	Comments
American Tower						
Cherokee #SC-85489	YES	NONE	\$ -	\$ -	\$ -	
Macedonia #SC-85501	YES	NONE	\$ -	\$ -	\$ -	
					\$ -	
AT&T (Local)	PARTIAL	YES	\$ 250,000.00	\$ 250,000.00	\$ 500,000.00	
					\$ -	
AT&T (Toll/Data)	PARTIAL	YES	\$ 50,000.00	\$ 50,000.00	\$ 100,000.00	
					\$ -	
Broad River Electric Cooperative	YES	YES	\$ 900,000.00	\$ 100,000.00	\$ 1,000,000.00	
					\$ -	
Charter Communications CATV	NO	YES	\$ -	\$ 250,000.00	\$ 250,000.00	
					\$ -	
Crown Castle Tower					\$ -	
SITE GNV-048-930334-COWPENS	YES	NONE	\$ -	\$ -	\$ -	
					\$ -	
DUKE Energy Carolinas Distribution	YES	YES	\$ 2,000,000.00	\$ 100,000.00	\$ 2,100,000.00	
					\$ -	
DUKE NET (Time Warner Cable)	YES	YES	\$ -	\$ -	\$ -	\$ included in DUKE Energy Distribution
					\$ -	
DUKE Energy Transmission	YES	NONE	\$ -	\$ -	\$ -	Verify vertical clearance crossing I-85 & Frontage Roads
					\$ -	
Gaffney Board of Public Works					\$ -	
Electric Distribution	YES	YES	\$ 500,000.00	\$ 66,000.00	\$ 566,000.00	
Sanitary Sewer	NO	YES		\$ 52,500.00	\$ 52,500.00	
Water	PARTIAL	YES	\$ 50,000.00	\$ 1,013,500.00	\$ 1,063,500.00	
					\$ -	
Grassy Pond Water Company	NO	YES	\$ -	\$ 400,000.00	\$ 400,000.00	
					\$ -	
LEVEL3 (Toll/Data)	NO	YES	\$ -	\$ 175,000.00	\$ 175,000.00	
					\$ -	
Macedonia Waterworks	NO	YES	\$ -	\$ 1,500,000.00	\$ 1,500,000.00	
					\$ -	
PalmetteNET (Spirit Communications)	NO	YES	\$ -	\$ 100,000.00	\$ 100,000.00	
					\$ -	
Piedmont Natural Gas	NO	YES	\$ -	\$ 1,500,000.00	\$ 1,500,000.00	
					\$ -	
SCDOT Sanitary Sewer (Rest Area)	YES	YES	\$ 234,000.00		\$ 234,000.00	
					\$ -	
SCDOT Water (Rest Area)	YES	YES	\$ 10,000.00		\$ 10,000.00	
					\$ -	
Spartanburg Water	NO	YES	\$ -	\$ 1,000,000.00	\$ 1,000,000.00	
					\$ -	
			SCDOT \$	UTILITY \$	TOTAL \$	
TOTAL RELOCATION ESTIMATED COST			\$ 3,994,000.00	\$ 6,557,000.00	\$ 10,551,000.00	

Spartanburg County SC811 Member List		Cherokee County SC811 Utility Member List		Utility Type		Utility Contact information						
Name	SC811Code	Name	SC811Code	SUE Code	Abbreviation	Utility Service Type	Contact Name	Company	JOB TITLE	Phone	Email	Address
		American Tower (SC329 sta. 194+00RT - Wind Hill RD & I-85 sta. 1208+00RT - Cannon Campground RD)			ATC	Cell tower	Alton Campbell	American Tower Corporation	Field Ops Technician - Southeast	864.979.3293	alton.campbell@americantower.com	P.O. Box 1782 West Union, SC 29696
ATT/D Records obtained	BSZT29	ATT/D Records obtained	BSZT29	T1	AT&T Local	Local Telecom	Michael Nate	AT&T (Spartanburg County)	SC Upstate HWY Moves	864.494.4822	mn5627@att.com	100 Belton Drive Spartanburg, SC 29301
		ATT/D	BNCZ49	T1	AT&T Local	Local Telecom	Eric Allen	AT&T (Cherokee County)	Manager OSP Design Engineering	704.413.5063	ea5498@att.com	4100 South Stream Boulevard Charlotte, NC 28217
							Lee Sadler	AT&T (Cherokee County)	OSP Design Engineer	704.478.7917	ls9173@att.com	4100 South Stream Boulevard Charlotte, NC 28217
							Grier Mangum	TELICS (AT&T Contractor)	Roadmove Manager	803.409.9905	telicroadmove@gmail.com	810 Dutch Square BLVD Columbia, SC 29210
		ATT/T Cable crossing between MM87 to 88, crossing with DUKE Energy in 2ea steel pipes	ATT09	T1	AT&T TOLL	Toll/Data/Long Dist	Scott Logeman	AT&T	Engineering Supervisor	770.602.2120	sl1213@att.com	5390 Overbend Trail, Suwanee, GA 30024
							Ron Dukes	DH Communications	Field Engineer	803.796.0884	rmdukes@att.net	180 Monarch Road Swansea, SC 29160
							Dwight Meadows	DH Communications	Field Engineer	864.517.2309	jdmeadows@att.com	400 North Academy Street Greenville, SC 29601
Broad River Electric Cooperative, Inc Records obtained	BRE32	Broad River Electric Cooperative, Inc Records obtained	BRE32	E1	BREC	Power Distribution	Jeffery Humphries	BREC	Staking Tech	864.489.5737	jhumphries@broadriverelectric.com	811 Hamrick Street, Gaffney, SC 29342
							Darren Grigsby	BREC	GIS	864.206.7140		
Charter Underbuild on DUKE poles, SC110 interchange	CCMZ41	Charter Underbuild on DUKE poles, SC110 interchange	CCMZ41	TV1	CHARTER	CATV	Karen Fisher	Charter	Project Coordinator	864.488.4416	kfisher@chartercom.com	124 Willis Plaza Gaffney, SC 29342
							Karen Allison	Charter			karen.allison@charter.com	
							Larry E Camp	Charter	Construction Coordinator	864.598.0817	larry.camp@chartercom.com	110 Commercial RD Spartanburg, SC 29304
		Crown Castle (I-85 sta. 1209+00RT - 6389 Cannon Campground RD)			CCT	Cell Tower	Roxanne Garman	Crown Castle	Real Estate Specialist, East Area, SP	980.209.8247	roxanne.garman@crowncastle.com	3530 Toringdon Way Suite 300 Charlotte, NC 28277
Duke Energy (Distribution) Records obtained	DPCZ02, DPCZ08, DPCZ60	Duke Energy (Distribution) Records obtained	DPCZ60	E2	DE	Power Distribution	Highway Relocation Program				highway.relocations@duke-energy.com	
							Larry Morris	DUKE	Program Manager HWY Relocation West	803.283.5084	larry.morris@duke-energy.com	217 Craig Manor RD Lancaster, SC
							Dick Brown	DUKE	Major Projects Engineer	864.948.5574	dick.brown@duke-energy.com	
							Michael Coggins	DUKE	Manager Engr Major Projects	864.948.5555	michael.coggins@duke-energy.com	
							Stephen Ratliff	DUKE	SR Engring Technologist	864.234.4079	stephen.ratliff@duke-energy.com	808 Duncan-Reidville RD Duncan, SC 29334
							Todd Huss	KCI Technologies	Consultant for DUKE Energy	704.860.0354	todd.huss@kci.com	
							Carlos Gittens	KCI Technologies	Project Manager	864.252.0022	carlos.gittens@kci.com	128 Millport Circle Suite 200 Greenville, SC 29607
							Bob Mabry	DUKE	SR Engring Technologist	828.698.2055	bob.mabry@duke-energy.com	957 Spartanburg HWY Hendersonville, NC 28792
							Stephen Townsend	DUKE			stephen.townsend@duke-energy.com	
Duke Energy (Transmission) 100kva Hystron White (parallel with RR)	DPCZ60	Duke Energy (Transmission) 230kva Goucha Black&White, 44kva Gaffney#1 Black&White, 100kva Robb Black&White, 44kva Gaffney	DPCZ60	OH-1	DT	Power Transmission	Michael Robinson	DUKE	Mgr Trans Engr	980.373.4228	mike.robinson@duke-energy.com	P.O. Box 1006 MC "EC10Q" Charlotte, NC 28201-1006
							Jeremy Sabo	DUKE	Engr Tech II Transmission	704.382.8396	jeremy.sabo@duke-energy.com	526 S Church ST MC "EC10Q" Charlotte, NC 28202
											highway.relocations@duke-energy.com	4690 Simms Creek Road Raleigh, NC 27616
Duke Energy Telecommunications Division (now TW Business Cable)	DPT77	Duke Energy Telecommunications Division (now TW Business Cable)		E2	DEN	DUKE Net (TW Business Cable)	Bryant Harshfield	DUKE	Senior IT Telecom Analyst	919.546.3242	bryant.harshfield@duke-energy.com	411 Fayetteville St MC-NC6-0675E Raleigh, NC 27601
		Gaffney Board of Public Works Records obtained	GPW48		GPBW	Power, Water, Sewer	Steve Steele	GPBW		864.488.8802 ext 1116	ssteele@gbpw.com	210 East Fredrick Street Gaffney, SC 29430
							Kim Fortner	GPBW	Operations Manager	864.488.8802 ext 1108	kfortner@gbpw.com	210 East Fredrick Street Gaffney, SC 29430
				W1 & S1			Matt Sellars	GPBW	W&S Superintendent	864.761.6096	msellars@gbpw.com	210 East Fredrick Street Gaffney, SC 29430
							Randy Parris	GPBW	Assist W&S Super	864.761.6139	rparris@gbpw.com	210 East Fredrick Street Gaffney, SC 29430
				E-3 & T4			Mark Bradley	GPBW	Electrical Superintendent	864.761.6593	mbradley@gbpw.com	210 East Fredrick Street Gaffney, SC 29430
							Brad Wright	GPBW	Assist Electical Super	864.444.4446	bwright@gbpw.com	210 East Fredrick Street Gaffney, SC 29430
		Grassy Pond Water Company WL at Exit 95		W2	GPWC	Water	L Coggins	GPWC		864.489.7777	lcoggins@grassypondwater.com	626 Chesnee HWY (SC11) P.O. Box 1209 Gaffney SC 29431
							Phillip Sarratt	GPWC			phillip.sarratt@grassypondwater.com	
							Lee Ann	GPWC	customer service		customer.service@grassypondwater.com	
							Rich Anderson	Summit Engineering	Consultant for GPWC	864.949.1111 ext 3109	randerson@summitengineeringgroup.com	9601 Warren Abernathy HWY Spartanburg, SC 29301
Level 3 Communications	LC393	Level 3 Communications Records obtained	LC393	T3	Level3	Toll/Data/Long Dist	Russ Wheat	Level3	OSP Field Technician	803.206.9563	russ.wheat@level3.com	3370 Lucius RD Columbia, SC 29201
		Macedonia Waterworks Records obtained		W3	MWW	Water	Tim Lowry	MWW	Superintendent	864.487.4596	timlowry1@hotmail.com	3142 Union HWY Gaffney, SC 29430
							Vernon Atkinson	Summit Engineering	Consultant for MWW	864.949.1111	vatkinson@summitengineeringgroup.com	9601 Warren Abernathy HWY Spartanburg, SC 29301
		Palmetto Net (Spirit) Records obtained	PET281	T2	PNS	Toll/Data/Long Dist	Joey Adams	PN/SC	Facilities Manager	803.726.8319	joey.adams@spiritcom.com	491 Lakeshore PKWY Rock Hill, SC 29730
							Robert Robinson	PN/SC	OSP Engineering	803.726.8337	robert.robinson@spiritcom.com	491 Lakeshore PKWY Rock Hill, SC 29730
							Eric McCall	TPRC Broadband	Consultant Spirit Communications	803.804.1959	eric@tprc.biz	306 West JI Drive Greensboro, NC 27406
							Ryan McCumber	TPRC Broadband	Consultant Spirit Communications	336.483.4254	ryan@tprcbroadband.com	306 West JI Drive Greensboro, NC 27406
Piedmont Natural Gas Records obtained	PNGZ81, PNSZ82	Piedmont Natural Gas Records obtained	PNCZ57, PNSZ82	G1	PNG	Natural Gas Distribution & Pipeline	Jason Hill	PNG	Spartanburg OPS MGR	864.577.5609	jason.hill@piedmontng.com	501 West Blackstock Road, Spartanburg, SC 29301
							Millfred Brock	PNG		864.576.0490; 4104	millfred.brock@piedmontng.com	501 West Blackstock Road, Spartanburg, SC 29301
							Mike White	PNG		864.576.0490; 4108	mike.white@piedmontng.com	501 West Blackstock Road, Spartanburg, SC 29301
							Carlos Roper	PNG (Distribution)	Construction Project Coordinator	864.286.7882	carlos.ropert@piedmontng.com	100 Woodruff Industrial Lane Greenville, SC 29607
							Jason Brown	PNG (Pipeline)	Charlotte Engr PM	704.731.4681	jason.brown@piedmontng.com	4720 Piedmont Row Drive Charlotte NC 29210
		SCDOT Records obtained		FS3	SCDOT	Rest Area SS&SSFM	Elizabeth Ellis	SCDOT	Resident Maintenance Engineer	864.489.2844	ellisv@scdot.org	1868 Old Georgia HWY Gaffney, SC 29340
		SCDOT		W5	SCDOT	Rest Area Water	Stephen Ellis	SCDOT	Resident Maintenance Engineer	864.489.2844	ellisv@scdot.org	1868 Old Georgia HWY Gaffney, SC 29340
Spartanburg Water System Records obtained	SW558	Spartanburg Water System	SW558	W4	SWS	Water & Sanitary Sewer	Charles Jackson	SWS	Director of Engineering	864.582.6375	CJACKSON@SWS-SSD.ORG	200 Commerce Street Spartanburg, SC 29304
Spartanburg County Environmental Service Records obtained	SCS35			S2			Tina Tutterrow	SWS	GIS	864.583.7361	ttutterrow@spartanburgwater.org	200 Commerce Street Spartanburg, SC 29304
Spartanburg Sanitary Sewer Records obtained	SS528			S2			Kevin Smith	SWS-SSSD	Project Engineer	864.580.5649	ksmith@sws-sssd.org	175 North Liberty Street Spartanburg SC 29306

PRELIMINARY UTILITY REPORT, UTILITY INFORMATION

Project Owner: SCDOT
File Number:
Project ID Number: P027114
Project Name: I-85 Widening Improvements Mile Marker 80 to 96
County: Spartanburg & Cherokee

Type: Cell Tower

SC811 & SUE Code:

Utility: American Tower

Contact: Alton Campbell, Field Operations Technician, Southeast
864.979.3293 alton.campbell@americantower.com
P.O. Box 1782 West Union, SC 29696

Existing Facility: Wind Hill Road Tower CHEROKEE #SC-85489
Cannon Campground Road Tower MACEDONIA #SC-85501 I-
85sta. 1207+00RT

Prior Rights: Fenced compound outside SCDOT ROW in an American Tower easement, SCDOT responsible for relocation cost

Impact: Wind Hill Road Tower is at the proposed cul-de-sac for Wind Hill Road and the realignment of S663 (Wind Hill RD), S329 (Victory Trail Road) and the fence compound is not impacted. The buried cables (AT&T, Spirit) supporting the tower are impacted by the proposed realignment and cul-de-sac.

Cannon Campground Road Tower is outside I-85 Present ROW (sta. 1207+00RT) and not impacted. The buried cables (AT&T) supporting the tower on S234 (Cannon Campground Road) is not impacted.

Relocation: Need to be able to access the tower and park in front of the tower compound to get to the entry gates in the future. Please make sure that we and our customers are able to access the tower and tower equipment 24/7, in case there is an emergency or customer equipment failure. Cell Towers are not impacted, buried cables will have to be relocated to NEW SCDOT ROW for SC 18 (Shelby HWY), S663 (Wind Hill Road), S329 (Victory Trail Road)

Estimated Relocation Cost: NO IMPACT to cell towers,

Future Facility: None anticipated

Restrictions and/or Moratoriums: Any service disruptions are scheduled with cellular carriers

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Notice to Proceed: 30 Days

Estimated Time to Relocate: NO IMPACT to cell towers

In-Contract Work: NONE



AMERICAN TOWER

SITE NAME: MACEDONIA
SITE NUMBER: SC-085501
FCC REGISTRATION NUMBER: NOT REQUIRED

FOR LEASING INFORMATION:

877-282-7483
877-ATC-SITE

FOR EMERGENCIES CALL:

877-518-6937
877-51-TOWER

NO TRESPASSING



AMERICAN TOWER™
CORPORATION

SITE NAME:

CHEROKEE

SITE NUMBER:

SC-85489

FCC REGISTRATION NUMBER:

NOT REQUIRED

FOR LEASING INFORMATION:

877-282-7483

877-ATC-SITE

IN CASE OF EMERGENCY:

877-518-6937

877-51-TOWER

NO TRESPASSING

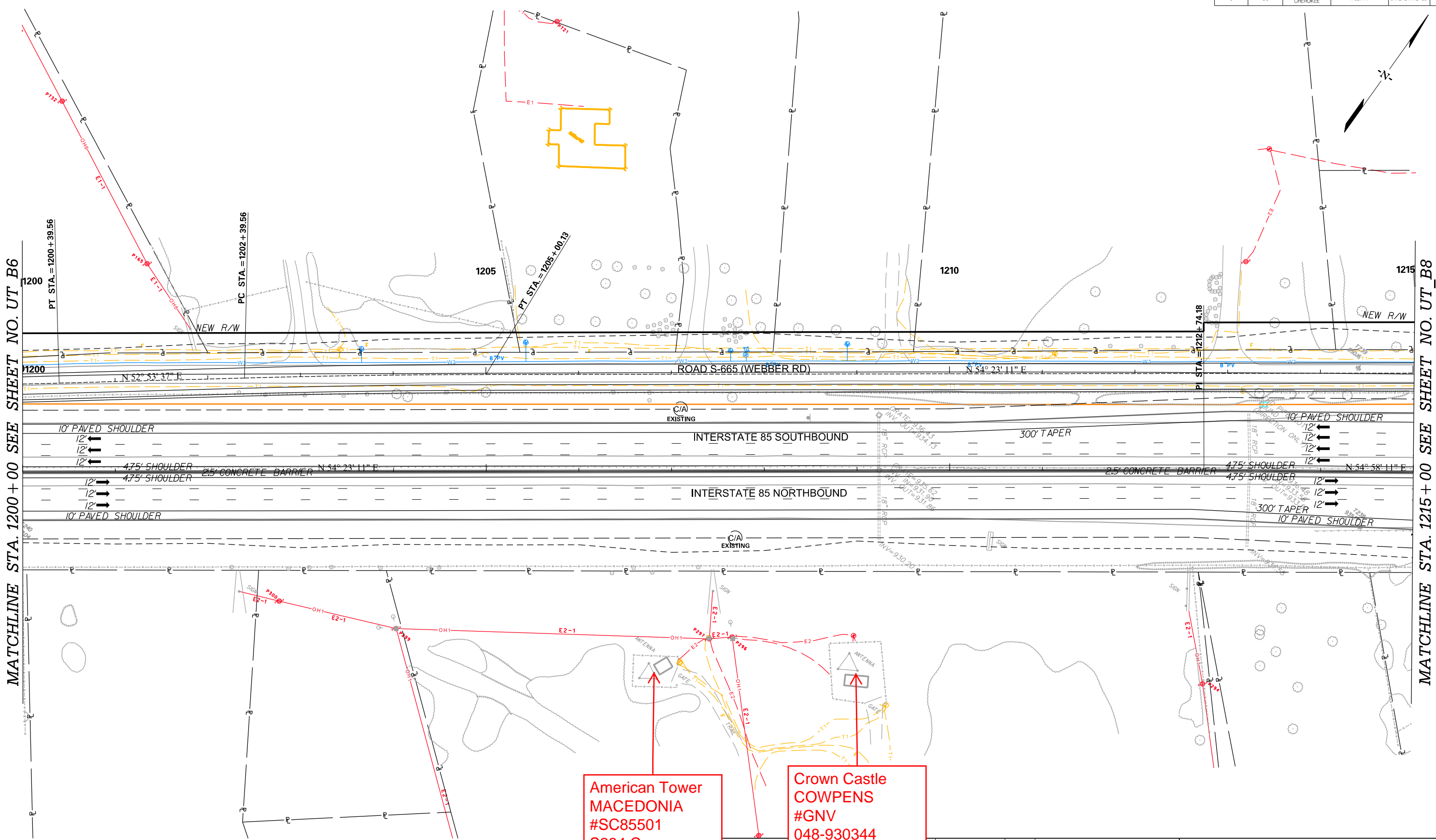
www.americantower.com

POSTING OF THIS SIGN REQUIRED BY LAW

FED. RD. DRW. NO.	STATE	COUNTY	PROJECT ID	ROAD / ROUTE NO.	SHEET NO.
3	SC	SPARTANBURG CHEROKEE	P027114	INTERSTATE 85	UT_B7

MATCHLINE STA. 1200 + 00 SEE SHEET NO. UT_B6

MATCHLINE STA. 1215 + 00 SEE SHEET NO. UT_B8



American Tower
MACEDONIA
#SC85501
S234 Cannon
Campground RD

Crown Castle
COWPENS
#GNV
048-930344
6389 Cannon
Campground RD
Gaffney, SC

RELIM
NOT FOR CON

SCALE: 1" = 50'

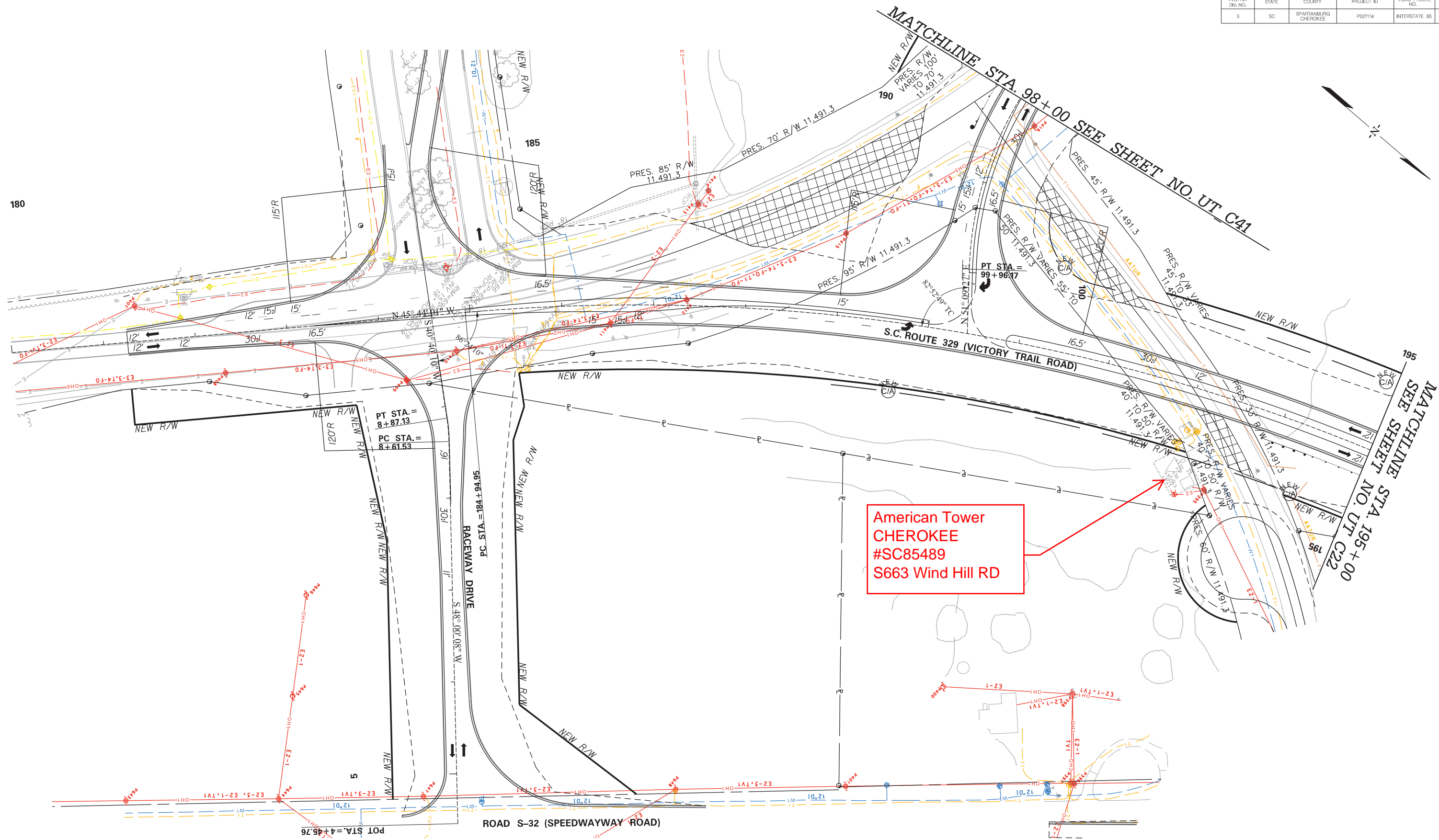
REV. NO.	BY	DATE	DESCRIPTION OF REVISION
2			
1			

SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION
INTERSTATE 85

UTILITY PLAN SHEET

INTERSTATE 85 MILE MARKER 90-97
SEGMENT B

FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROAD / ROUTE NO.	SHEET NO.
3	SC	SPARTANBURG CHEROKEE	P02714	INTERSTATE 85	UT_C32



American Tower
 CHEROKEE
 #SC85489
 S663 Wind Hill RD

PRELIMINARY NOT FOR CONSTRUCTION	7				SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION INTERSTATE 85 UTILITY PLAN SHEET INTERSTATE 85 MILE MARKER 90-97 SEGMENT C
	6				
	5				
	4				
	3				
	2				
	1				
	REV. NO.	BY	DATE	DESCRIPTION OF REVISION	

SCALE: 1" = 50'

Z:\Projects\14-60 185 Widening Cherokee Co MM80-96\Utilities\sheets\snt_UT_C32.dgn
 1/15/2016



January 8, 2015

Mr. Michael Nat
AT&T Distribution
100 Belton Drive
Spartanburg, South Carolina 29349

Re: File P027114 – Contract Id. No. 8888860 – Relocation of Telecommunication Facilities – I-85
Widening from Mile Marker 80 to 96 – Cherokee/Spartanburg Counties

Dear Mr. Nat:

The South Carolina Department of Transportation is currently under contract with Infrastructure Consulting & Engineering (ICE) to perform Design Build Preparation Services relating to the above referenced project. As part of these design efforts, survey, subsurface utility engineering and utility coordination will be performed.

The purpose of this letter is to notify you that ICE, CH Engineering and Mead & Hunt will contact you to gather utility data necessary for this project. We ask that you cooperate with them concerning this request such that utility conflicts and concerns can be identified early in the project schedule.

If you should have any questions concerning this, please feel free to contact me.

Sincerely,

keittcc@scdot.org 2015.01.08 13:12:35
-0500'

Cedric C. Keitt
Utility Project Manager

MCA:krc

cc: Brad Reynolds, SCDOT, Program Manager
Robert Ryggs, SCDOT, Utility Coordinator District Three
Jamie Fowler Jr., SCDOT, Utility Coordinator District Four
Shane Parris, Resident Construction Engineer, Cherokee County
Mark C. Attaway, SCDOT, HQ State Utility Engineer Dennis
Joel Wimberly, SCDOT, HQ Utility Project Manager
Gus Kretschmer, ICE Engineering, Utility Relocation Coordinator Manager
File:RW/UM/CCK



PRELIMINARY UTILITY REPORT, UTILITY INFORMATION

Project Owner: SCDOT
File Number:
Project ID Number: P027114
Project Name: I-85 Widening Improvements Mile Marker 80 to 96
County: Spartanburg & Cherokee

Type: Telecommunication, Local Telephone,

SC811 & SUE Code: BNCZ49, BSZT29 T1

Utility: AT&T

Contact: Spartanburg County (MM80 to Pacolet River)
Mike Nat 864.494.4822 mn5627@att.com
100 Belton Drive Spartanburg, SC 29301

Cherokee County (Pacolet River to MM96)
Eric Allen 704.413.5063 ea5498@att.com
4100 South Stream Boulevard Charlotte, NC 28217

Lee Sadler 704.478.7917 ls9173@att.com
4100 South Stream Boulevard Charlotte, NC 28217

TELICS Roadmove Manager (AT&T Contractor)
Grier Mangum 803.409.9905 telicsroadmove@gmail.com
810 Dutch Square BLVD Columbia, SC 29210

Existing Facility: Copper & Fiber Optic cables directed buried (244,000+/- LF) and aerial (40,000+/-LF) along Frontage Road and Secondary Roads outside I-85 C/A ROW; duct and vault systems, horizontal directional drilled ducts and aerial crossing I-85; enclosure pedestals, remote site switching cabinets throughout the Project limits

Prior Rights: Cables, ducts, vaults, I-85 crossings, and pedestals are inside present SCDOT ROW by encroachment permit not having prior rights; remote site switching cabinets located outside present SCDOT ROW in AT&T easement have prior rights

Impact: Impact/conflict in areas of Frontage Road realignment, excavation for vertical curve improvements, intersection improvement/relocation, drainage improvements/additions

Relocation: AT&T will relocate to outside shoulder of Frontage Roads and Secondary Roads. NEW ROW will have to be acquired, cleared and rough graded (1FT to finish grade) for replacement direct bury cables, vaults, pedestals and drainage plans completed to provide field staking for HDD replacement ducts

Estimated Relocation Cost: \$500,000.00+, shared cost

PRELIMINARY UTILITY REPORT, UTILITY INFORMATION

Project Owner: SCDOT

File Number:

Project ID Number: P027114

Project Name: I-85 Widening Improvements Mile Marker 80 to 96

County: Spartanburg & Cherokee

Future Facility: NONE anticipated

Restrictions and/or Moratoriums: Relocate by wire center area, coordinate with telecom customer schedule for outage windows to complete cable splicing and switchover, replacement remote site cabinets must be installed, cable splice, signal verified before existing cabinets can be removed

Notice to Proceed: Roadway Construction NTP

Estimated Time to Relocate: 6 months plus

In-Contract Work: Install replacement ducts and vaults; cable, enclosures, remote switching cabinets, splicing work is all proprietary to AT&T



AT&T

**UNDERGROUND
CABLE**



**CALL BEFORE
YOU DIG**

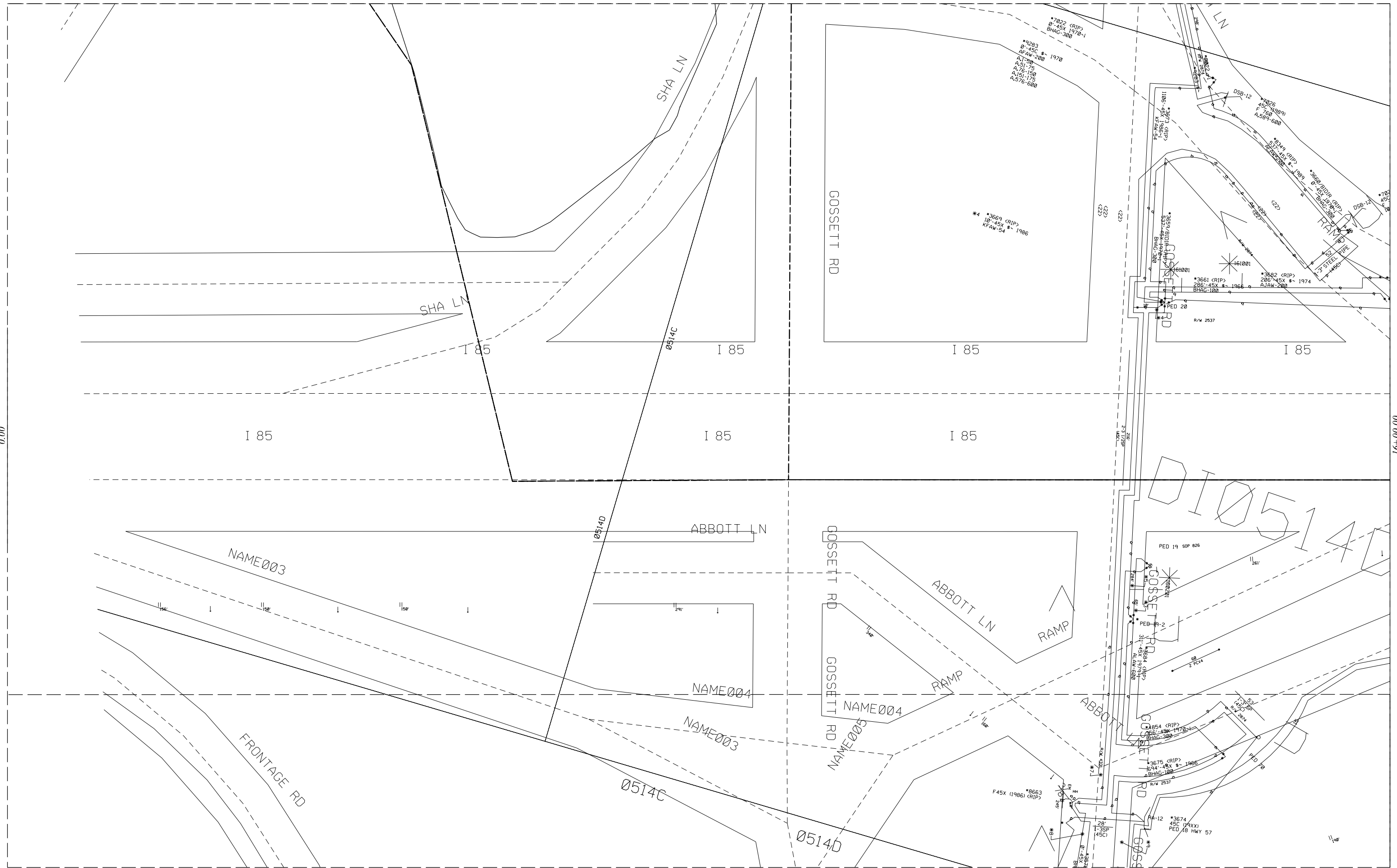


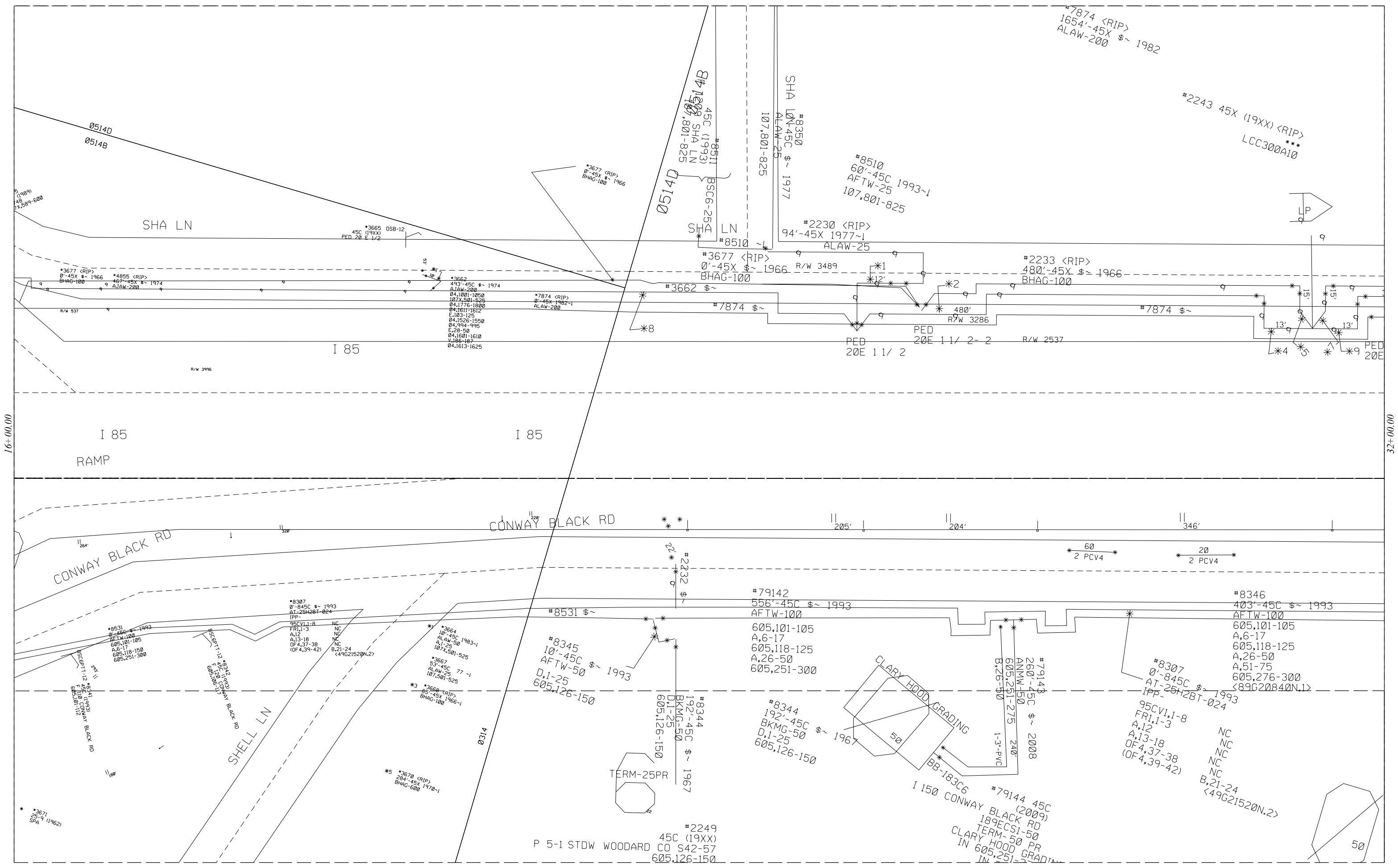
**Have a job? Digging?
Call before you dig.**



0.00

16+00.00





*7874 <RIP>
1654'-45X \$~ 1982
ALAW-200

*2243 45X (19XX) <RIP>
LCC300A10

*8510
60'-45C 1993-1
AFTW-25
107,801-825

SHA LN #8350
ALAW-25 \$~ 1977
107,801-825

SHA LN #8511
BSC6-25 \$~ 1974
107,801-825

#2230 <RIP>
94'-45X 1977-1
ALAW-25

#2233 <RIP>
480'-45X \$~ 1966
BHAG-100

#3677 <RIP>
0'-45X \$~ 1966
BHAG-100

*3662 \$~
493'-45C \$~ 1974
ALAW-200
04,1001-1050
107,501-525
04,1776-1800
04,1811-1812
E,103-125
04,1526-1550
04,994-995
E,25-50
04,1601-1610
V,186-187
04,1613-1625

*7874 <RIP>
0'-45X \$~ 1982-1
ALAW-200

*3677 <RIP>
0'-45X \$~ 1966
BHAG-100

*4855 <RIP>
467'-45X \$~ 1974
AJAW-200

16+00.00

32+00.00

CONWAY BLACK RD

CONWAY BLACK RD

CLARY HOOD GRADING
50
BB-183C6
I 150 CONWAY BLACK RD

#8307
0'-845C \$~ 1993
AT-25H2BT-024
IPP-
95CV1,1-8
FRI,1-3
A,12
A,13-18
OF 4,37-38
(OF 4,39-42)
NC
NC
NC
NC
B,21-24
<49G21520N.2>

#8346
403'-45C \$~ 1993
AFTW-100
605,101-105
A,6-17
605,118-125
A,26-50
A,51-75
605,276-300
<89G20840N.1>

#79142
556'-45C \$~ 1993
AFTW-100
605,101-105
A,6-17
605,118-125
A,26-50
605,251-300

#8345
10'-45C \$~ 1993
AFTW-50
D,1-25
605,126-150

#8344
192'-45C \$~ 1967
BKM5-50
D,1-25
605,126-150

TERM-25PR

#2249
45C (19XX)
192'-45X 1970-1
BKM5-50
P 5-1 STDW WOODARD CO S42-57
605,126-150

#8307
0'-845C \$~ 1993
AT-25H2BT-024
IPP-
95CV1,1-8
FRI,1-3
A,12
A,13-18
OF 4,37-38
(OF 4,39-42)
NC
NC
NC
NC
B,21-24
<49G21520N.2>

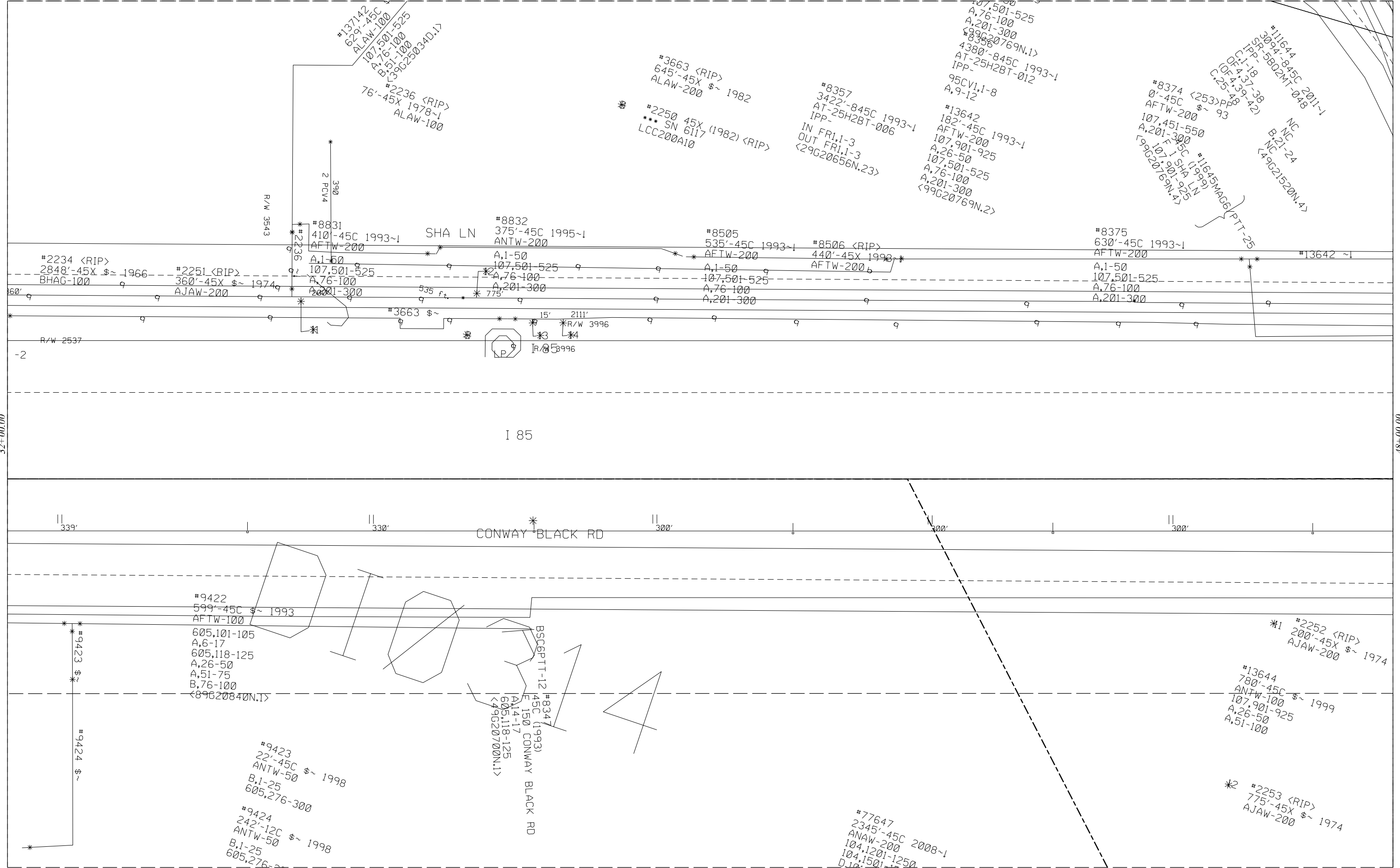
*3664
10'-45C 1983-1
ALAW-50
A,1-25
107,501-525
*3667
53'-45C 77-1
ALAW-25
107,501-525
*3
*3668 <RIP>
85'-45X 1966-1
BHAG-100

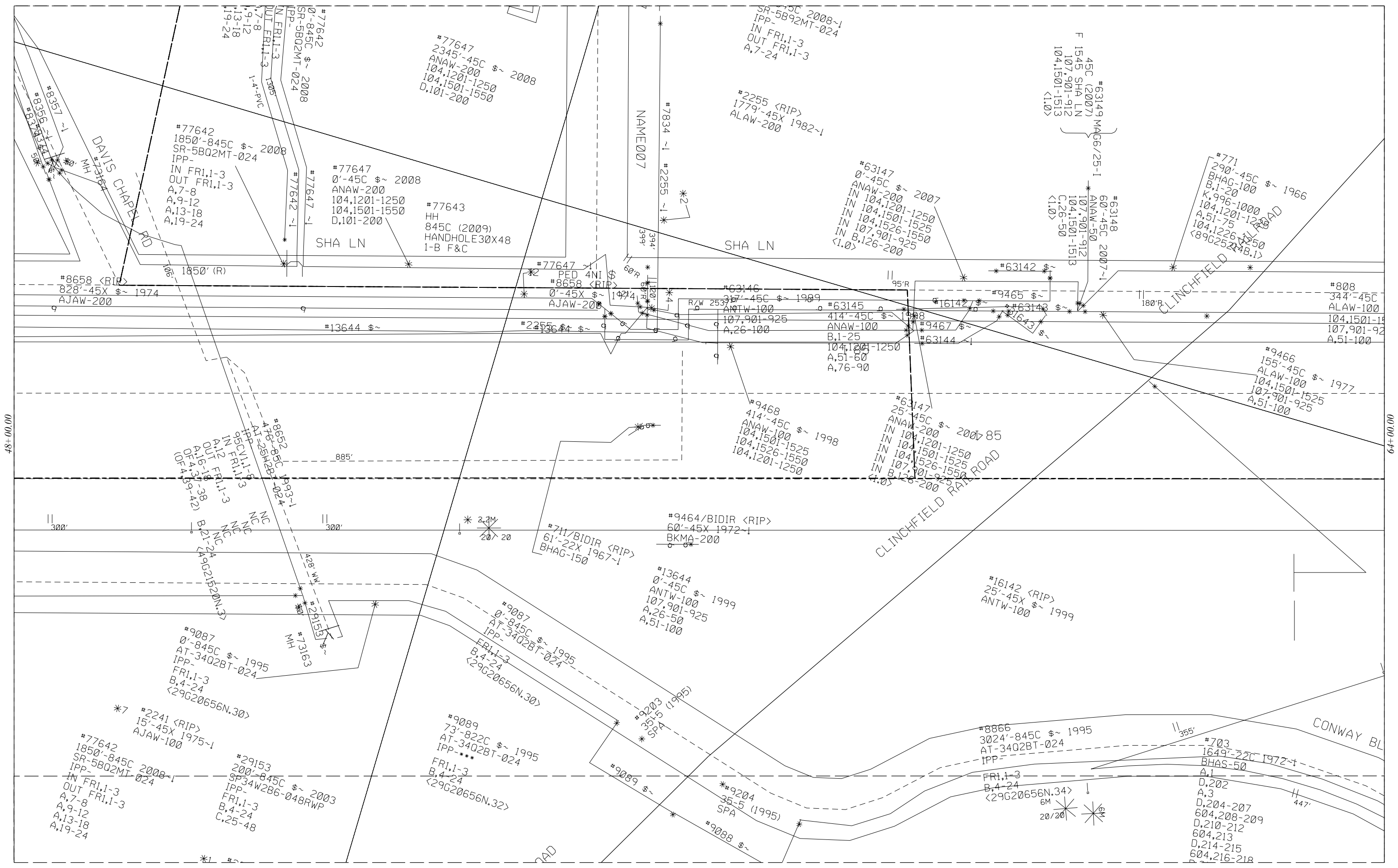
*3670 <RIP>
294'-45X 1970-1
BHAG-600

#8531
0'-45C \$~ 1993
AFTW-100
605,101-105
A,6-17
605,118-150
605,251-300

SHELL LN

*3671
25'-9 (1962)
SPA





#77647
2345'-45C \$~ 2008
ANAW-200
104,1201-1250
104,1501-1550
D,101-200

#77642
1850'-845C \$~ 2008
SR-5BQ2MT-024
IPP-
IN FRI,1-3
OUT FRI,1-3
A,7-8
A,9-12
A,13-18
A,19-24

#77647
0'-45C \$~ 2008
ANAW-200
104,1201-1250
104,1501-1550
D,101-200

#77643
HH
845C (2009)
HANDHOLE 30X48
1-B F&C

#8658 <RIP>
828'-45X \$~ 1974
AJAW-200

#77647 <RIP>
PED 4NI \$
#8658 <RIP>
0'-45X \$~ 1974
AJAW-200

#63140
317'-45C \$~ 1989
ANTW-100
107,901-925
A,26-100

#63145
414'-45C \$~ 1988
ANAW-100
B,1-25
104,1201-1250
A,51-60
A,76-90

#9465 \$~
#63148 \$~
#9467 \$~
#63144 \$~

#808
344'-45C
ALAW-100
104,1501-1550
107,901-925
A,51-100

#9466
155'-45C \$~ 1977
ALAW-100
104,1501-1525
107,901-925
A,51-100

#9468
414'-45C \$~ 1998
ANAW-100
104,1501-1525
104,1201-1250

#63147
25'-45C \$~ 2007
ANAW-200
IN 104,1201-1250
IN 104,1501-1525
IN 104,1526-1550
IN 107,901-925
IN B,126-200

#711/BIDIR <RIP>
61'-22X 1967-1
BHAG-150

#9464/BIDIR <RIP>
60'-45X 1972-1
BKMA-200

#13644
0'-45C \$~ 1999
ANTW-100
107,901-925
A,26-50
A,51-100

#16142 <RIP>
25'-45X \$~ 1999
ANTW-100

#9087
0'-845C \$~ 1995
AT-3402BT-024
IPP-
FRI,1-3
B,4-24
<29G20656N.30>

#9087
0'-845C \$~ 1995
AT-3402BT-024
IPP-
FRI,1-3
B,4-24
<29G20656N.30>

*7 #2241 <RIP>
15'-45X 1975-1
AJAW-100

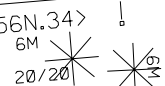
#9089
73'-822C \$~ 1995
AT-3402BT-024
IPP-***
FRI,1-3
B,4-24
<29G20656N.32>

#77642
1850'-845C 2008-1
SR-5BQ2MT-024
IPP-
IN FRI,1-3
OUT FRI,1-3
A,7-8
A,9-12
A,13-18
A,19-24

#29153
200'-845C \$~ 2003
SP34W2B6-048RWP
IPP-
FRI,1-3
B,4-24
C,25-48

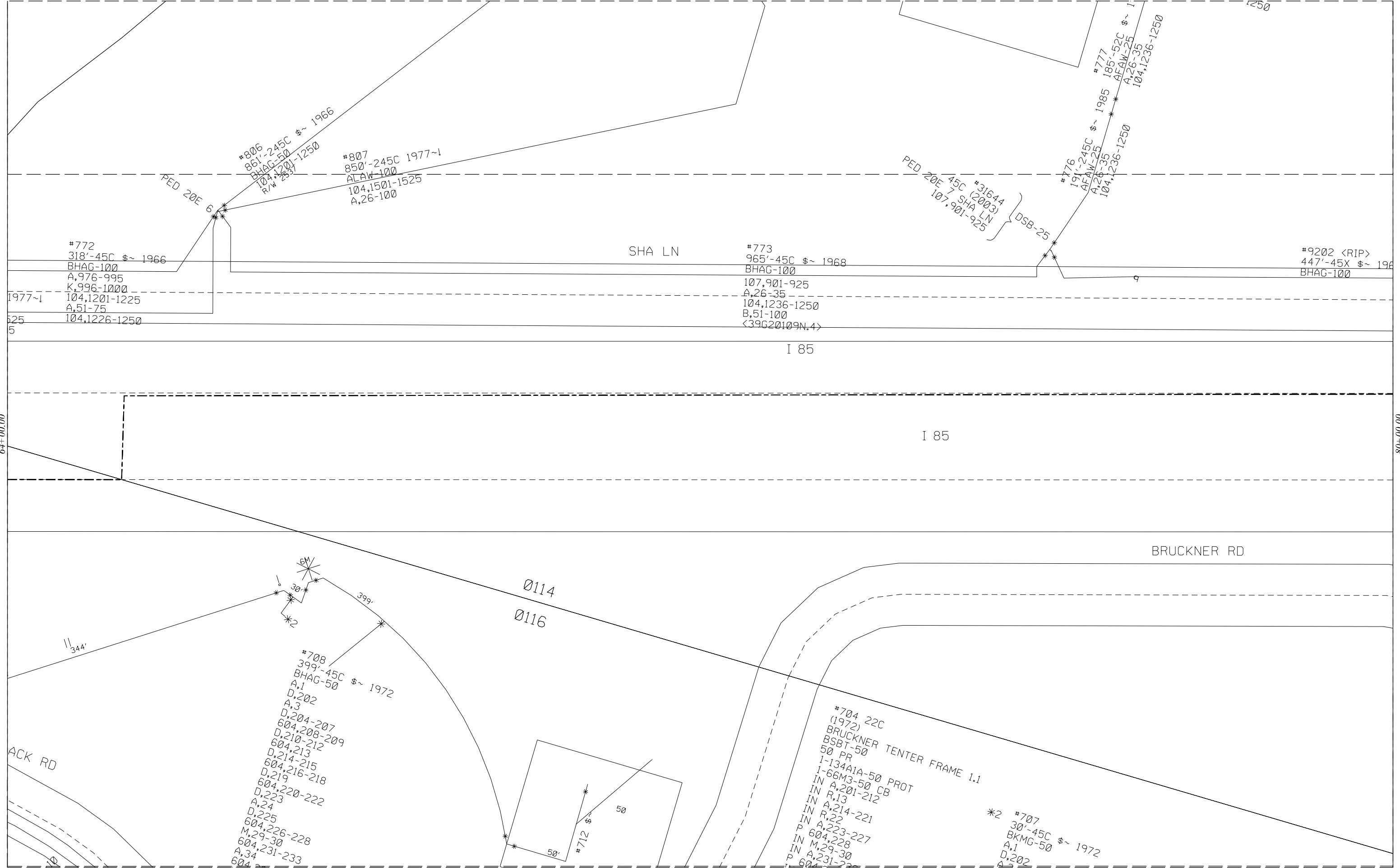
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3024'-845C \$~ 1995
AT-3402BT-024
IPP-
FRI,1-3
B,4-24
<29G20656N.34>

#703
1649'-22C 1972-1
BHAS-50
A,1
D,202
A,3
D,204-207
604,208-209
D,210-212
604,213
D,214-215
604,216-218



00'00.00

00'00.00



#806
861'-245C \$~ 1966
BHAG-50
104,1201-1250
R/W 253'

#807
850'-245C 1977-1
ALAW-100
104,1501-1525
A,26-100

#772
318'-45C \$~ 1966
BHAG-100
A,976-995
K,996-1000
1977-1
104,1201-1225
A,51-75
104,1226-1250

SHA LN

#773
965'-45C \$~ 1968
BHAG-100
107,901-925
A,26-35
104,1236-1250
B,51-100
<39G20109N,4>

#9202 <RIP>
447'-45X \$~ 1968
BHAG-100

PED 20E 7
45C (2003)
#31644
107,901-925
SHA LN

DSB-25

#776
191'-245C \$~ 1985
AFAM-25
A,26-35
104,1236-1250

#777
185'-52C \$~ 1985
AFAM-25
A,26-35
104,1236-1250

I 85

I 85

BRUCKNER RD

Ø114

Ø116

344'

#708
399'-45C \$~ 1972
BHAG-50
A,1
D,202
A,3
D,204-207
604,208-209
D,210-212
604,213
D,214-215
604,216-218
D,219
604,220-222
D,223
A,24
D,225
604,226-228
M,29-30
604,231-233
A,34
604,234

#704 22C
(1972)
BRUCKNER TENTER FRAME 1.1
BSBT-50
50 PR
I-134A1A-50 PROT
I-66M3-50 CB
IN A,201-212
IN R,13
IN A,214-221
IN R,22
IN A,223-227
P 604,228
IN M,29-30
IN A,231-233
P 604,234

*2 #707
30'-45C \$~ 1972
BKMG-50
A,1
D,202
A,3

#712 \$~

50'

50'

64+00.00

80+00.00

96+00.00

112+00.00

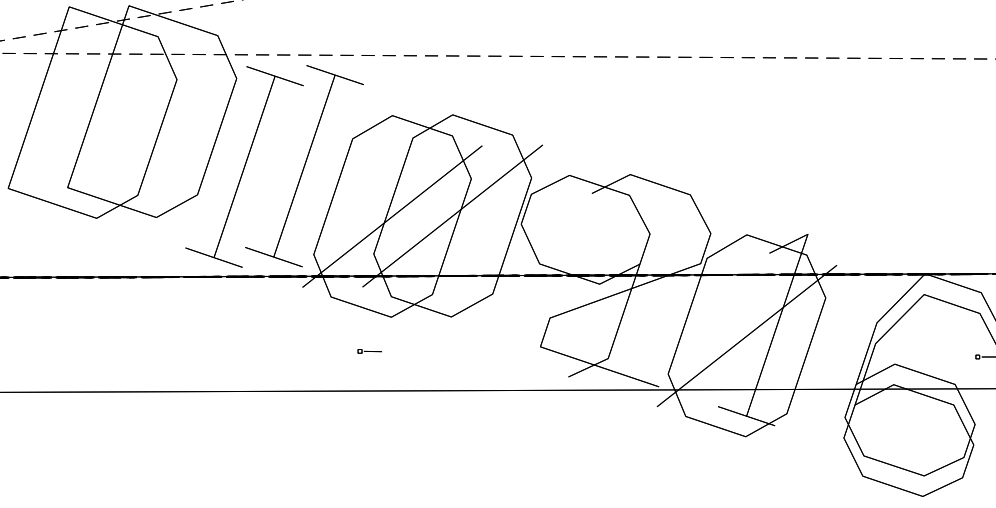
F 930
45C (2007)
DEWBERRY RD
110,476-487
#38459 MAG6/12-1

DEWBERRY RD

#38458
0'-45C 2007~1
ANMW-100
D,1-24
110,475-500
D,51-100

I 85

I 85



□

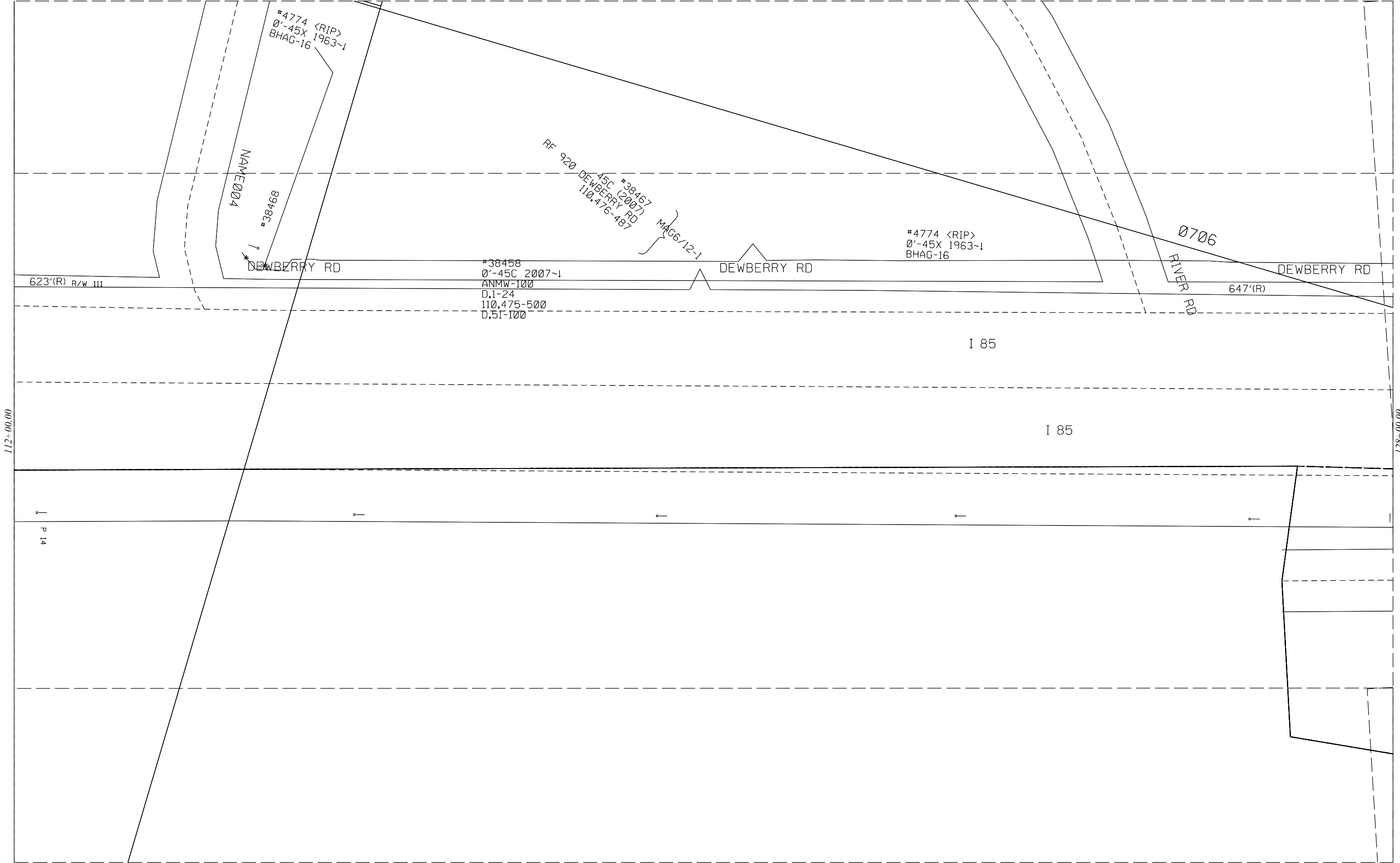
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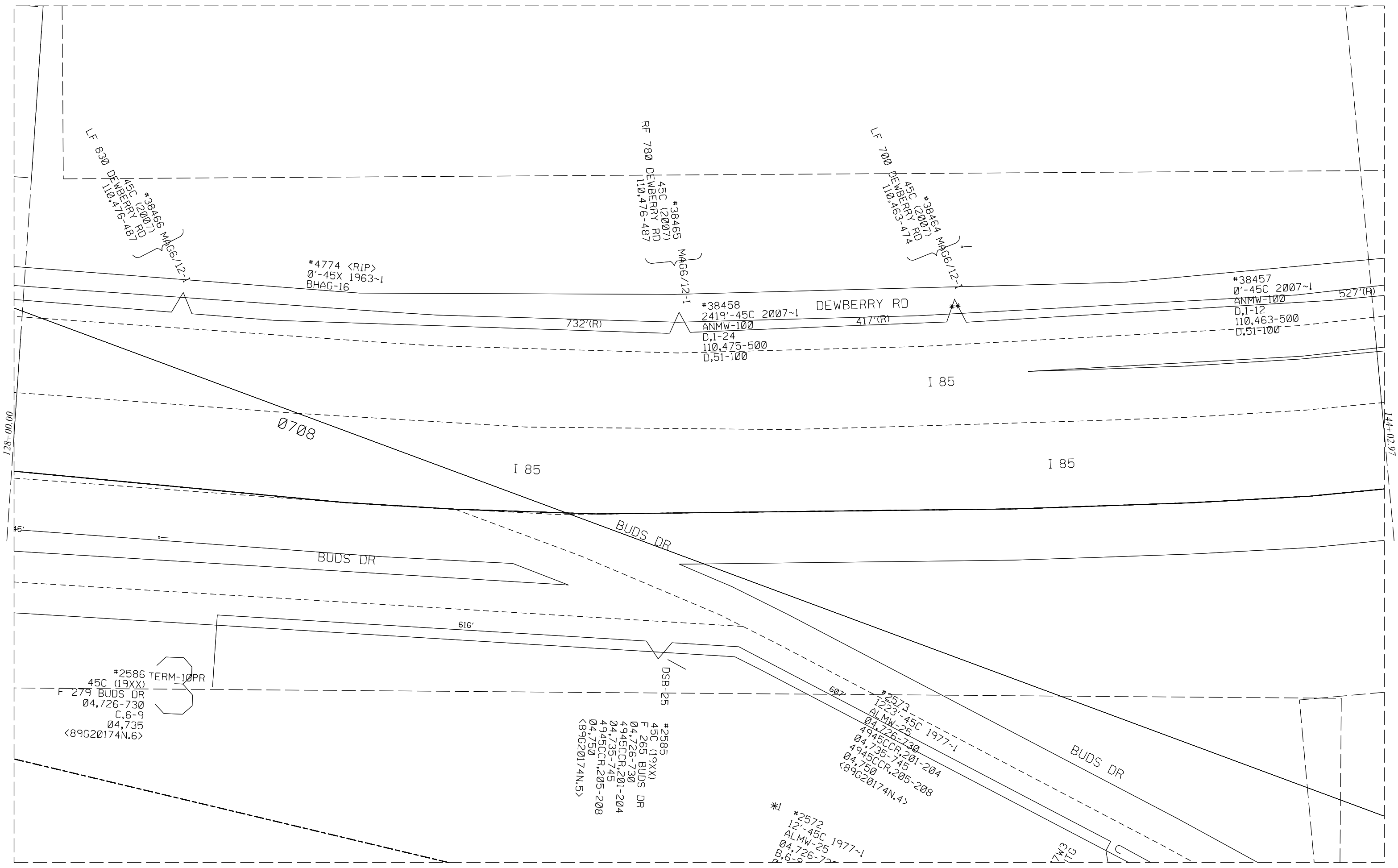
□

□

112+00.00

128+00.00





LF 830 DEWBERRY RD
45C (2007)
110,416-487
#38466 MAGG/12-1

#4774 <RIP>
0'-45X 1963~1
BHAG-16

RF 780 DEWBERRY RD
45C (2007)
110,476-487
#38465 MAGG/12-1

LF 700 DEWBERRY RD
45C (2007)
110,463-474
#38466 MAGG/12-1

732'(R)

#38458
2419'-45C 2007~1
ANMW-100
D,1-24
110,475-500
D,51-100

DEWBERRY RD

417'(R)

#38457
0'-45C 2007~1
ANMW-100
D,1-12
110,463-500
D,51-100

527'(R)

I 85

0708

I 85

I 85

BUDS DR

BUDS DR

616'

DSB-25

#2586 TERM-10PR
45C (19XX)
F 279 BUDS DR
04,726-730
C,6-9
04,735
<89G20174N.6>

#2585
45C (19XX)
F 265 BUDS DR
04,726-730
4945CCR,201-204
04,735-745
4945CCR,205-208
04,750
<89G20174N.5>

#2573
1223'-45C 1977~1
ALMW-25
04,726-730
4945CCR,201-204
04,735-745
4945CCR,205-208
04,750
<89G20174N.4>

*1 #2572
12'-45C 1977~1
ALMW-25
04,726-730
C,6-9

BUDS DR

743
116

144+03.00

160+00.00

RF 690 DEWBERRY RD
45C (2007)
110,463-474

Ø508
Ø708

RF 610 DEWBERRY RD
45C (2007)
110,463-474

RF 580 DEWBERRY RD
45C (2007)
110,463-474
SOP 120

MAG6/12-1
#38469

#4774 <RIP>
3951'-45X 1963~1
BHAG-16

MAG6/12-1
#38470

#38457
1439'-45C 2007~1
ANMW-100
D,1-12
110,463-500
D,51-100

#40905
1188'-45C 2007~1
ANMW-100
D,1-12
110,463-500
D,51-100

R/W 89

DEW

912'(R)

374'(R)

169'

225'

45C #2282
PED 72 HWY 737
4945CCR,226-237
<89G20347N,24>

DSB-12

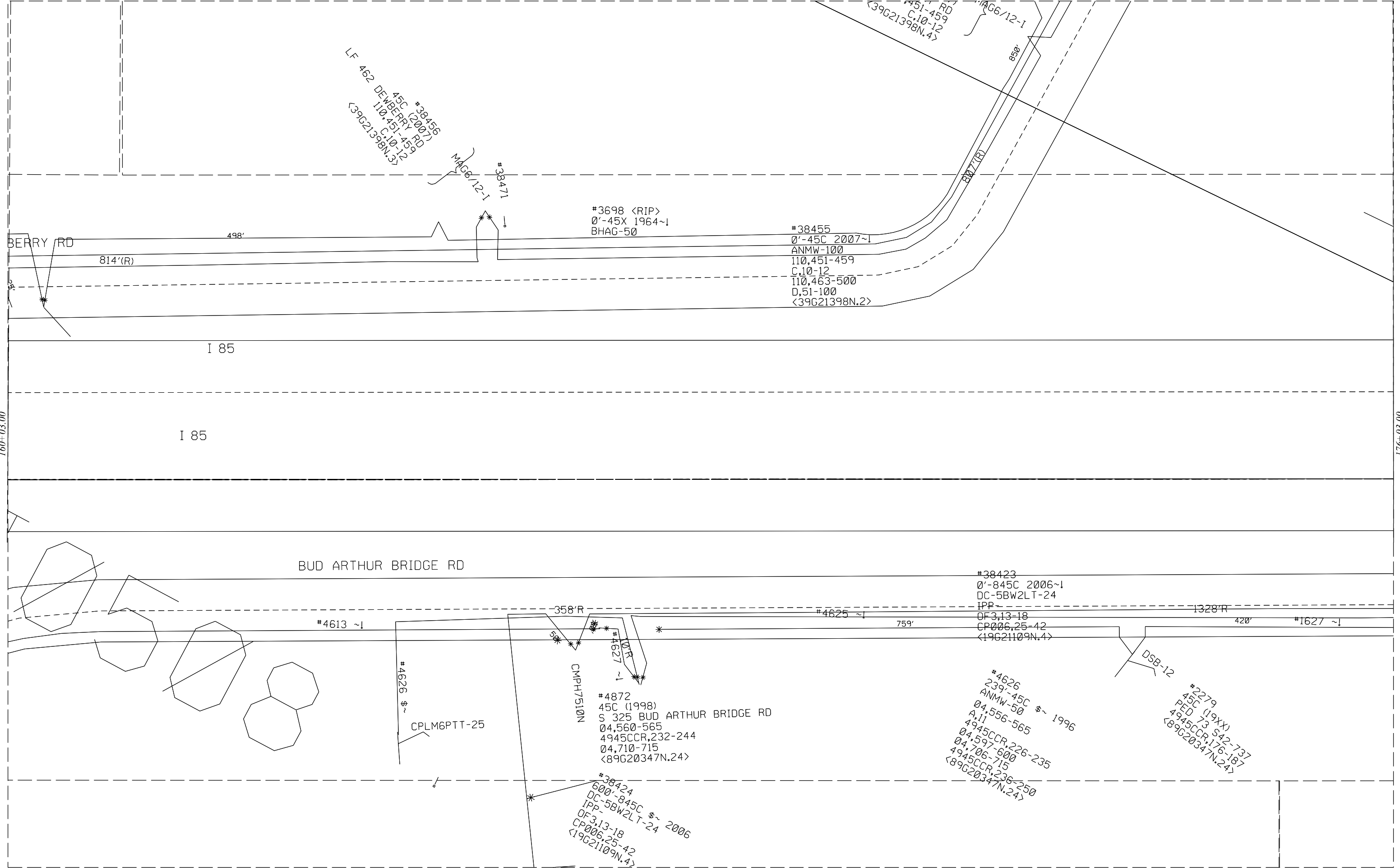
#2272
416'-45C 1977~1
ALMW-50
Ø4,726-730
4945CCR,201-204
Ø4,735-745
4945CCR,205-208
Ø4,750
4945CCR,226-250
<89G20174N,1>

#2274
1673'-45C 1970~1
BKMG-50
Ø4,726-730
4945CCR,201-204
Ø4,735-745
4945CCR,205-208
Ø4,750
4945CCR,226-250
<89G20174N,1>

510591

#2272 ~1

#2271
12'-45C 1977~1
ALMW-50
Ø4,726-730
4945CCR,201-204
Ø4,735-745
4945CCR,205-208
Ø4,750
4945CCR,226-250
<89G20174N,1>



LF 462 DEWBERRY RD
45C (2007)
110,451-459
<39G21398N.3>

MAG6/12-1
#38471

#3698 <RIP>
0'-45X 1964-1
BHAG-50

#38455
0'-45C 2007-1
ANMW-100
110,451-459
C,10-12
110,463-500
D,51-100
<39G21398N.2>

451-459 RD
C,10-12
<39G21398N.4>

MAG6/12-1
850'

807'(R)

BERRY RD

498'

814'(R)

I 85

I 85

BUD ARTHUR BRIDGE RD

#38423
0'-845C 2006-1
DC-5BW2LT-24
IPP
OF3,13-18
CP006,25-42
<19G21109N.4>

#4613 ~|

358'R

#4625 ~|

759'

1328'R

#1627 ~|

#4626 \$~

CPLM6PTT-25

CMPH7510N

#4872
45C (1998)
S 325 BUD ARTHUR BRIDGE RD
04,560-565
4945CCR,232-244
04,710-715
<89G20347N.24>

#38424
600'-845C \$~ 2006
DC-5BW2LT-24
IPP
OF3,13-18
CP006,25-42
<19G21109N.4>

#4626
239'-45C \$~ 1996
ANMW-50
04,556-565
4945CCR,226-235
04,597-600
04,706-715
4945CCR,236-250
<89G20347N.24>

DSB-12

#2279
45C (19XX)
PED 73 S42-737
4945CCR,176-187
<89G20347N.24>

160+03.00

176+03.00

224+03.00

240+03.01

|| 472'

P 13 |

#4894
0'-220 \$~ 1975
BKMS-50
110,151-175
105176-200

P 14 |

|| 335'

P 15 |

#606
719'-220 \$~ 1975
BKMS-50
110,151-200

|| 335'

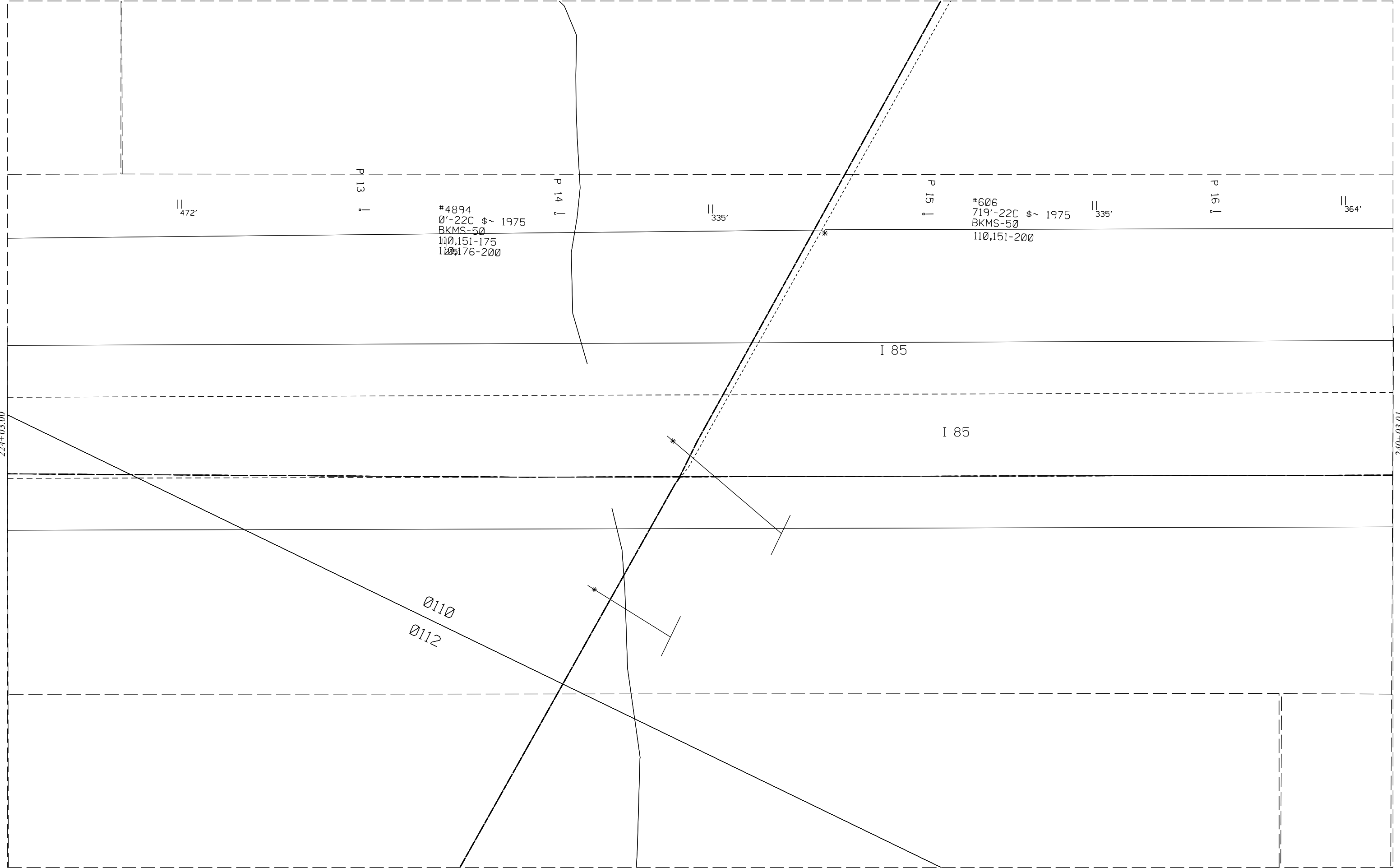
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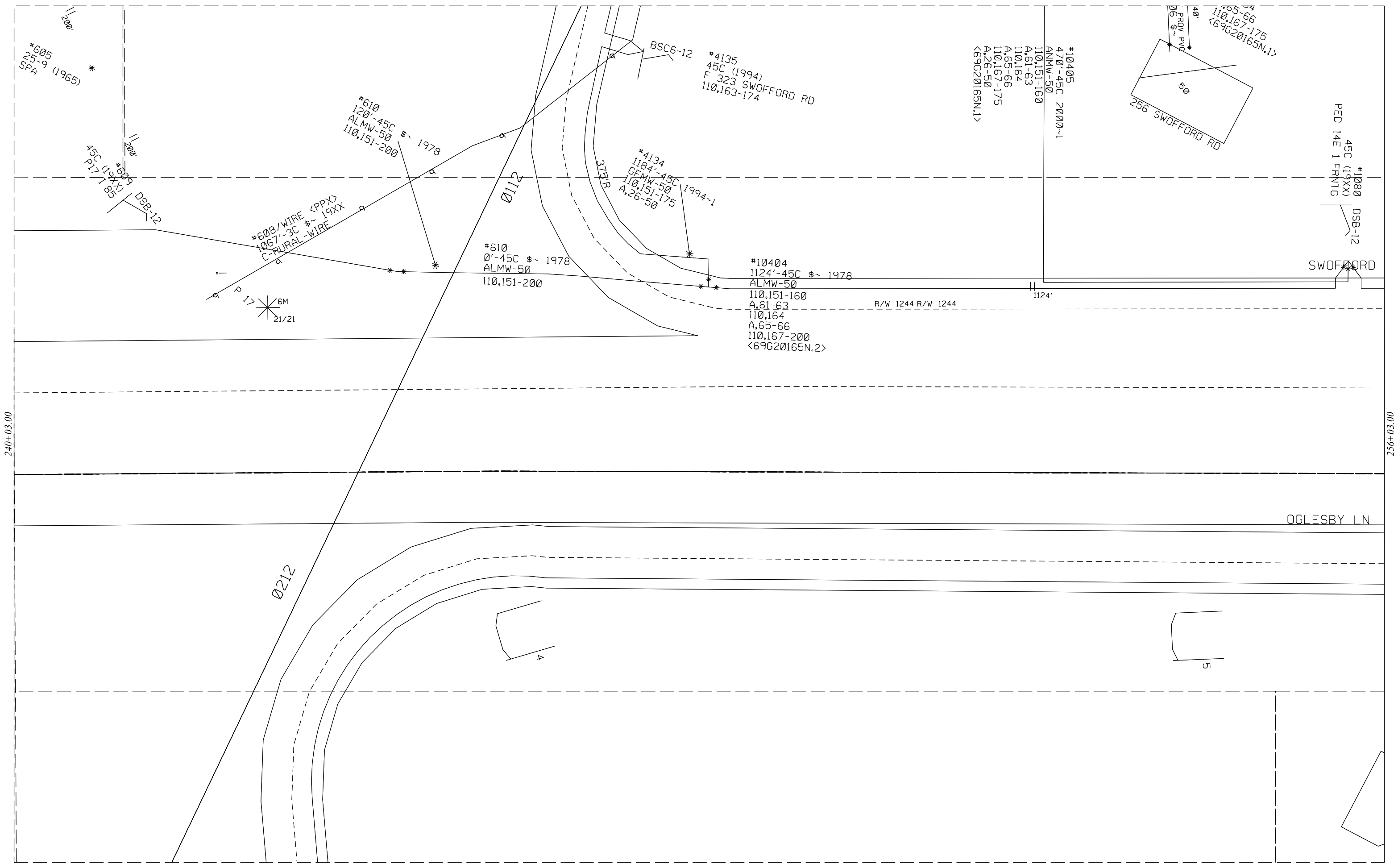
|| 364'

I 85

I 85

Ø110
Ø112





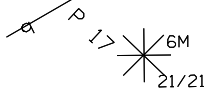
240+03.00

256+03.00

*605
25-9 (1965)
SPA

45C (19XX)
P17 185
DSB-12

*608/WIRE <PPX>
1067'-3C \$~ 19XX
C-RURAL-WIRE



*610
120'-45C \$~ 1978
ALMW-50
110,151-200

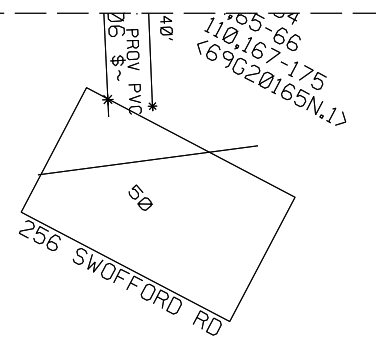
*610
0'-45C \$~ 1978
ALMW-50
110,151-200

*4134
1184'-45C 1994~1
GFMW-50
110,151-175
A,26-50

BSC6-12
*4135
45C (1994)
F 323 SWOFFORD RD
110,163-174

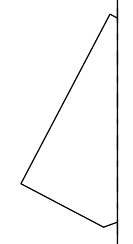
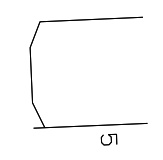
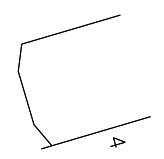
#10404
1124'-45C \$~ 1978
ALMW-50
110,151-160
A,61-63
110,164
A,65-66
110,167-200
<69G20165N.2>

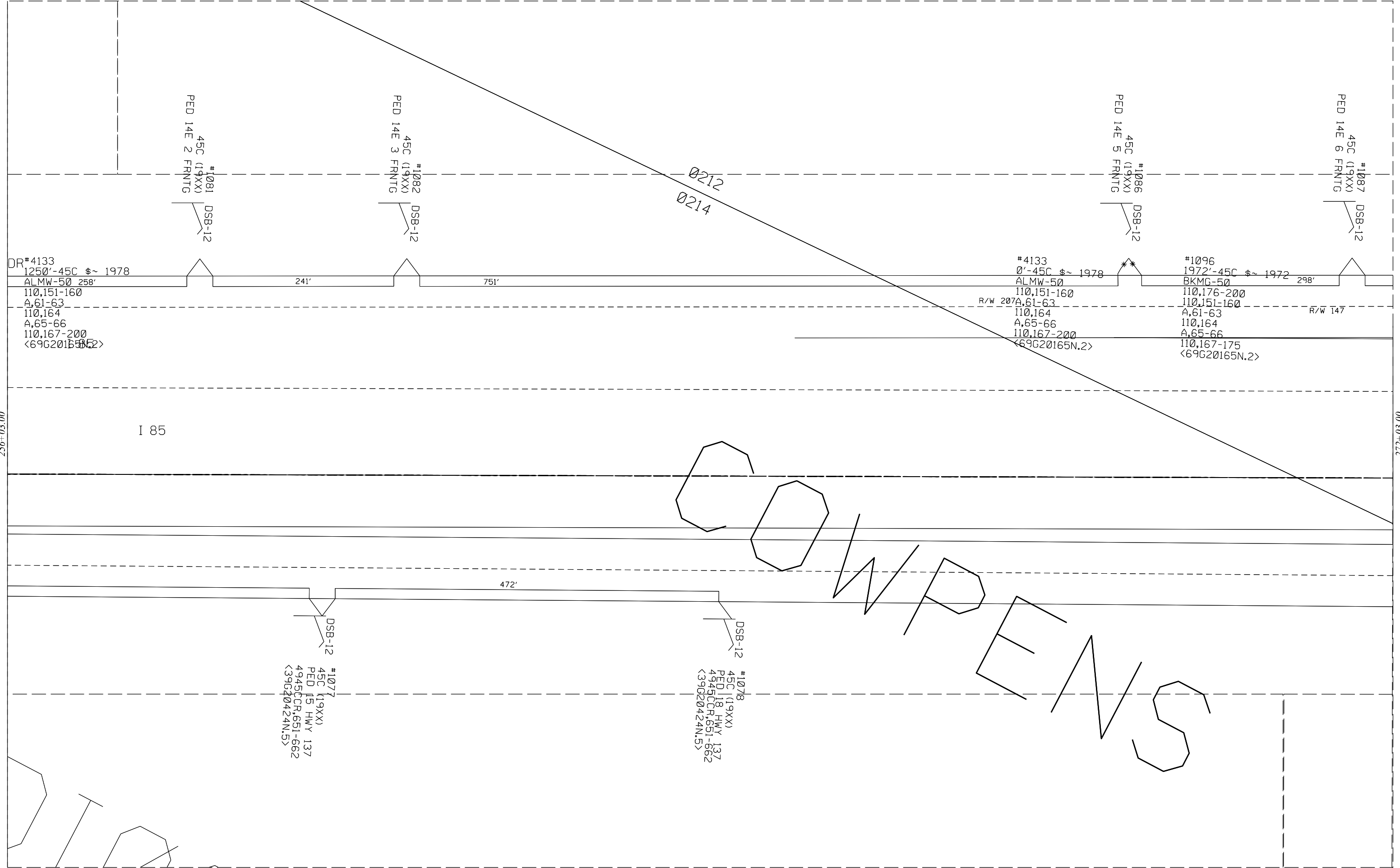
#10405
470'-45C 2000~1
ANMW-50
110,151-160
A,61-63
110,164
A,65-66
110,167-175
A,26-50
<69G20165N.1>



#1080
45C (19XX)
DSB-12
PED 14E 1 FRNTG
SWOFFORD

OGLESBY LN





DR#4133
 1250'-45C \$~ 1978
 ALMW-50 258'
 110,151-160
 A,61-63
 110,164
 A,65-66
 110,167-200
 <69G20165N.2>

#1081
 45C (19XX)
 PED 14E 2 FRNTG
 DSB-12

#1082
 45C (19XX)
 PED 14E 3 FRNTG
 DSB-12

#1086
 45C (19XX)
 PED 14E 5 FRNTG
 DSB-12

#1087
 45C (19XX)
 PED 14E 6 FRNTG
 DSB-12

#4133
 0'-45C \$~ 1978
 ALMW-50
 110,151-160
 A,61-63
 110,164
 A,65-66
 110,167-200
 <69G20165N.2>

#1096
 1972'-45C \$~ 1972
 BKMG-50 298'
 110,176-200
 110,151-160
 A,61-63
 110,164
 A,65-66
 110,167-175
 <69G20165N.2>

I 85

LOWPENS

#1077
 45C (19XX)
 PED 15 HWY 137
 4945CCR,651-662
 <39G20424N.5>

#1078
 45C (19XX)
 PED 18 HWY 137
 4945CCR,651-662
 <39G20424N.5>

0212
 0214

472'

241'

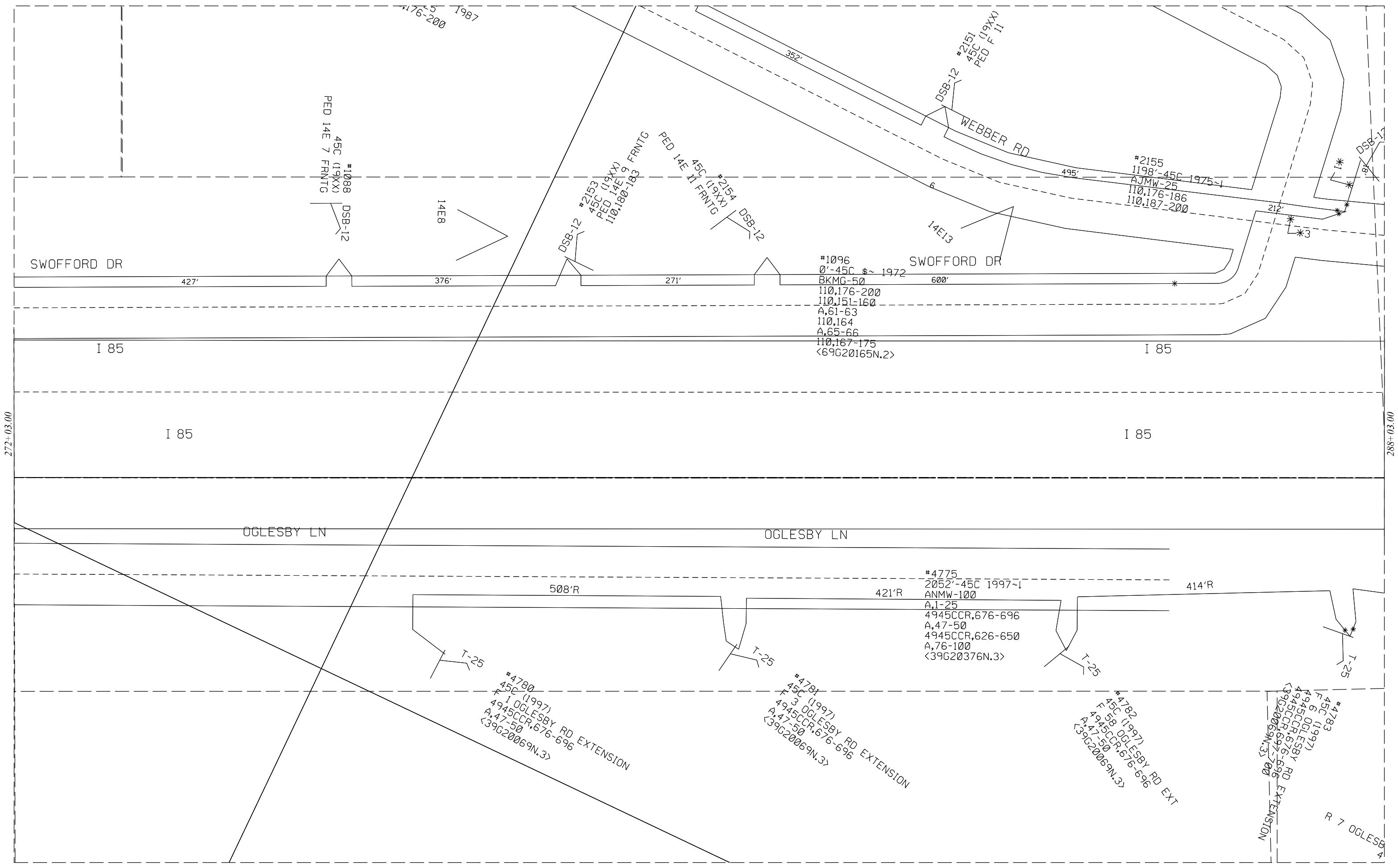
751'

R/W 147

R/W 207

00.30+952

00.30+212



#176-200 1987

#1088
45C (19XX)
PED 14E 7 FRNTG
DSB-12

14E8

SWOFFORD DR

427'

376'

271'

SWOFFORD DR

600'

#1096
0'-45C \$~ 1972
BKMG-50
110,176-200
110,151-160
A,61-63
110,164
A,65-66
110,167-175
<69G20165N.2>

14E13

#2153
45C (19XX)
PED 14E 9 FRNTG
110,180-183
DSB-12

#2154
45C (19XX)
PED 14E 11 FRNTG
DSB-12

#2151
45C (19XX)
PED F 11
DSB-12

WEBBER RD

#2155
1198'-45C 1975-1
AJMW-25
110,176-186
110,187-200

I 85

I 85

I 85

OGLESBY LN

OGLESBY LN

508'R

421'R

414'R

T-25

T-25

T-25

T-25

#4780
45C (1997)
F 1 OGLESBY RD EXTENSION
4945CCR,676-696
A,47-50
<39G20069N.3>

#4781
45C (1997)
F 3 OGLESBY RD EXTENSION
4945CCR,676-696
A,47-50
<39G20069N.3>

#4782
45C (1997)
F 58 OGLESBY RD EXT
4945CCR,676-696
A,47-50
<39G20069N.3>

#4783
45C (1997)
F 6 OGLESBY RD EXTENSION
4945CCR,676-696
A,47-50
<39G20069N.3>

R 7 OGLESBY LN

272+03.00

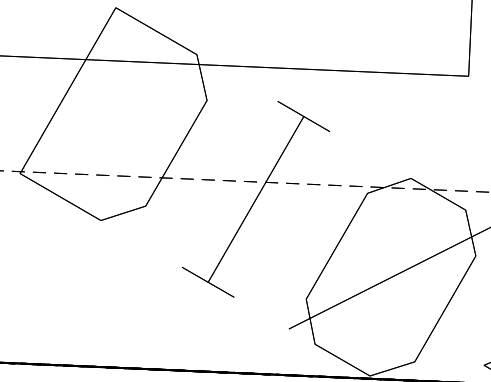
288+03.00

167-175
69620165N.27
*2148
45C (1987)
PED 14E15 S11 137
110,176-187

WEBBER RD

SUNNY SLOPE DR

WEBBER RD



SUNNY SLOPE DR

I 85

I 85

I 85

I 85

CANNONS CAMPGROUND RD

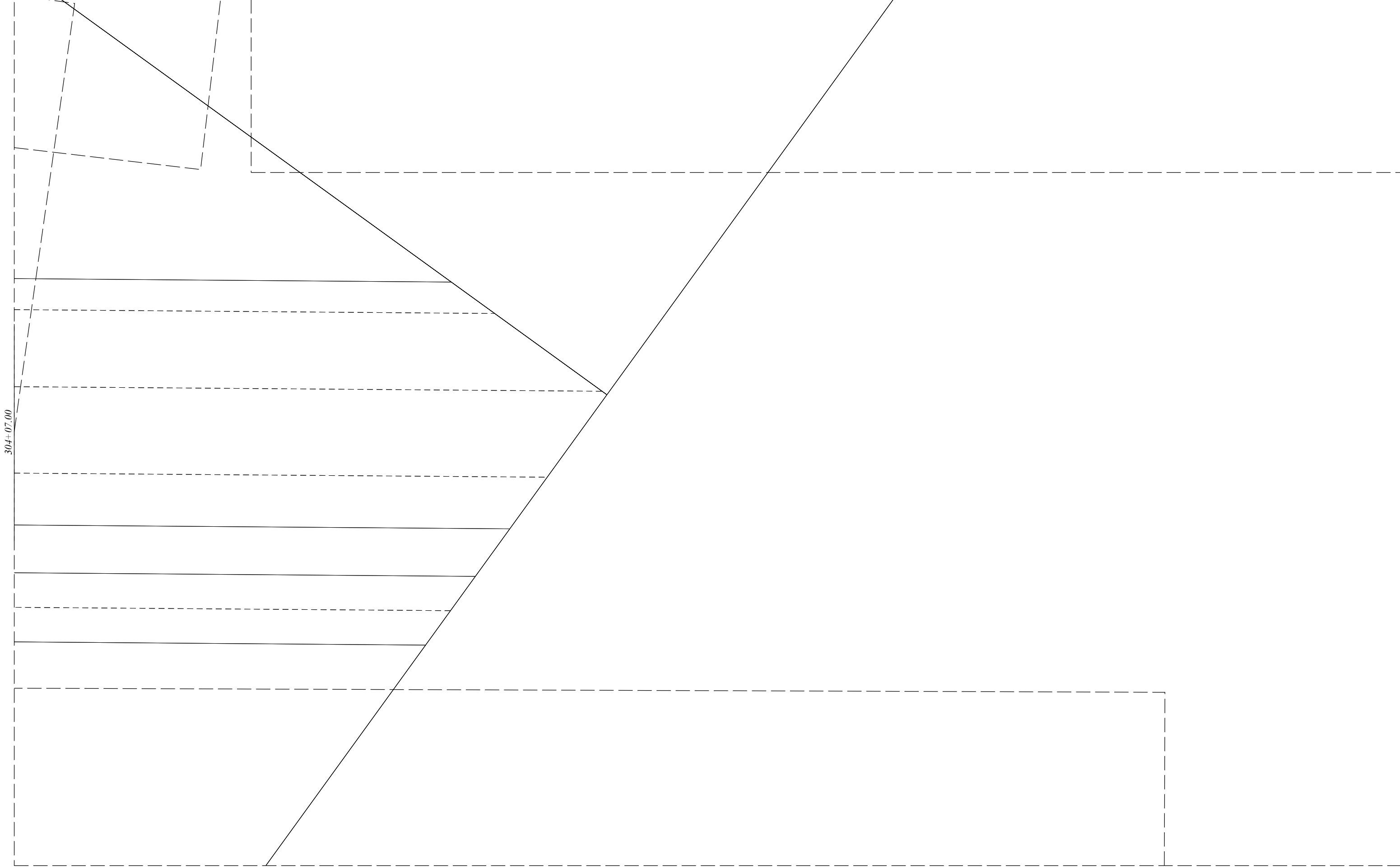
867/R

SUNNY SLOPE

288+03.00

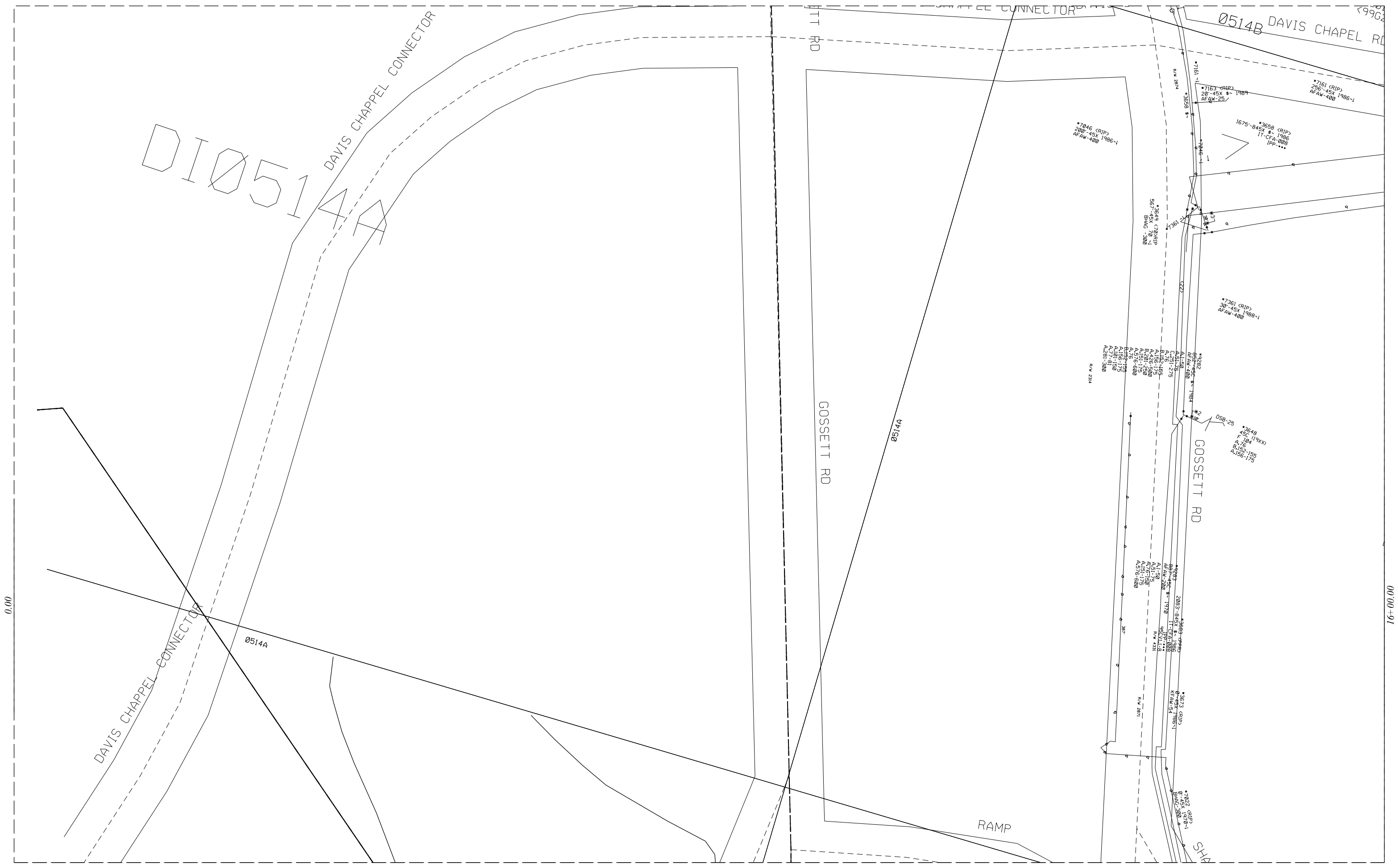
304+00.88

0 45C #



304+07.00

315+53.01 Extr. 453.99



0514A

DAVIS CHAPEL CONNECTOR

RTT RD

GOSSETT RD

0514B

GOSSETT RD

0514B DAVIS CHAPEL RD

*7046 (RIP)
20'-45X 1986-1
AFAW-400

*3646 (RIP)
56'-75X
BHAIG-380

*7361 (RIP)
30'-45X 1988-1
AFAW-400

*3648 (RIP)
45'-104
A-176
B-152-155
A-155-175

*3282 (RIP)
AFAW-400

*3283 (RIP)
AFAW-400

*3673 (RIP)
AFAW-400

DAVIS CHAPEL CONNECTOR

0514A

RAMP

SHS

0.00

16+00.00+91

300
0769N.1

MD 2016, 169-336
OUT MD 2014, 1-169

NOTE FACILITY LOCATE CONTRACTOR:
CAUTION -
ANY BELLSOUTH OWNED BURIED POWER
CABLES FEEDING POWER TRANSFER
SWITCHES AND DLC CABINETS
MUST BE LOCATED

NOTE FACILITY LOCATE CONTRACTOR:
CAUTION -
ANY BELLSOUTH OWNED BURIED POWER
CABLES FEEDING POWER TRANSFER
SWITCHES AND DLC CABINETS
MUST BE LOCATED

DAVIS CHAPEL RD

DAVIS CHAPEL RD

CMPH-751-FNH

CMPH-751-FNH

#9281
0'-45C 1985-1
AFAW-300
A1-50
PG06,1301-1400
A,76
B,152-155
A,51-75
PG06,1401-1425
107,881-900
A,51-75
A,76-100
PG06,501-525

#3656 (RIP)
0'-45X 1985-1
KFAW-420

#8507
650'-45C \$~ 1993
AFTW-25
107,801-825
R/W 4210

#2396
30-9 (1964)
SPA

#2336 12C (1984)
BSBT-100/200V12
100 PR
1-189B1-100
1-3AA1-52
2-4A1-52
107,201-250
B,51-100

#139143 (RIP)
75'-45X \$~ 1984
AFAW-100

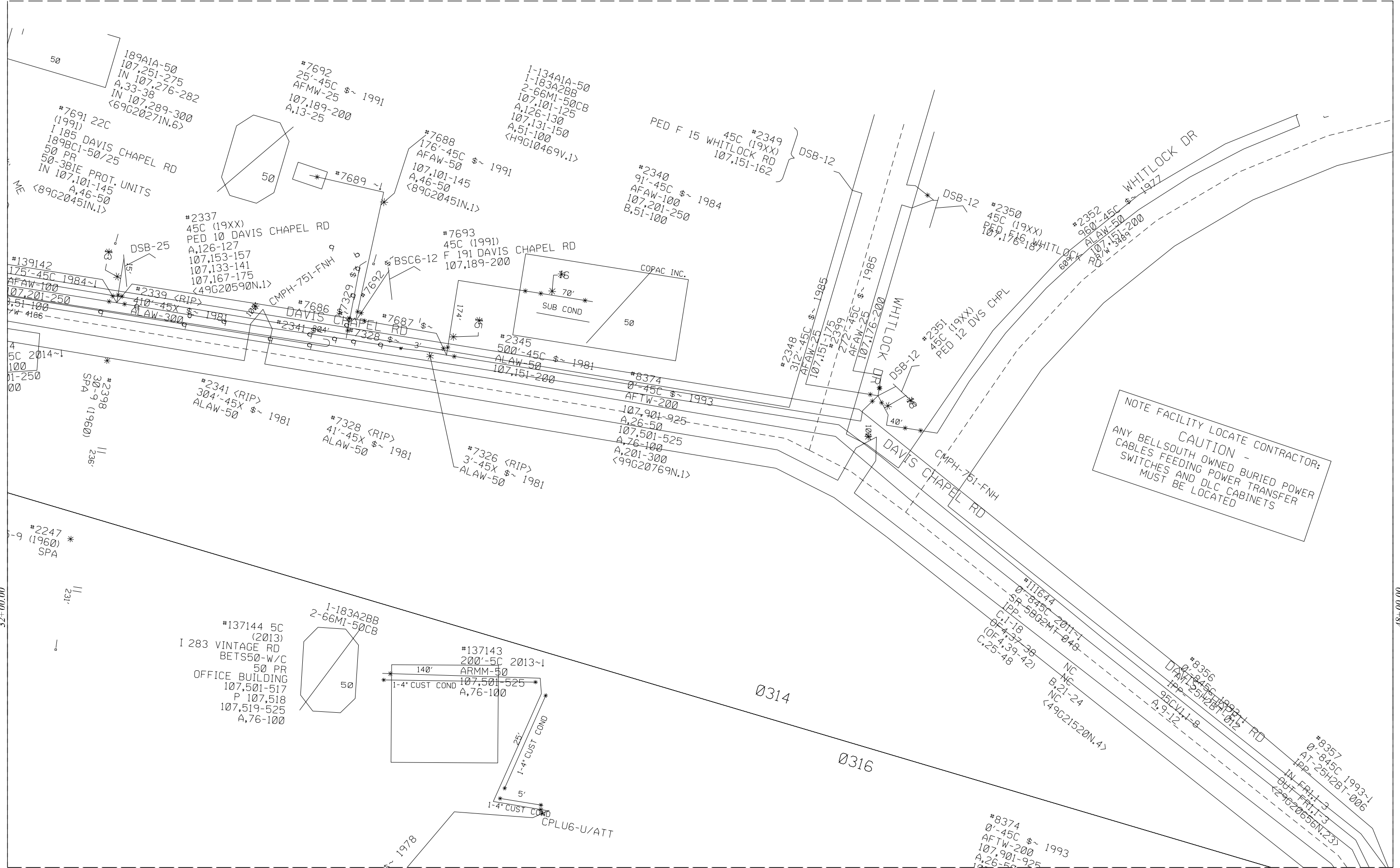
#13914
155'-4
ANAW-
107,20
B,51-1

DI0514B

#2 *3651
10'-45C \$~ 1984
AFAW-25
A,76
B,152-155
A,51-75
#3 *3651 (RIP)
30'-45C 1985-1
AFAW-300
107,401-800
PG06,501-525
B,226-300

16+00.00

32+00.00



NOTE FACILITY LOCATE CONTRACTOR:
CAUTION -
 ANY BELLSOUTH OWNED BURIED POWER
 CABLES FEEDING POWER TRANSFER
 SWITCHES AND DLC CABINETS
 MUST BE LOCATED

32+00.00

48+00.00

#137144 5C
 (2013)
 I 283 VINTAGE RD
 BETS50-W/C
 50 PR
 OFFICE BUILDING
 P 107,501-517
 107,519-525
 A,76-100

#137143
 200'-5C 2013~1
 ARMM-50
 107,501-525
 A,76-100

#8374
 0'-45C \$~ 1993
 AFTW-200
 107,901-925
 A,26-50

#8357
 0'-845C 1993-1
 AT-25H2B1-006
 IN ERH-3
 OUT ERH-3
 <29G20656N.23>



*8
 #2384/BIDIR
 69'-442C 1974~1
 ABAM-600
 B,1-17
 B,18-20
 B,21-75
 A,151-185
 V,186-187
 A,188-200
 A,1-18
 B,94-95
 A,21-25
 A,51-100
 E,201-275
 A,76-100
 104,1201-1250
 A,26-50
 E,376-400
 104,1501-1550
 Y,451-600
 <89G25214B,1>

#2375 52C
 (1980)
 HOE CHST COMP
 BSBT-100/200V12
 104,1501-1100

#77647
 0'-45C \$~ 2008
 ANAW-200
 104,1201-1250
 104,1501-1550
 D,101-200

#2376
 144'-52C 1984~1
 BKMA-300
 COMPTIE,1-200
 B,201-300

#2401 52C
 (1984)
 HOE CHST
 TERM-200PR
 104,1501-50
 OUT COMPTIE,1-200

#799 52C
 (19XX)
 F 8 A BLDG
 BSBT-50
 1-134A1500PR
 1-183A2 BB
 1-66MI-50
 HFCONSOLE,1-50

#801 52C
 (1983)
 TERM CT
 BSBT-100/200V12
 1-189B1000PR
 IN A,26-100
 OUT CT,1-25

#803 52C
 (1983)
 HT 1
 BSBT-50
 50,189B1-50
 CT,1-25
 Y,26-50

#804 52C
 (1983)
 HT 2
 BSBT-50
 50,189B1-50
 CT,1-25
 X,26-50

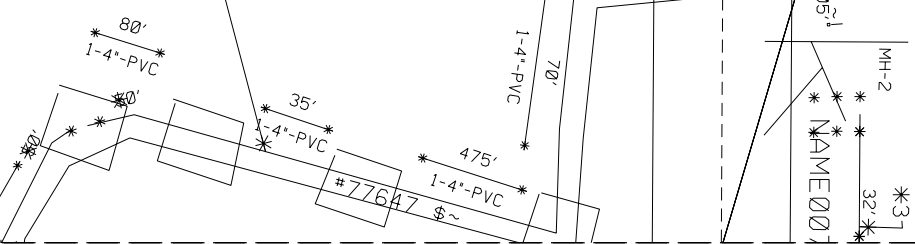
#2402 52C
 (1984)
 HOE CHST CMPTR
 TERM-300PR
 104,1501-50
 6-66MI-50CB
 1-187B1BB
 COMPTIE,1-200
 B,201-300

#77645
 785'-845C \$~ 2008
 SR-5B92MT-024
 IPP-
 IN FRI,1-3
 OUT FRI,1-3
 A,7-24

#77647
 2345'-45C 2008~1
 ANAW-200
 104,1201-1250
 104,1501-1550
 D,101-200

#7834
 347'-45C 1982~1
 ALAW-200
 A,1076-1100
 A,1126-1147
 B,48
 A,1149-1150
 B,51-54
 A,1755-1772
 B,73
 A,1774-1775
 B,76-100
 A,76-80
 A,92
 A,94
 A,86-90
 B,113-121
 A,1751-1753
 B,125
 A,1441-1448
 A,659-675
 B,151-160
 A,161-175
 A,26-30
 A,42
 A,44
 A,36-40
 A,188-200

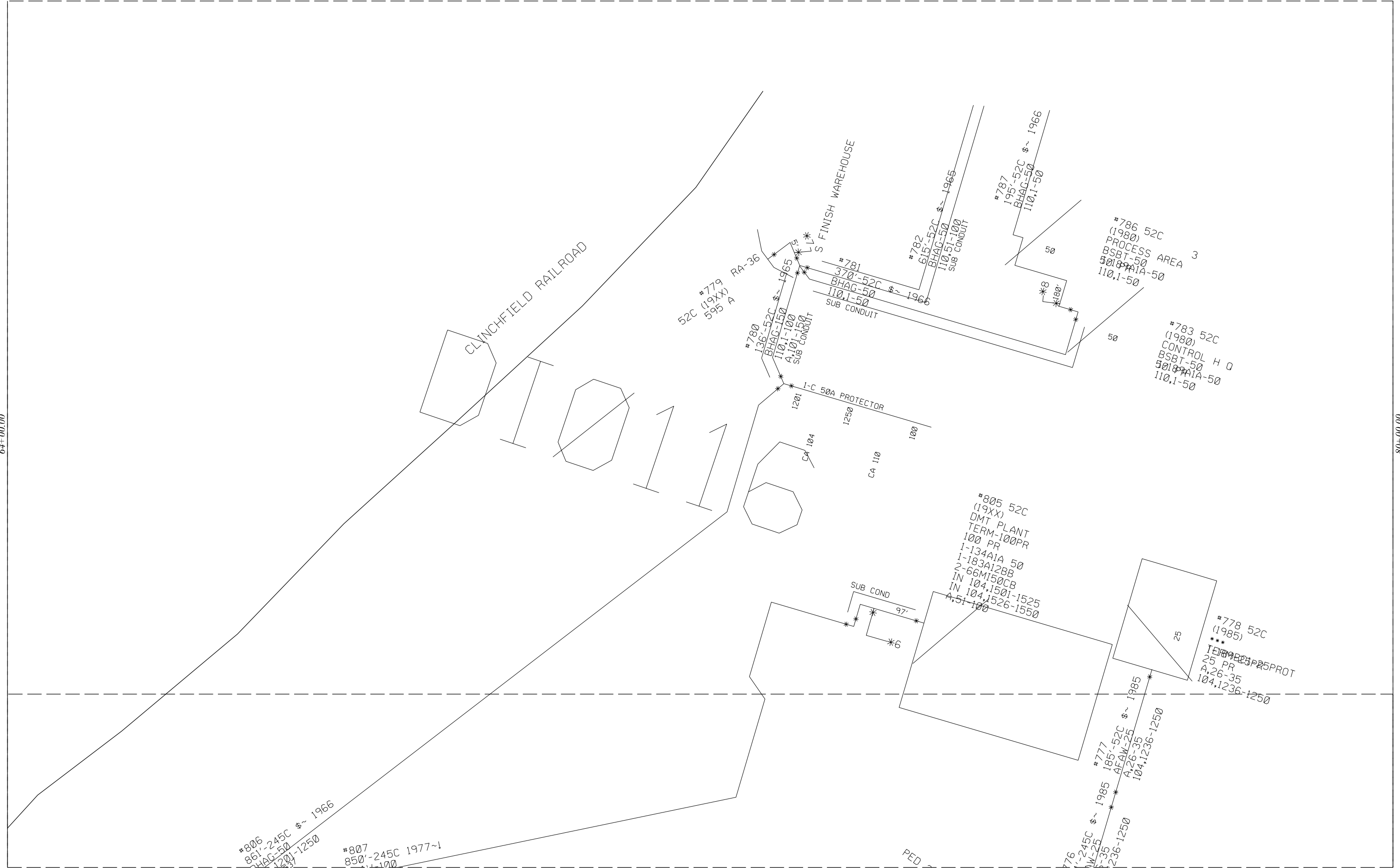
#77645
 0'-845C



MH-2
 *37
 *32
 *31
 *30
 *29
 *28
 *27
 *26
 *25
 *24
 *23
 *22
 *21
 *20
 *19
 *18
 *17
 *16
 *15
 *14
 *13
 *12
 *11
 *10
 *9
 *8
 *7
 *6
 *5
 *4
 *3
 *2
 *1
 NAME 001

64+00.00

80+00.00



#806
861'-245C \$~ 1966
BHAG-50
1201-1250

#807
850'-245C 1977~1
1100

52C #779
(19XX)
595 A
RA-36

#780
136'-52C \$~ 1965
BHAG-150
A,101-150
SUB CONDUIT

#781
370'-52C \$~ 1966
BHAG-50
110,1-50
SUB CONDUIT

#782
615'-52C \$~ 1965
BHAG-50
110,51-100
SUB CONDUIT

#787
195'-52C \$~ 1966
BHAG-50
110,1-50

#786 52C
(1980)
PROCESS AREA 3
BSBT-50
50189AIA-50
110,1-50

#783 52C
(1980)
CONTROL H Q
BSBT-50
50189AIA-50
110,1-50

#805 52C
(19XX)
DMT PLANT
TERM-100PR
100 PR
1-134AIA 50
1-183A12BB
2-66M150CB
IN 104,1501-1525
IN 104,1526-1550
A,51-100

#778 52C
(1985)

TEMPORARY
25 PR
A,26-35
104,1236-1250

#776
1'-245C \$~ 1985
W-25
6-35
236-1250

#777
185'-52C \$~ 1985
AFAW-25
A,26-35
104,1236-1250

1-C 50A PROTECTOR
1201
1250
100
CA 110

CLINCHFIELD RAILROAD

S FINISH WAREHOUSE

PED

80+00.00

96+00.00

*3 #9466
0'-45C \$~ 1977
ALAW-100
104,1501-1525
107,901-925
A,51-100

*5 #847
0'-52C \$~ 1966
BHAG-50
110,51-100

*6 #809
97'-52C \$~ 1977
BKMA-100
104,1501-1525
A,26-100

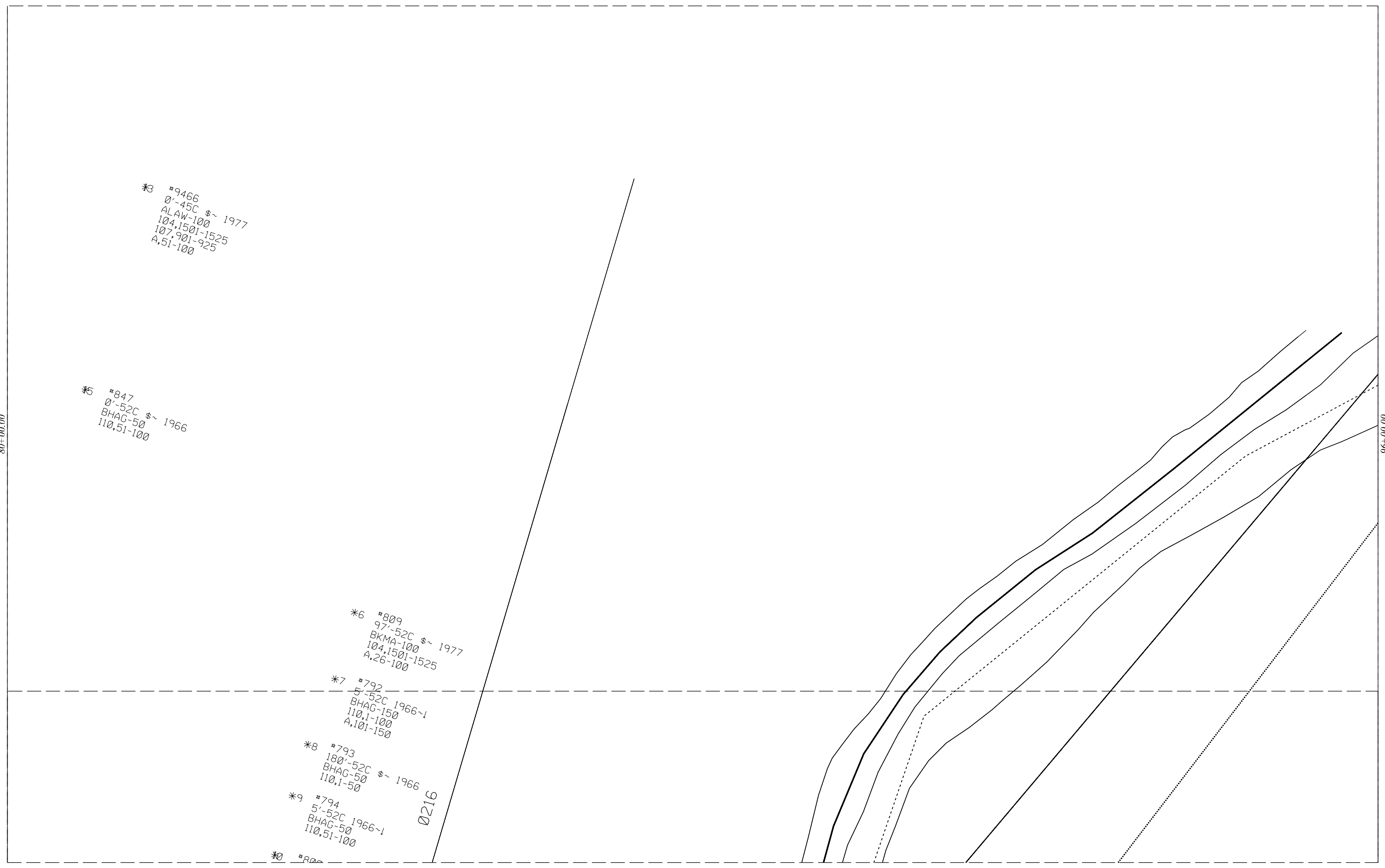
*7 #792
5'-52C 1966~1
BHAG-150
110,1-100
A,101-150

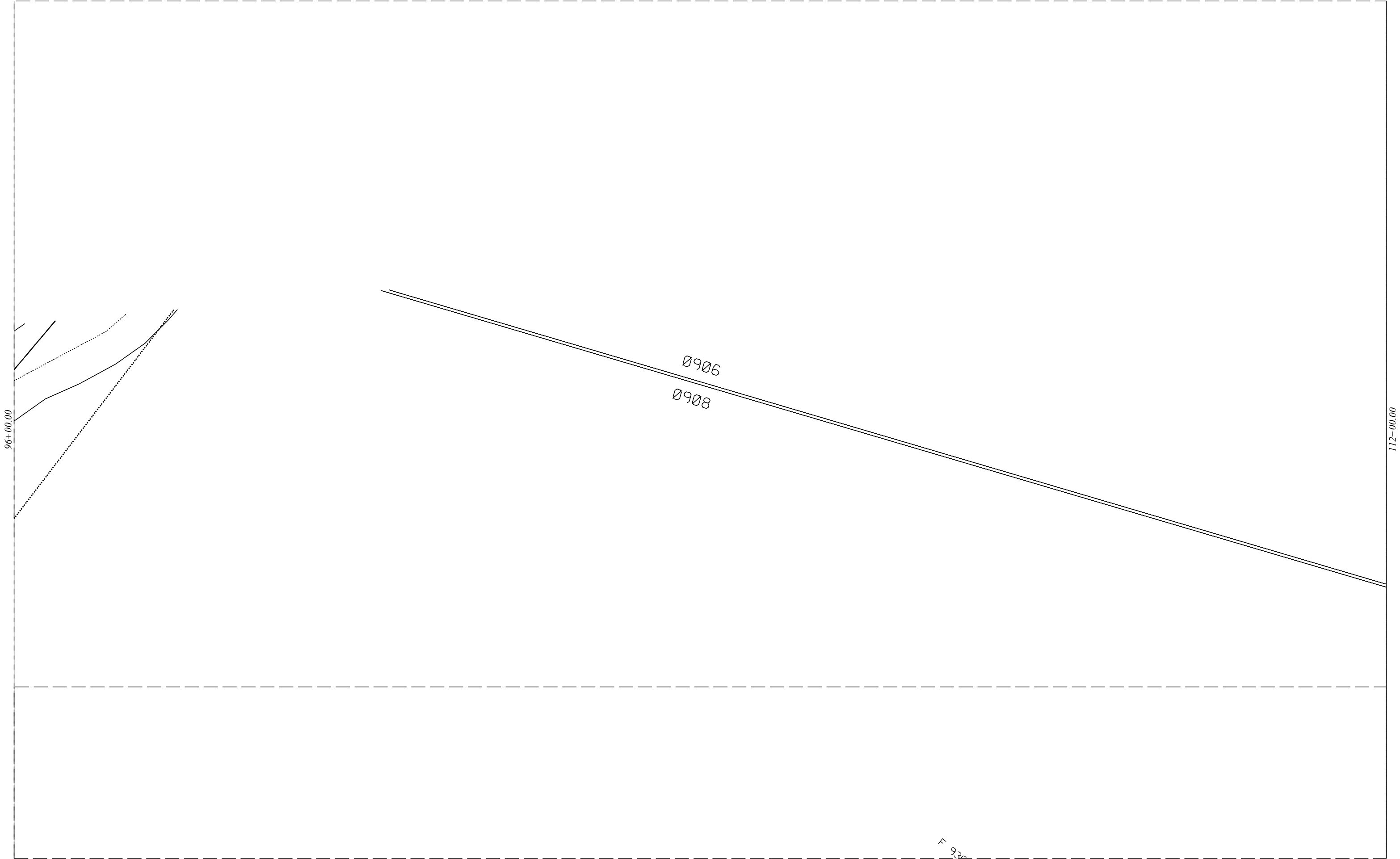
*8 #793
180'-52C \$~ 1966
BHAG-50
110,1-50

*9 #794
5'-52C 1966~1
BHAG-50
110,51-100

*10 #800

0216





96+00.00

112+00.00

0906

0908

F 930

112+00.00

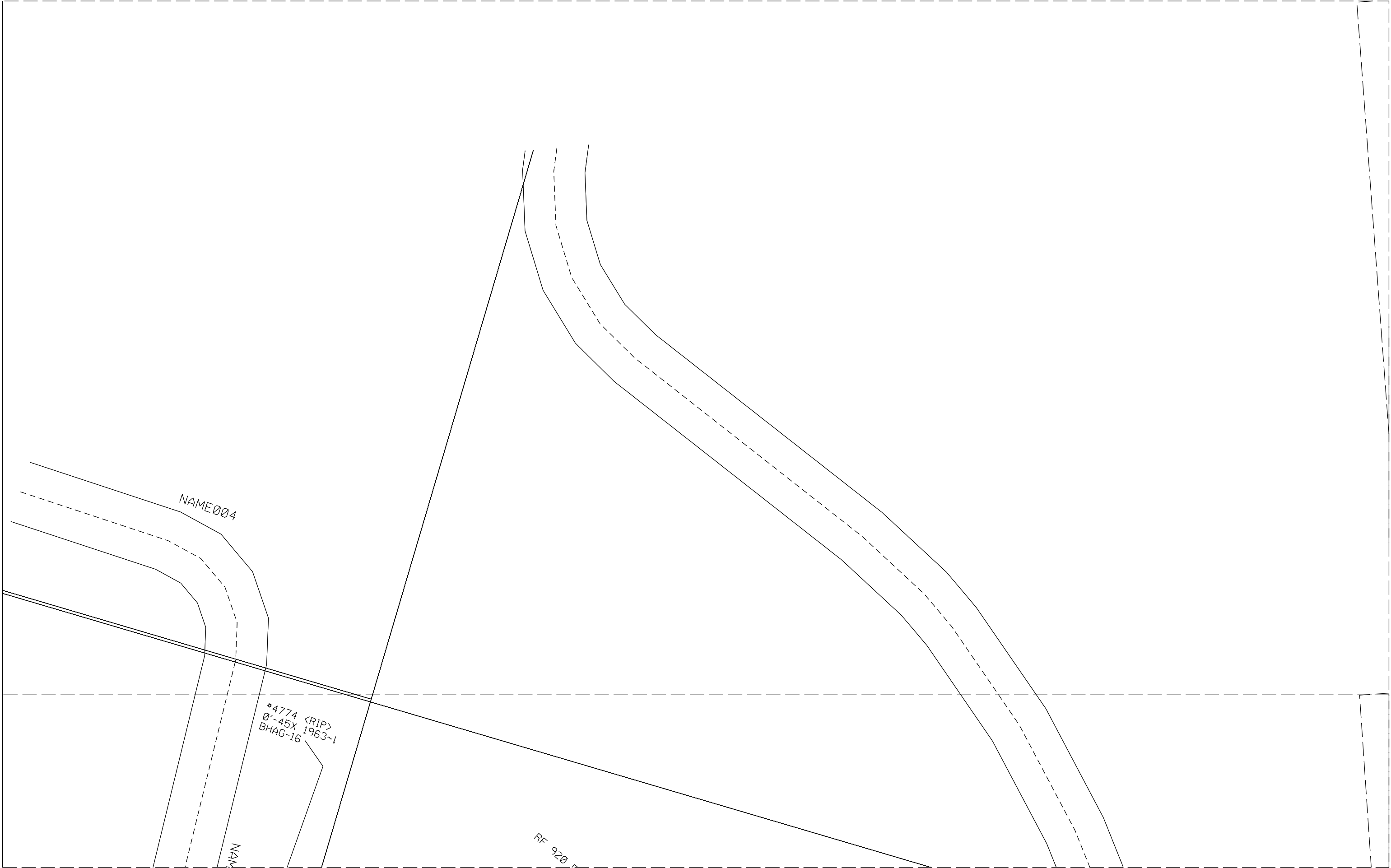
128+00.00

NAME004

#4774 <RIP>
Ø'-45X 1963~1
BHAG-16

NAM

RF 920



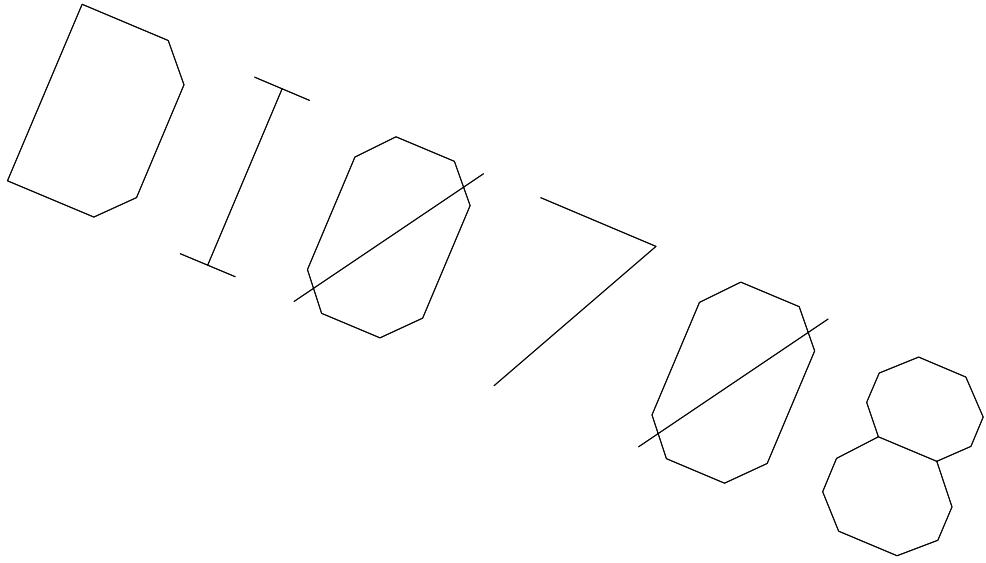
128+00.00

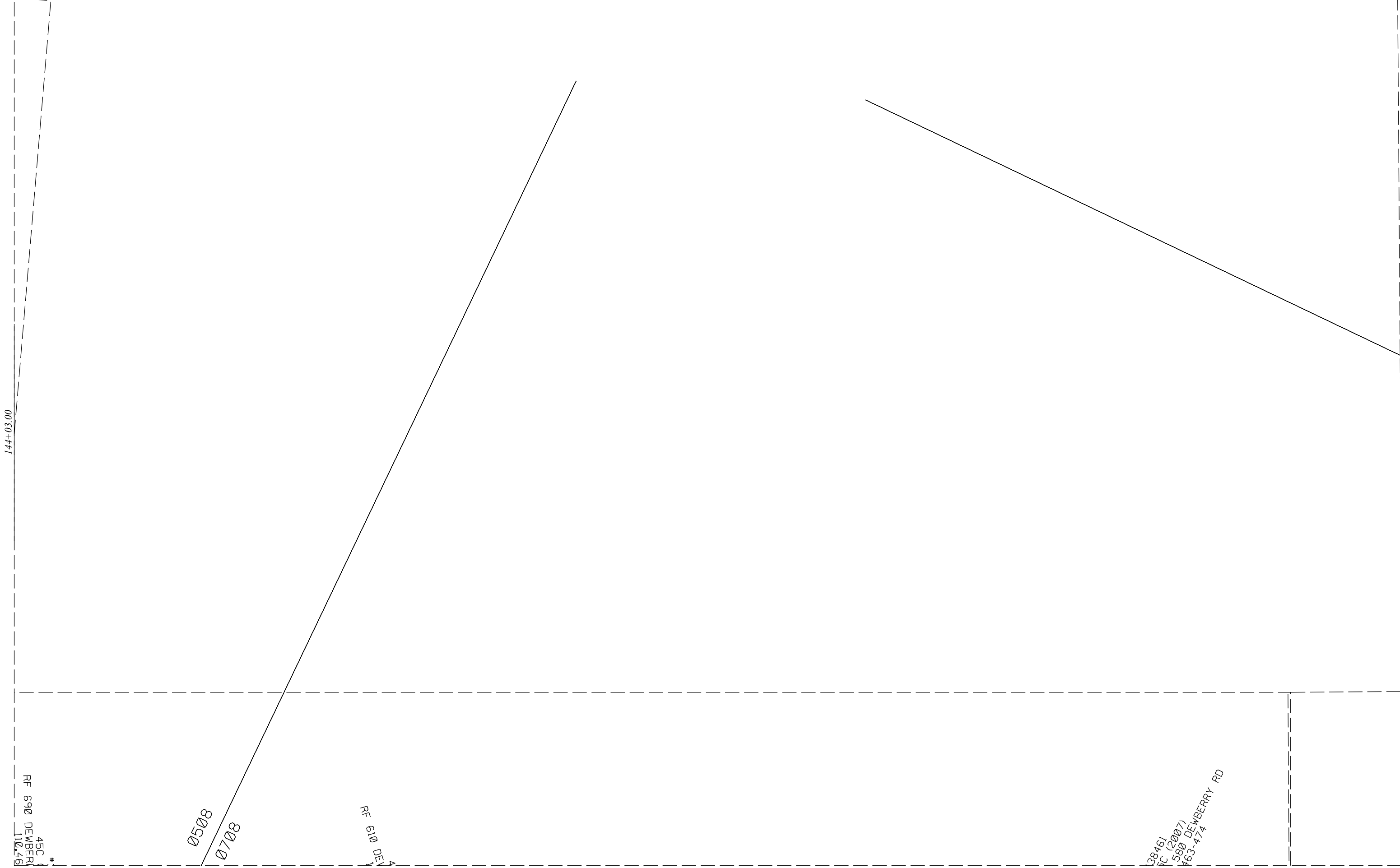
144+03.16

LF 830 D

RF 780 D

LF 100





00+50+77.1

160+03.00

RF 690 DEWBERRY
110.46

8050
80708

RF 610 DEN

38461
580 DEWBERRY RD

45C

160+03.00

176+03.00

0508
0510

LF 462 DEWBERRY RD
45C (2007)
110,451-459
C.10-12
<39G21398N.3>

MAG6

#3

LF 424 DEWBERRY RD
45C (2007)
110,451-459
C.10-12
<39G21398N.4>

MAG6/12-1

850'

87'(R)

*38455
2054-45C
ANMN-100
110,451-459
C.10-12
D51-100
<39G21398N.2>

1247'(R)

45C (19XX) DS
PED 2 S1
#2301 <PPX>

176+03.00

192+03.00

#3299
727'-45C
AJMW-50
A.1-25
110.51-75
\$~ 1973

#3301 45C
(1-991)
S 291 DEWBERRY RD
TERM-50PR
50 PR-15
A.1-25
110.51-75

#3
*1614
214-12C
AJMW-100
110.51-100
110.51-100
110.51-25
8.51-100

*1613 12C
(19X)
CLARKSON BRBS SHOP HWY 110
B501-100/200/12
100 PR
2-1A4A-80 CBT
110.51-80
110.51-100
110.51-25
8.51-100

#3195 KRIP
302'-45X
AJMW-50
1973-1

B-12
#3196
292'-45C
AFAM-50
A.1-25
110.51-75
#3194

CLARKSON DR

727'

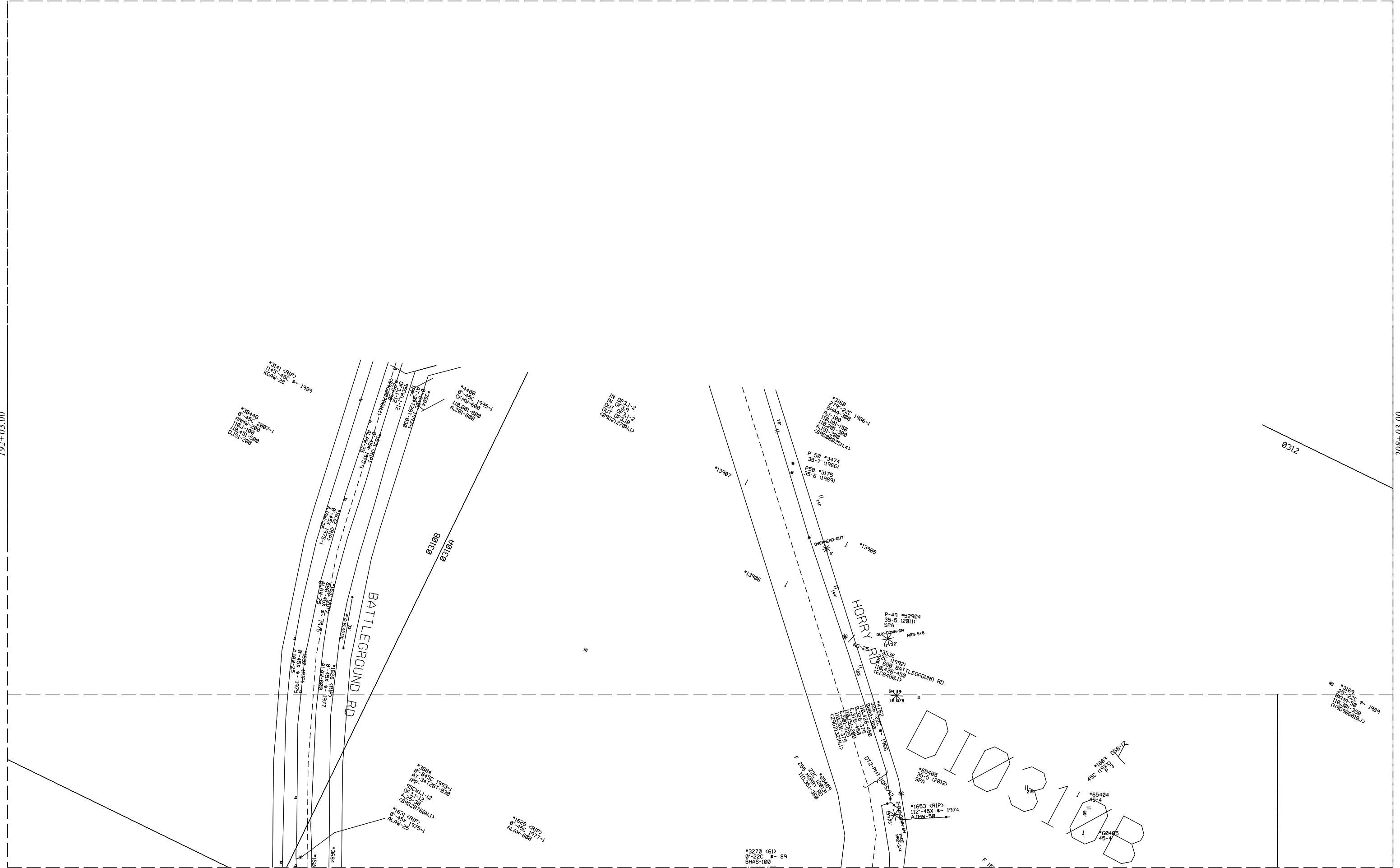
Ø310C

Ø150

Ø310C
Ø310A

192+03.00

208+03.00



*3141 (RIP)
0'-45X 1989
KQAW-28

*38446
0'-45X 2007-1
ALAW-500
110.451-500
D.151-500

*4400
0'-45X 1995-1
ALAW-500
110.601-500
A.201-500

IN OF 31-2
IN OF 3-3
OUT OF 31-2
OUT OF 310
(09021270N.1)

*3160
27'-22" 1966-1
BHAM-300
A.1-100
110.101-150
A.151-200
(69000220N.4)

P 50 *3474
35-7 (1966)
P50 *3175
35-6 (1969)

P-49 *52904
35-5 (2011)
SPA
OUT-DOWN-HM
MR3-5/8
1122'

*3536
22C (1992)
650 BATTLEGROUND RD
118.456-458
(EC8450.1)

*3160
25'-22" 1989
BHAM-50
110.301-350
(49000010B.1)

*3684
0'-45X 1993-1
Imp-34 1261-030
BSCM.1-12
DF-31-12
A.201-30
(69020766N.1)

*1631 (RIP)
0'-45X 1975-1
ALAW-25

*1626 (RIP)
0'-45X 1977-1
ALAW-500

*3278 (61) 89
0'-22" *
BHAS-100

*1653 (RIP)
12'-45X * 1974
ALAW-50

*1609
ASC (1923)
P.33

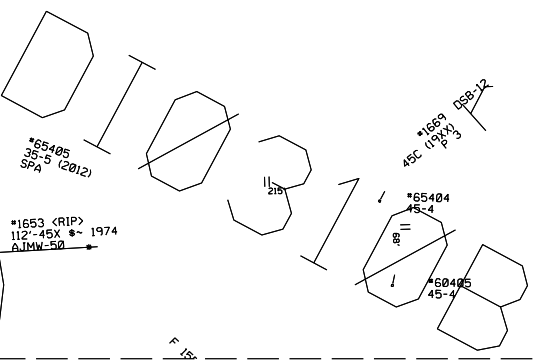
*65404
45-4

*60405
45-4

0312

BATTLEGROUND RD

HORRY RD

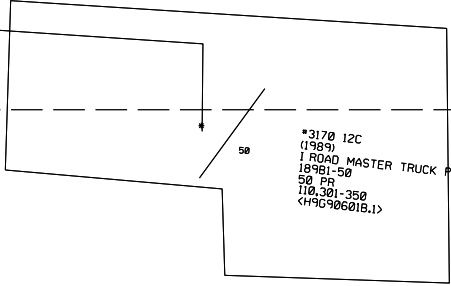


208+03.00

224+03.00

<170006564>
RCC
06-MAY-81
1-8861-321-514
186C*

ONCD 1500 HI

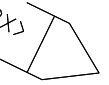


50

*3170 12C
(1989)
1 ROAD MASTER TRUCK PLAZA
18901-50
50 PR
110,301-350
<+3C90601B.1>

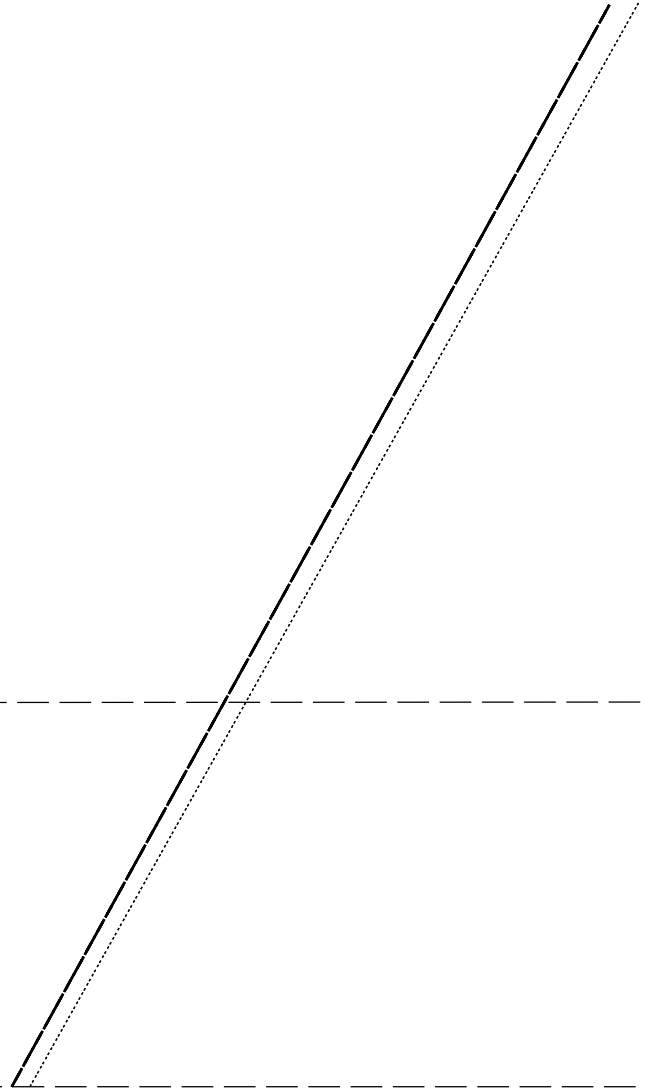
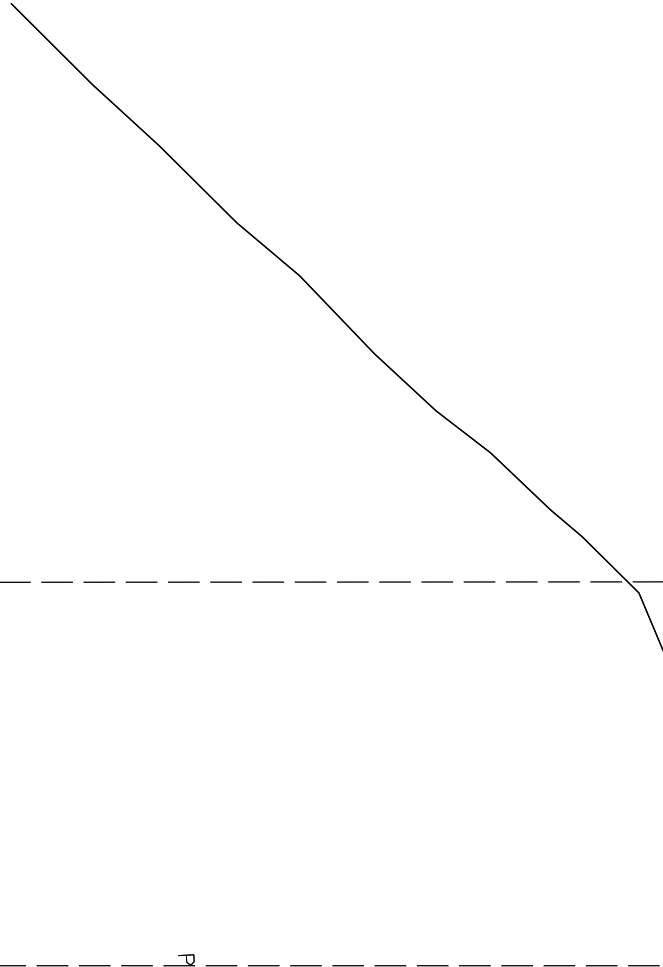
*1624 22X (1975) <PPX>

LCC50A10
110,176-200
110,151-175



224+03.00

240+03.01



#604
25-9 (1965) *SPA

#605
25-9 (1965) *SPA

1/200'

45C (19
P17 #8

P

240+03.00

256+03.00

#4134
Ø-45C \$~ 1994
GFMW-50
110,151-175
A,26-50

#4134
Ø-45C \$~ 1994
GFMW-50
110,151-175
A,26-50

#10406
75'-12C
ANMW-50 \$~ 2000
110,151-160
A,61-63
110,164
A,65-66
110,167-175
A,26-50
<69G20165N.1>

#608/WIRE (PPX)
Ø-3C 19XX-1
C-RURAL-WIRE

BSC6-12
#4135
45C (1994)
F 323 SWOFFORD RD
110,163-174

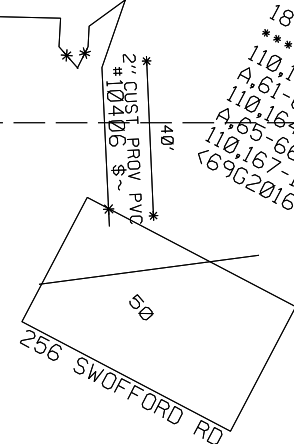
#610
120'-45C
ALMW-50
110,151-200 \$~ 1978

#4134
1184'-45C
GFMW-50

#10407
#10408

#10409 12C
(2000)
I 256 SWOFFORD DR
189ECSI-25
*** PR
110,151-160
A,61-63
110,164
A,65-66
110,167-175
<69G20165N.1>

#10405
470'-45C 2000-1
ANMW-50
110,151-160
A,61-63
110,164
A,65-66
110,167-175
A,26-50
<69G20165N.1>



#1
45C (1994)
PED 14E 1 FR

11200'

256+03.00

272+03.00

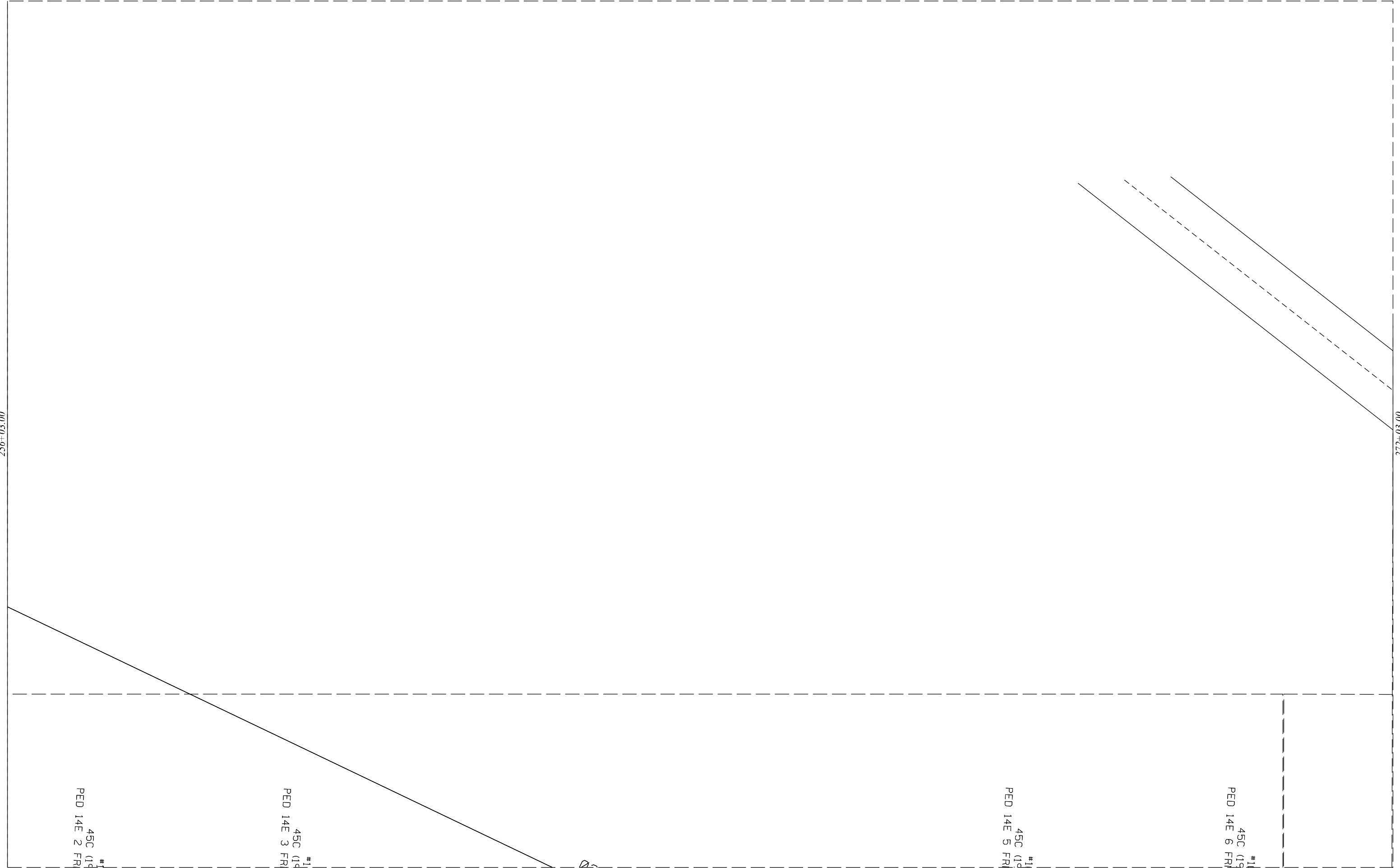
#1
45C (14
PED 14E 2 FR

#1
45C (14
PED 14E 3 FR

#1
45C (14
PED 14E 5 FR

#1
45C (14
PED 14E 6 FR

25



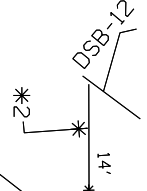
272+03.00

288+03.00

*2 #1092
14'-45C 1987-1
AFMW-25
110,176-200

*1093
45C (19XX)
PED F 11
110,183-194
(19)G 10472K.1)

STONE RD



250'

11'

*1091 (19XX)
45C (19XX)
PED F 11
110,189-200

WEBBER RD
#2155
18'-45C 1975-1
AJMW-25
110,176-186
110,187-200

Ø414
Ø214

*2152
45C (19XX)
PED F 13

STONE RD

*3 #1095
250'-45C 1975-1
AJMW-25
110,176-186
110,187-200

*1 #1090
11'-45C 1987
AFMW-25
110,176-200

*1 #2149
18'-45C 1987-1
AFMW-25
110,176-200

*3 #2156
212'-45C
BKMG-50
110,176-200
110,151-160
A,61-63
110,164
A,65-66
110,167-175
(69)G 20165N.2)

#10
45C (19
PED 14E 7 FRN

FRNTG
PED 14E 45C

35'

352'

*2151
45C (19XX)
PED F 11

WEBBER RD

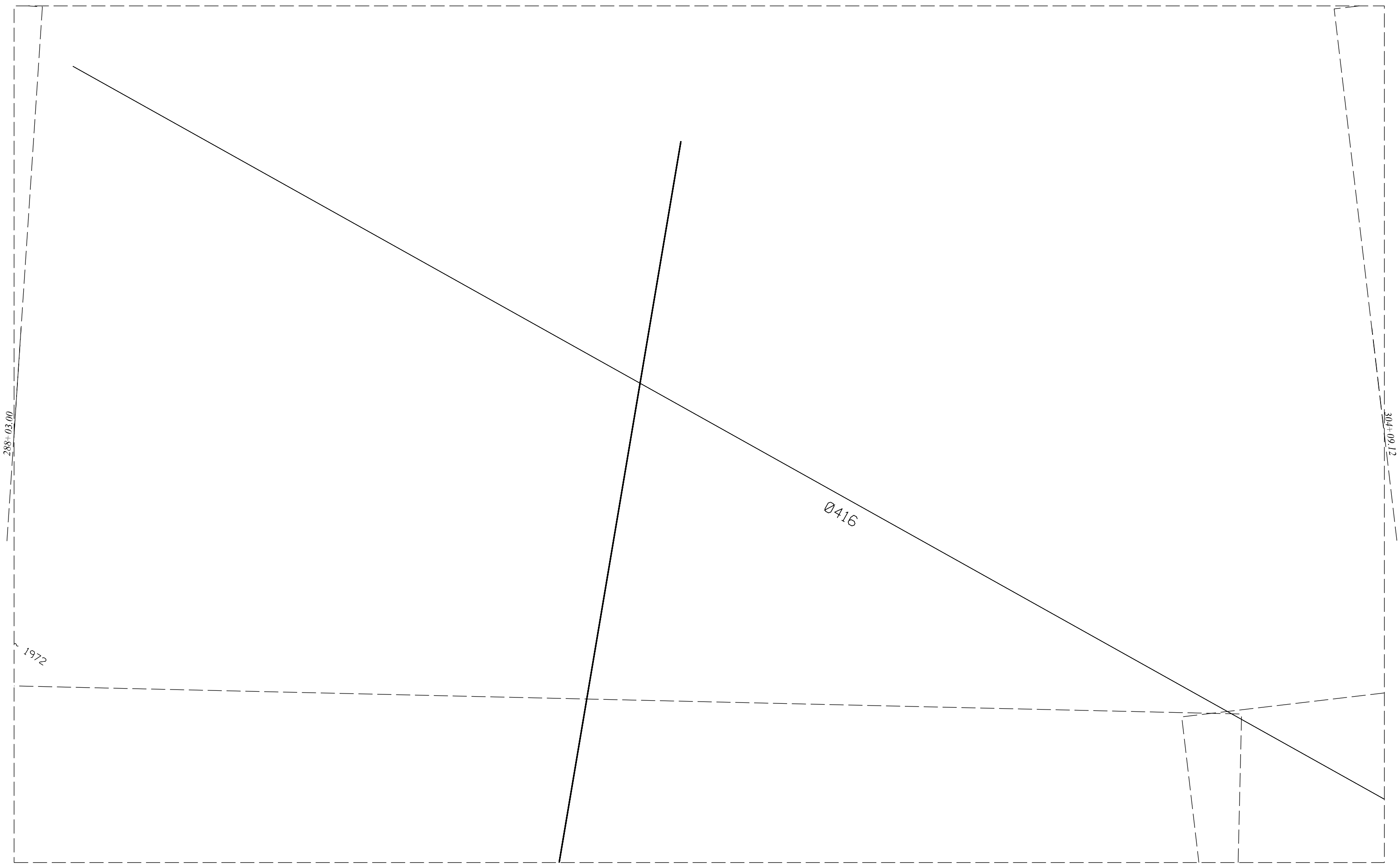
#2155
1198'-45C

*1
#2148
45C (1987)
PED 14E15 S11 137
110,176-187

DSB-12

*1

495'



288+03.00

304+09.12

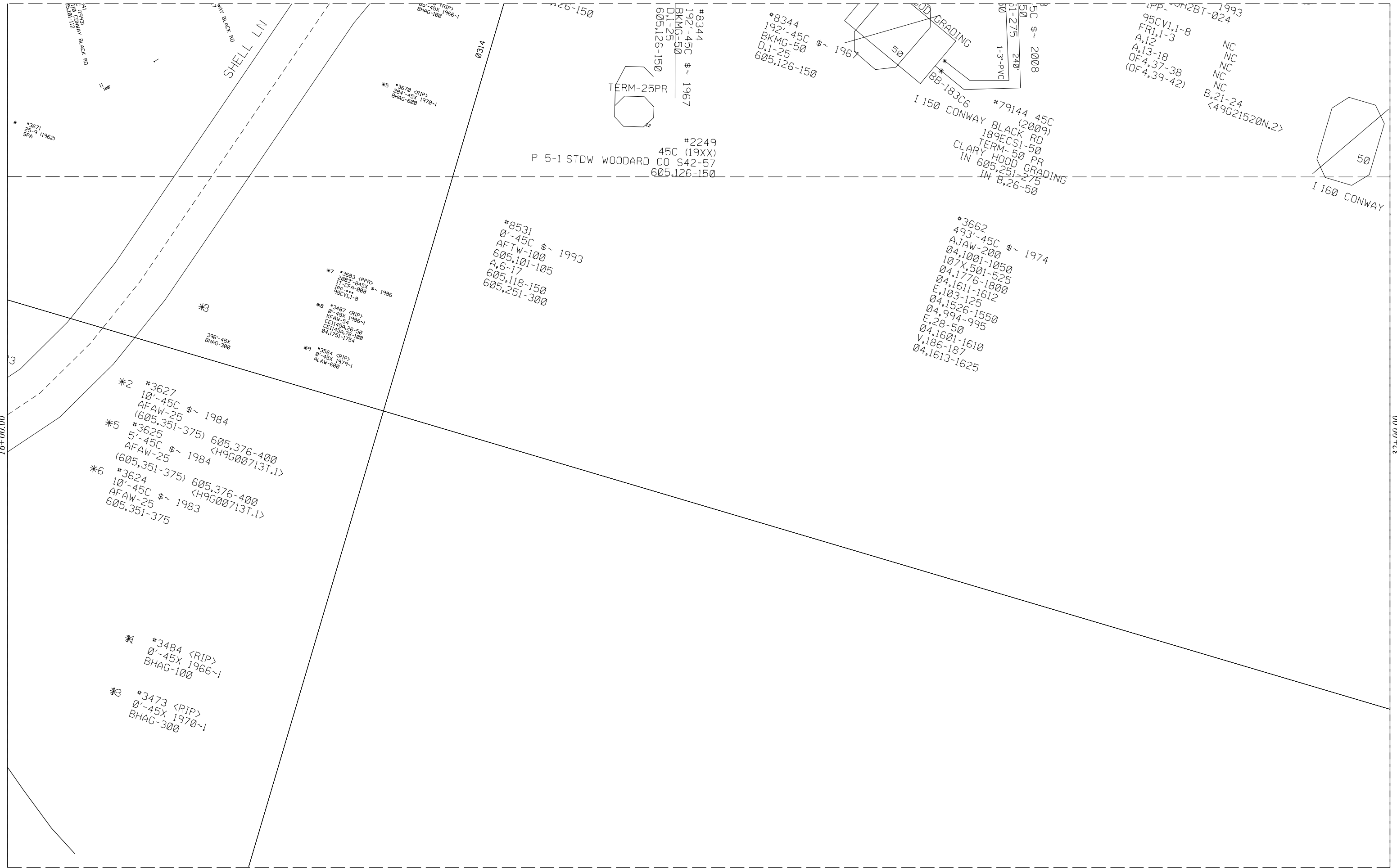
1972

0416

304+09.00



308+39.24 Ext. 1169.76



16+00.00

32+00.00

*3671
25-9 (1962)
SPA

*2 #3627
10'-45C \$~ 1984
AFAW-25
(605,351-375) 605,376-400
<H9G00713T.1>
*5 #3625
5'-45C \$~ 1984
AFAW-25
(605,351-375) 605,376-400
<H9G00713T.1>
*6 #3624
10'-45C \$~ 1983
AFAW-25
605,351-375

*1 #3484 <RIP>
0'-45X 1966~!
BHAG-100

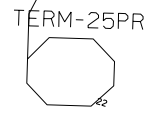
*3 #3473 <RIP>
0'-45X 1970~!
BHAG-300

*7 #3683 <PPR>
2083-845X \$~ 1986
IPFA-000
IPFA-000
95CV1.1-8

*8 #3487 <RIP>
0'-45X 1986~!
KFAW-54
CE1145A,26-50
CE1145A,76-100
04,1751-1754

*9 #3564 <RIP>
0'-45X 1979~!
ALAW-600

#8531
0'-45C \$~ 1993
AFTW-100
605,101-105
A,6-17
605,118-150
605,251-300



#2249
45C (19XX)
P 5-1 STDW WOODARD CO S42-57
605,126-150

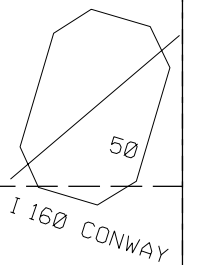
#8344
192'-45C \$~ 1967
BKMKG-50
D,1-25
605,126-150

#8344
192'-45C \$~ 1967
BKMKG-50
D,1-25
605,126-150

#79144 45C
(2009)
189ECS1-50
TERM-50 PR
CLARY HOOD GRADING
IN 605,251-275
IN B,26-50

#3662
493'-45C \$~ 1974
AJAW-200
04,1001-1050
107X,501-525
04,1776-1800
04,1611-1612
E,103-125
04,1526-1550
04,994-995
E,28-50
04,1601-1610
V,186-187
04,1613-1625

1993
ZBT-024
95CV1.1-8
FR1.1-3
A,12
A,13-18
OF 4,37-38
(OF 4,39-42)
NC
NC
NC
NC
NC
B,21-24
<49G21520N.2>



I 160 CONWAY

605,276-300

#8347
45C (1993)
E 150 CONWAY BLACK RD
A14-17
605,118-125
<49620700N.1>

107,901-925 \$~ 1999
A,26-50
A,51-100

#9423
22'-45C \$~ 1998
ANTW-50
B,1-25
605,276-300

*2 #2253 <RIP>
775'-45X \$~ 1974
AJAW-200

#9424
242'-12C \$~ 1998
ANTW-50
B,1-25
605,276-300

#77647
2345'-45C 2008~1
ANAW-200
104,1201-1250
104,1501-1550
D,101-200

#9424 \$~

#9425 12C
(1998)
BLACK RD 1.1
189ECSI-50
50 PR
B,1-25
605,276-300

*9 #2242 <RIP>
13'-45X \$~ 1975
AJAW-200

32+00.00

48+00.00

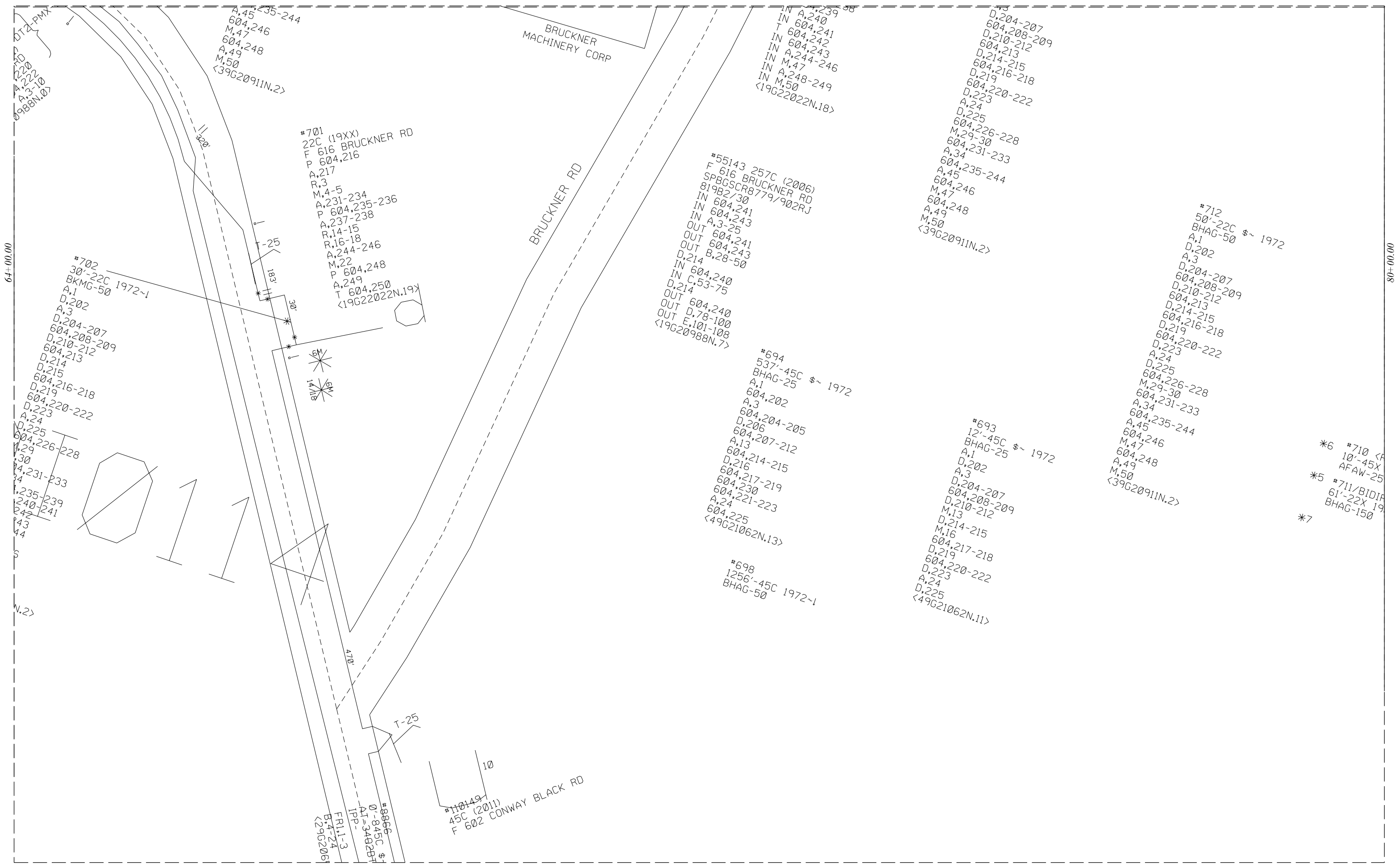
*3 #2254 <RIP>
10'-45X \$~ 1982
ALAW-200

*4 #2255 <RIP>
1779'-45X \$~ 1982
ALAW-200

0312

0314

CLINCHFIELD RAILROAD



A,45
604,246
M,47
604,248
A,49
M,50
<39G20911N.2>

BRUCKNER
MACHINERY CORP

IN A,239
IN 604,240
T 604,241
IN 604,242
IN A,244-246
IN M,47
IN A,248-249
IN M,50
<19G22022N.18>

D,204-207
604,208-209
D,210-212
604,213
D,214-215
604,216-218
D,219
604,220-222
D,223
A,24
D,225
604,226-228
M,29-30
604,231-233
A,34
604,235-244
A,45
604,246
M,47
604,248
A,49
M,50
<39G20911N.2>

#701
22C (19XX)
F 616 BRUCKNER RD
P 604,216
A,217
R,3
M,4-5
A,231-234
P 604,235-236
A,237-238
R,14-15
R,16-18
A,244-246
M,22
P 604,248
A,249
T 604,250
<19G22022N.19>

BRUCKNER RD

#55143 257C (2006)
F 616 BRUCKNER RD
SPBGSCR8779/902RJ
819B2/30
IN 604,241
IN 604,243
IN A,3-25
OUT 604,241
OUT 604,243
OUT B,28-50
D,214
IN 604,240
IN C,53-75
D,214
OUT 604,240
OUT D,78-100
OUT E,101-108
<19G20988N.7>

#712
50'-22C \$~ 1972
BHAG-50
A,1
D,202
A,3
D,204-207
604,208-209
D,210-212
604,213
D,214-215
604,216-218
D,219
604,220-222
D,223
A,24
D,225
604,226-228
M,29-30
604,231-233
A,34
604,235-244
A,45
604,246
M,47
604,248
A,49
M,50
<39G20911N.2>

#702
30'-22C 1972-1
BKMG-50
A,1
D,202
A,3
D,204-207
604,208-209
D,210-212
604,213
D,214
D,215
604,216-218
D,219
604,220-222
D,223
A,24
D,225
604,226-228
M,29-30
604,231-233
A,45
604,246
M,47
604,248
A,49
M,50
<39G20911N.2>

#694
537'-45C \$~ 1972
BHAG-25
A,1
604,202
A,3
604,204-205
D,206
604,207-212
A,13
604,214-215
D,216
604,217-219
604,230
604,221-223
A,24
604,225
<49G21062N.13>

#693
12'-45C \$~ 1972
BHAG-25
A,1
D,202
A,3
D,204-207
604,208-209
D,210-212
M,13
D,214-215
M,16
604,217-218
D,219
604,220-222
D,223
A,24
D,225
<49G21062N.11>

*6 #710 <F
10'-45X
AFAW-25
*5 #711/BIDIF
61'-22X 19
BHAG-150
*7

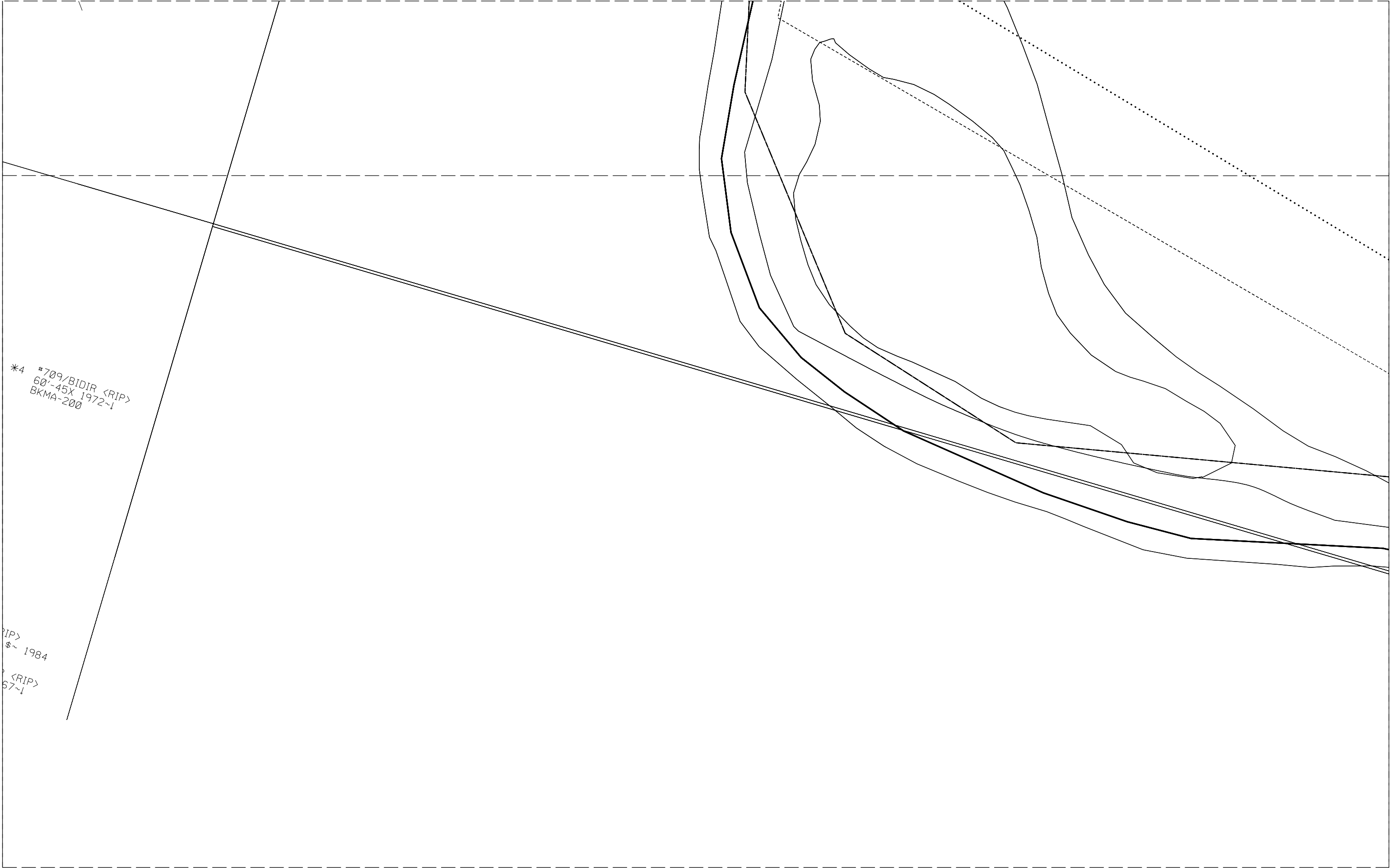
#698
1256'-45C 1972-1
BHAG-50

#8866
0'-845C \$~
A1-3402B1
FR1-3
B,4-24
<29G2061

#110149
45C (2011)
F 602 CONWAY BLACK RD

64'-00.00

80'-00.00



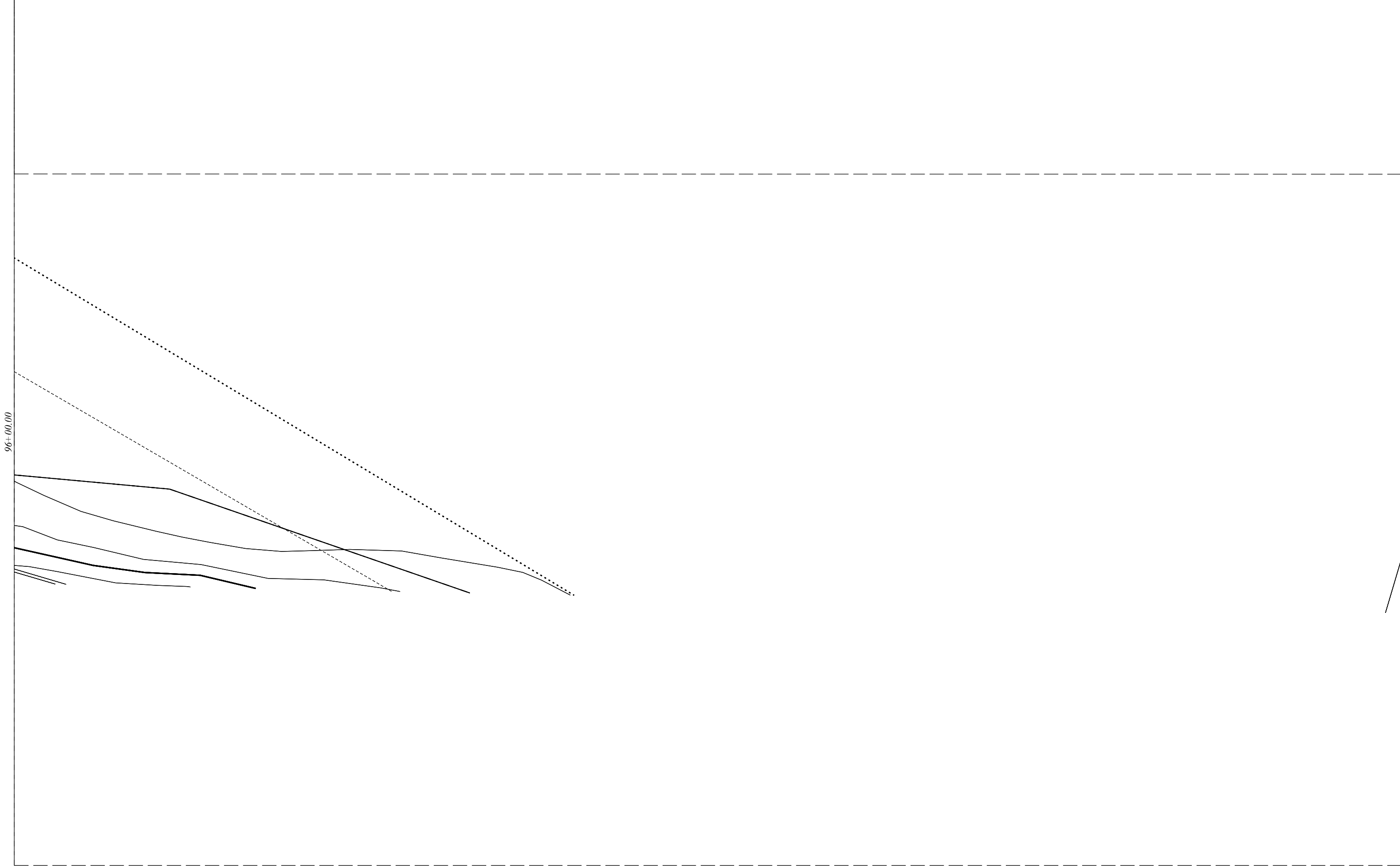
80+00.00

96+00.00

*4 #709/BIDIR <RIP>
60'-45X 1972~1
BKMA-200

<RIP>
\$~ 1984

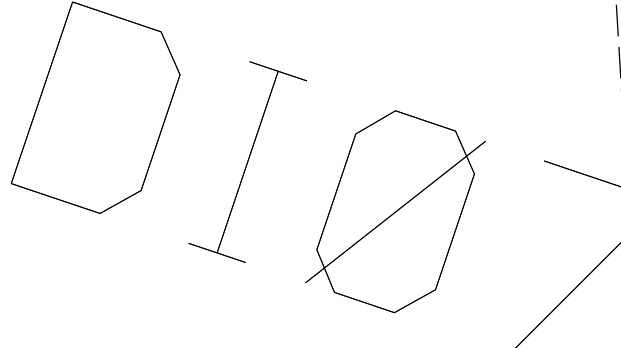
<RIP>
67~1



112+00.00

Ø706
Ø906

128+00.00



F 279 BUDS DR
04,726-730
C,6-9
04,735
<89G20174N.6>

25 #2585
45C (19XX)
F 265 BUDS DR
04,726-730
4945CCR,201-204
04,735-745
4945CCR,205-208
04,750
<89G20174N.5>

#2573
123'-45C 1977-1
ALMW-25
04,726-730
4945CCR,201-204
04,735-745
4945CCR,205-208
04,750
<89G20174N.4>

*1 #2572
12'-45C 1977-1
ALMW-25
04,726-730
B,6-9
04,735-745
B,21-24
04,750
<89G20174N.7>
*6 #3136
0'-45C 1988-1
AFMW-25
04,726-730
4945CCR,201-204
04,735-745
4945CCR,205-208
04,750
<89G20174N.2>

BUDS DR

PEDS FRNT
GLN
12'
1'

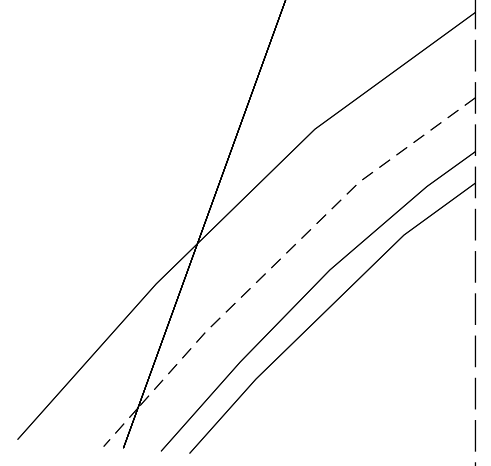
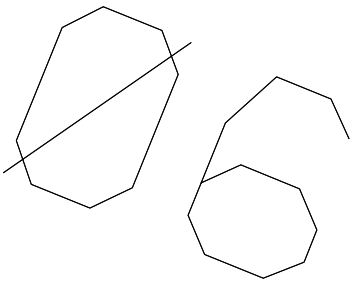
DSB-12

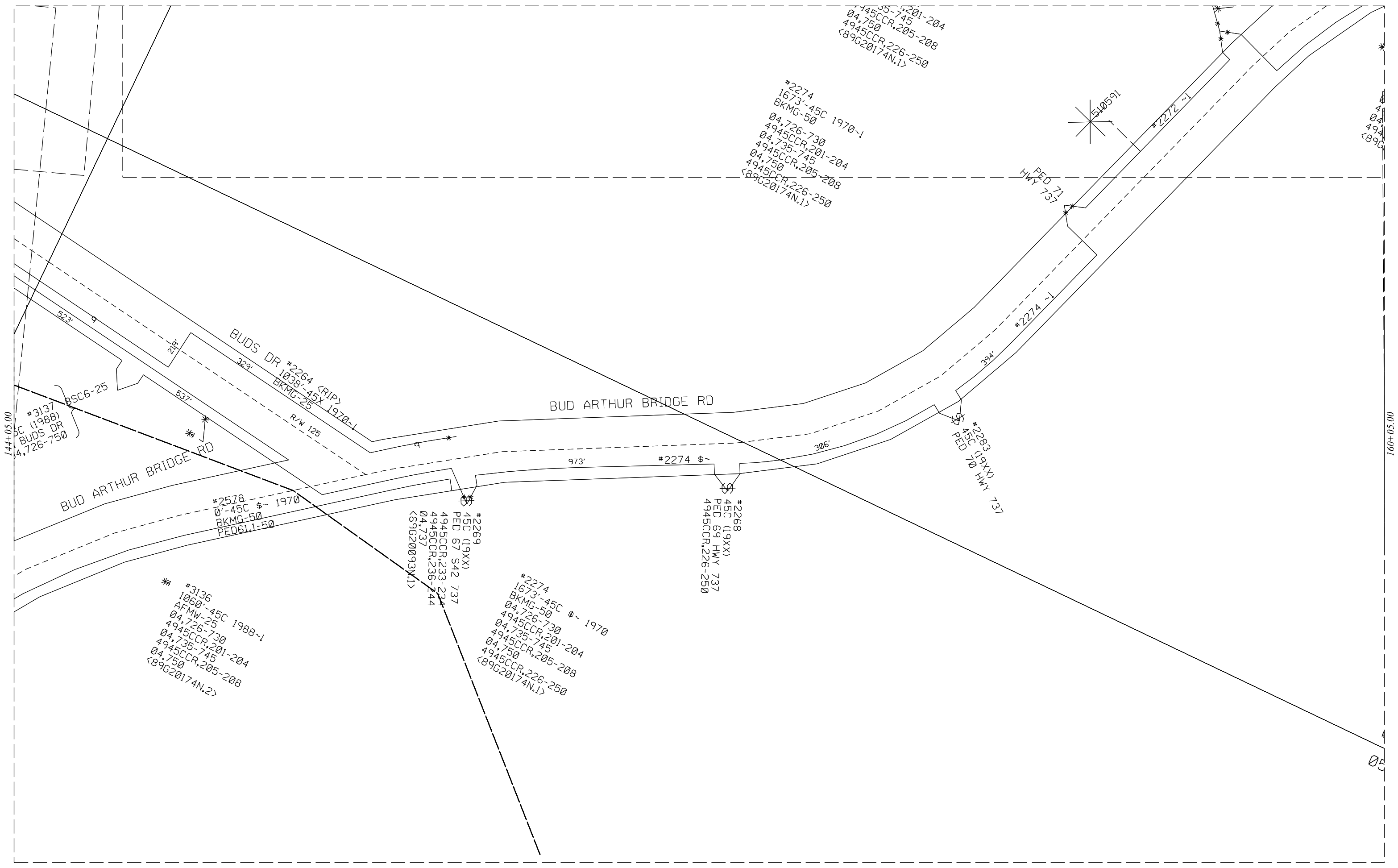
#2584
45C (19XX)
F 245 BUDS DR
04,739-745
B,21-24
04,750
<89G20174N.3>

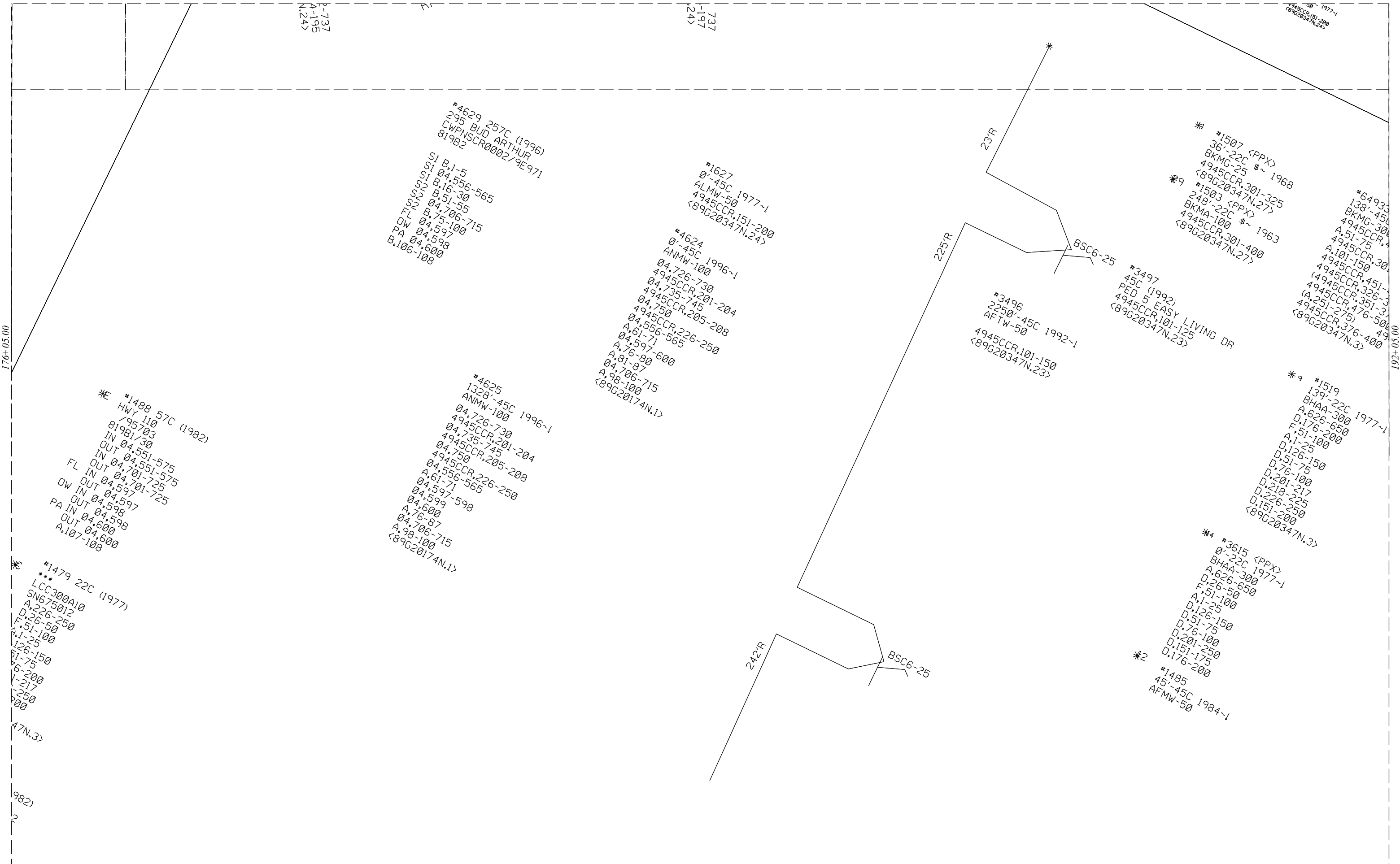
508'
*2264 (RIP)
0'-45X 1970-1
BKMG-25

00'00'+827

144'-04.73
10'







8-737
A-195
N.24>

737
-197
24>

8-1977-1
4945CCR,151-200
<89G20347N.23>

*4629 257C (1996)
295 BUD ARTHUR
CWPNSCR0002/9E971
819B2

S1 B,1-5
S1 04,556-565
S1 B,16-30
S2 B,51-55
S2 04,706-715
S2 B,75-100
FL 04,597
OW 04,598
PA 04,600
B,106-108

*1627
0-45C 1977-1
ALMW-50
4945CCR,151-200
<89G20347N.24>

*4624
0-45C 1996-1
ANMW-100
04,726-730
4945CCR,201-204
04,735-745
4945CCR,205-208
04,750
4945CCR,226-250
04,556-565
A,61-71
04,597-600
A,76-80
A,81-87
04,706-715
A,98-100
<89G20174N.1>

*4625
1328-45C 1996-1
ANMW-100
04,726-730
4945CCR,201-204
04,735-745
4945CCR,205-208
04,750
4945CCR,226-250
04,556-565
A,61-71
04,597-598
04,599
04,600
A,76-87
04,706-715
A,98-100
<89G20174N.1>

237R

225R

242R

BSC6-25

BSC6-25

*1507 <PPX>
36'-22C \$~ 1968
BKMG-25
4945CCR,301-325
*9 <89G20347N.27>

*3497
45C (1992)
PED 5 EASY LIVING DR
4945CCR,101-125
*9 <89G20347N.23>

*3496
2250'-45C 1992-1
AFTW-50
4945CCR,101-150
*9 <89G20347N.23>

*9 #1519
139'-22C 1977-1
BHAA-300
A,626-650
D,176-200
F,51-100
A,1-25
D,126-150
D,51-75
D,76-100
D,201-217
D,218-225
D,226-250
D,151-200
*9 <89G20347N.3>

*4 #3615 <PPX>
0'-22C 1977-1
BHAA-300
A,626-650
D,26-50
F,51-100
A,1-25
D,126-150
D,51-75
D,76-100
D,201-250
D,151-175
D,176-200

*2 #1485
45'-45C 1984-1
AFMW-50

*1488 57C (1982)
HWY 110
/95703
819B1/30
IN 04,551-575
OUT 04,551-575
IN 04,701-725
OUT 04,701-725
FL IN 04,597
OW IN 04,597
OUT 04,598
PA IN 04,598
OUT 04,600
A,107-108

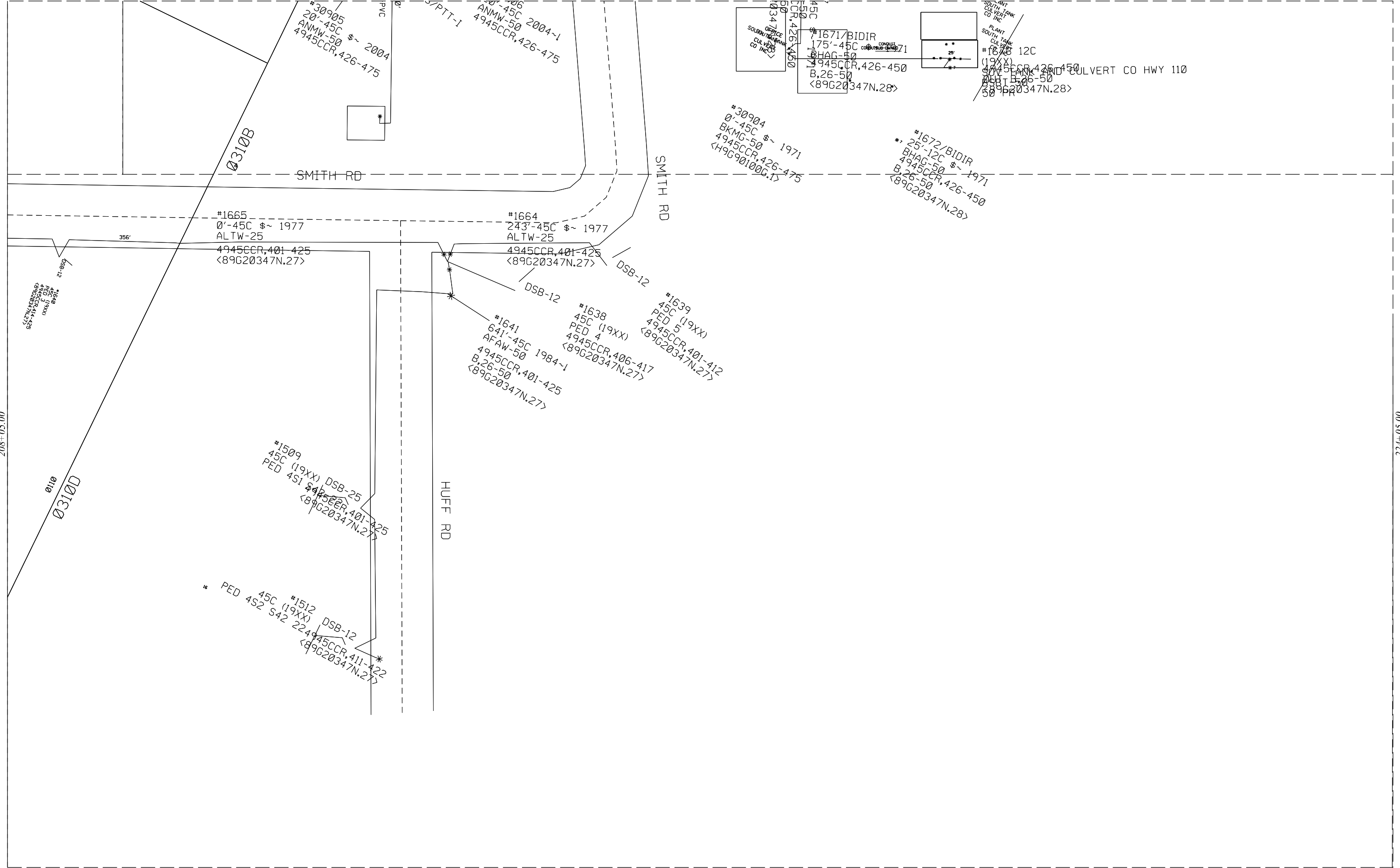
*1479 22C (1977)
LCC300A10
SN675012
A,226-250
D,26-50
F,51-100
A,1-25
D,126-150
D,51-75
D,76-200
V,217
V,250
V,300
47N.3>

982)

2

208+05.00

224+05.00



Ø310B

SMITH RD

SMITH RD

DSB-12

HUFF RD

Ø310D

#1665
Ø'-45C \$~ 1977
ALTW-25

#1664
243'-45C \$~ 1977
ALTW-25

#1641
641'-45C 1984-1
AFAM-50
4945CCR,401-425
B,26-50
<89G20347N.27>

#1638
45C (19XX)
PED 4
4945CCR,406-417
<89G20347N.27>

#1639
45C (19XX)
PED 5
4945CCR,401-412
<89G20347N.27>

#1509
45C (19XX) DSB-25
PED 4S1
4945CCR,401-425
<89G20347N.27>

#1512
45C (19XX) DSB-12
PED 4S2
4945CCR,411-422
<89G20347N.27>

#30905
20'-45C \$~ 2004
ANMW-50
4945CCR,426-475

#30906
Ø'-45C 2004-1
ANMW-50
4945CCR,426-475

#30904
Ø'-45C \$~ 1971
BKM-50
4945CCR,426-475
<H9G90100G.1>

#1672/BIDIR
25'-12C \$~ 1971
BHAG-50
4945CCR,426-450
B,26-50
<89G20347N.28>

#1671/BIDIR
175'-45C \$~ 1971
BHAG-50
4945CCR,426-450
B,26-50
<89G20347N.28>

PLANT SOUTH TANK
CULVERT CO INC
#1670
12C (19XX)
4945CCR,426-450
B,26-50
<89G20347N.28>

OFFICE
SOUTH TANK
CULVERT
CO INC

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356'

71'-85'

#1508
45C (19XX)
PED 4
4945CCR,414-425
<89G20347N.27>

*

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25'

25'

25'

25'

25'

25'

25'

25'

25'

25'

25'

25'

25'

25'

25'

25'

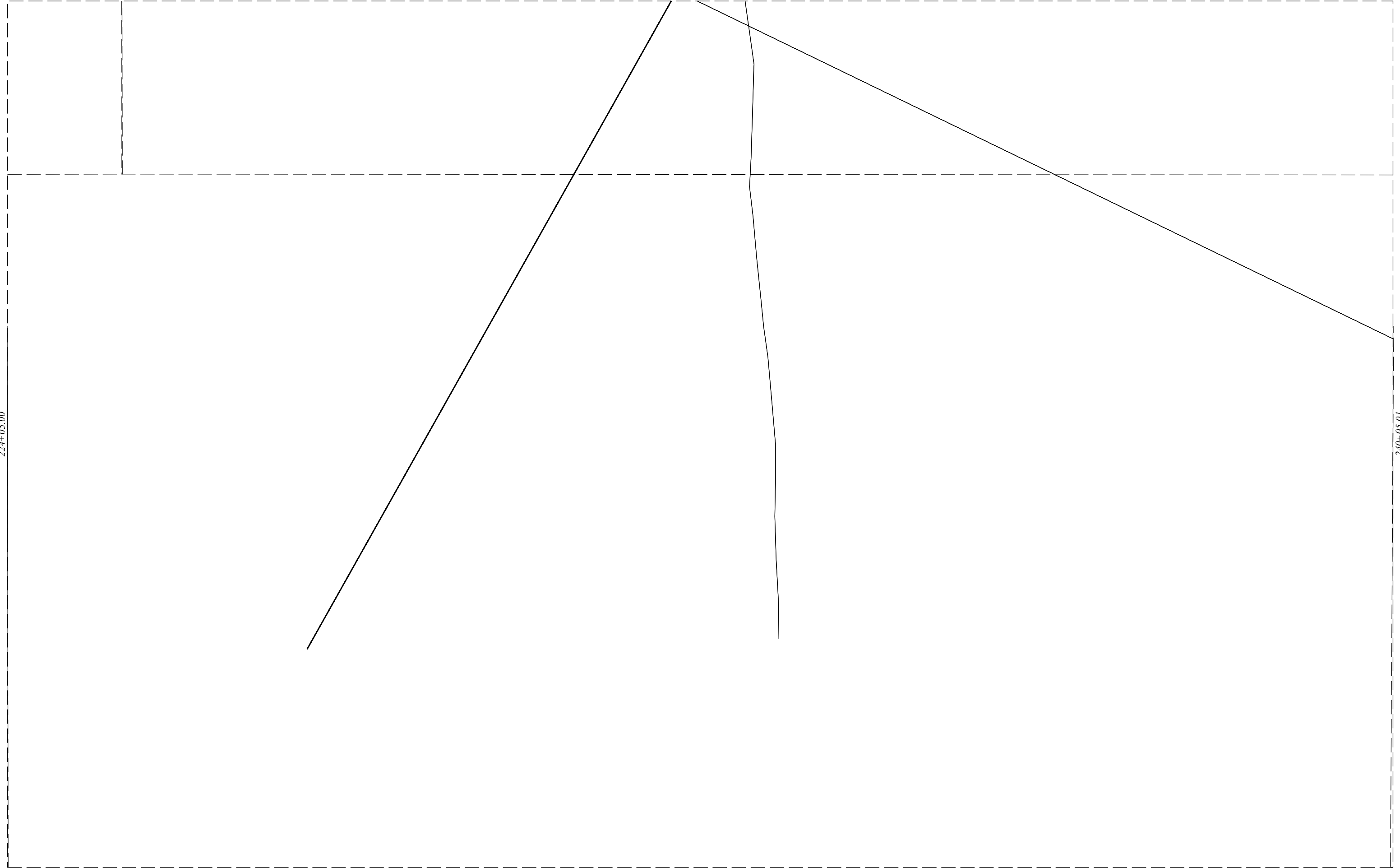
25'

25'

25'

224+05.00

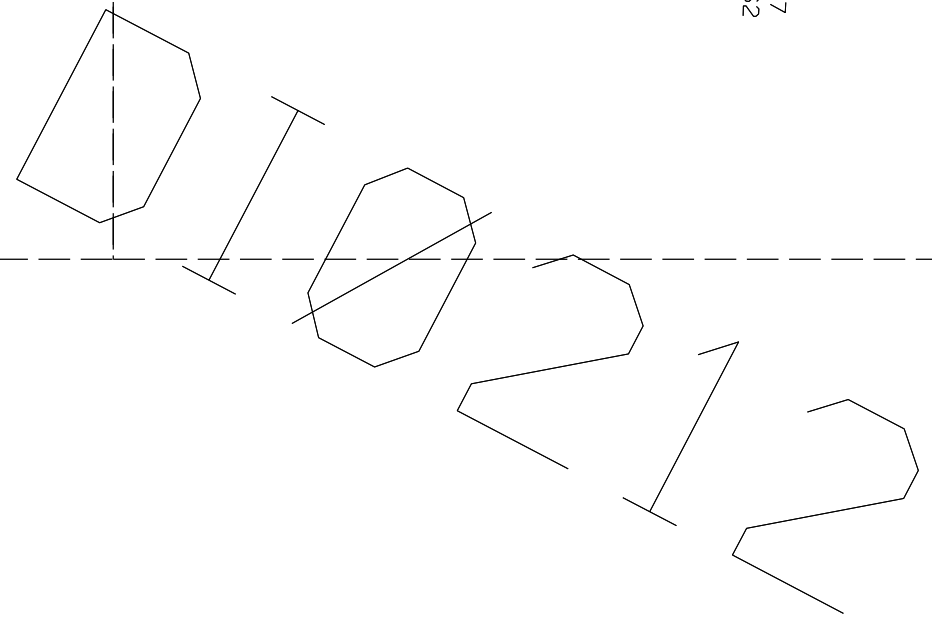
240+05.01



V5

8
(19XX)
18 HWY 137
(CR,651-662
20424N.5)

7
(19XX)
15 HWY 137
(CR,651-662
0424N.5)



256+05.00

272+05.00

272+05.00

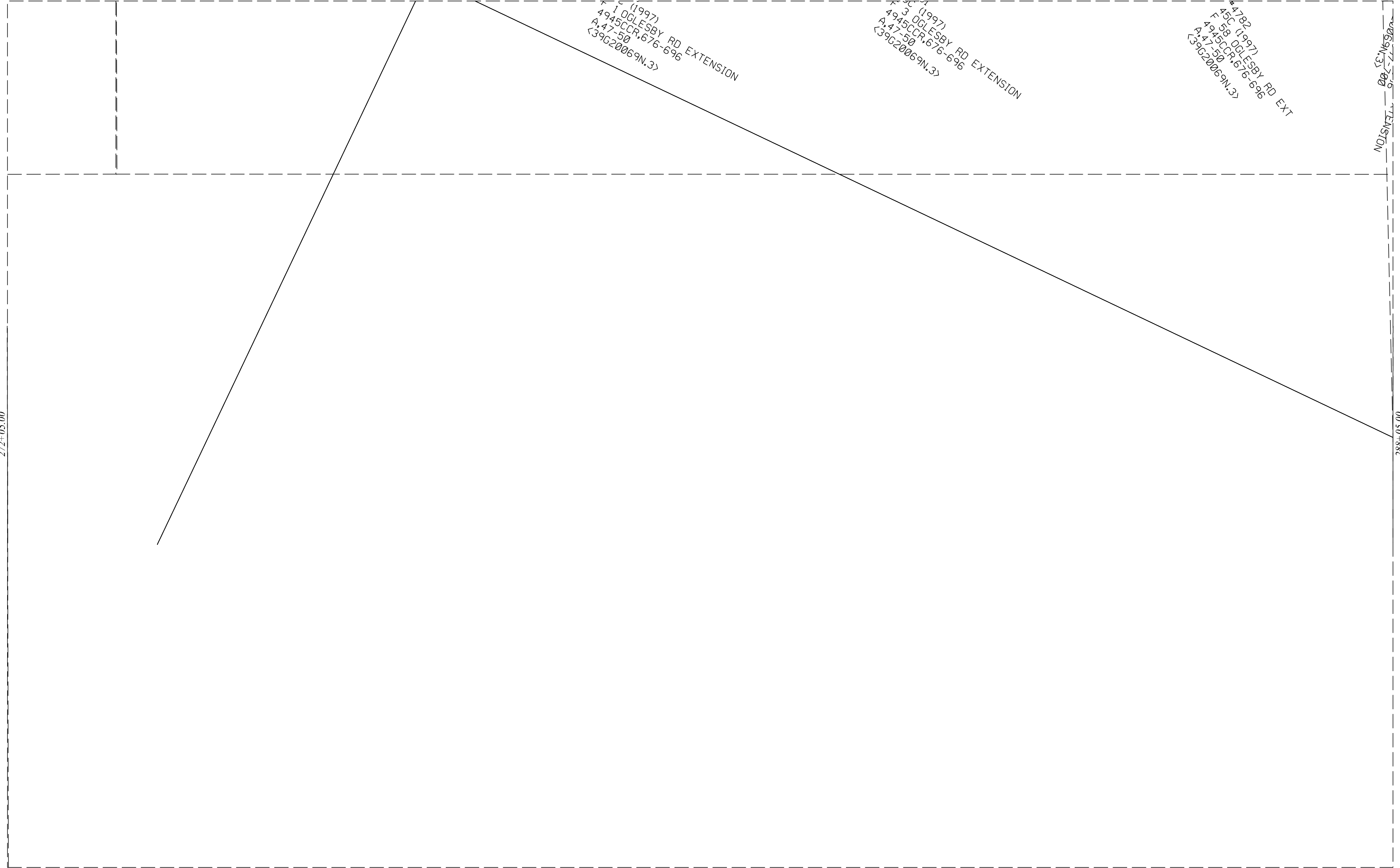
288+05.00

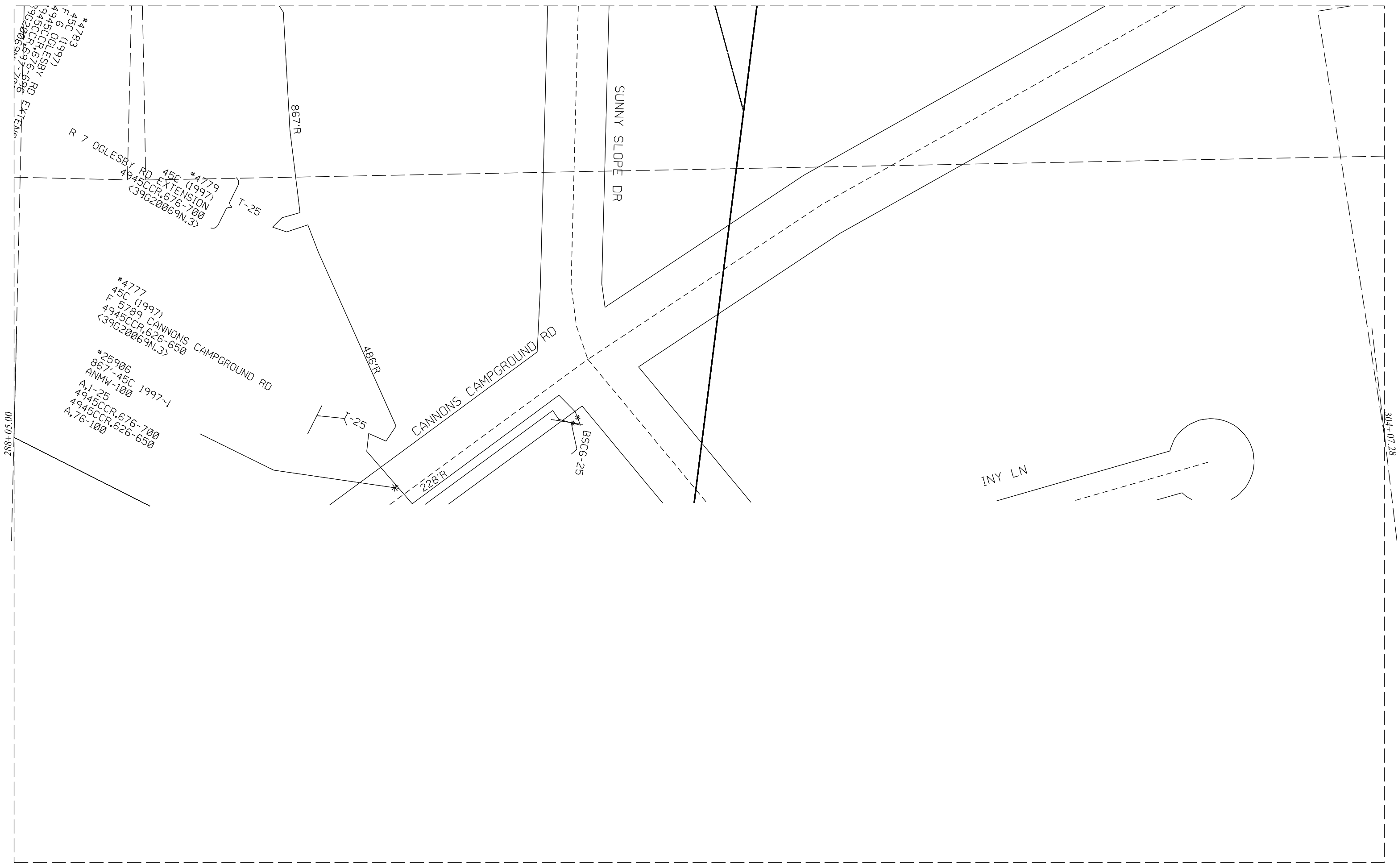
F 1 (1997)
4945CCR,676-696
A,47-50
<39G20069N.3>
DGLESBY RD EXTENSION

F 3 (1997)
4945CCR,676-696
A,47-50
<39G20069N.3>
DGLESBY RD EXTENSION

F 4782 (1997)
458 DGLESBY RD EXT
4945CCR,676-696
A,47-50
<39G20069N.3>

0659N.3J
7-16
00
71
DGLESBY RD EXTENSION





#4783
45C (1997)
F 5 OGLESBY
4945CCR,676-700
99G20069N.3
R 7 OGLESBY RD EXTENSION

#4779
45C (1997)
F 5 OGLESBY
4945CCR,676-700
(39G20069N.3)
T-25

#4777
45C (1997)
F 5789 CANNONS CAMPGROUND RD
4945CCR,626-650
(39G20069N.3)

*25906
867'-45C 1997-1
ANMW-100
A,1-25
4945CCR,676-700
4945CCR,626-650
A,76-100

867'R

486'R

228'R

SUNNY SLOPE DR

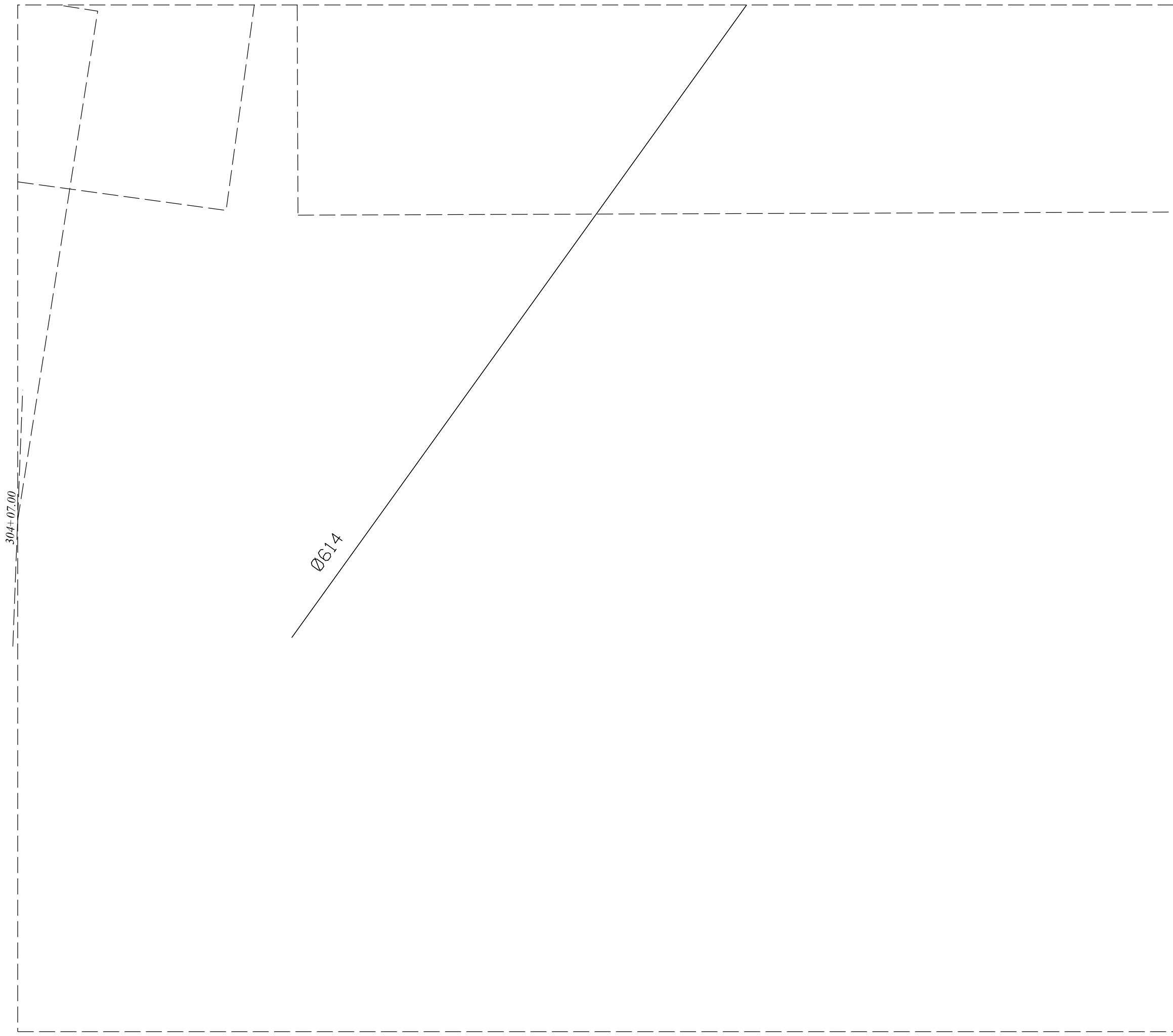
CANNONS CAMPGROUND RD

BSC6-25

INY LN

288+05.00

304+07.28



304+07.00

Ø614



January 8, 2015

Mr. Ron Dukes
AT&T
100 Belton Drive
Spartanburg, South Carolina 29349

Re: File P027114 – Contract Id. No. 8888860 – Relocation of Telecommunication Toll Facilities – I-85
Widening from Mile Marker 80 to 96 – Cherokee/Spartanburg Counties

Dear Mr. Dukes:

The South Carolina Department of Transportation is currently under contract with Infrastructure Consulting & Engineering (ICE) to perform Design Build Preparation Services relating to the above referenced project. As part of these design efforts, survey, subsurface utility engineering and utility coordination will be performed.

The purpose of this letter is to notify you that ICE, CH Engineering and Mead & Hunt will contact you to gather utility data necessary for this project. We ask that you cooperate with them concerning this request such that utility conflicts and concerns can be identified early in the project schedule.

If you should have any questions concerning this, please feel free to contact me.

Sincerely,

keittcc@scdot.org 2015.01.08 13:11:06
-05'07

Cedric C. Keitt
Utility Project Manager

MCA:krc

cc: Brad Reynolds, SCDOT, Program Manager
Robert Ryggs, SCDOT, Utility Coordinator District Three
Jamie Fowler Jr., SCDOT, Utility Coordinator District Four
Shane Parris, Resident Construction Engineer, Cherokee County
Mark C. Attaway, SCDOT, HQ State Utility Engineer Dennis
Joel Wimberly, SCDOT, HQ Utility Project Manager
Gus Kretschmer, ICE Engineering, Utility Relocation Coordinator Manager
Scott Logeman, AT&T
Dwight Meadow, AT&T
File:RW/UM/CCK



PRELIMINARY UTILITY REPORT, UTILITY INFORMATION

Project Owner: SCDOT
File Number:
Project ID Number: P027114
Project Name: I-85 Widening Improvements Mile Marker 80 to 96
County: Spartanburg & Cherokee

Type: Telecommunication, Toll/Data/Long Distance,

SC811 & SUE Code: ATT09 T1 (TRANSMISSION)

Utility: AT&T Transmission

Contact: Scott Logeman 770.602.2120 s11213@att.com
5390 Overbend Trail, Suwanee GA, 30024

DH Communications (AT&T Contractor)
Ron Dukes 803.796.0884 rmdukes@att.net
180 Monarch Road Swansea, SC 29160

Existing Facility: I-85 station 1266+00 (SUE Sheet UT_B11) Fiber Optic cable directed buried (900+/-LF) crossing Frontage Road and I-85 C/A ROW in two steel ducts, 4-inch & 10-inch that was installed by horizontal directional drill under I-85

Prior Rights: Cable crossing SCDOT ROW by encroachment permit not having prior rights; cable outside present SCDOT ROW in AT&T easement has prior rights

Impact: Impact/conflict in areas of Frontage Road realignment, excavation for vertical curve improvements, drainage improvements/additions

Relocation: AT&T will evaluate changes to Frontage Road and I-85 for impact to duct carrying fiber optic cable to determine if replacement ducts are needed

Estimated Relocation Cost: \$100,000.00+, shared cost

Future Facility: NONE anticipated

Restrictions and/or Moratoriums: Relocate by wire center area, coordinate with telecom customer schedule for outage windows to complete cable splicing and switchover, replacement cable splice, signal verified before existing cable be removed

Notice to Proceed: Roadway Construction NTP

Estimated Time to Relocate: 1 month plus

In-Contract Work: Install replacement ducts; cable, enclosures, splicing work is all proprietary to AT&T

MAGG RD

WARNING
NO TRUCKS





WARNING!
BURIED FIBER OPTIC CABLE
IN THIS VICINITY



CALL BEFORE YOU DIG!

VIOLATORS SUBJECT TO PROSECUTION!
FOR FREE LOCATION CALL
1-800-922-0983

AT&T
FOR EMERGENCY CONTACT OR AT&T CALL 1-800-252-4101

**THIS MARKER
OFFSET
FROM
CABLE**



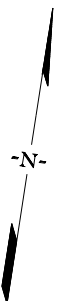
WARNING!
BURIED FIBER OPTIC CABLE
IN THIS VICINITY
CALL BEFORE YOU DIG!
VIOLATORS SUBJECT TO PROSECUTION
FOR FREE LOCATION CALL
1-800-922-0983

WARNING!
BURIED FIBER OPTIC CABLE
IN THIS VICINITY
CALL BEFORE YOU DIG!
VIOLATORS SUBJECT TO PROSECUTION
FOR FREE LOCATION CALL
1-800-922-0983

AT&T
800-922-0983

808

FED. RD. DR. NO.	STATE	COUNTY	PROJECT ID	ROAD / ROUTE NO.	SHEET NO.
3	SC	SPARTANBURG CHEROKEE	P027114	INTERSTATE 85	UT_B11



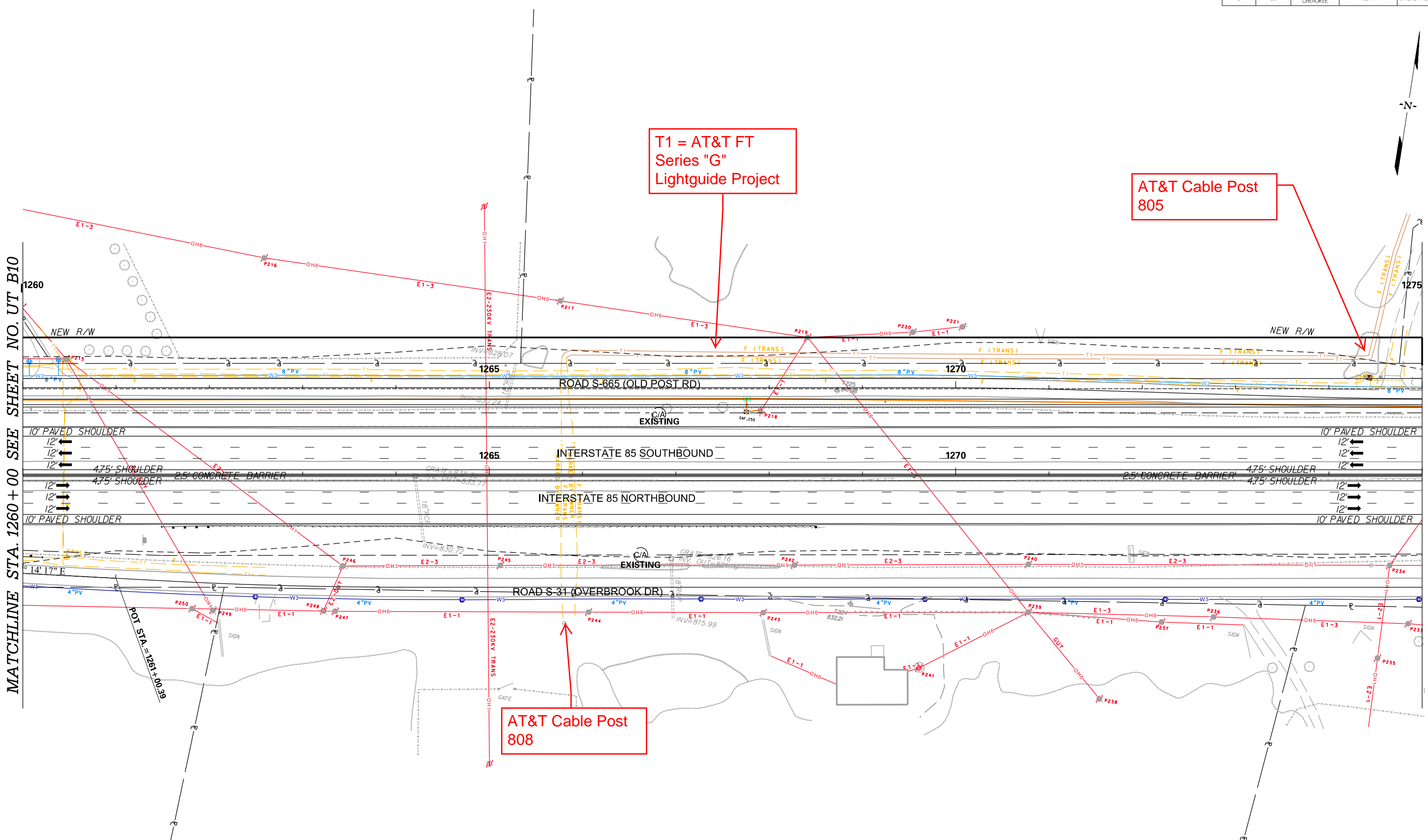
T1 = AT&T FT
Series "G"
Lightguide Project

AT&T Cable Post
805

AT&T Cable Post
808

MATCHLINE STA. 1260 + 00 SEE SHEET NO. UT_B10

MATCHLINE STA. 1275 + 00 SEE SHEET NO. UT_B12



<p>PRELIMINARY NOT FOR CONSTRUCTION</p>	7				<p>SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION INTERSTATE 85</p> <p>UTILITY PLAN SHEET</p> <p>INTERSTATE 85 MILE MARKER 90-97 SEGMENT B</p>
	6				
	5				
	4				
	3				
	2				
	1				
	REV. NO.	BY	DATE	DESCRIPTION OF REVISION	

SCALE: 1" = 50'

Z:\Projects\14-60 185 Widening Cherokee Co MM80-96\Utilities\sheets\SHT_UT_B11.dgn
12/28/2015



January 8, 2015

Mr. Jeffery Humphries
Staking Technician
Broad River Electric Cooperative, Inc. 811
Hamrick Street
Gaffney, South Carolina 29342

Re: File P027114 – Contract Id. No. 8888860 – Relocation of Electric Facilities – I-85 Widening from
Mile Marker 80 to 96 – Cherokee/Spartanburg Counties

Dear Mr. Humphries:

The South Carolina Department of Transportation is currently under contract with Infrastructure Consulting & Engineering (ICE) to perform Design Build Preparation Services relating to the above referenced project. As part of these design efforts, survey, subsurface utility engineering and utility coordination will be performed.

The purpose of this letter is to notify you that ICE, CH Engineering and Mead & Hunt will contact you to gather utility data necessary for this project. We ask that you cooperate with them concerning this request such that utility conflicts and concerns can be identified early in the project schedule.

If you should have any questions concerning this, please feel free to contact me.

Sincerely,

 keittcc@scdot.org
2015.01.08 13:18:08
-05'00'

Cedric C. Keitt
Utility Project Manager

MCA:krc

cc: Brad Reynolds, SCDOT, Program Manager
Robert Ryggs, SCDOT, Utility Coordinator District Three
Jamie Fowler Jr., SCDOT, Utility Coordinator District Four
Shane Parris, Resident Construction Engineer, Cherokee County
Mark C. Attaway, SCDOT, HQ State Utility Engineer
Dennis Joel Wimberly, SCDOT, HQ Utility Project Manager
Gus Kretschmer, ICE Engineering, Utility Relocation Coordinator Manager
File:RW/UM/CCK



PRELIMINARY UTILITY REPORT, UTILITY INFORMATION

Project Owner: SCDOT
File Number:
Project ID Number: P027114
Project Name: I-85 Widening Improvements Mile Marker 80 to 96
County: Spartanburg & Cherokee

Type: Electric Distribution

SC811 & SUE Code: BRE32 & E1

Utility: Broad River Electric Cooperative, INC.

Contact: Jeffery Humphries, Staking Technician
864.489.5737 jhumphries@broadriverelectric.com
811 Hamrick Street, Gaffney, SC 29342

Existing Facility: Single and 3Phase aerial electric distribution on wood poles (20,000+/-LF) and underground services (4,300+/-LF) in Cherokee County

Prior Rights: Cooperative wood poles are generally set 1FT outside present road right of way for prior rights with road and Interstate crossings are generally by encroachment

Impact: Shifting Frontage Roads alignment, Interstate vertical changes and new interchanges will impact existing poles and Interstate crossings, will need to be relocated

Relocation: Set replacement poles to 1FT outside Frontage Roads NEW right of way, set taller poles for Interstate crossings for vertical changes and relocate for new interchanges to 1FT outside Frontage Roads

Estimated Relocation Cost: \$1,000,000.00+/-, shared cost

Future Facility: NONE

Restrictions and/or Moratoriums: Business/Commercial customers schedule for line outage, switchover and scheduling SCHP for traffic control for any Interstate crossing relocation

Notice to Proceed: Utility Relocation Agreement and Encroachment Application approved by SCDOT Utility Office

Estimated Time to Relocate: 3 to 6 months

In-Contract Work: NONE



BROAD RIVER ELECTRIC COOPERATIVE
DISTRIBUTION LINES CROSSING HWY 85
NOV. 20, 2014 SCALE: 1" = 200'
DRAWING 1 OF 6



336 ACSR / 336 ACSR 3 Ph
DOUBLE CIRCUIT

336 ACSR / 336 ACSR 3 Ph



BROAD RIVER ELECTRIC COOPERATIVE
DISTRIBUTION LINES CROSSING HWY 85
NOV. 20, 2014 SCALE: 1" = 200'
DRAWING 3 OF 6



BROAD RIVER ELECTRIC COOPERATIVE
DISTRIBUTION LINES CROSSING HWY 85
NOV. 20, 2014 SCALE: 1" = 200'
DRAWING 4 OF 6



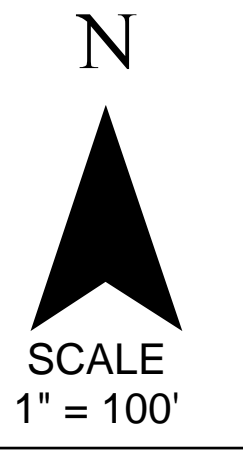
BROAD RIVER ELECTRIC COOPERATIVE
DISTRIBUTION LINES CROSSING HWY 85
NOV. 20, 2014 SCALE: 1" = 200'
DRAWING 5 OF 6

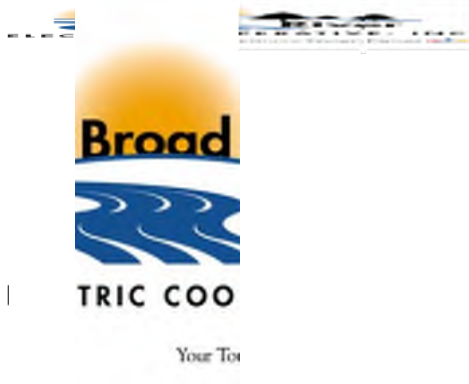


2 ACSR / 2 ACSR 1 Ph

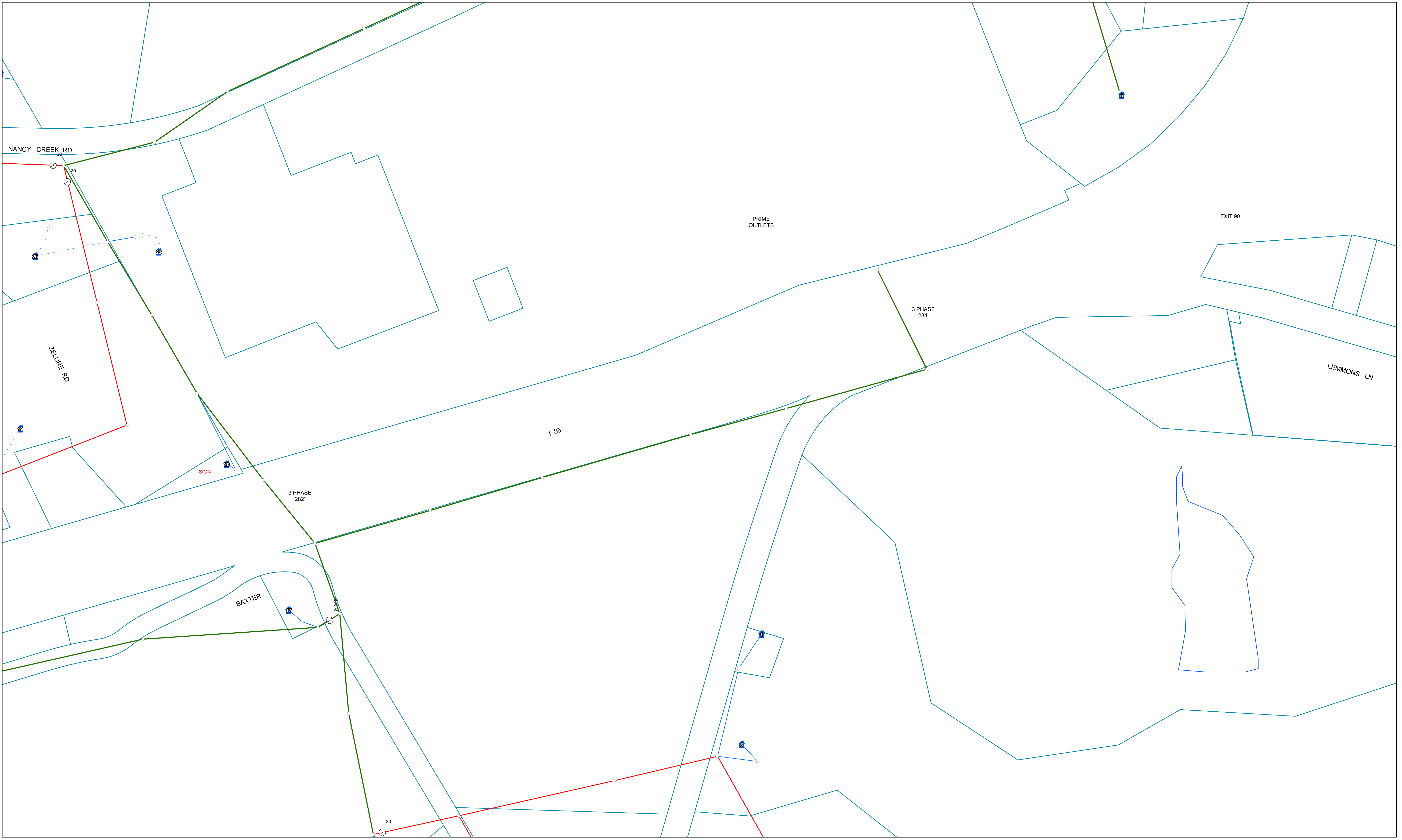
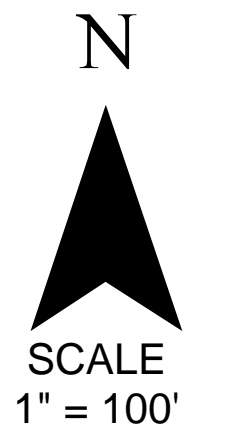


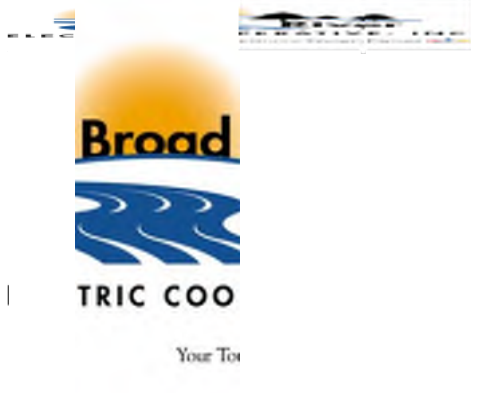
WIDENING OF INTERSTATE 85 BROAD RIVER ELECTRIC COOPERATIVE EXISTING LINES



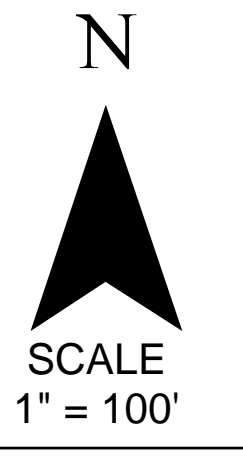


WIDENING OF INTERSTATE 85 BROAD RIVER ELECTRIC COOPERATIVE EXISTING LINES



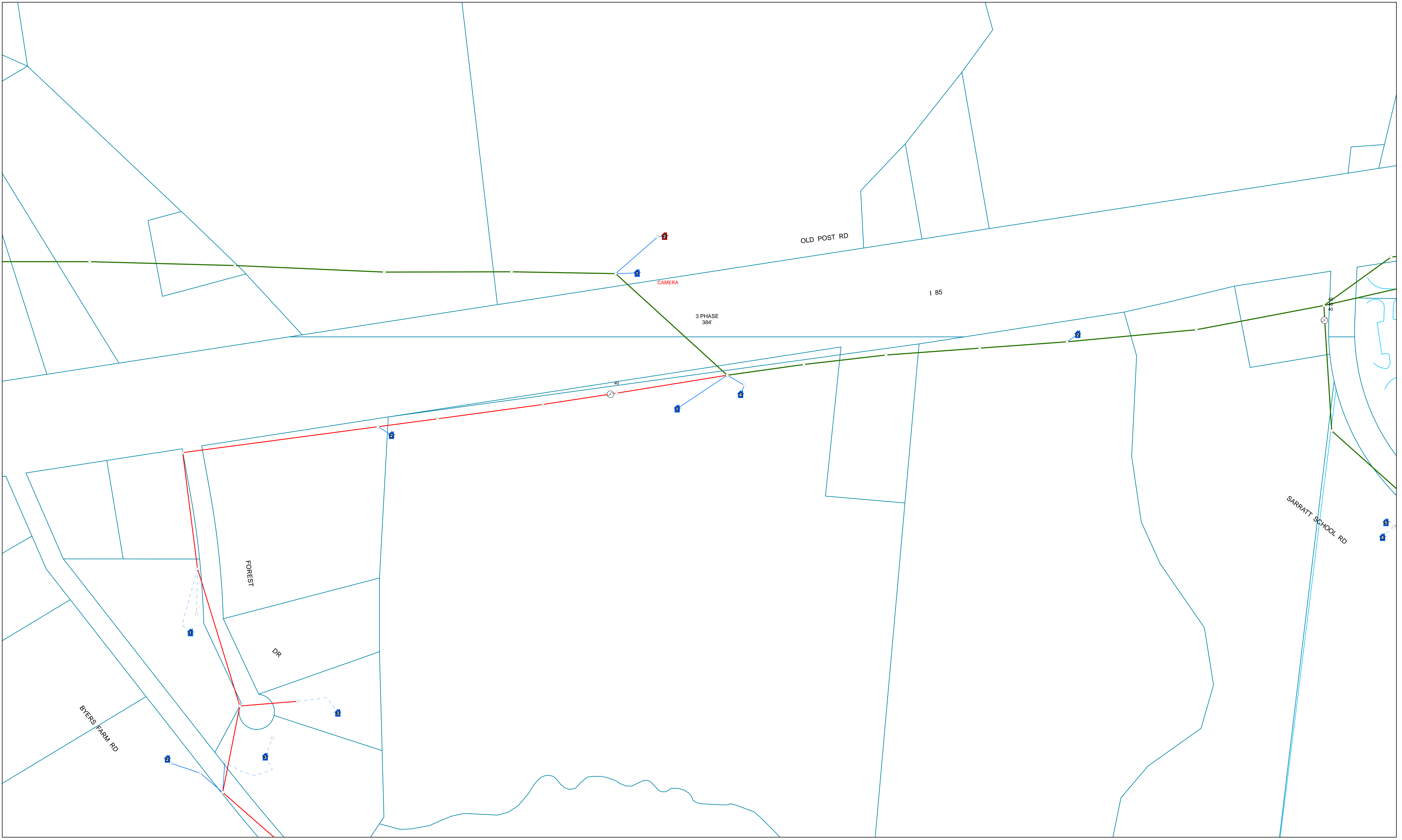
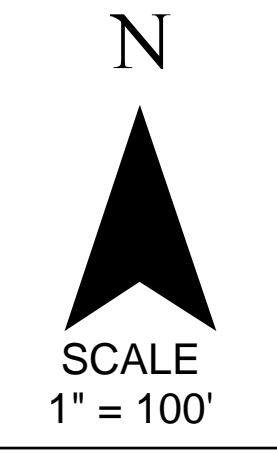


WIDENING OF INTERSTATE 85 BROAD RIVER ELECTRIC COOPERATIVE EXISTING LINES



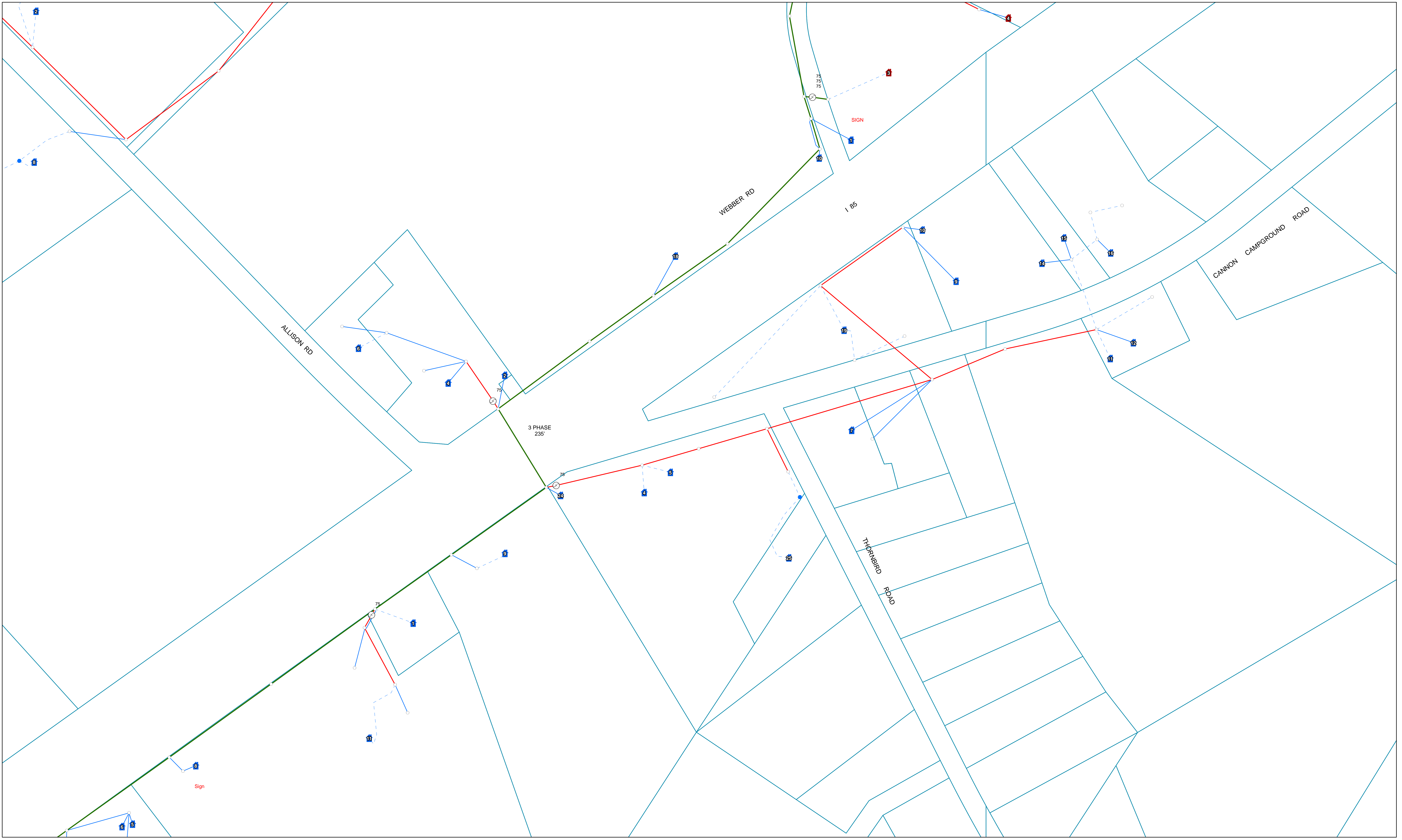
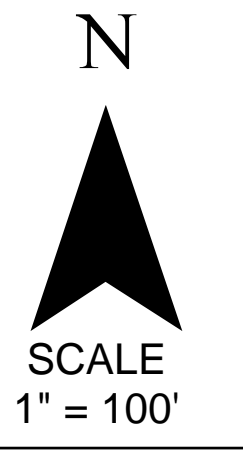


WIDENING OF INTERSTATE 85 BROAD RIVER ELECTRIC COOPERATIVE EXISTING LINES





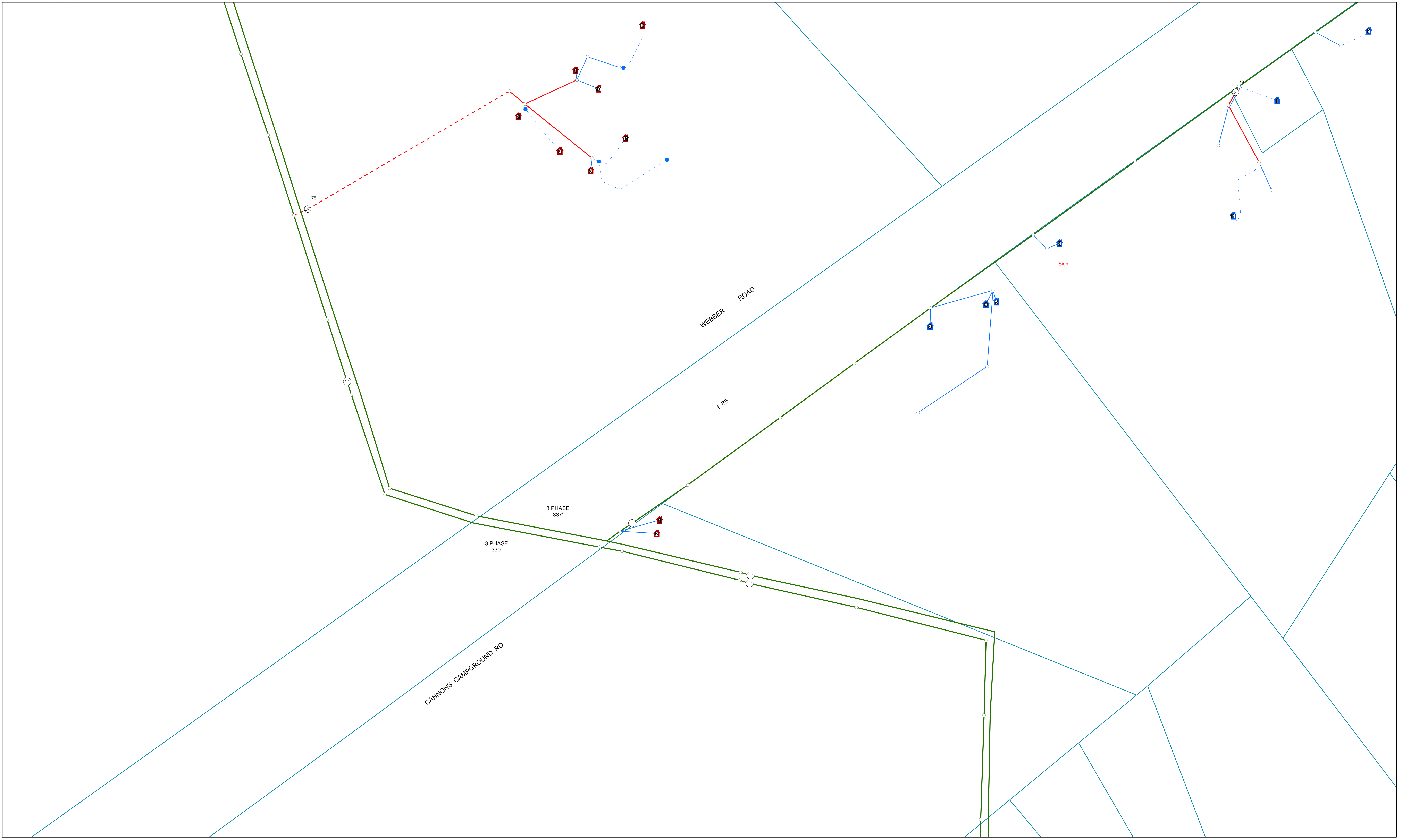
WIDENING OF INTERSTATE 85 BROAD RIVER ELECTRIC COOPERATIVE EXISTING LINES





WIDENING OF INTERSTATE 85 BROAD RIVER ELECTRIC COOPERATIVE EXISTING LINES

N
SCALE
1" = 100'



January 8, 2015

Ms. Karen Fisher
Project Coordinator
Charter Communications
124 Willis Plaza Road
Gaffney, South Carolina 29342

Re: File P027114 – Contract Id. No. 8888860 – Relocation of Telecommunication Facilities – I-85
Widening from Mile Marker 80 to 96 – Cherokee/Spartanburg Counties

Dear Ms. Fisher:

The South Carolina Department of Transportation is currently under contract with Infrastructure Consulting & Engineering (ICE) to perform Design Build Preparation Services relating to the above referenced project. As part of these design efforts, survey, subsurface utility engineering and utility coordination will be performed.

The purpose of this letter is to notify you that ICE, CH Engineering and Mead & Hunt will contact you to gather utility data necessary for this project. We ask that you cooperate with them concerning this request such that utility conflicts and concerns can be identified early in the project schedule.

If you should have any questions concerning this, please feel free to contact me.

Sincerely,

 keittcc@scdot.org
2015.01.08 13:18:56 -05'00'

Cedric C. Keitt
Utility Project Manager

MCA:krc

cc: Brad Reynolds, SCDOT, Program Manager

Robert Ryggs, SCDOT, Utility Coordinator District Three

Jamie Fowler Jr., SCDOT, Utility Coordinator District Four

Shane Parris, Resident Construction Engineer, Cherokee County

Mark C. Attaway, SCDOT, HQ State Utility Engineer

Dennis Joel Wimberly, SCDOT, HQ Utility Project Manager

Gus Kretschmer, ICE Engineering, Utility Relocation Coordinator Manager

File:RW/UM/CCK



PRELIMINARY UTILITY REPORT, UTILITY INFORMATION

Project Owner: SCDOT
File Number:
Project ID Number: P027114
Project Name: I-85 Widening Improvements Mile Marker 80 to 96
County: Spartanburg & Cherokee

Type: CATV

SC811 & SUE Code: CCMZ41 & TV1

Utility: Charter Communications

Contact: Larry Camp, Construction Coordinator
864.598.0817 larry.camp@chartercom.com
110 Commercial Road Spartanburg, SC 29304

Existing Facility: Aerial coaxial/fiber optic cables (42,800LF+) and underground cables (10,500LF+)

Prior Rights: By franchise and joint use agreement CATV do not have prior rights for aerial cables attached to electric distribution poles, underground cables outside present right of way if in an easement may have prior rights

Impact: Where electric distribution poles are in conflict and require adjustment/relocation

Relocation: Charter Communications will follow after replacement poles are set and electric distribution is completed with work

Estimated Relocation Cost: \$250,000.00 Charter Communication responsibility

Future Facility: NONE anticipated

Restrictions and/or Moratoriums: Commercial/business customers schedule for splicing and cutover, SCHP scheduling for Interstate traffic control for crossing relocations

Notice to Proceed: Joint planning with electric distribution, DUKE Energy and BREC

Estimated Time to Relocate: 3 to 6 months

In-Contract Work: NONE, cable installation by master contractor and splicing by company forces

PRELIMINARY UTILITY REPORT, UTILITY INFORMATION

Project Owner: SCDOT
File Number:
Project ID Number: P027114
Project Name: I-85 Widening Improvements Mile Marker 80 to 96
County: Spartanburg & Cherokee

Type: Cell Tower

SC811 & SUE Code:

Utility: Crown Castle

Contact: Roxanne Garman, Real Estate Specialist, East Area, Special Projects
980.209.8247 roxanne.garman@crowncastel.com
3530 Toringdon Way Suite 300 Charlotte, NC 28277

Existing Facility: Cell Tower I-85 sta. 1207+00RT; Crown Castle Business Unit #806192, Address 6389 Cannon Campground Road Gaffney, SC; Site GNV-048-930344-COWPENS

Prior Rights: Fenced compound outside SCDOT ROW in a Crown Castle tower easement, SCDOT responsible for relocation cost

Impact: No impact to Cannon Campground Road Tower, is outside I-85 Present ROW and buried cables (AT&T) supporting the tower on S234 (Cannon Campground Road) are not impacted.

Relocation: Need to be able to access the tower and park in front of the tower compound to get to the entry gates in the future. Please make sure that we and our customers are able to access the tower and tower equipment 24/7, in case there is an emergency or customer equipment failure.

Estimated Relocation Cost: NO IMPACT to cell tower

Future Facility: None anticipated

Restrictions and/or Moratoriums: Any service disruptions are scheduled with cellular carriers

Notice to Proceed: 30 Days

Estimated Time to Relocate: NO IMPACT to cell towers

In-Contract Work: NONE



www.crowncastle.com

FOR LEASE
INFORMATION:

877-486-9377

FOR EMERGENCY
24 HOUR SERVICE:

800-788-7011

CROWN BUSINESS
UNIT NUMBER:

806192

SITE ADDRESS: 6389 Cannon Campground Road
Gaffney, SC

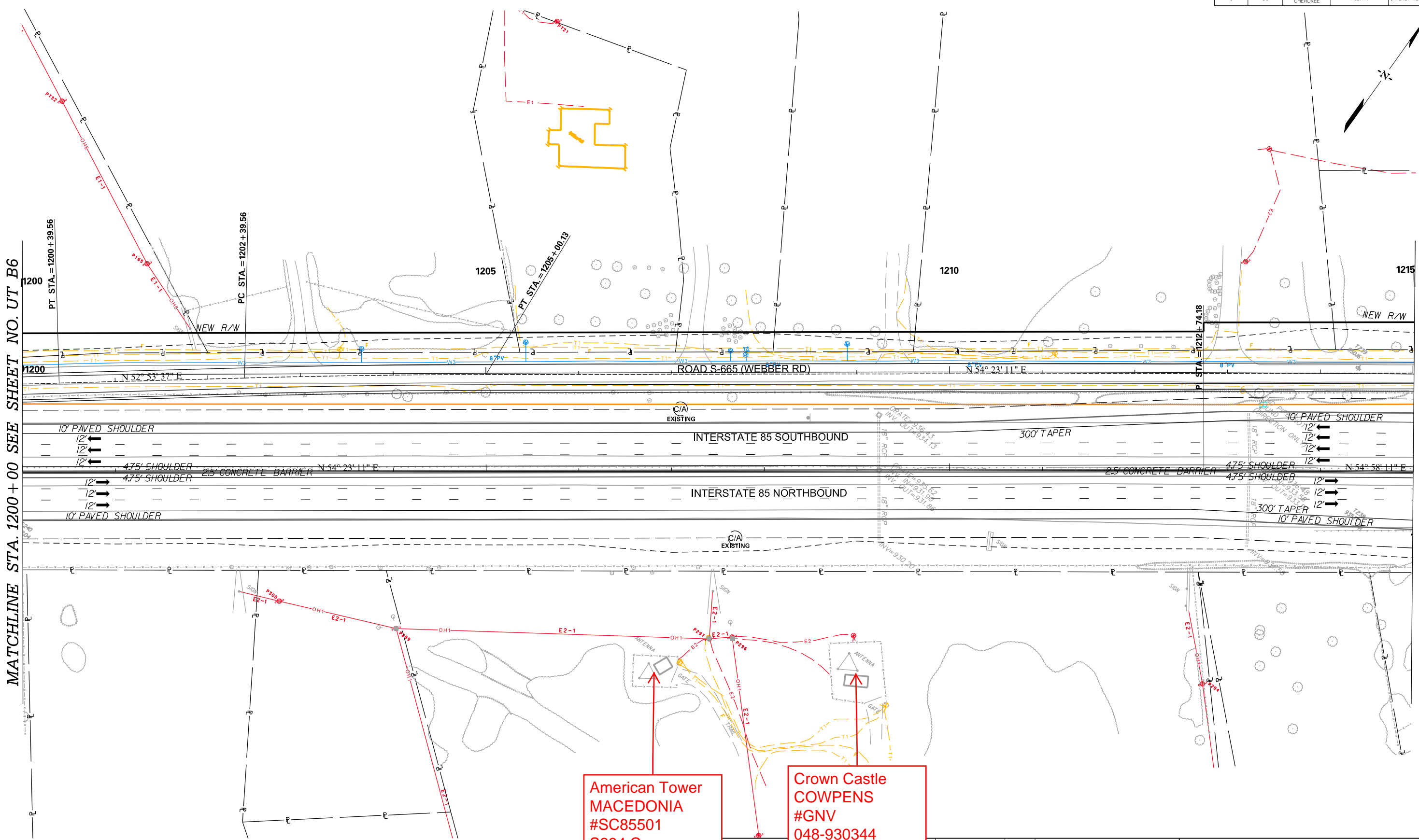
SITE NAME: GIV 048 930344-Gowpens

FCC TOWER
REGISTRATION NO.:

FED. RD. DRW. NO.	STATE	COUNTY	PROJECT ID	ROAD / ROUTE NO.	SHEET NO.
3	SC	SPARTANBURG CHEROKEE	P027114	INTERSTATE 85	UT_B7

MATCHLINE STA. 1200 + 00 SEE SHEET NO. UT_B6

MATCHLINE STA. 1215 + 00 SEE SHEET NO. UT_B8



American Tower
MACEDONIA
#SC85501
S234 Cannon
Campground RD

Crown Castle
COWPENS
#GNV
048-930344
6389 Cannon
Campground RD
Gaffney, SC

RELIM
NOT FOR CON

SCALE: 1" = 50'

REV. NO.	BY	DATE	DESCRIPTION OF REVISION
2			
1			

SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION
INTERSTATE 85

UTILITY PLAN SHEET

INTERSTATE 85 MILE MARKER 90-97
SEGMENT B

January 8, 2015

Ms. Jeanine Bowers
Duke Energy Distribution
920 Beau Avenue MC "SPECO"
Spartanburg, South Carolina 29303

Re: File P027114 – Contract Id. No. 8888860 – Relocation of Distribution Facilities – I-85 Widening
from Mile Marker 80 to 96 – Cherokee/Spartanburg Counties


Dear Ms. Bowers:

The South Carolina Department of Transportation is currently under contract with Infrastructure Consulting & Engineering (ICE) to perform Design Build Preparation Services relating to the above referenced project. As part of these design efforts, survey, subsurface utility engineering and utility coordination will be performed.

The purpose of this letter is to notify you that ICE, CH Engineering and Mead & Hunt will contact you to gather utility data necessary for this project. We ask that you cooperate with them concerning this request such that utility conflicts and concerns can be identified early in the project schedule.

If you should have any questions concerning this, please feel free to contact me.

Sincerely,


keittcc@scdot.org
2015.01.08 14:06:51
-05'00'

Cedric C. Keitt
Utility Project Manager

MCA:krc

cc: Brad Reynolds, SCDOT, Program Manager
Robert Ryggs, SCDOT, Utility Coordinator District Three
Jamie Fowler Jr., SCDOT, Utility Coordinator District Four
Shane Parris, Resident Construction Engineer, Cherokee County
Mark C. Attaway, SCDOT, HQ State Utility Engineer
Dennis Joel Wimberly, SCDOT, HQ Utility Project Manager
Gus Kretschmer, ICE Engineering, Utility Relocation Coordinator Manager
File:RW/UM/CCK



PRELIMINARY UTILITY REPORT, UTILITY INFORMATION

Project Owner: SCDOT
File Number:
Project ID Number: P027114
Project Name: I-85 Widening Improvements Mile Marker 80 to 96
County: Spartanburg & Cherokee

Type: Electric Distribution

SC811 & SUE Code: DPCZ60 & E2

Utility: Duke Energy Carolinas

Contact: Highway.relocation@duke-energy.com
Stephen Ratliff, Senior Engineering Technologist
864.234.4079 stephen.ratliff@duke-energy.com

KCI Technologies (Design Sub-Contractor DUKE Energy)
Carlos Gittens, Senior Project Manager
864.252.0022 carlos.gittens@kci.com
128 Millport Circle Suite 200 Greenville, SC 29607

Existing Facility: Single and 3Phase aerial electric distribution on wood poles (172,000LF+) and underground primary and service lines (28,500LF+) in both Spartanburg and Cherokee Counties.

Prior Rights: DUKE Energy wood poles are generally set 1FT outside present road right of way for prior rights with road and Interstate crossings are generally by encroachment

Impact: Shifting Frontage Roads alignment, Interstate vertical changes and new interchanges will impact existing poles and Interstate crossings, will need to be relocated. KCI is actively verifying pole impact/conflicts and prior rights for 186 poles in the project limits.

Relocation: Set replacement poles to 1FT outside Frontage Roads NEW right of way, set taller poles for Interstate crossings for vertical changes and relocate for new interchanges to 1FT outside Frontage Roads

Estimated Relocation Cost: \$2,100,000.00+/-

Future Facility: NONE anticipated

Restrictions and/or Moratoriums: Business/Commercial customers schedule for line outage, switchover and scheduling SCHP for traffic control for any Interstate crossing relocation

PRELIMINARY UTILITY REPORT, UTILITY INFORMATION

Project Owner: SCDOT

File Number:

Project ID Number: P027114

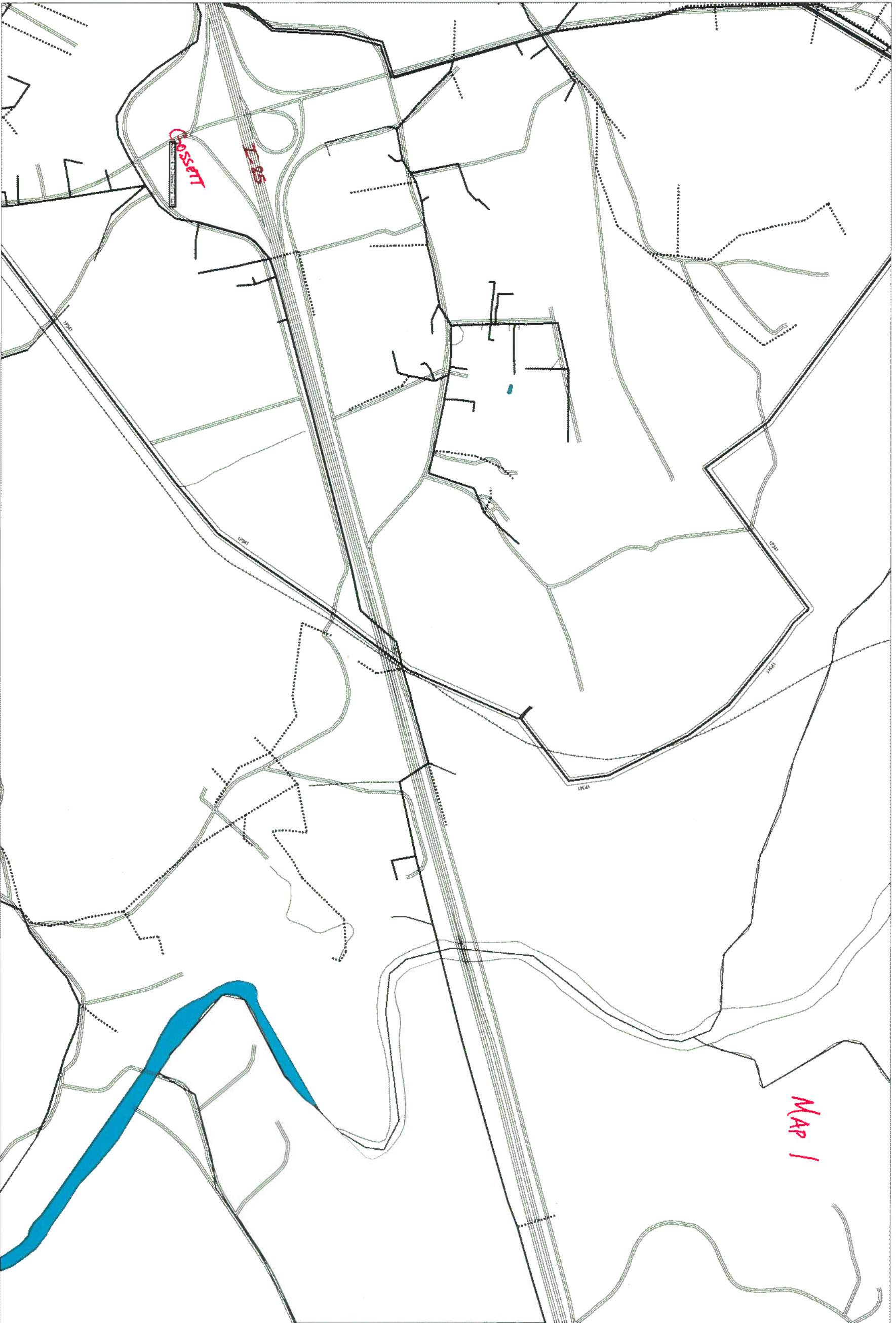
Project Name: I-85 Widening Improvements Mile Marker 80 to 96

County: Spartanburg & Cherokee

Notice to Proceed: KCI is preparing preliminary impact/conflict and relocation plan for DUKE Energy now

Estimated Time to Relocate: 6 to 9 months

In-Contract Work: NONE



Duke Energy

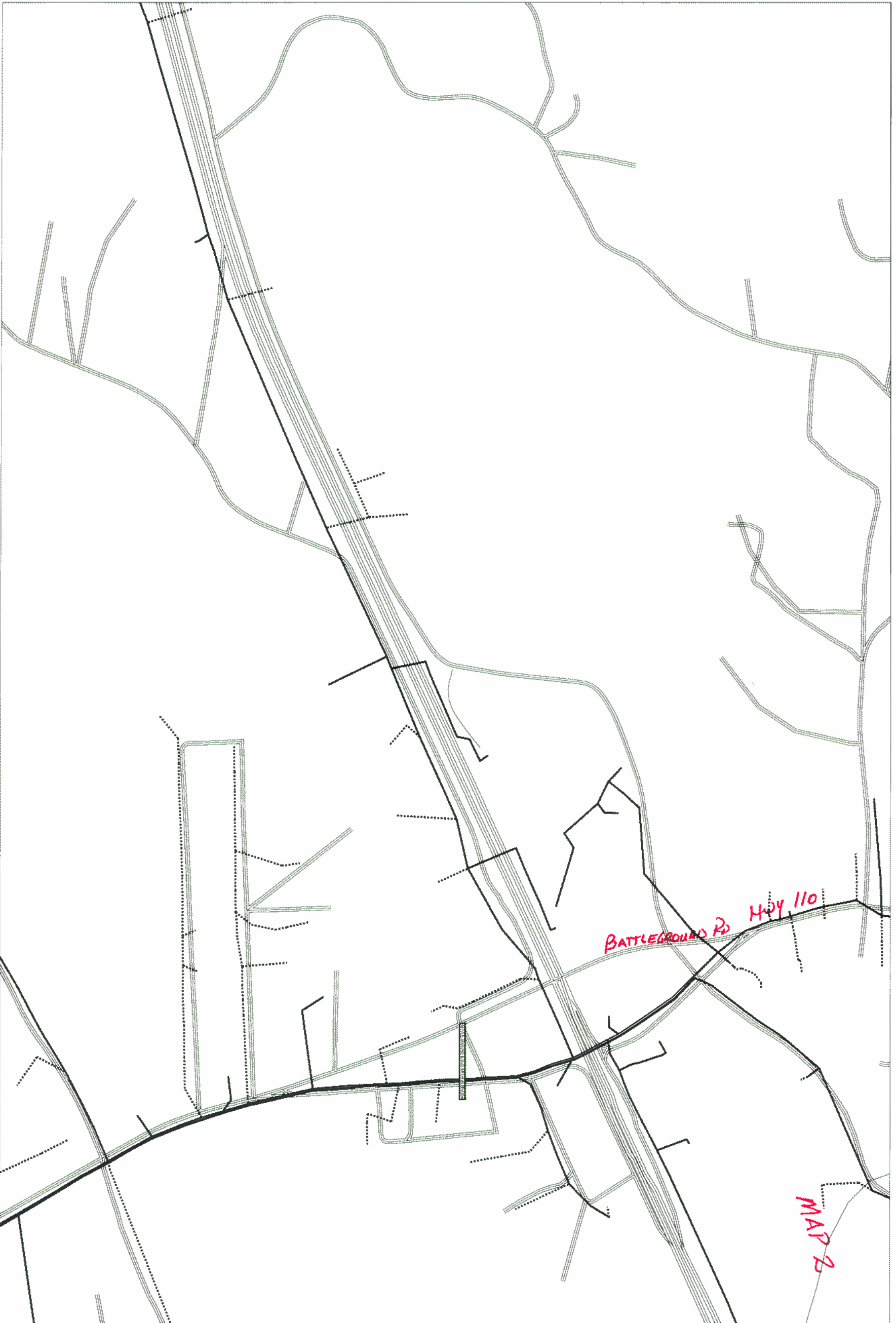
Scale: 1 IN = 1153 FT

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11/26/14 08:05

LAT: 35.032272

LON: -81.859236



MAP 2

BATTLEGROUND RD Hwy 110

Duke Energy

Scale: 1 IN = 973 FT

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11/26/14 08:11

LAT: 35.041374

LON: -81.825115



Duke Energy

Scale: 1 IN = 973 FT

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11/26/14 08:11

LAT: 35.048986

LON: -81.798324



Duke Energy

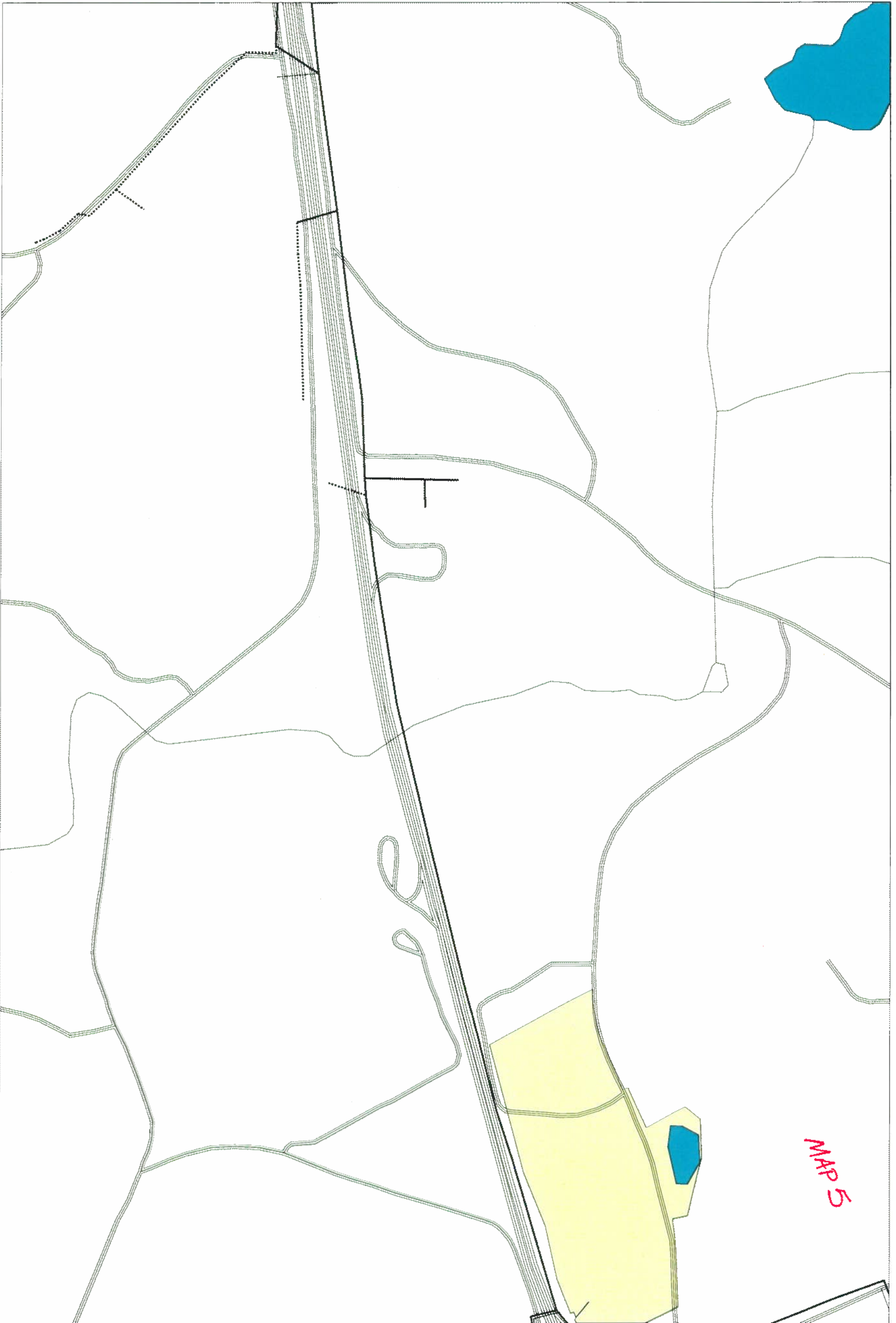
Scale: 1 IN = 973 FT

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11/26/14 08:15

LAT: 35.069611

LON: -81.757058



MAP 5

Duke Energy

Scale: 1 IN = 973 FT

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11/26/14 08:16

LAT: 35.078543

LON: -81.726055

MAP 6

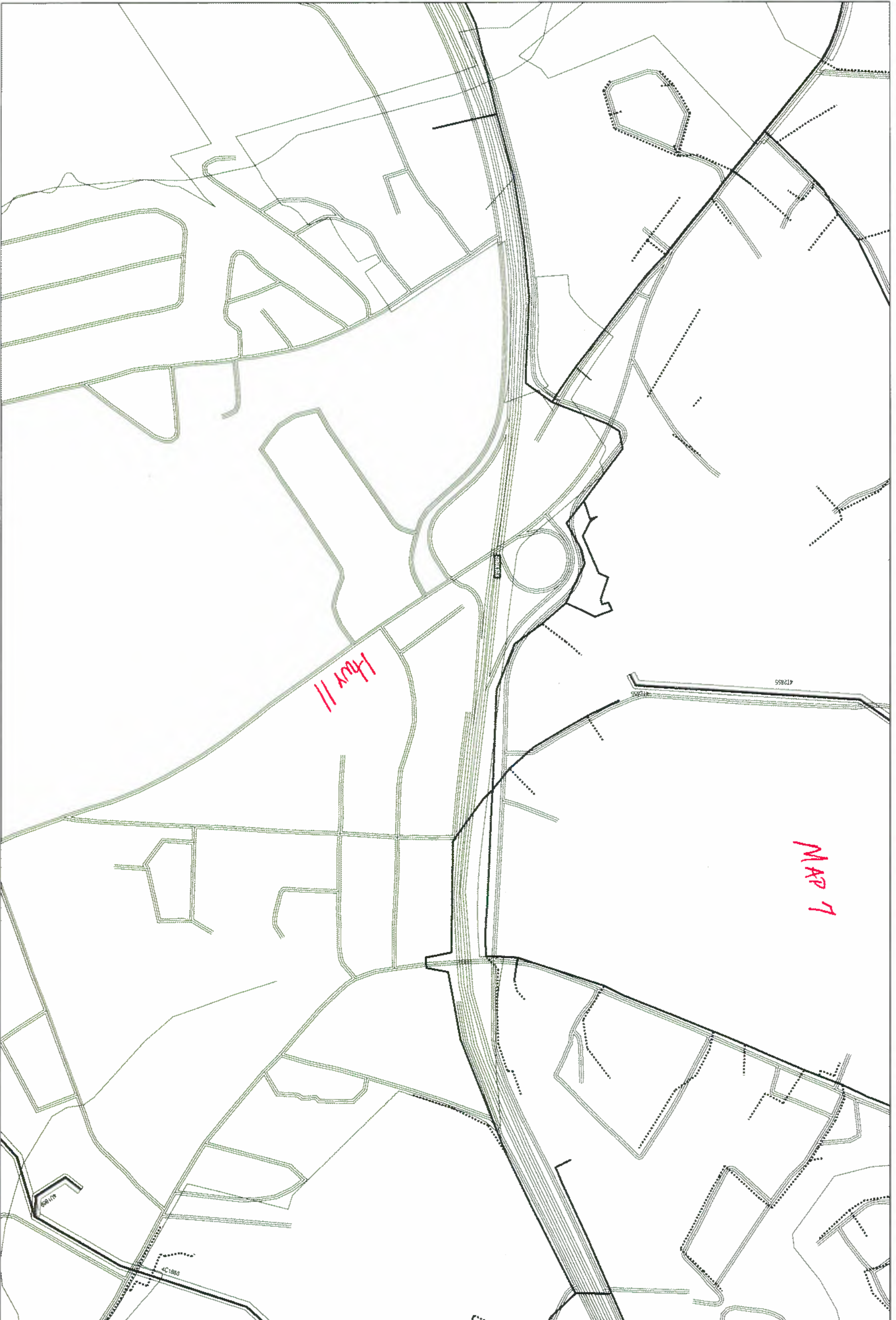


Duke Energy

Scale: 1 IN = 973 FT

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11/26/14 08:18
LAT: 35.087626
LON: -81.692801



Duke Energy

Scale: 1 IN = 973 FT

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11/26/14 08:21

LAT: 35.095957

LON: -81.665280

MAP 8



Duke Energy

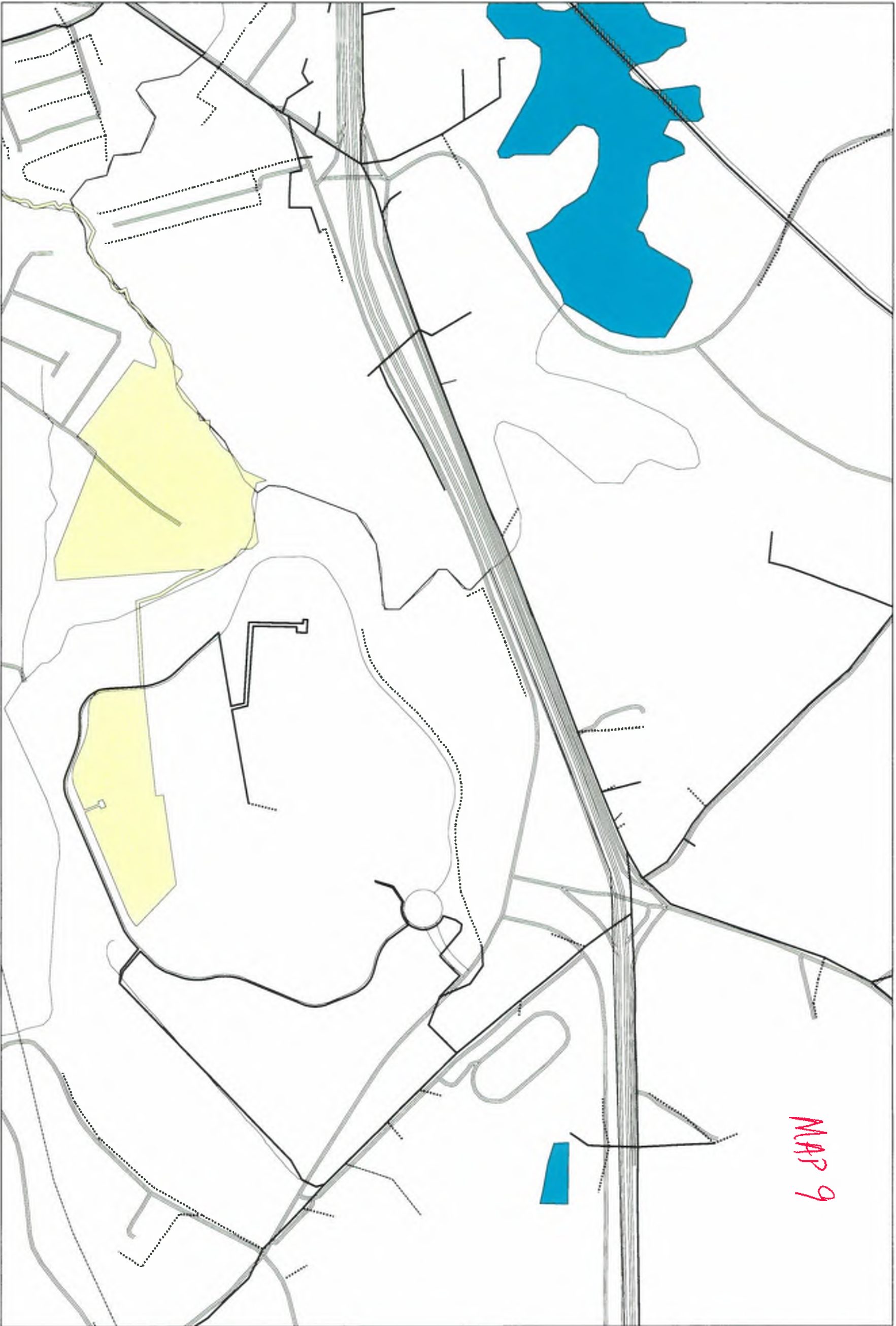
Scale: 1 IN = 1152 FT

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11/26/14 08:52

LAT: 35.097752

LON: -81.649182



MAP 9

Duke Energy

Scale: 1 IN = 1152 FT

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11/26/14 08:52

LAT: 35.105549

LON: -81.609599



MAP 10

Duke Energy

Scale: 1 IN = 1152 FT

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11/26/14 08:53

LAT: 35.114024

LON: -81.578319

PRELIMINARY UTILITY REPORT, UTILITY INFORMATION

Project Owner: SCDOT
File Number:
Project ID Number: P027114
Project Name: I-85 Widening Improvements Mile Marker 80 to 96
County: Spartanburg & Cherokee

Type: Telecommunications

SC811 & SUE Code: DPT77

Utility: DUKE Net (TW Business Cable)

Contact: Bryant Harshfield, Senior IT Telecom Analyst
919.546.3242 bryant.harshfield@duke-energy.com
411 Fayetteville MC-NC6-0675E Raleigh, NC 27601

Existing Facility: DUKE Net is no longer a subsidiary of Duke Energy – it is now part of Time Warner Cable. Based on the physical location of the fiber being attached above the neutral – certified electrical workers have to perform a majority of the work on the overhead fiber. DUKE Energy overhead line crews will still need to relocate the overhead fiber where possible and the labor / material will be included in the estimate provided by DUKE Energy. For any splicing, underground work, etc. – Time Warner will need to get involved. Once everything is identified and the proposed design is prepared, we will know the impact to Duke Net and get the right parties involved.

Prior Rights: DUKE Net cable will maintain the same prior rights as DUKE Energy electric transmission and distribution facilities.

Impact: Where DUKE Net fiber cable is attached to DUKE Energy poles and those poles are in conflict, so will the fiber cable be impacted

Relocation: Aerial fiber cable will follow DUKE Energy pole relocation plan and be relocated by DUKE Energy crews. Underground fiber cable will follow SCDOT Utility Accommodations Policy and be relocated by Time Warner Business Cable crews to outside edge of Present/NEW ROW

Estimated Relocation Cost: Labor / material will be included in the estimate provided by DUKE Energy for DUKE Net relocation

Future Facility: NONE anticipated

Restrictions and/or Moratoriums: Splice/cutover will be scheduled with customer's outage window or scheduled maintenance/service outage windows

Notice to Proceed: Project notification needs to be sent to DUKE Energy Highway Relocations to assign a Project Engineer.

PRELIMINARY UTILITY REPORT, UTILITY INFORMATION

Project Owner: SCDOT

File Number:

Project ID Number: P027114

Project Name: I-85 Widening Improvements Mile Marker 80 to 96

County: Spartanburg & Cherokee

Estimated Time to Relocate: Will follow DUKE Energy electric transmission/distribution crews after electric facilities are completed, 3 months

In-Contract Work: NONE, based on the physical location of the aerial fiber being attached above the neutral – certified electrical workers have to perform a majority of the work on the overhead fiber; underground fiber is to be performed by TW Business Cable crews

January 8, 2015

Mr. Michael Robinson
Duke Energy Transmission
Post Office Box 1006
MC "EC10Q"
Charlotte, North Carolina 28201-1006

Re: File P027114 – Contract Id. No. 8888860 – Relocation of Transmission Facilities – I-85 Widening
from Mile Marker 80 to 96 – Cherokee/Spartanburg Counties


Dear Mr. Robinson:

The South Carolina Department of Transportation is currently under contract with Infrastructure Consulting & Engineering (ICE) to perform Design Build Preparation Services relating to the above referenced project. As part of these design efforts, survey, subsurface utility engineering and utility coordination will be performed.

The purpose of this letter is to notify you that ICE, CH Engineering and Mead & Hunt will contact you to gather utility data necessary for this project. We ask that you cooperate with them concerning this request such that utility conflicts and concerns can be identified early in the project schedule.

If you should have any questions concerning this, please feel free to contact me.

Sincerely,

 keittcc@scdot.org
2015.01.08 14:07:36
-05'00'

Cedric C. Keitt
Utility Project Manager

MCA:krc

cc: Brad Reynolds, SCDOT, Program Manager
Robert Ryggs, SCDOT, Utility Coordinator District Three
Jamie Fowler Jr., SCDOT, Utility Coordinator District Four
Shane Parris, Resident Construction Engineer, Cherokee County
Mark C. Attaway, SCDOT, HQ State Utility Engineer
Dennis Joel Wimberly, SCDOT, HQ Utility Project Manager
Gus Kretschmer, ICE Engineering, Utility Relocation Coordinator Manager
File:RW/UM/CCK



PRELIMINARY UTILITY REPORT, UTILITY INFORMATION

Project Owner: SCDOT
File Number:
Project ID Number: P027114
Project Name: I-85 Widening Improvements Mile Marker 80 to 96
County: Spartanburg & Cherokee

Type: Electric Transmission

SC811 & SUE Code: DPCZ60 & E2

Utility: DUKE Energy Carolinas

Contact: highway.relocations@duke-energy.com
Jeremy Sabo, Engineering Technologist II
704.382.8396 jeremy.sabo@duke-energy.com
526 South Church Street MC-EC10Q Charlotte, NC 28202

Existing Facility: Spartanburg County - 100kVA Hystron White (parallel to CSXRR) crossing I-85 sta. 895+00 SUE line "OH1"
Cherokee County - 230 kVA Goucha Black & White crossing I-85 sta. 1625+00, 44kVA Gaffney#1 Black & White crossing I-85 sta. 1610+00, 100kVA Robb Black & White crossing I-85 sta. 1611+00, 44kVA Gaffney crossing I-85 sta. 1615+00

Prior Rights: Transmission structures are outside present SCDOT ROW and C/AROW, adjustment/relocation cost is the responsibility of SCDOT

Impact: NONE anticipated with transmission structures clear of widening, vertical clearance will need to be verified for any change to profile of I-85 under the conductors

Relocation: NONE anticipated with transmission structures, verify vertical clearance and adjust as necessary

Estimated Relocation Cost: NONE

Future Facility: NONE anticipated

Restrictions and/or Moratoriums: Summer cooling, winter heating periods and power plant maintenance to schedule line outage for any adjustment work

Notice to Proceed: 3 months

Estimated Time to Relocate: 1 month

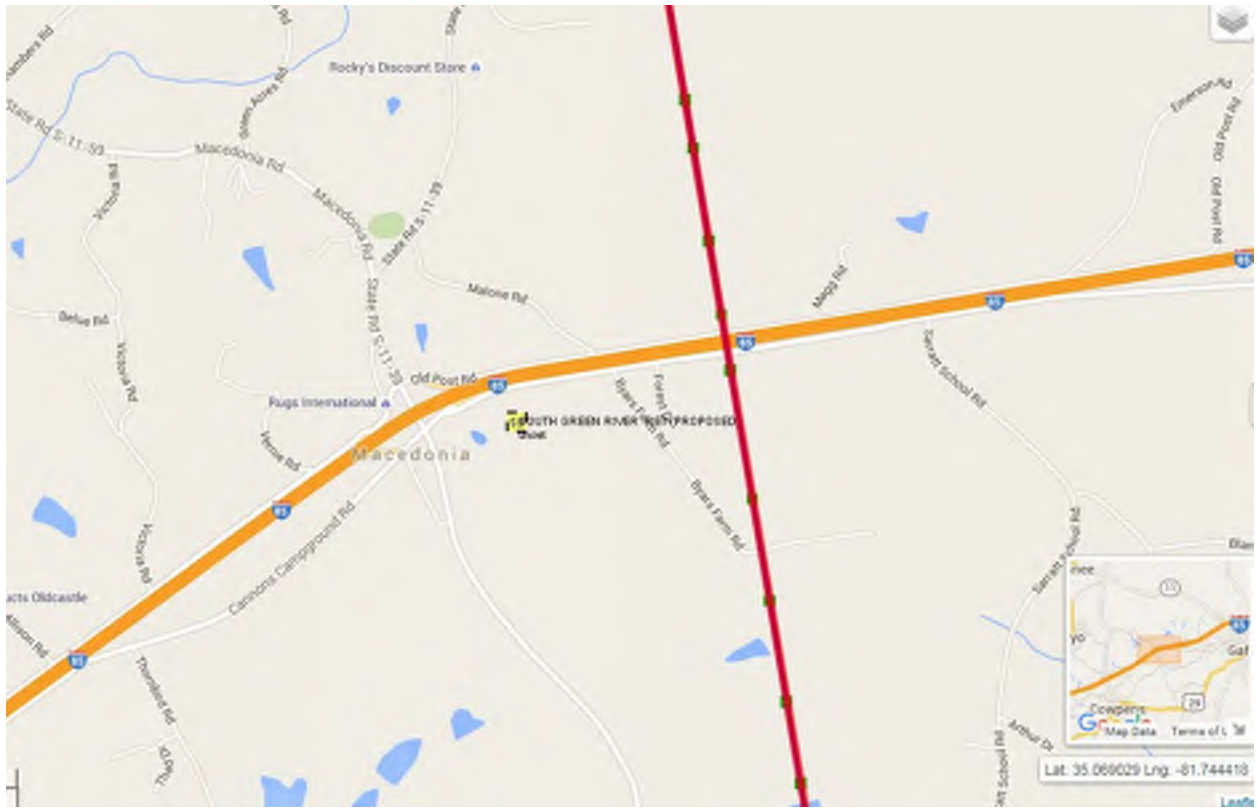
In-Contract Work: NONE





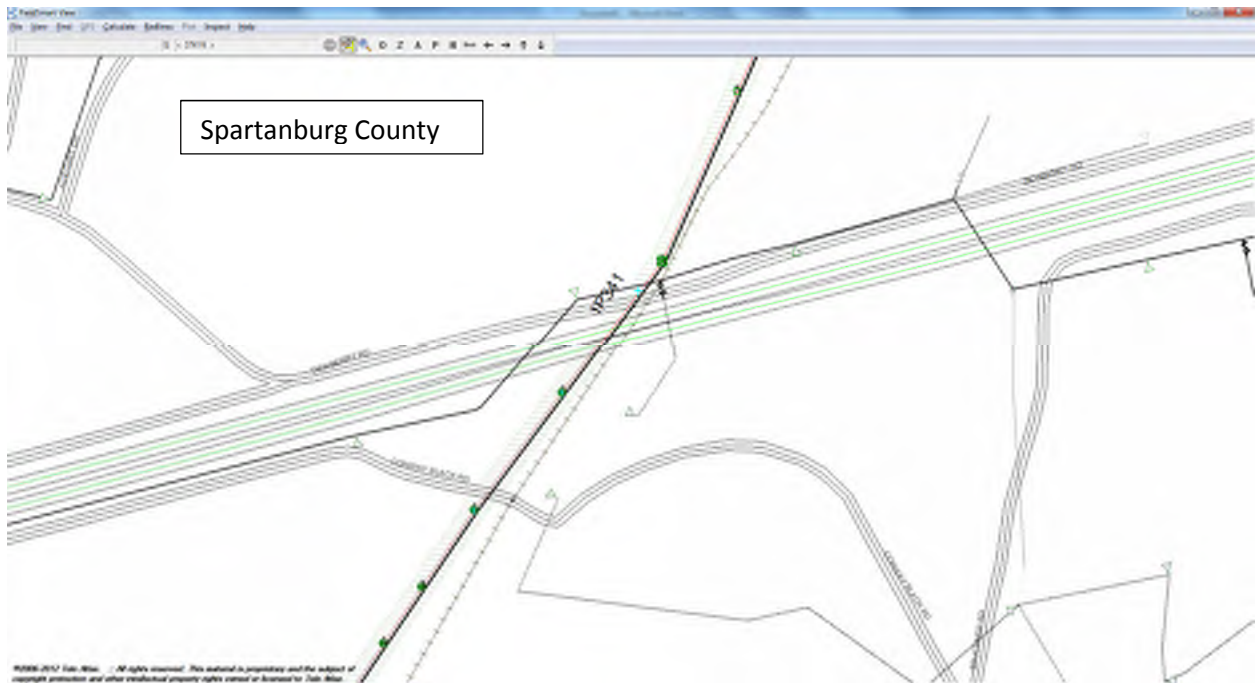




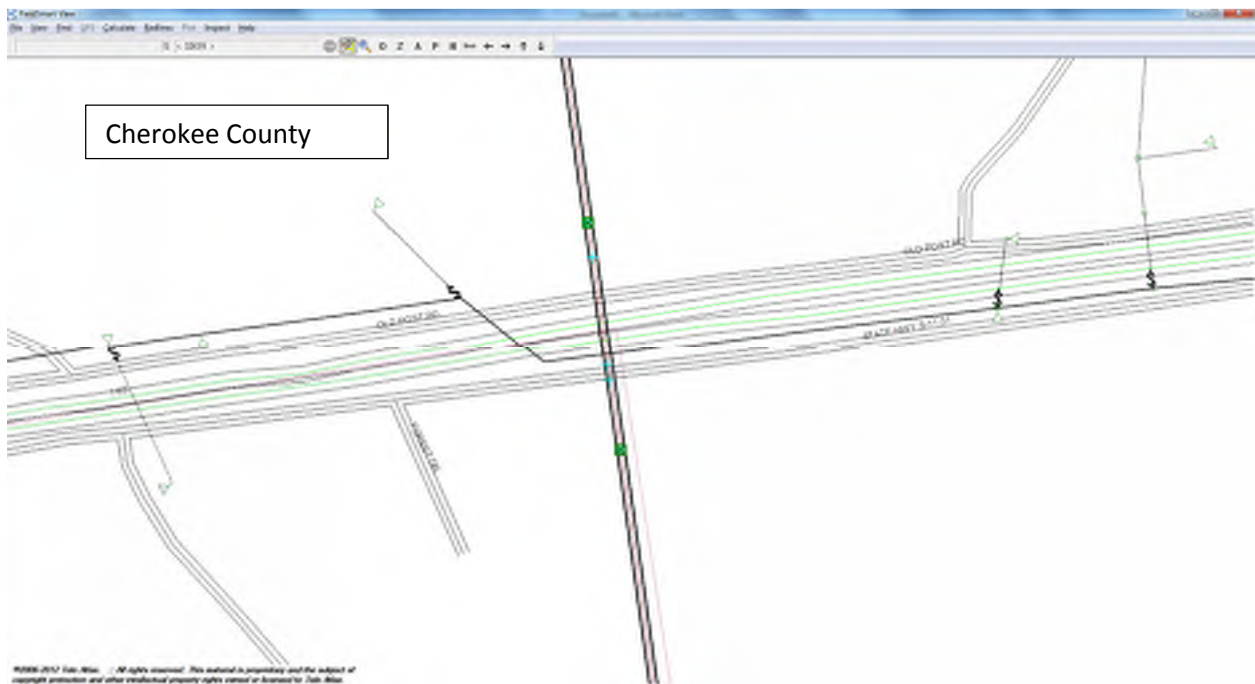


DUKE Energy 230kVA transmission crossing I-85 sta. 1265+00

I-85 Widening Project (MM 80 to MM 96) – Duke Energy Transmission Crossings

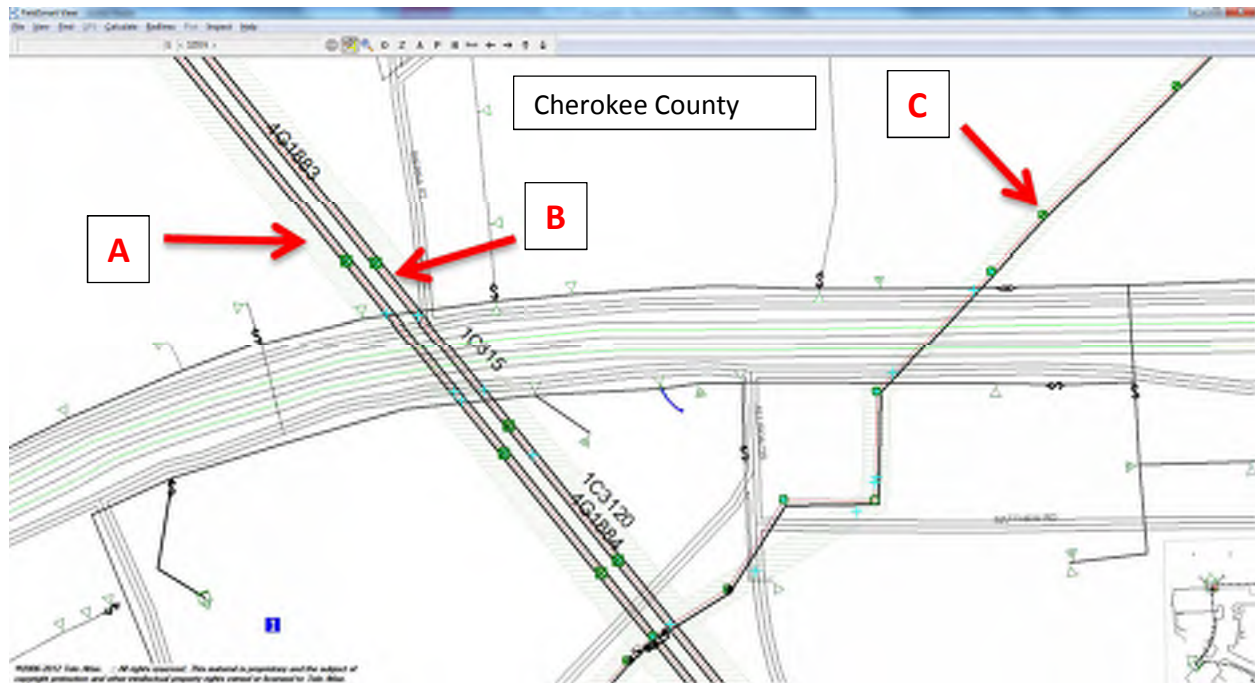


100kV Transmission Line Crossing – Line Index 1P341 - Hystron White



230kV Transmission Line Crossing – Line Indexes 2C26, 2C2990 - Goucha Black & White

I-85 Widening Project (MM 80 to MM 96) – Duke Energy Transmission Crossings



- A. 44kV Transmission Line Crossing – Line Indexes 4G1883, 4G1884 – Gaffney No. 1 Black & White
- B. 100kV Transmission Line Crossing – Line Indexes 1C315, 1C3120 – Robb Black & White
- C. 44kV Transmission Line Crossing – Line Index 4G1887 - Gaffney

**DUKE ENERGY ELECTRIC TRANSMISSION RIGHT-OF-WAY
GUIDELINES/RESTRICTIONS
VALID FOR
NORTH CAROLINA AND SOUTH CAROLINA**

This list of right-of-way restrictions has been developed to answer the most frequently asked questions about property owner use of Duke Energy's electric transmission rights of way. This list does not cover all restrictions or all possible situations. You should contact the Asset Protection Specialist if you have additional concerns about the rights of way. This list of restrictions is subject to change at any time and without notice. Duke Energy reserves all rights conveyed to it by the right-of-way agreement applicable to the subject property. All activity within the rights of way shall be reviewed by an Asset Protection Specialist to obtain prior written approval. Engineering plans may be required. Compliance with the Duke Energy Right-of-Way Guidelines/Restrictions or approval of any plans by Duke Energy does not mean that the requirements of any local, county, state, or federal government or other applicable agency with governing authority have been satisfied.

1. Structures, buildings, manufactured/mobile homes, satellite systems, swimming pools (any associated equipment and decking), graves, billboards, dumpsters, signs, wells, deer stands, retaining walls, septic systems or tanks (whether above or below ground), debris of any type, flammable material, building material, wrecked or disabled vehicles and all other objects (whether above or below ground) which, in Duke Energy's opinion interferes with the electric transmission right of way, are not allowed within the right-of-way limits. Transformers, telephone/cable pedestals (and associated equipment), and fire hydrants are not allowed. Manholes, water valves, water meters, backflow preventers and irrigation heads are not permitted. Attachments to Duke Energy structures are prohibited.
2. Fences and gates shall not exceed 10 feet in height and shall be installed greater than 25 feet from poles, towers and guy anchors. Fences shall not parallel the centerline within the rights of way but may cross from one side to the other at any angle not less than 30 degrees with the centerline. If a fence crosses the rights of way, a gate (16-foot-wide at each crossing) shall be installed by the property owner, per Duke Energy's specifications. The property owner is required to install a Duke Energy lock on the gate to ensure access. Duke Energy will supply a lock.
3. Grading (cuts or fill) shall be no closer than 25 feet from poles, towers, guys and anchors (except for parking areas, see paragraph 7) and the slope shall not exceed 4:1. Grading or filling near Duke Energy facilities, which will prevent free equipment access, or creates ground to conductor clearance violations, will not be permitted. Storage or stockpiling of dirt or any other material is prohibited. Sedimentation control, including re-vegetation, is required per state regulations.
4. Streets, roads, driveways, sewer/water lines, other utility lines or any underground facilities shall not parallel the centerline within the rights of way, but may cross, from one side to the other, at any angle not less than 30 degrees with the centerline. No portion of such facility or corresponding easement shall be located within 25 feet of Duke Energy's facilities. Roundabouts, cul-de-sacs, intersections (such as roads, driveways and alleyways) are not permitted.
5. Any drainage feature that allows water to pond, causes erosion, directs stormwater toward the rights of way, or limits access to or around Duke Energy facilities is prohibited.
6. Contact Duke Energy prior to the construction of lakes, ponds, retention, or detention facilities, etc.
7. Parking may be permitted within the rights of way, provided that:
 - a. Prior to grading, concrete barriers shall be installed at a minimum of 9 feet from the Duke Energy facilities. During construction, grading shall be no closer than 10 feet to any Duke Energy facility.
 - b. After grading/paving activity is complete, a Duke Energy approved barrier, sufficient to withstand a 15-mph vehicular impact, shall be erected 9 feet from any Duke Energy facility.
 - c. Any access areas, entrances, or exits shall cross (from one side to the other) the rights of way at any angle not less than 30 degrees with the centerline, and shall not pass within 25 feet of any structure. Parking lot entrances/exits cannot create an intersection within the rights of way.
 - d. Lighting within the right-of-way limits must be approved by Duke Energy before installing. Due to engineering design standards, lighting is not allowed in the "Wire Zone." Where lighting is approved (Border Zone), the total height may not exceed 15 feet in Area A and 12 feet in Area B. See map on back of this page for Areas. Contact your Asset Protection Specialist as the "Wire Zone" varies for the different voltage lines.
8. Duke Energy will not object to certain vegetation plantings as long as:
 - a. It does not interfere with the access to or the safe, reliable operation and maintenance of Duke Energy facilities.
 - b. With prior written approval, Duke Energy does not object to low growing shrubs and grasses within the "Wire Zone." Tree species are not allowed within the "Wire Zone." Trees that are approved in the "Border Zone" may not exceed, at maturity, 15 feet in Area A and 12 feet in Area B. See map on back of page for areas. Contact the Asset Protection Specialist for Wire Zone/Border Zone definitions.
 - c. For compliant mature height species, refer to plants.ces.ncsu.edu/ for reference.
 - d. Engineering drawings must indicate the outer most conductor.
 - e. Vegetation that is not in compliance is subject to removal without notice.
 - f. Duke Energy may exercise the rights to cut "danger trees" outside the right-of-way limits as required to properly maintain and operate the transmission line.

We hope this is useful information. If you have additional questions or plan any activity not mentioned above, please contact the Asset Protection Specialist for your area.(See map)

January 8, 2015

Ms. Kim Fortner
Gaffney Board of Public Works
210 East Fredrick Street
Gaffney, South Carolina 29430

Re: File P027114 – Contract Id. No. 8888860 – Relocation of Facilities – I-85 Widening from Mile Marker 80 to 96 – Cherokee/Spartanburg Counties


Dear Ms. Fortner:

The South Carolina Department of Transportation is currently under contract with Infrastructure Consulting & Engineering (ICE) to perform Design Build Preparation Services relating to the above referenced project. As part of these design efforts, survey, subsurface utility engineering and utility coordination will be performed.

The purpose of this letter is to notify you that ICE, CH Engineering and Mead & Hunt will contact you to gather utility data necessary for this project. We ask that you cooperate with them concerning this request such that utility conflicts and concerns can be identified early in the project schedule.

If you should have any questions concerning this, please feel free to contact me.

Sincerely,

 keittcc@scdot.org
2015.01.08 13:24:05
-05'00'

Cedric C. Keitt
Utility Project Manager

MCA:krc

cc: Brad Reynolds, SCDOT, Program Manager
Robert Ryggs, SCDOT, Utility Coordinator District Three
Jamie Fowler Jr., SCDOT, Utility Coordinator District Four
Shane Parris, Resident Construction Engineer, Cherokee County
Mark C. Attaway, SCDOT, HQ State Utility Engineer
Dennis Joel Wimberly, SCDOT, HQ Utility Project Manager
Gus Kretschmer, ICE Engineering, Utility Relocation Coordinator Manager
Steve Steele, Gaffney Board of Public Works
Matt Sellars, Gaffney Board of Public Works
Randy Parris, Gaffney Board of Public Works
Mark Bradley, Gaffney Board of Public Works
Brad Wright, Gaffney Board of Public Works
File:RW/UM/CCK



BOARD OF PUBLIC WORKS

210 East Frederick Street, Post Office Box 64

GAFFNEY, SOUTH CAROLINA 29342

(864) 488-8800

FACSIMILE (864) 488-8855



"THE PEACHOID"

November 9, 2015

Mr. Gus Kretschmer
Utility Coordinator
Infrastructure Consulting & Engineering
1021 Briargate Circle
Columbia, SC 29210

Re: I-B5 Widening Utility Relocations
Gaffney Board of Public Works

Dear Mr. Kretschmer:

The Gaffney Board of Public Works (BPW) has reviewed the I-B5 Widening project plans labeled "For Utility Review of Existing Infrastructure and Preliminary Impact/Conflict Identification". Based on our review, approximately 19,000 linear feet of water lines ranging in size from 6-inch to 12-inch, 1,000 linear feet of 8-inch gravity sewer line, numerous fire hydrants and manholes, 6,000 linear feet of overhead electric, over 40 poles and several hundred feet of fiber optic cable will be impacted by this project.

We have used our best judgement in estimating the potential costs associated with permanent relocation of services. The estimates shown below do not include any money for right of way acquisition. We have assumed SCDOT will allow the BPW to locate within any existing or newly acquired rights of way.

Water

Labor	\$ 779,500
Materials	\$ 234,000

Sewer

Labor	\$ 37,500
Materials	\$ 15,000

Page 2
Mr. Gus Kretschmer
Continued

Electric

Labor	\$ 308,000
Materials	\$ 148,000
Engineering	\$ 110,000
TOTAL	\$1,632,000

This project will have a very significant impact on our budgeting over the next couple of years. Should the proposed plans change significantly we would greatly appreciate a revised set of drawings as soon as possible.

Please let me know if you have any questions or comments.

Sincerely,















Kim Fortner

KF












Cc: Matt Sellers
Mark Bradley
Randy Parris

Water Legend












-  WFirehyd
-  <all other values>
-  AIR_VLV
-  CAP
-  PLG
-  RED
-  TEE
-  INLET
-  <all other values>
-  BO
-  HYIS
-  ISO

Water


























DIAMETER

-  0.5 - 4
-  6
-  8
-  10 - 16
-  16 - 36
-  Wcust
-  Wservice
-  Wtank
-  WTreatpl
-  WCasing
-  WPumpsta

Sewer Legend

-  SManhole
-  <all other values>
-  AIR
-  STB
-  TEE
-  Sewer
-  SPumpsta
-  SLateral
-  Sclnout
-  Streatpl
-  SCasing

Electric Legend

-  Pole
-  Substat
-  Tran
-  Underground Facility
-  <all other values>
-  1OH
-  1UG
-  2OH
-  2UG
-  3OH
-  3UG
-  Service
-  <all other values>
-  ABS
-  DCS
-  FUS
-  REC
-  SBS
-  Custmr
-  Conduit
-  Capc
-  Light
-  Voltreg
-  Grnd
-  Guy

PRELIMINARY UTILITY REPORT, UTILITY INFORMATION

Project Owner: SCDOT
File Number:
Project ID Number: P027114
Project Name: I-85 Widening Improvements Mile Marker 80 to 96
County: Spartanburg & Cherokee

Type: Electric Distribution

SC811 & SUE Code: GPW48 & E3

Utility: Gaffney Board of Public Works

Contact: Mark Bradley, Electric Superintendent
864.761.6593 mbradley@gbpw.com
201 East Fredrick Street Gaffney, SC 29430

Existing Facility: Single and 3Phase aerial electric distribution on wood poles (30,500LF+) and underground primary and service lines (5,800LF+) in Cherokee County Gaffney service area.

Prior Rights: GBPW wood poles are generally set 1FT outside present road right of way for prior rights with road and Interstate crossings are generally by encroachment

Impact: Shifting Frontage Roads alignment, Interstate vertical changes and new interchanges will impact existing poles and Interstate crossings, will need to be relocated

Relocation: Set replacement poles to 1FT outside Frontage Roads NEW right of way, set taller poles for Interstate crossings for vertical changes and relocate for new interchanges to 1FT outside Frontage Roads

Estimated Relocation Cost: \$566,000+/- shared cost

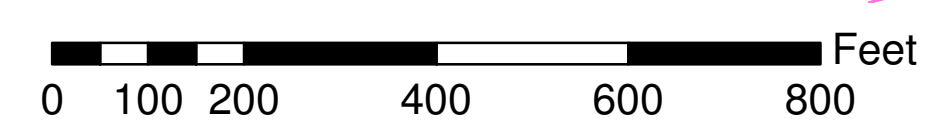
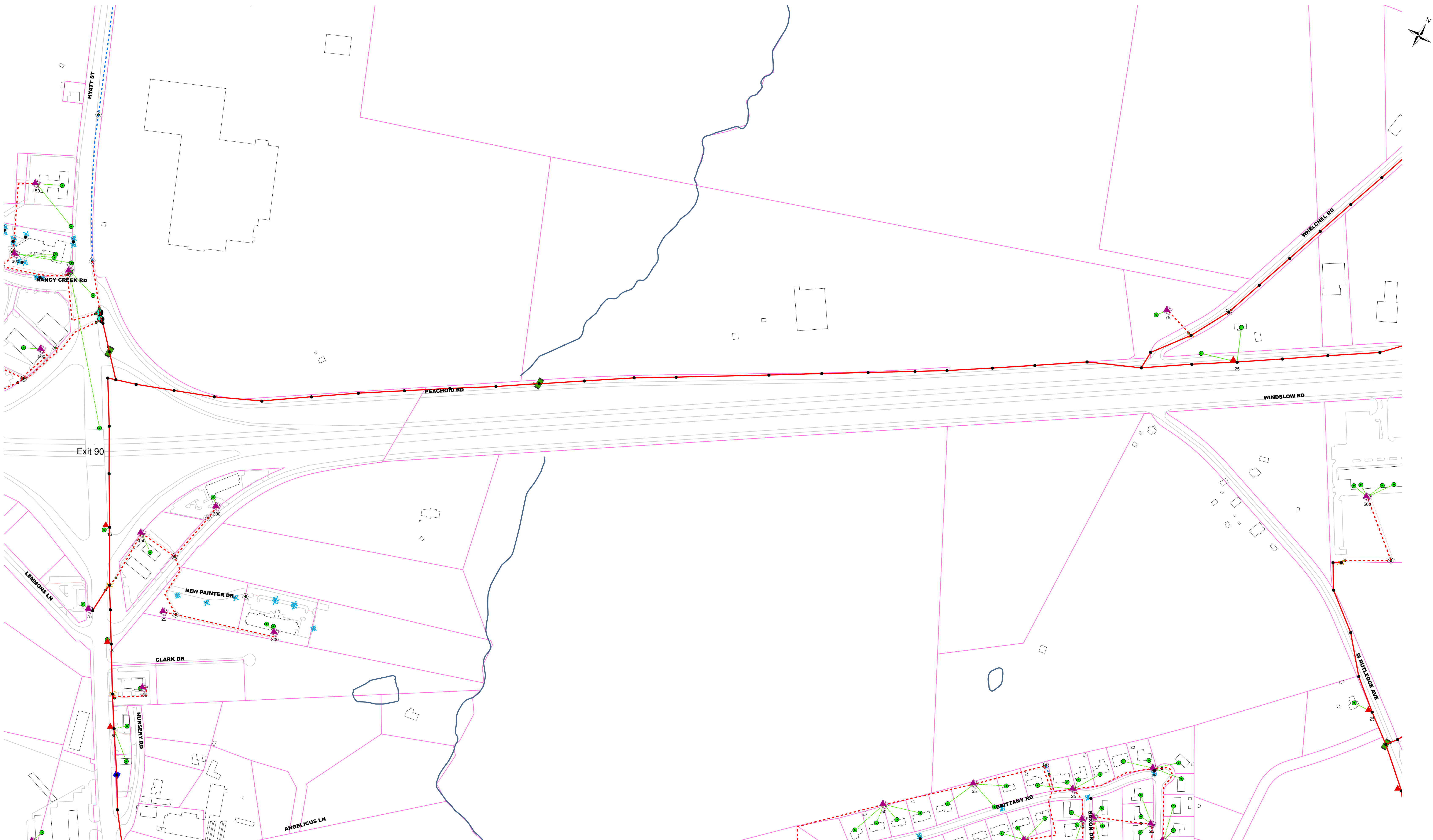
Future Facility: NONE anticipated

Restrictions and/or Moratoriums: Business/Commercial customers schedule for line outage, switchover and scheduling SCHP for traffic control for any Interstate crossing relocation

Notice to Proceed: 30 days

Estimated Time to Relocate: 3 to 6 months

In-Contract Work: NONE



Exit 90

LEWISONS LN

NEW PAINTER DR

CLARK DR

NURSERY RD

ANGELICUS LN

BRITTANY RD

WINDSLOW RD

WRITLEDGE AVE

NANCY CREEK RD

PEACHFORD RD

WINDSLOW RD

WHELCHER RD

HYATT ST

150

300

500

75

150

50

25

150

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150

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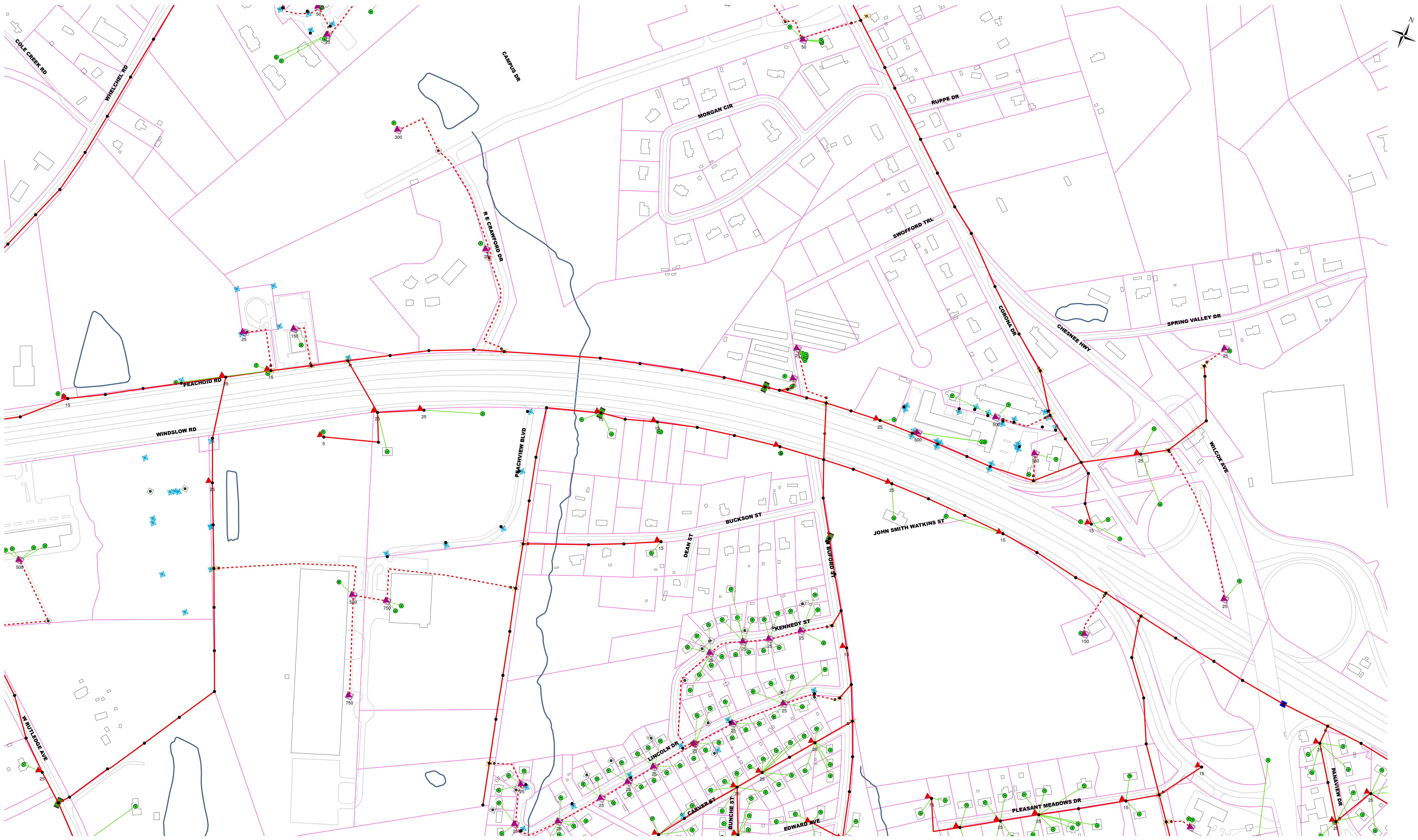
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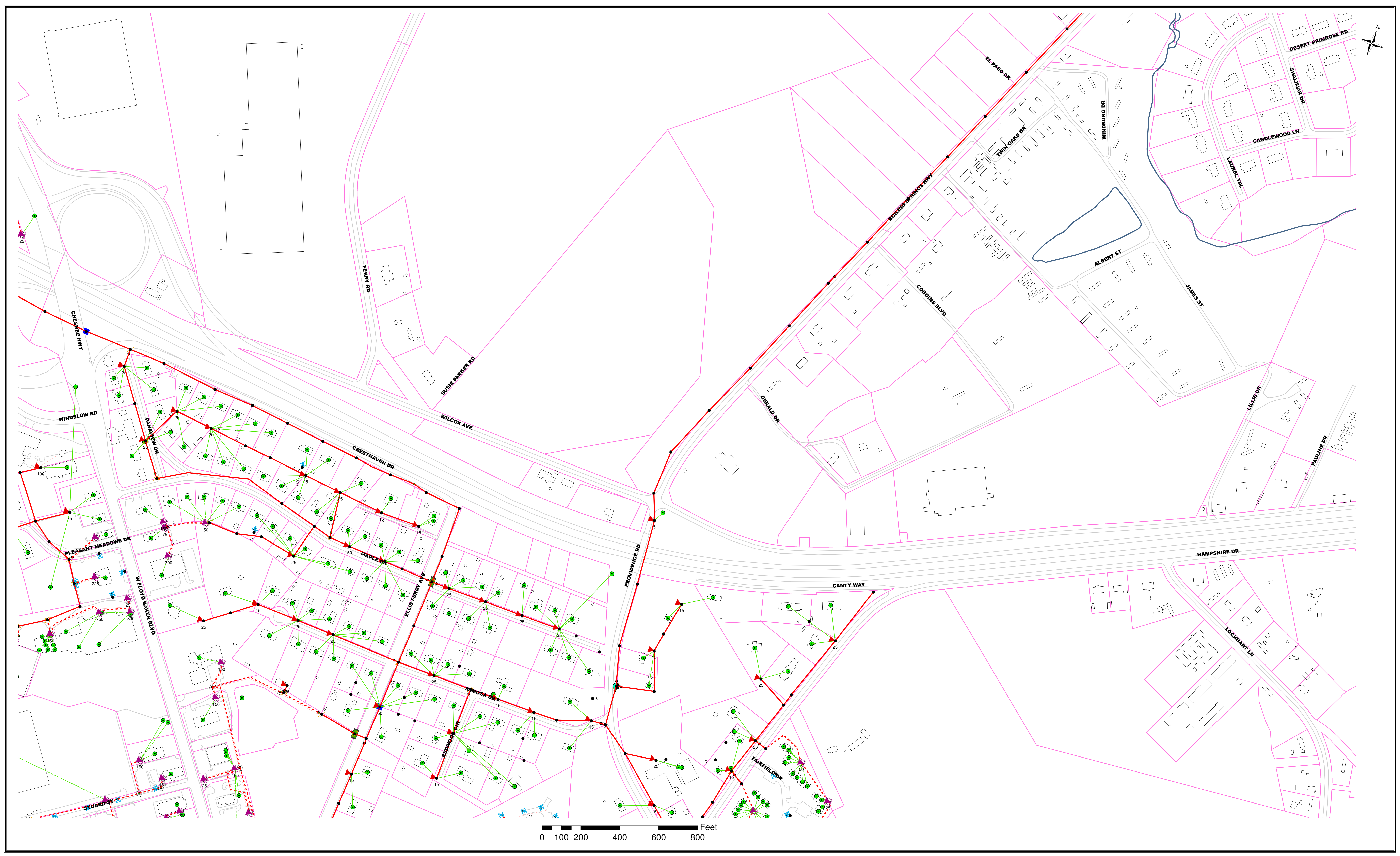
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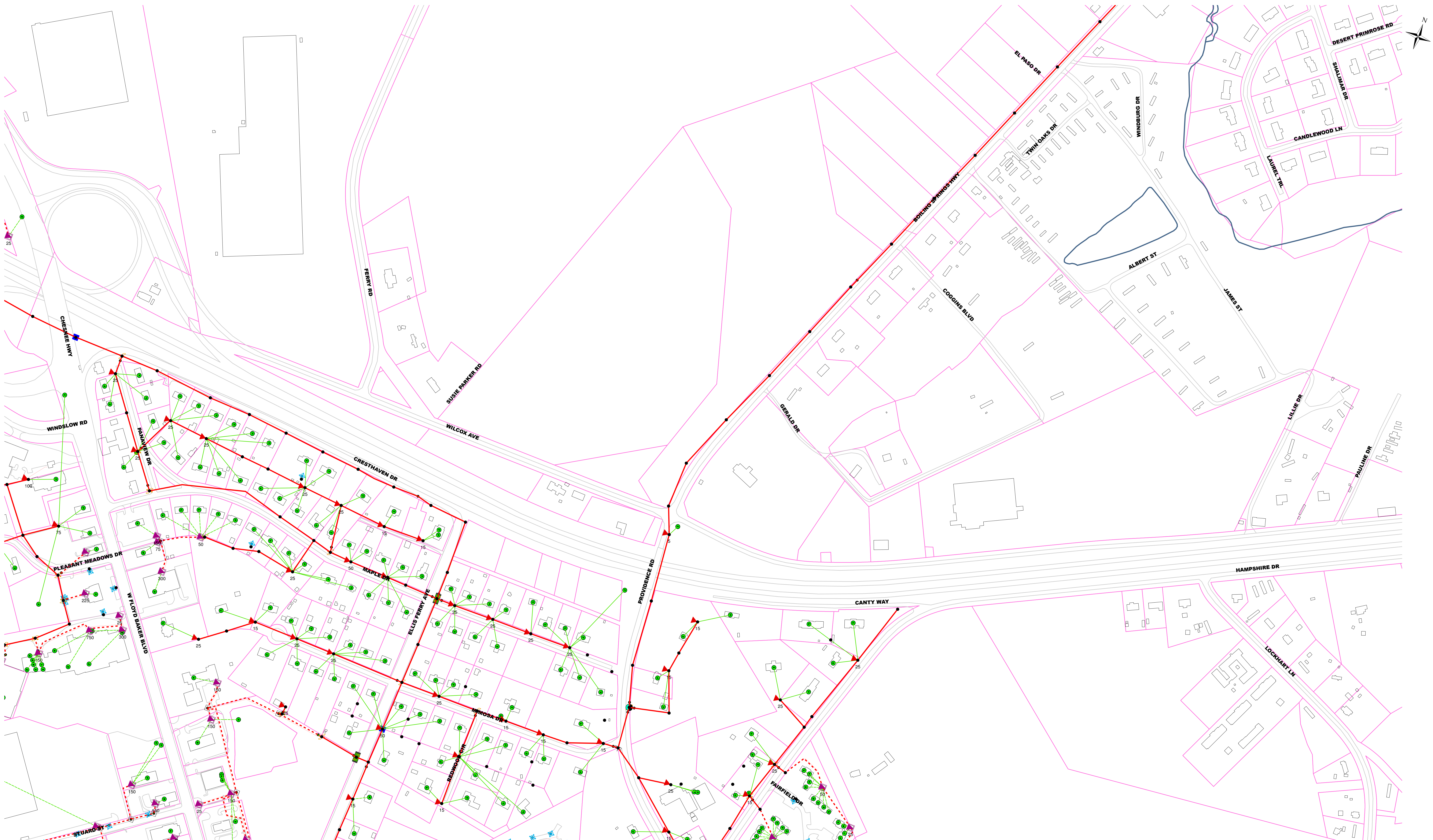
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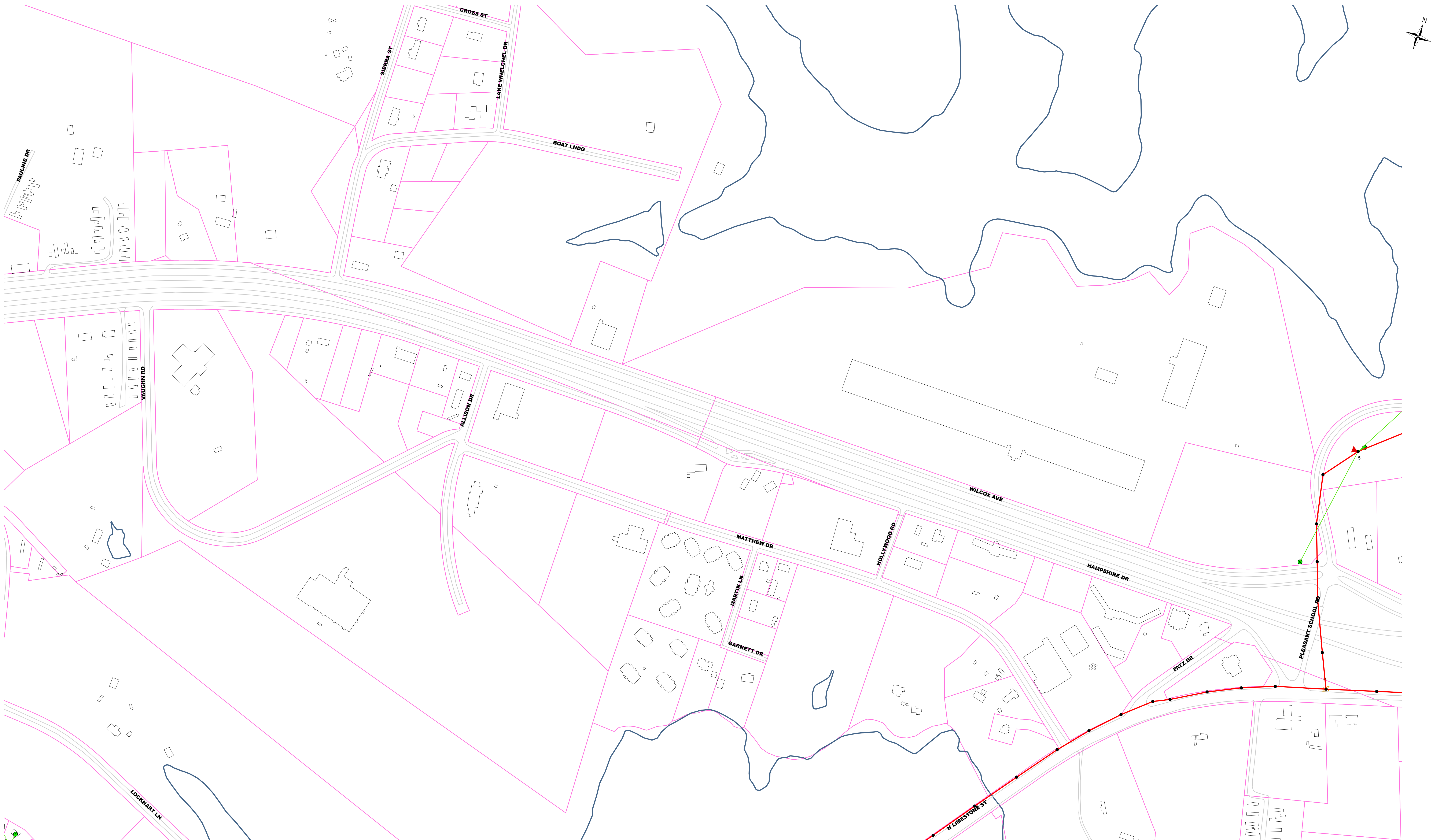
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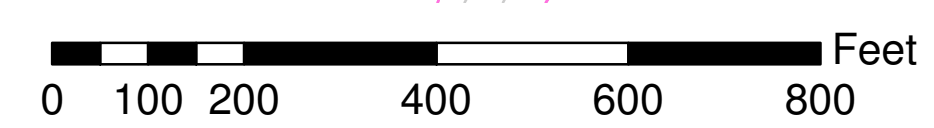
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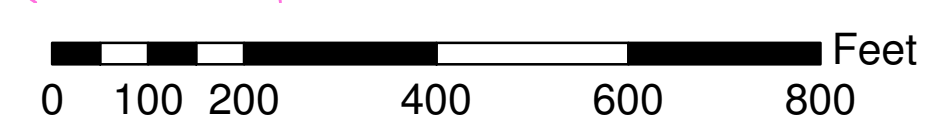
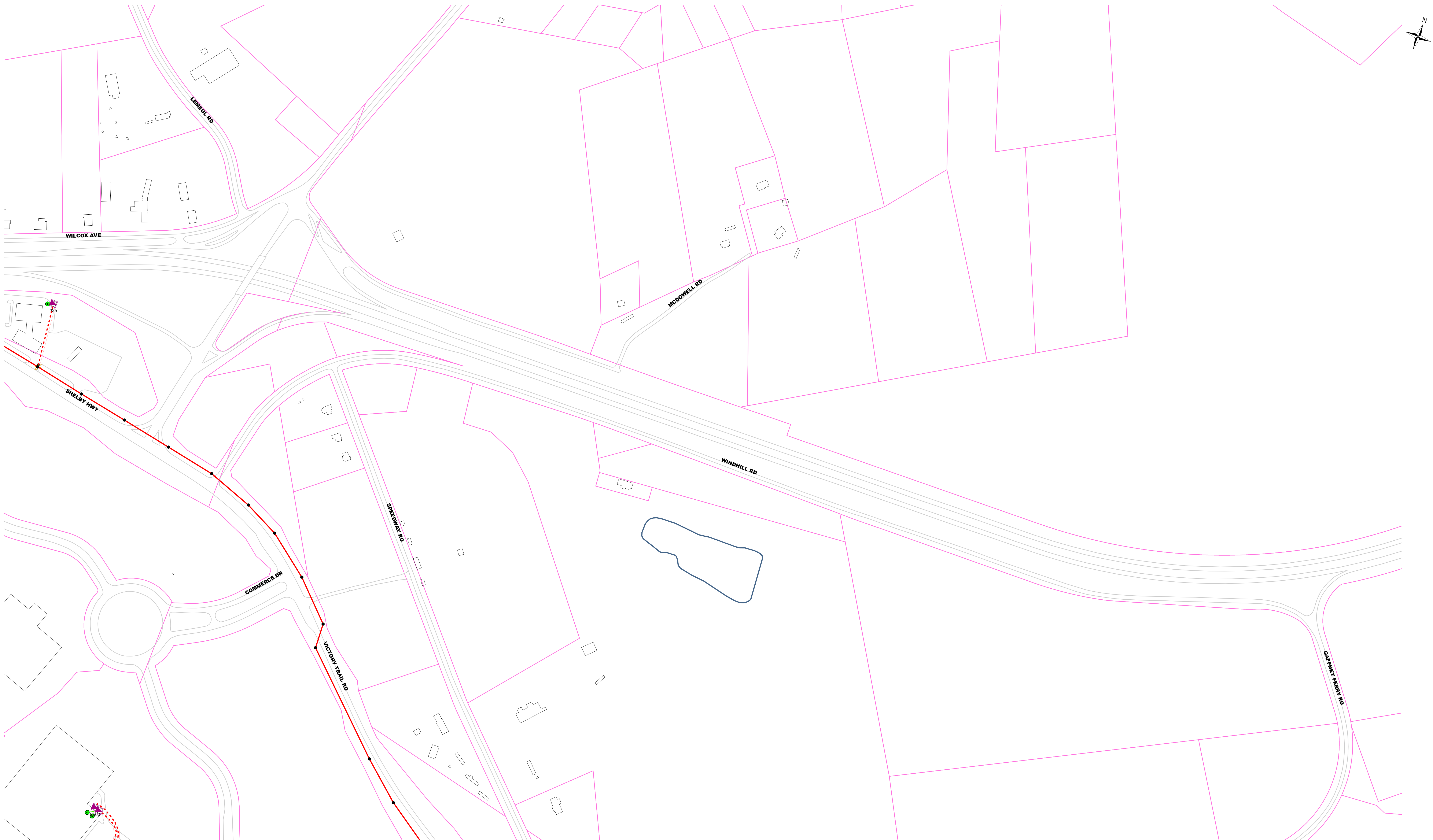


EL PASO DR
TWIN OAKS DR
WINDBURG DR
ALBERT ST
JAMES ST
LAUREL TR
CANDLEWOOD LN
DESERT PRIMROSE RD
SALVIA DR
LILLIE DR
PAULINE DR
HAMPSHIRE DR
LOCKHART LN
CANTY WAY
PROVIDENCE RD
GERALD DR
BOILING SPRINGS HWY
WILCOX AVE
SUBSIE PARKER RD
FERRY RD
CRESTHAVEN DR
MAPLE DR
ELLIS FERRY AVE
WIMOSA DR
REDWOOD DR
FAIRFIELD DR
PLEASANT MEADOWS DR
WINDSLOW RD
CHESTER HWY
W FLAT D BARKER BLVD
STUART ST



0 100 200 400 600 800 Feet





PRELIMINARY UTILITY REPORT, UTILITY INFORMATION

Project Owner: SCDOT
File Number:
Project ID Number: P027114
Project Name: I-85 Widening Improvements Mile Marker 80 to 96
County: Spartanburg & Cherokee

Type: Water and Sanitary Sewer

SC811 & SUE Code: GBPW & W1/S1

Utility: Gaffney Board of Public Works

Contact: Matt Sellars, Water & Sewer Superintendent
864.761.6096 msellars@gbpw.com

Existing Facility: Various size water distribution lines (6"DI, 12"DI, 6"CI, 8"CI, 6"AC, 6"PVC) along Frontage Roads (78,600LF+) and gravity sanitary sewer lines (498LF)

Prior Rights: Water mains are inside present SCDOT ROW by encroachment, relocation cost the responsibility of GBPW

Impact: Exit 90 improvements (12"DI WL on Peachoid RD, 12"DI WL crossing I-85 sta.1401+00), WL crossing I-85 sta. 1451+00, Peachoid Water Tower & 16"WL I-85 sta. 1474+00LT, WL crossing I-85 sta. 1538+00, 8"CI WL crossing I-85 sta. 1558+00, WL crossing I-85 sta. 1648+00, 36" RCP & 24"CI Raw Water Supply crossing I-85 sta. 1700+00,

Relocation: Using SUE QLA (test hole) to determine impact/conflict with WL crossing I-85, replace crossing if in conflict. WL parallel with I-85 Frontage Roads needs to verify impact/conflict with grading and MSE walls, relocate if in conflict. WL in interchange improvements will need to replace WL in the realigned Frontage Roads shoulder

Estimated Relocation Cost: Water lines \$1,013,500+ and sanitary sewer \$52,500+ for GBPW cost

Future Facility: NONE anticipated

Restrictions and/or Moratoriums: Relocation water line tie ins should be scheduled for low demand hours, avoid impact/conflict with the 36" RCP & 24"CI Raw Water Supply

Notice to Proceed: 30 days

Estimated Time to Relocate: 3 to 6 months

PRELIMINARY UTILITY REPORT, UTILITY INFORMATION

Project Owner: SCDOT

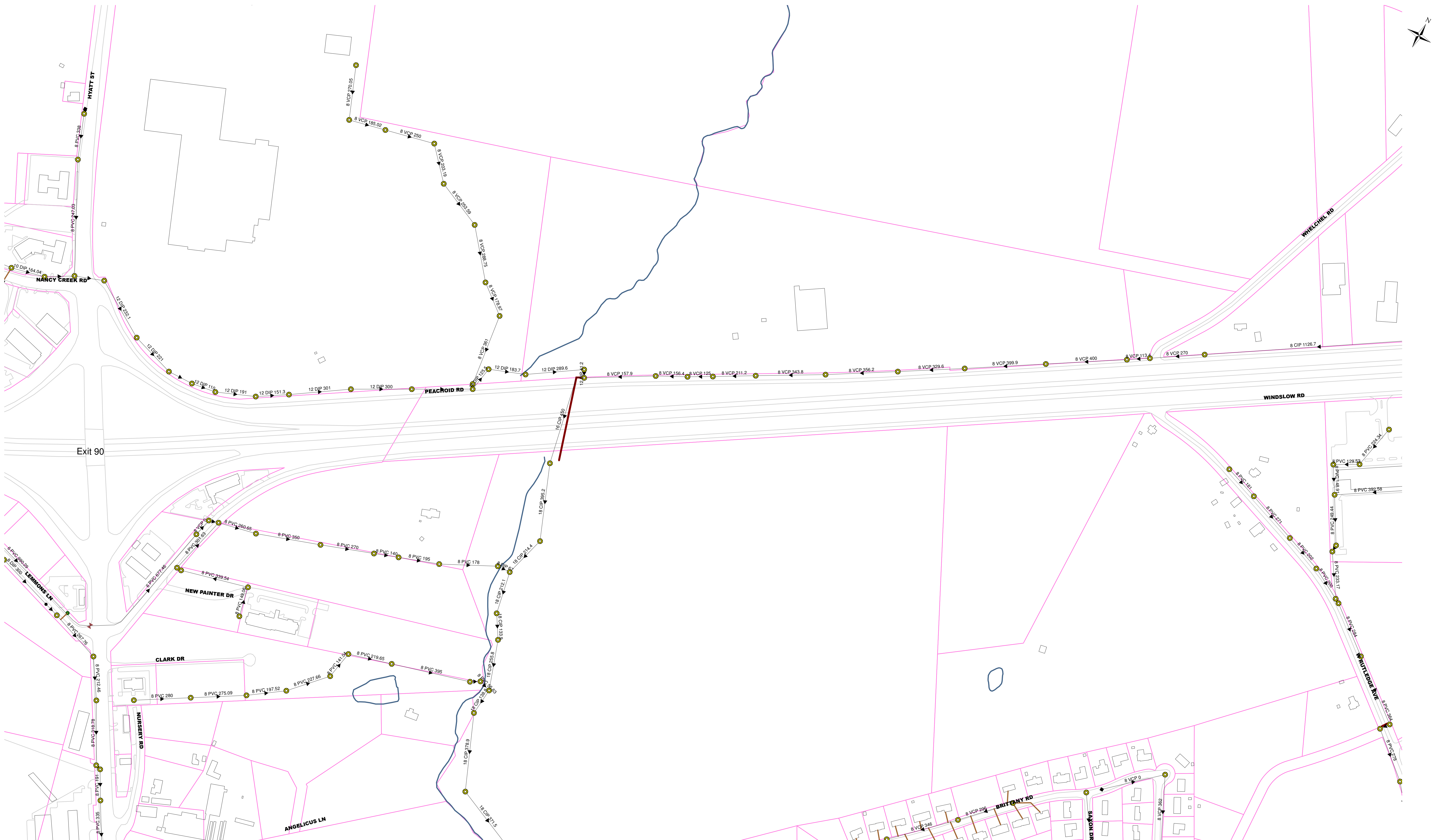
File Number:

Project ID Number: P027114

Project Name: I-85 Widening Improvements Mile Marker 80 to 96

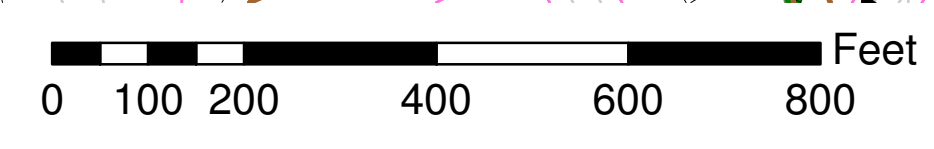
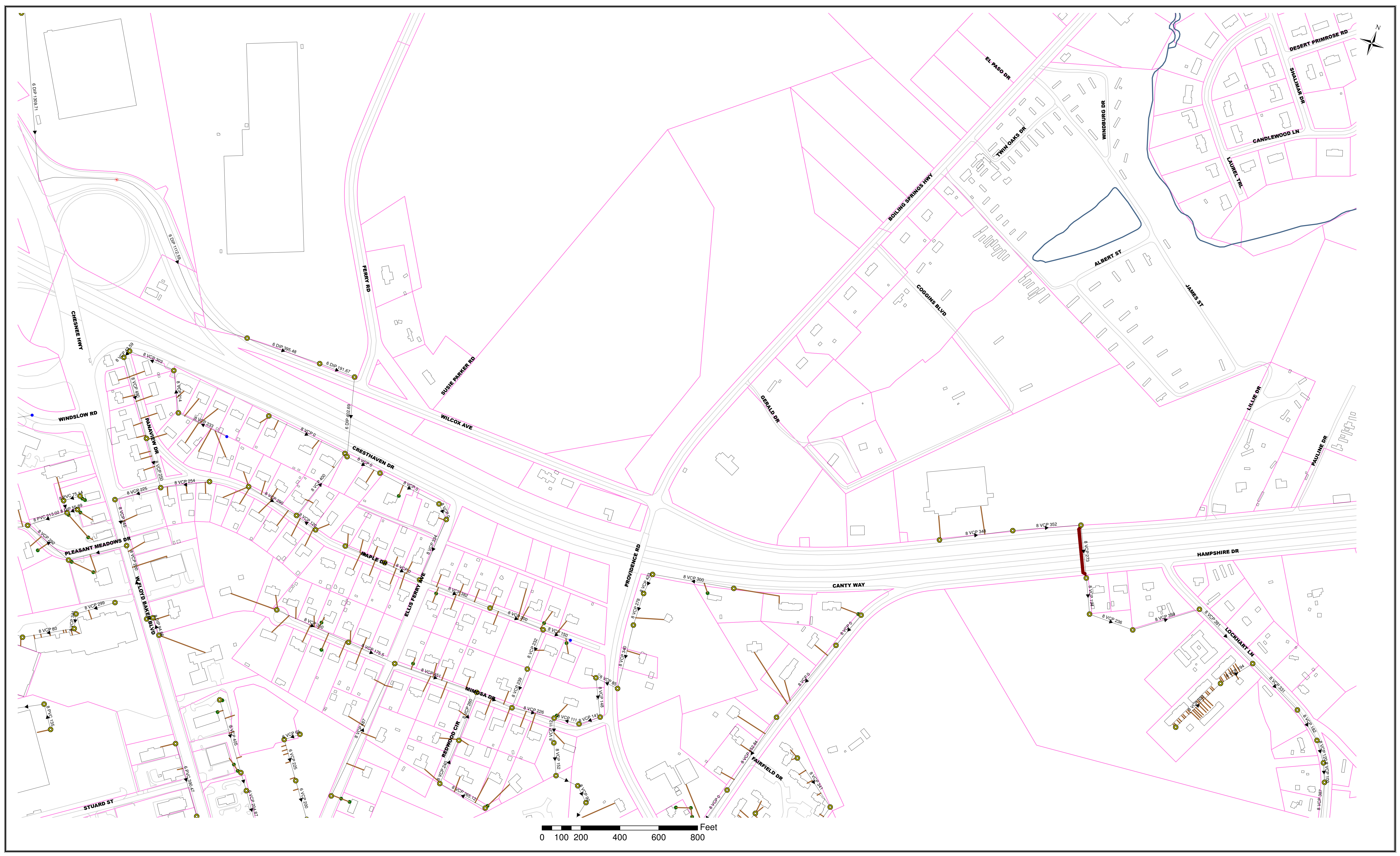
County: Spartanburg & Cherokee

In-Contract Work: Yes



Exit 90

0 100 200 400 600 800 Feet

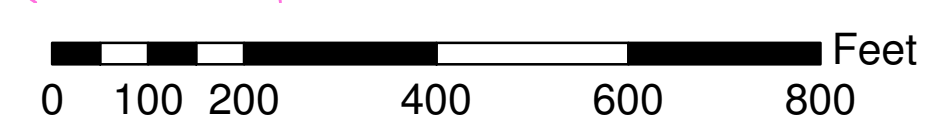




0 100 200 400 600 800 Feet



0 100 200 400 600 800 Feet



8 PVC 320.69
8 PVC 207.2
SHELBY HWY

LENOIR RD

WILCOX AVE

MCDOWELL RD

WINDHILL RD

COMMERCE DR

VICTORY TRAIL RD

SPEEDWAY RD

GAFFNEY FERRY RD

PRELIMINARY UTILITY REPORT, UTILITY INFORMATION

Project Owner: SCDOT
File Number:
Project ID Number: P027114
Project Name: I-85 Widening Improvements Mile Marker 80 to 96
County: Spartanburg & Cherokee

Type: Water and Sanitary Sewer

SC811 & SUE Code: GBPW & W1/S1

Utility: Gaffney Board of Public Works

Contact: Matt Sellars, Water & Sewer Superintendent
864.761.6096 msellars@gbpw.com

Existing Facility: Various size water distribution lines (6"DI, 12"DI, 6"CI, 8"CI, 6"AC, 6"PVC) along Frontage Roads (78,600LF+) and gravity sanitary sewer lines (498LF), Potassium Permanganate Building for Lake Whelchel on Lake Whelchel Dam.

Prior Rights: Water mains are inside present SCDOT ROW by encroachment, relocation cost the responsibility of GBPW. The Potassium Permanganate Building is on GBPW property and relocation is reimbursable.

Impact: Exit 90 improvements (12"DI WL on Peachoid RD, 12"DI WL crossing I-85 sta.1401+00), WL crossing I-85 sta. 1451+00, Peachoid Water Tower & 16"WL I-85 sta. 1474+00LT, WL crossing I-85 sta. 1538+00, 8"CI WL crossing I-85 sta. 1558+00, WL crossing I-85 sta. 1648+00, 36" RCP & 24"CI Raw Water Supply crossing I-85 sta. 1700+00, The Potassium Permanganate Building is in the fill for Pleasant School RD embankment fill.

Relocation: Using SUE QLA (test hole) to determine impact/conflict with WL crossing I-85, replace crossing if in conflict. WL parallel with I-85 Frontage Roads verify impact/conflict with grading and MSE walls, relocate if in conflict. WL in interchange improvements, replace WL in the realigned Frontage Roads shoulder. The Potassium Permanganate Building equipment and material can be relocated to the larger Whelchel Dam building.

Estimated Relocation Cost: Water lines \$1,013,500+ and sanitary sewer \$52,500+ and for GBPW cost; The Potassium Permanganate Building cost is estimated for replacement cost of \$50,000 and SCDOT cost.

Future Facility: NONE anticipated

Restrictions and/or Moratoriums: Relocation water line tie ins should be scheduled for low demand hours, avoid impact/conflict with the 36" RCP & 24"CI Raw Water Supply

PRELIMINARY UTILITY REPORT, UTILITY INFORMATION

Project Owner: SCDOT

File Number:

Project ID Number: P027114

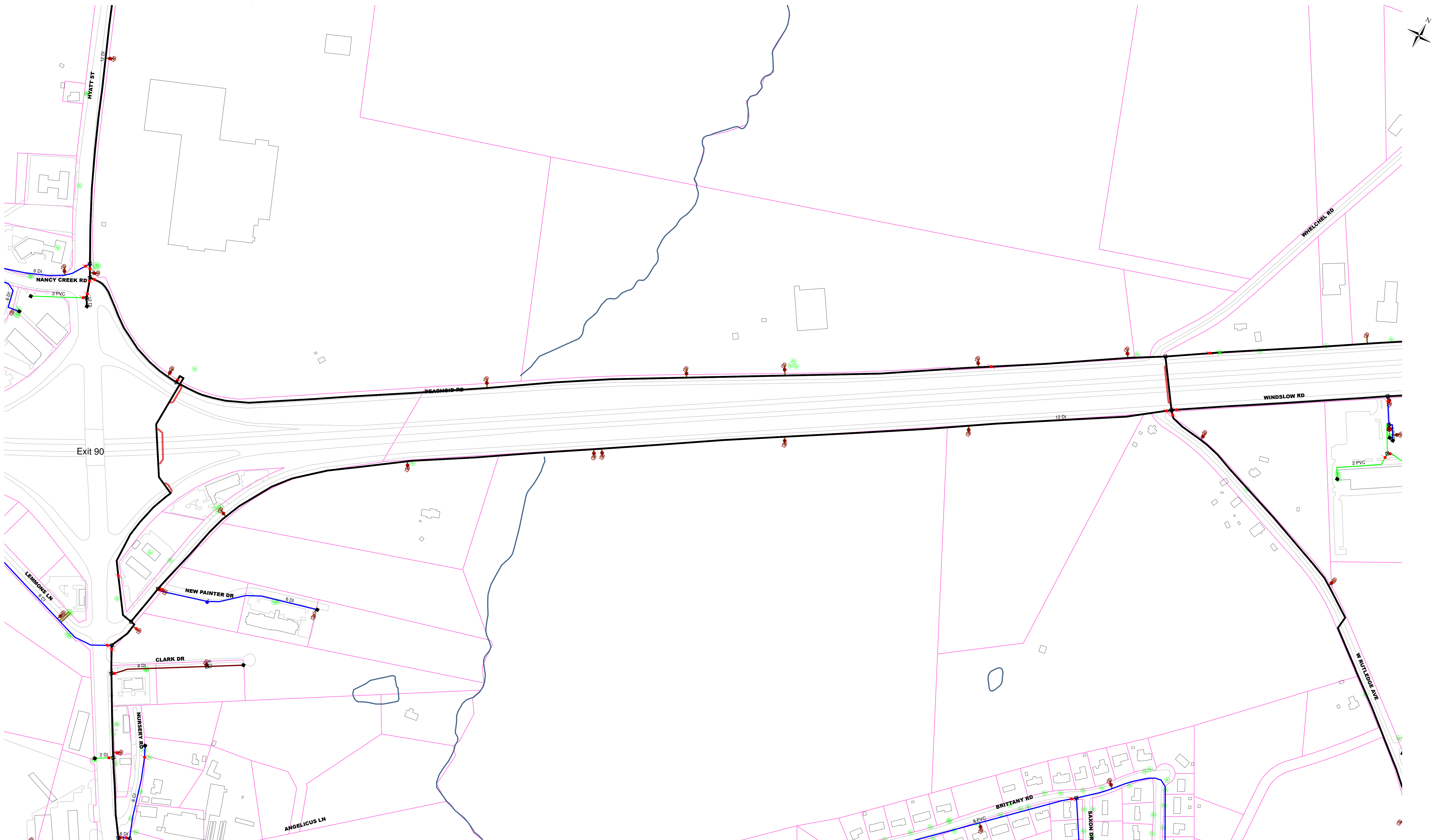
Project Name: I-85 Widening Improvements Mile Marker 80 to 96

County: Spartanburg & Cherokee

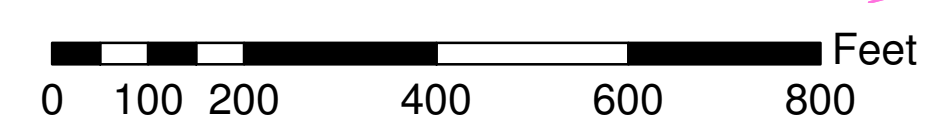
Notice to Proceed: 30 days

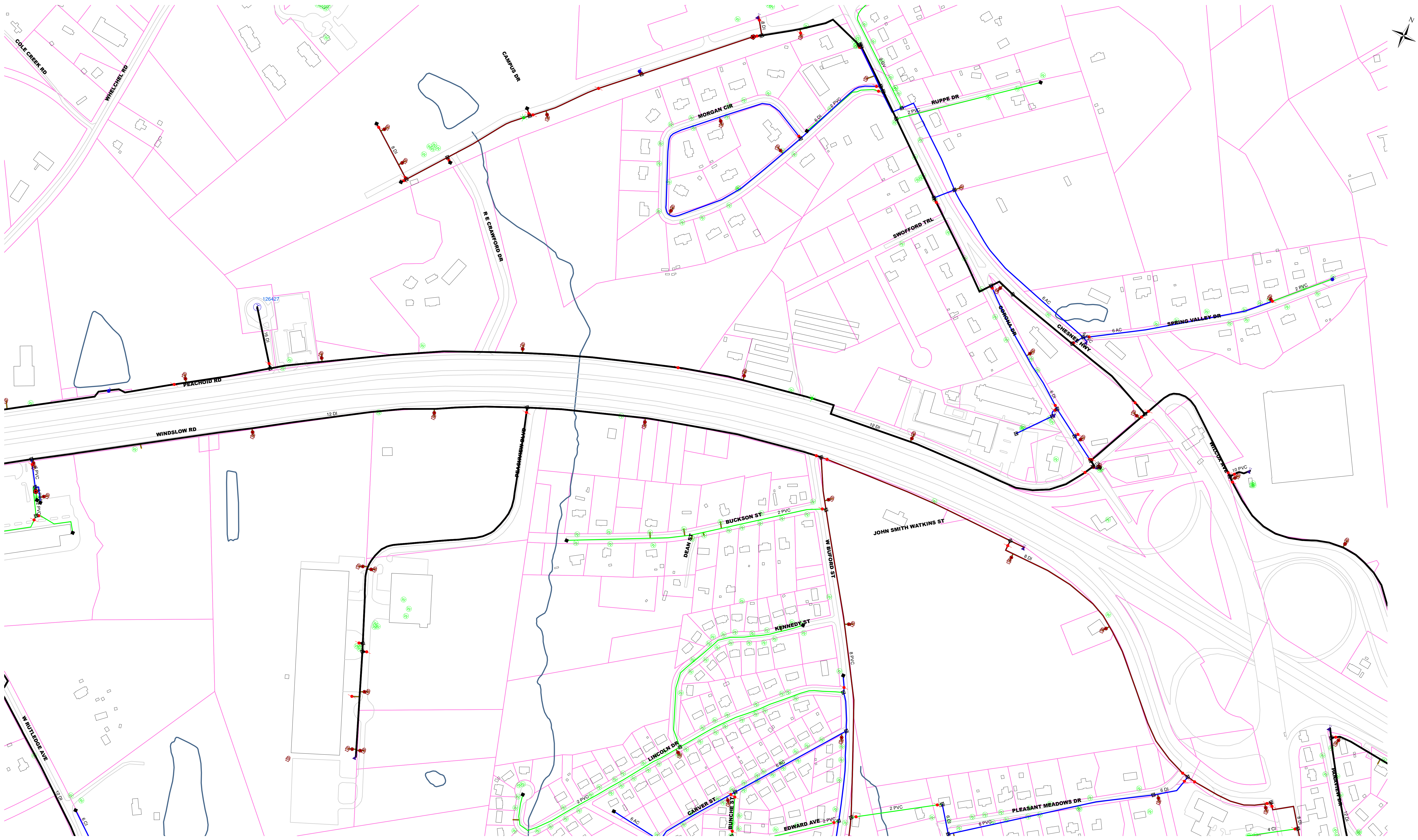
Estimated Time to Relocate: 3 to 6 months

In-Contract Work: Yes

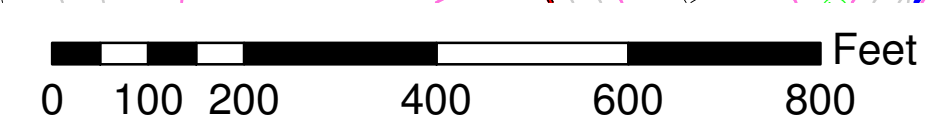
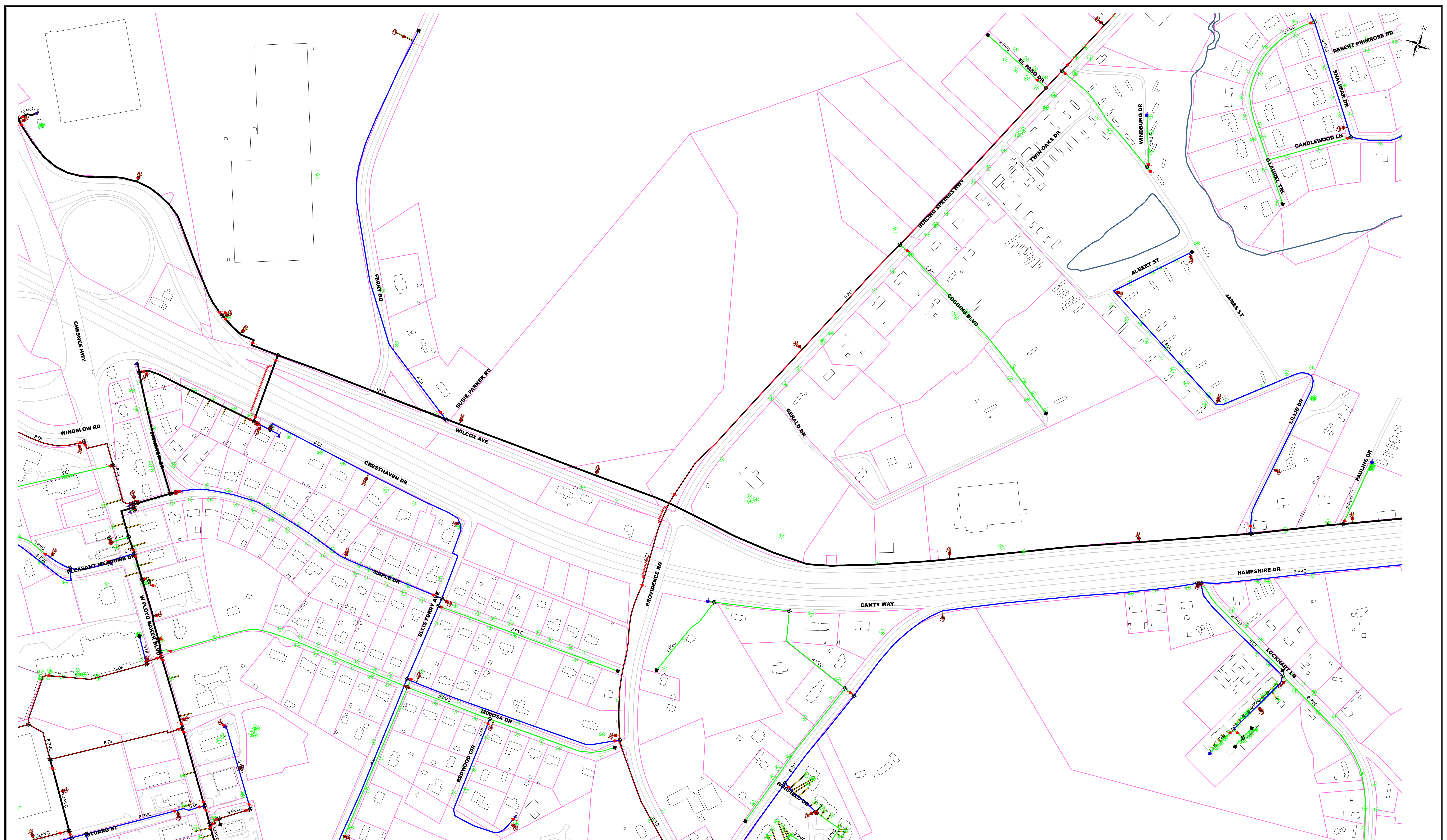


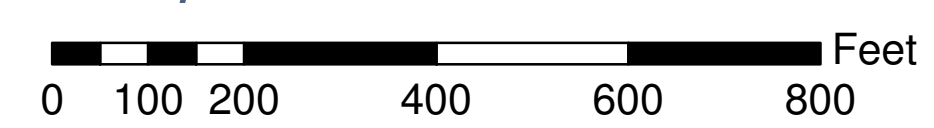
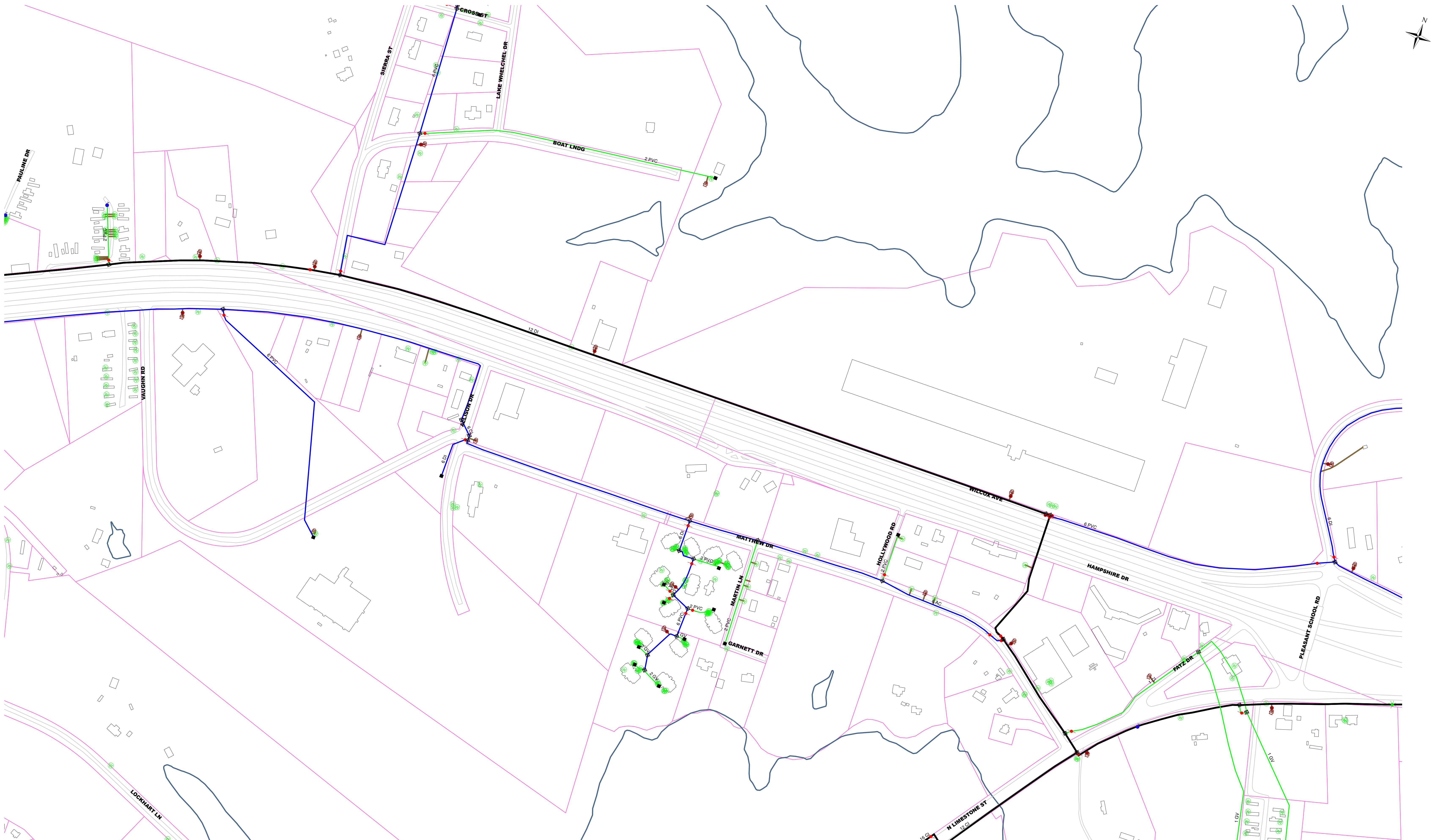
Exit 90

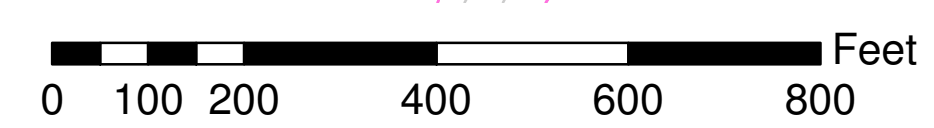
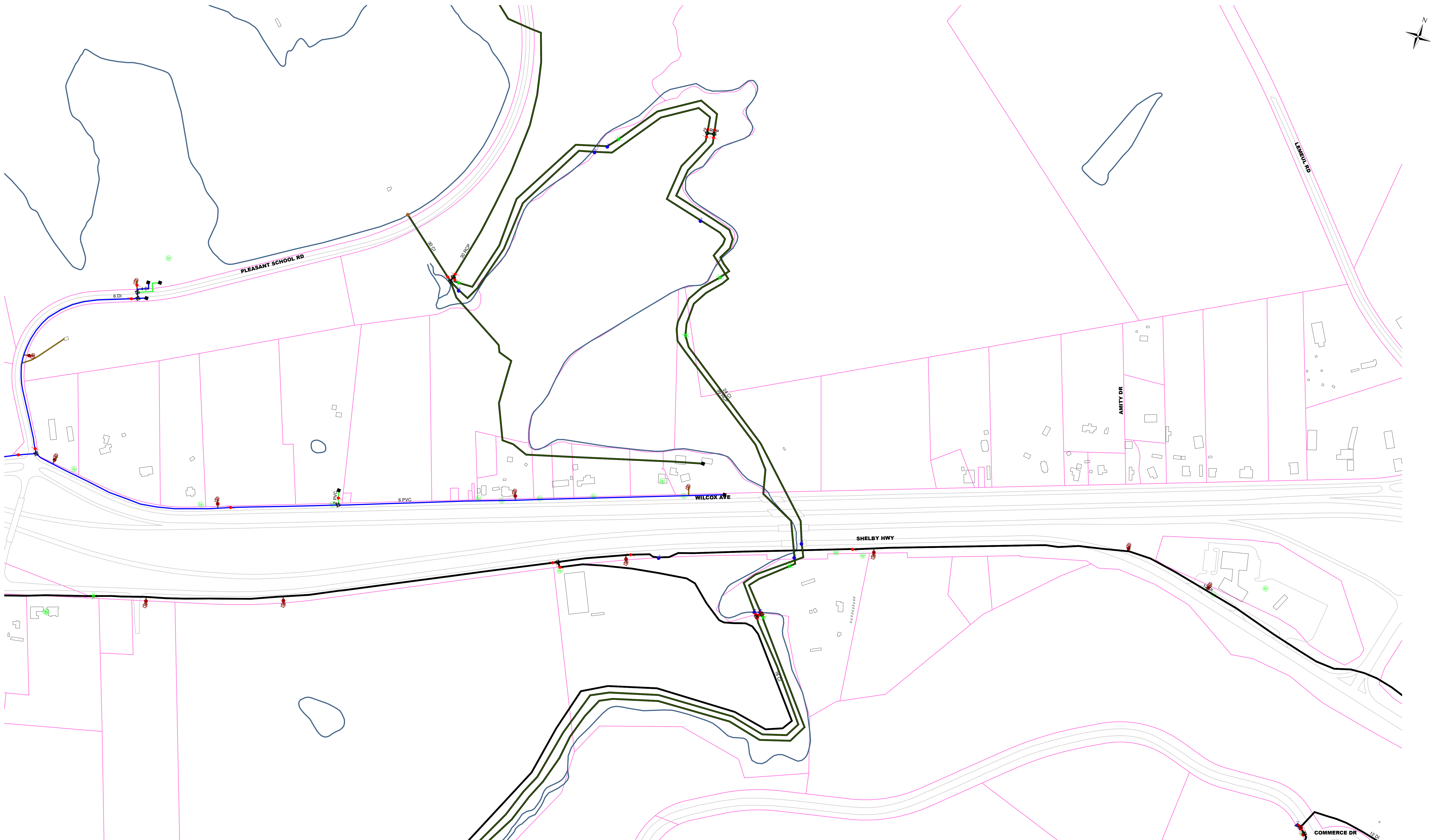




0 100 200 400 600 800 Feet







COMMERCE DR 12 DI

PLEASANT SCHOOL RD

WILCOX AVE

SHELBY HWY

AMITY DR

LEWELL RD

6 DI

6 PVC

30 DI

30 RCP

24 DI

18 DI

12 DI



WILCOX AVE

LELAND RD

MCDOWELL RD

WINDHILL RD

SHELBY HWY

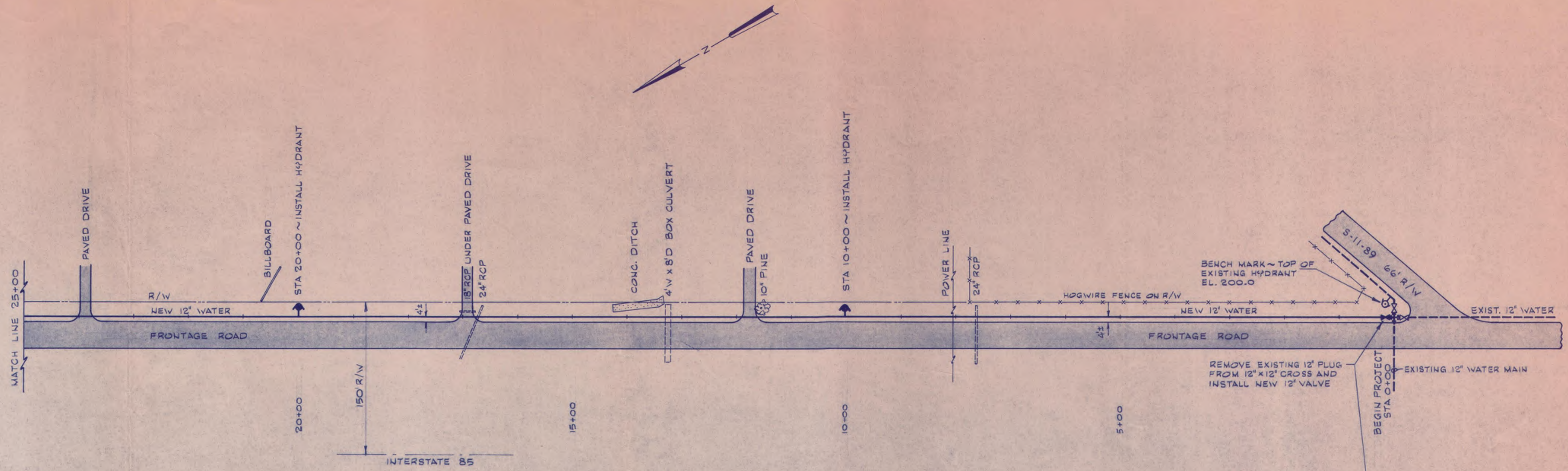
COMMERCE DR

SPEEDWAY RD

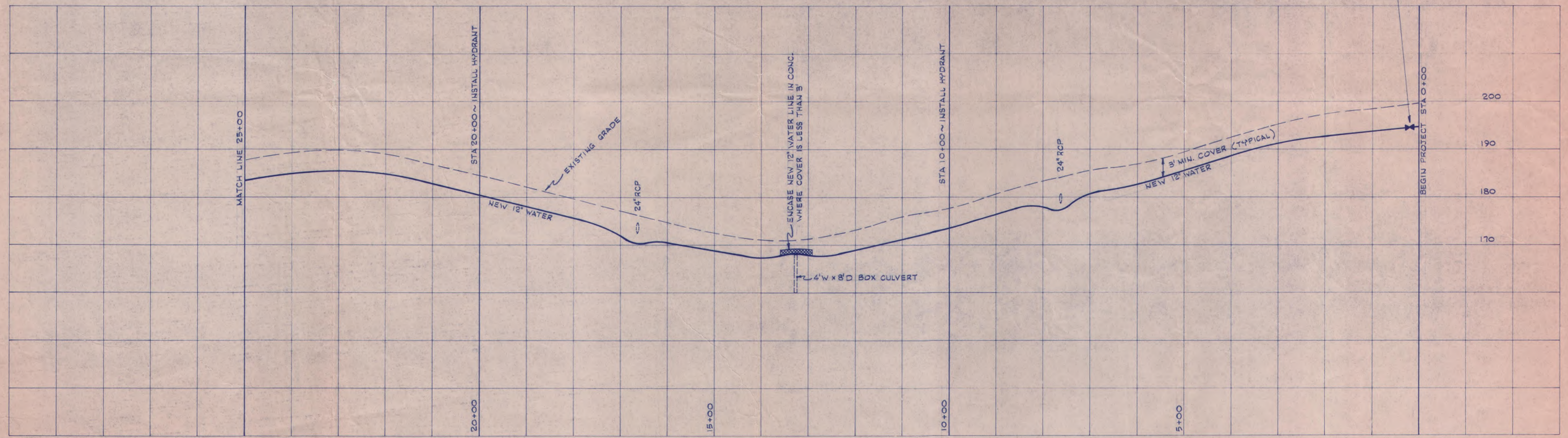
VICTORY TRAIL RD

GARNETT FERRY RD

0 100 200 400 600 800 Feet




PLAN : NOT TO SCALE

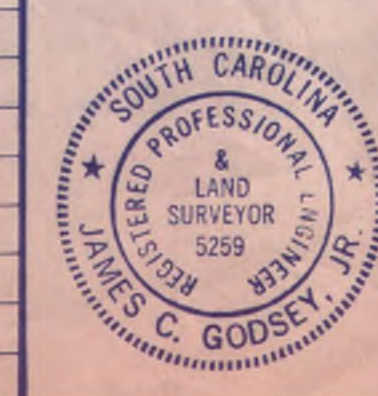


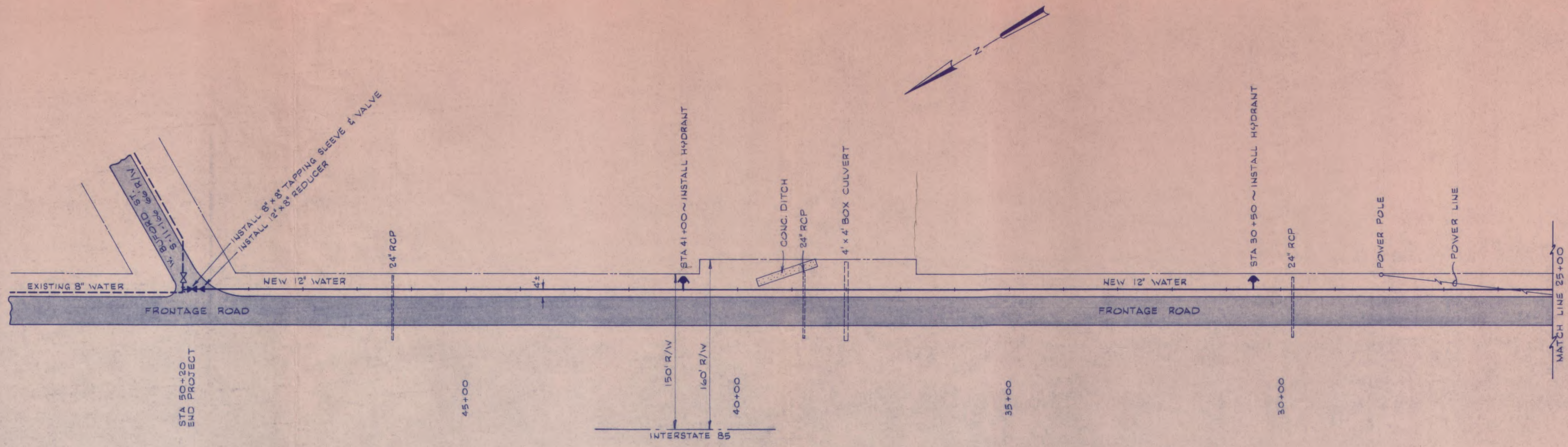
PROFILE : VERT. : 1" = 10'
 HOR. : 1" = 100'

PLAN & PROFILE STA 0+00 THRU STA 25+00

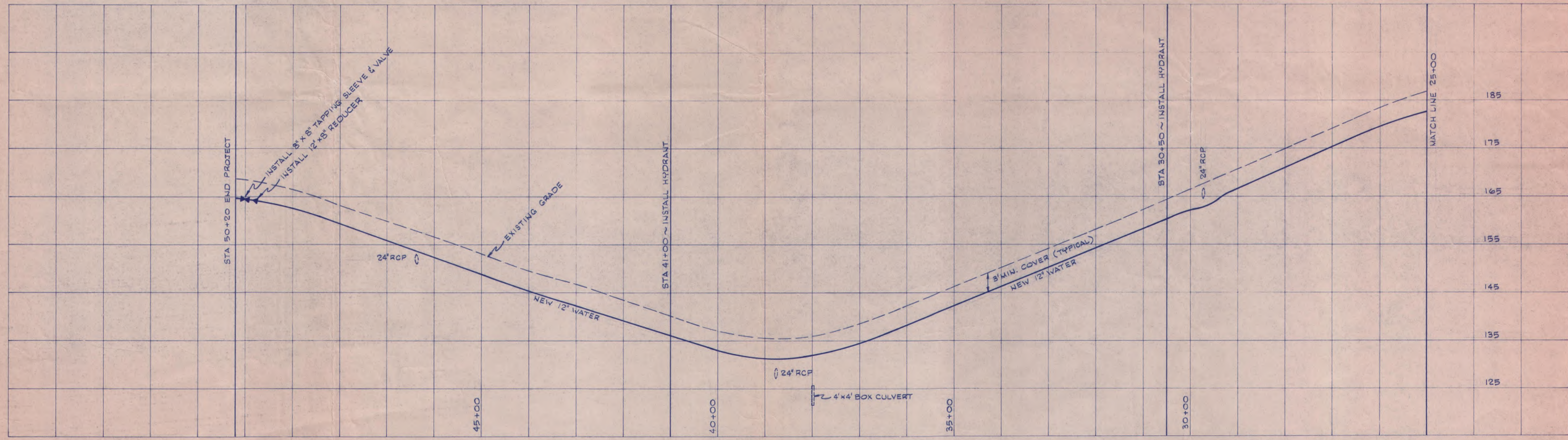
	CAROLINA ENGINEERING SERVICE P. O. BOX 920 GREENWOOD, SOUTH CAROLINA	
	BOARD OF PUBLIC WORKS GAFFNEY, SOUTH CAROLINA WATER MAIN EXTENSION FRONTAGE ROAD	
DESIGNED : Godsey DRAWN : Holsonback CHECKED : Godsey	DATE : September, 1985 SCALE : As Noted JOB No. 85055	SHEET 3 OF 5

No.	DATE	REVISION





PLAN : NOT TO SCALE



PROFILE : VERT. : 1" = 10'
 HOR. : 1" = 100'

No.	DATE	REVISION

PLAN & PROFILE STA 25+00 THRU STA 50+20

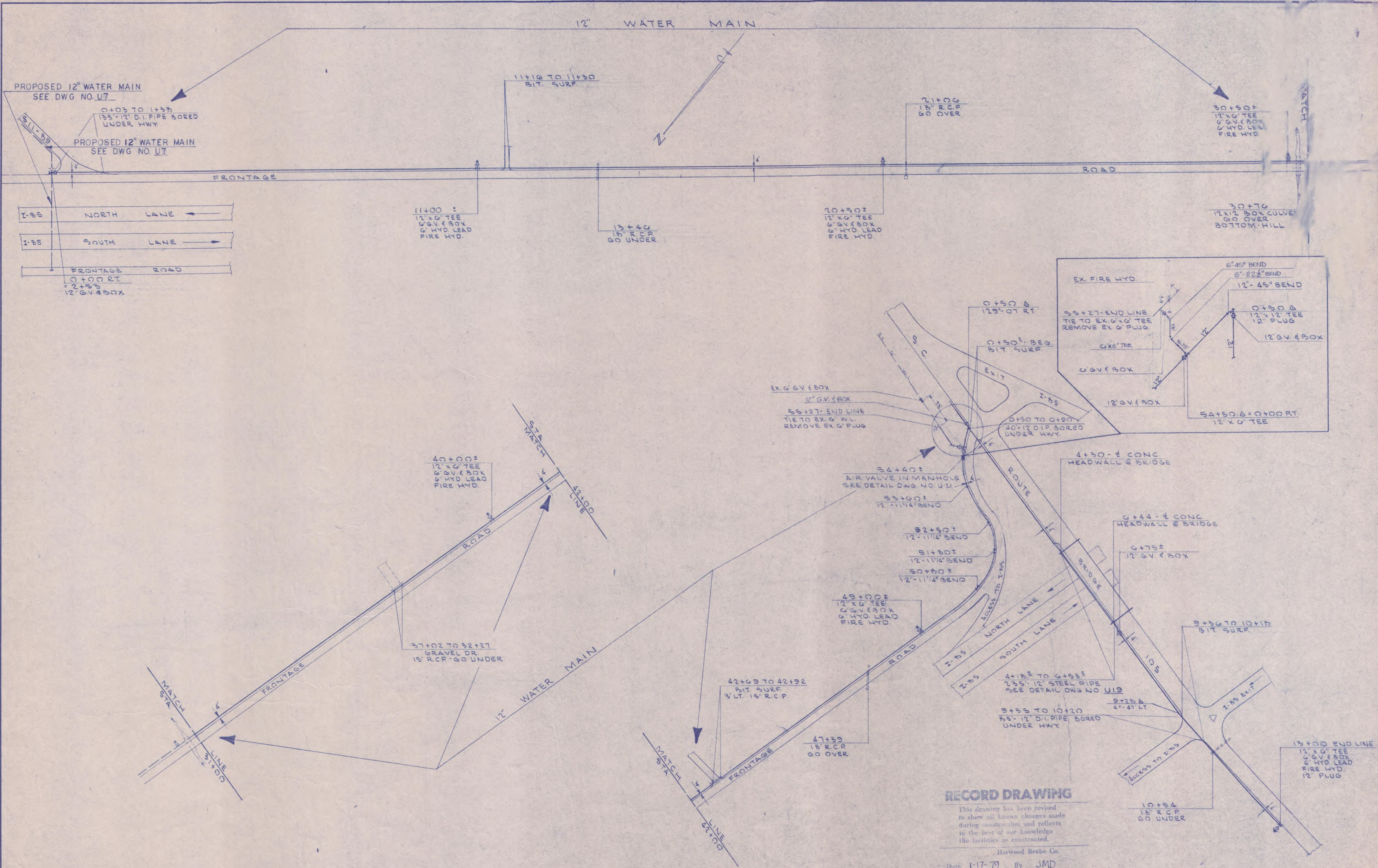


CAROLINA ENGINEERING SERVICE
 P. O. BOX 920 GREENWOOD, SOUTH CAROLINA



BOARD OF PUBLIC WORKS
 GAFFNEY, SOUTH CAROLINA
WATER MAIN EXTENSION
 FRONTAGE ROAD

DESIGNED : Godsey	DATE : September, 1985	SHEET
DRAWN : Holsonback	SCALE : As Noted	4 OF 5
CHECKED : Godsey	JOB No. 85055	



RECORD DRAWING

This drawing has been revised to show all known changes made during construction and reflects to the best of our knowledge the facilities as constructed.

Harwood Beebe Co.

Date: 1-17-79 By: JMD

NO.	DATE	BY	REVISION
1	1-20-79	UH	REVISED I-85 CROSSING @ STA 0+00

HARWOOD BEEBE
 ENGINEERS
 PLANNERS
 CONSULTANTS
 SPARTANBURG, S. C. FLORENCE, S. C. COLUMBIA, S. C.

SCALE: 1"=100'	PROJECT NO.
DATE: OCT. 1977	JOB NO.
DRAWN BY: LEH	G 190X
CHECKED BY: RDW	FILE NO.
APPROVED BY: RDL	

BOARD OF PUBLIC WORKS
 GAFFNEY, S. C.
 WATER SYSTEM IMPROVEMENT

12" WATER MAIN

DRAWING NO.	SEQUENCE NO.
U8	9
OF 21	OF 22

January 8, 2015

Mr. Philip Sarratt
General Manager
Grassy Pond Water Company
Post Office Box 1209
Gaffney, South Carolina 29342

Re: File P027114 – Contract Id. No. 8888860 – Relocation of Water Facilities – I-85 Widening from
Mile Marker 80 to 96 – Cherokee/Spartanburg Counties

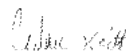
Dear Mr. Sarratt:

The South Carolina Department of Transportation is currently under contract with Infrastructure Consulting & Engineering (ICE) to perform Design Build Preparation Services relating to the above referenced project. As part of these design efforts, survey, subsurface utility engineering and utility coordination will be performed.

The purpose of this letter is to notify you that ICE, CH Engineering and Mead & Hunt will contact you to gather utility data necessary for this project. We ask that you cooperate with them concerning this request such that utility conflicts and concerns can be identified early in the project schedule.

If you should have any questions concerning this, please feel free to contact me.

Sincerely,


keittcc@scdot.org
2015.01.08
13:25:26 -05'00'

Cedric C. Keitt
Utility Project Manager

MCA:krc

cc: Brad Reynolds, SCDOT, Program Manager

Robert Ryggs, SCDOT, Utility Coordinator District Three

Jamie Fowler Jr., SCDOT, Utility Coordinator District Four

Shane Parris, Resident Construction Engineer, Cherokee County

Philip Sarratt, General Manager, Grassy Pond Water Co.

Mark C. Attaway, SCDOT, HQ State Utility Engineer

Dennis Joel Wimberly, SCDOT, HQ Utility Project Manager

Gus Kretschmer, ICE Engineering, Utility Relocation Coordinator Manager

File:RW/UM/CCK



PRELIMINARY UTILITY REPORT, UTILITY INFORMATION

Project Owner: SCDOT
File Number:
Project ID Number: P027114
Project Name: I-85 Widening Improvements Mile Marker 80 to 96
County: Spartanburg & Cherokee

Type: Water distribution

SC811 & SUE Code: GPWC & W2

Utility: Grassy Pond Water Company

Contact: Phillip Sarratt, Superintendent
864.489.7777 phillip.sarratt@grassypondwater.com
626 Chesenee HWY (SC11) Gaffney, SC 29431

Rich Anderson, Summit Engineering (Consultant GPWC)
864.949.1111 ext. 3109 randerson@summitengineeringgroup.com
9601 Warren Abernathy HWY Spartanburg, SC 29301

Existing Facility: 6" WL along Frontage RD S668 (Wilcox Avenue) from I-85 sta. 1710+00LT to SC329 (Victory Trail Road [SC18-Shelby HWY]) sta. 218+15 (5,400LF+/-)

Prior Rights: WL inside present SCDOT ROW by encroachment, relocation cost responsibility is Grassy Pond Water Company

Impact: I-85 Exit 96 with SC18 (Shelby HWY) reconstruction and relocate S668 (Wilcox Avenue) and SC18 (Shelby HWY)

Relocation: Relocate to the realigned S668 (Wilcox Avenue) outside shoulder

Estimated Relocation Cost: \$400,000.00 Grassy Pond Water Company responsibility

Future Facility: NONE anticipated

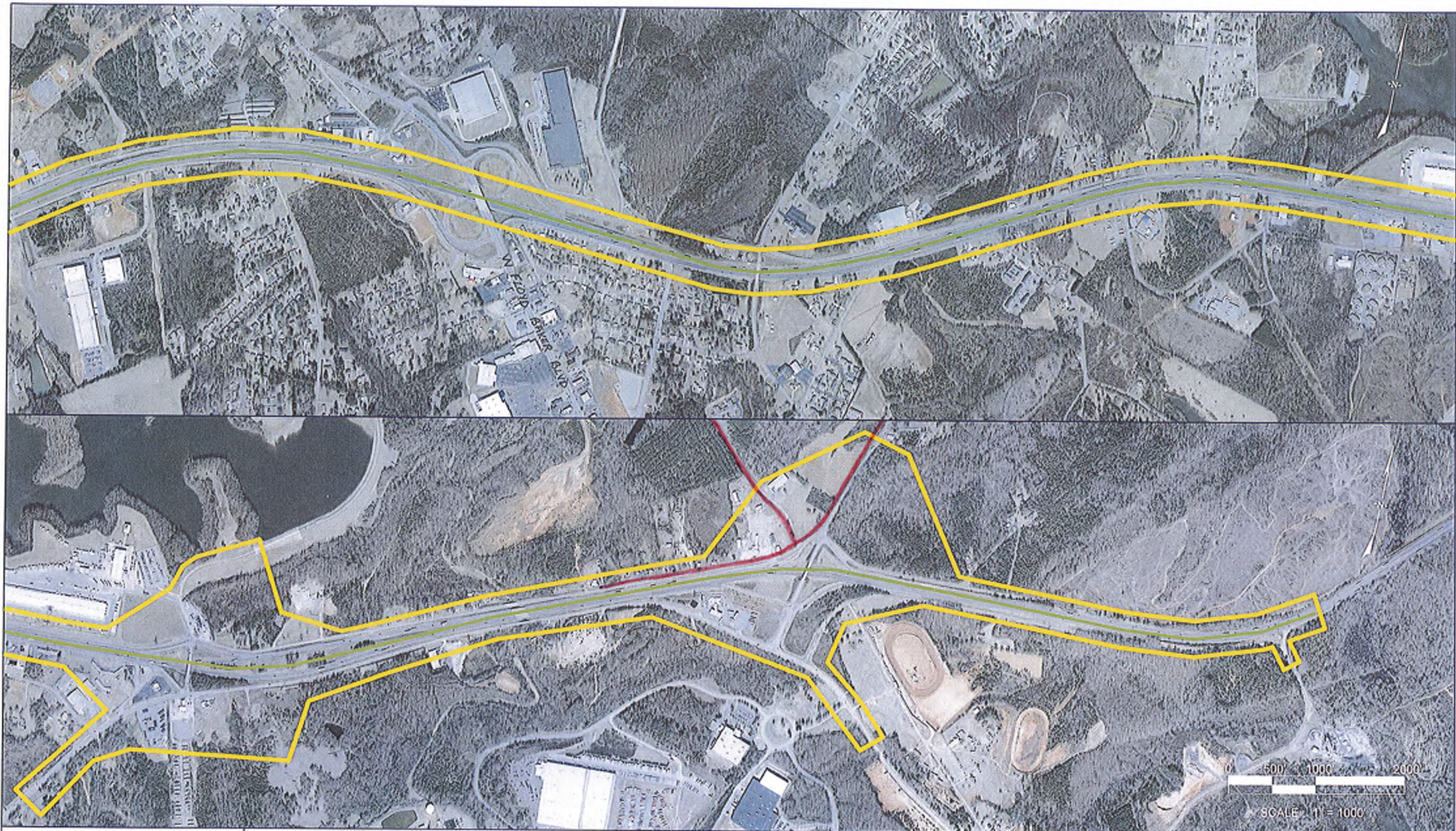
Restrictions and/or Moratoriums: Relocation water line tie ins should be scheduled for low demand hours

Notice to Proceed: 30 days

Estimated Time to Relocate: 3 to 6 months

In-Contract Work: YES

CHESNUT HWY



N LIMESTONE ST

I-85 WIDENING PROJECT (MM 80 TO MM 96)

VICTORY TRAIL RD

GPWC
- WATERLINE

GAFFNEY
FERRY RD

SPARTANBURG AND CHEROKEE COUNTIES, SOUTH CAROLINA

SCDOT

SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION

STUDY AREA

FIGURE 3



January 8, 2015

Mr. Tim Boykin
Program Manager
Level 3 Communications
1025 Eldorado Boulevard
Broomfield, CO 80021

Re: File P027114 – Contract Id. No. 8888860 – Relocation of Telecommunication Facilities – I-85
Widening from Mile Marker 80 to 96 – Cherokee/Spartanburg Counties

Dear Mr. Boykin:

The South Carolina Department of Transportation is currently under contract with Infrastructure Consulting & Engineering (ICE) to perform Design Build Preparation Services relating to the above referenced project. As part of these design efforts, survey, subsurface utility engineering and utility coordination will be performed.

The purpose of this letter is to notify you that ICE, CH Engineering and Mead & Hunt will contact you to gather utility data necessary for this project. We ask that you cooperate with them concerning this request such that utility conflicts and concerns can be identified early in the project schedule.

If you should have any questions concerning this, please feel free to contact me.

Sincerely,



Cedric C. Keitt
Utility Project Manager

MCA:krc

cc: Brad Reynolds, SCDOT, Program Manager
Robert Ryggs, SCDOT, Utility Coordinator District Three
Jamie Fowler Jr., SCDOT, Utility Coordinator District Four
Shane Parris, Resident Construction Engineer, Cherokee County
Mark C. Attaway, SCDOT, HQ State Utility Engineer
Dennis Joel Wimberly, SCDOT, HQ Utility Project Manager
Gus Kretschmer, ICE Engineering, Utility Relocation Coordinator Manager
File:RW/UM/CCK



PRELIMINARY UTILITY REPORT, UTILITY INFORMATION

Project Owner: SCDOT
File Number:
Project ID Number: P027114
Project Name: I-85 Widening Improvements Mile Marker 80 to 96
County: Spartanburg & Cherokee

Type: Telecommunications, Toll/Data

SC811 & SUE Code: LC393 & T3

Utility: Level3

Contact: Russ Wheat, OSP Field Technician
803.206.9563 russ.wheat@level3.com
3370 Lucius Road Columbia, SC 29201

Existing Facility: Fiber Optic Cable along S39 (Macedonia RD & South Green River RD) crossing I-85 sta.1230+00

Prior Rights: Cable in shoulder of SCDOT present ROW by encroachment and relocation cost the responsibility of Level3

Impact: Realignment of S39 (Macedonia RD & South Green River RD) and replacement of bridge over I-85

Relocation: Relocate to NEW SCDOT ROW for S39 (Macedonia RD & South Green River RD) and replace I-85 crossing

Estimated Relocation Cost: \$175,000.00 responsibility of Level3

Future Facility: NONE anticipated

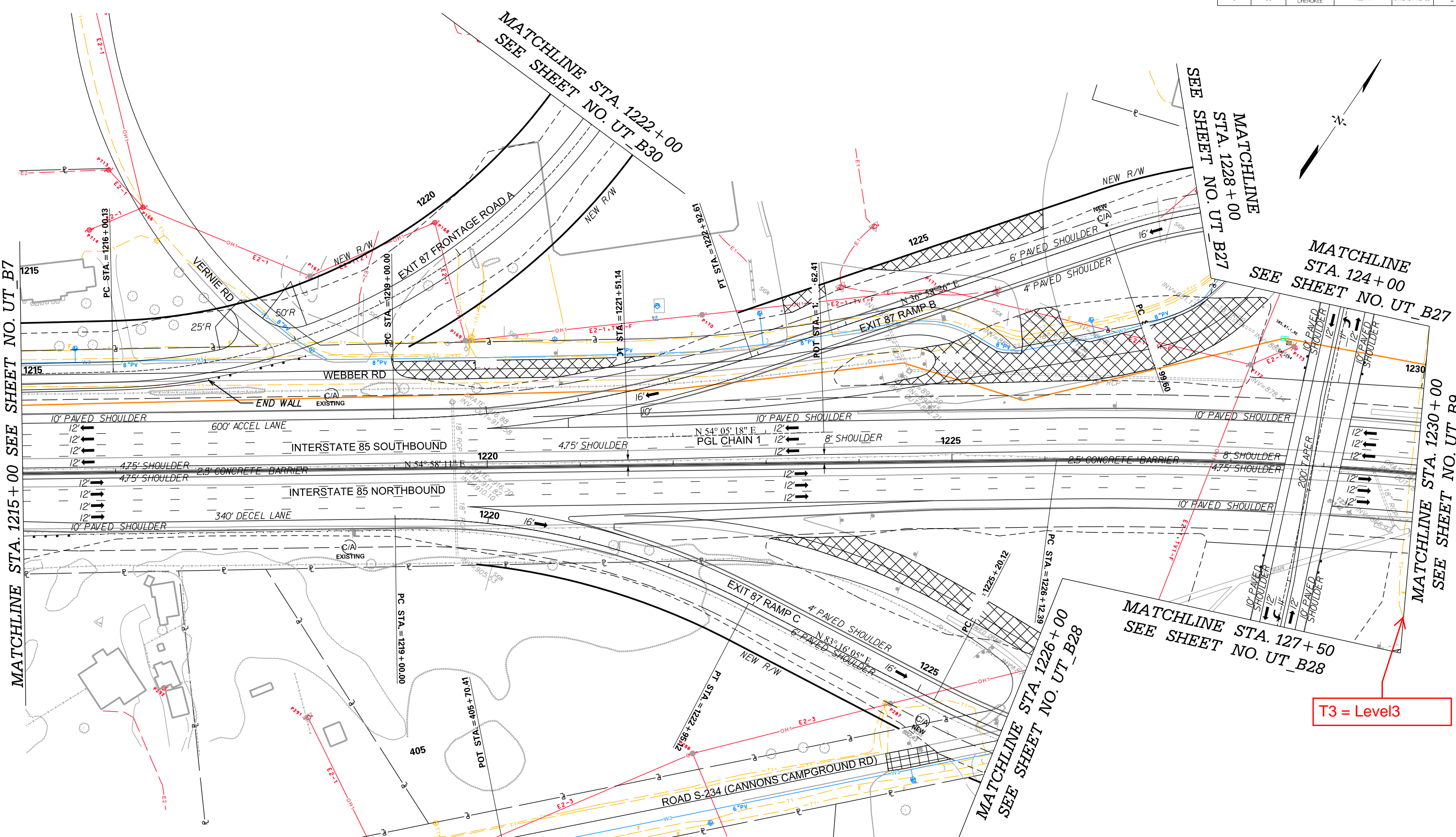
Restrictions and/or Moratoriums: Splicing/Cutover outage window determined by customer schedule

Notice to Proceed: 30 days

Estimated Time to Relocate: 30 days

In-Contract Work: NONE

FED. RD. DRW. NO.	STATE	COUNTY	PROJECT ID	ROAD / ROUTE NO.	SHEET NO.
3	SC	SPARTANBURG CHEROKEE	P027114	INTERSTATE 85	UT_B8



MATCHLINE STA. 1215 + 00 SEE SHEET NO. UT_B7

MATCHLINE STA. 1222 + 00
SEE SHEET NO. UT_B30

MATCHLINE
STA. 1228 + 00
SEE SHEET NO. UT_B27

MATCHLINE
STA. 124 + 00
SEE SHEET NO. UT_B27

MATCHLINE STA. 1230 + 00
SEE SHEET NO. UT_B9

MATCHLINE STA. 127 + 50
SEE SHEET NO. UT_B28

MATCHLINE STA. 1226 + 00
SEE SHEET NO. UT_B28

T3 = Level3

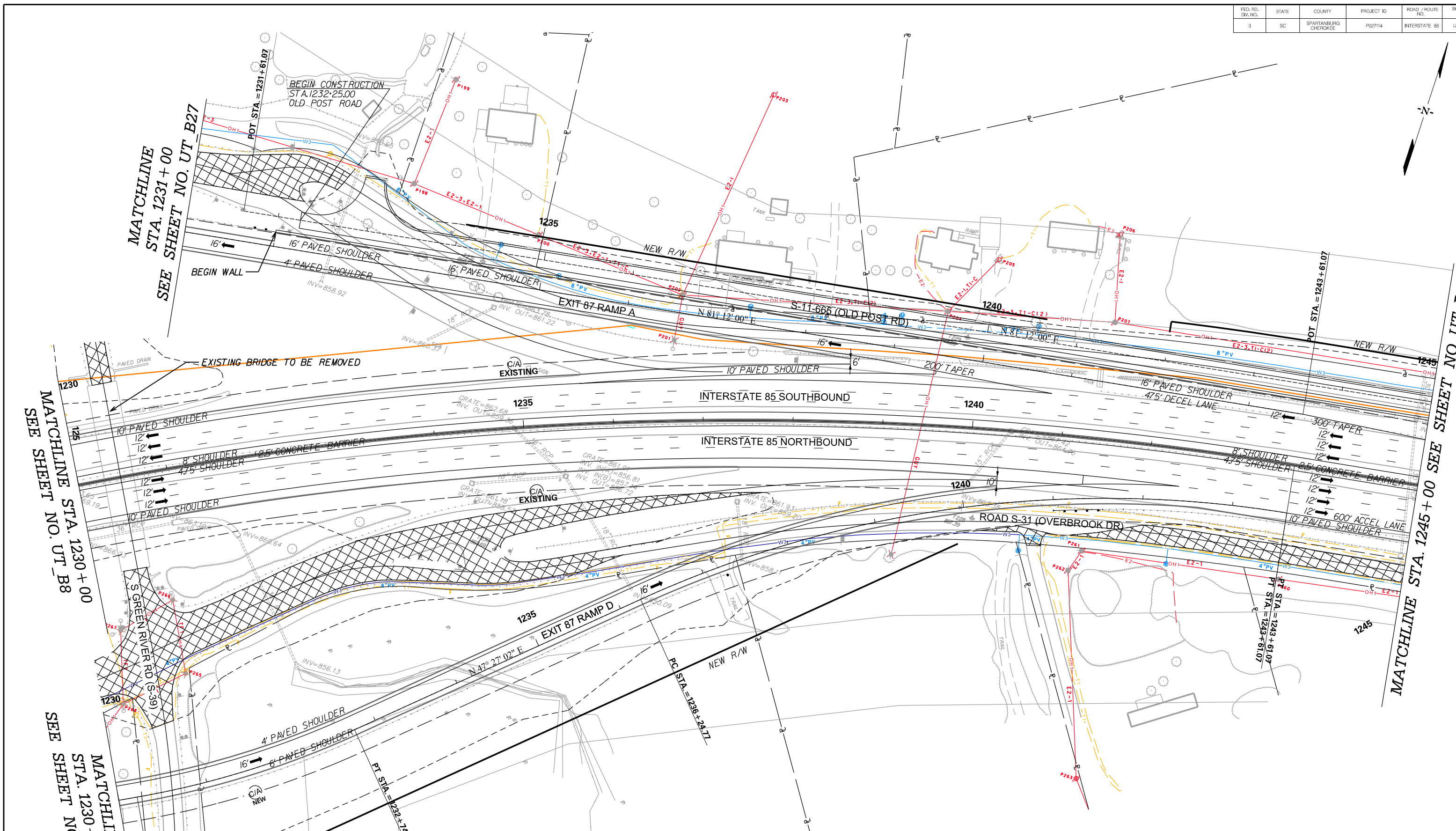
PRELIMINARY
NOT FOR CONSTRUCTION

SCALE: 1" = 50'

7				
6				
5				
4				
3				
2				
1				
REV. NO.	BY	DATE	DESCRIPTION OF REVISION	

SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION
INTERSTATE 85
UTILITY PLAN SHEET
INTERSTATE 85 MILE MARKER 90-97
SEGMENT B

FED. RD. DRW. NO.	STATE	COUNTY	PROJECT ID	ROAD / ROUTE NO.	SHEET NO.
3	SC	SPARTANBURG CHEROKEE	P027114	INTERSTATE 85	UT_B9



MATCHLINE
STA. 1231+00
SEE SHEET NO. UT_B27

MATCHLINE STA. 1230+00
SEE SHEET NO. UT_B8

MATCHLINE STA. 1230+00
SEE SHEET NO. UT_B28

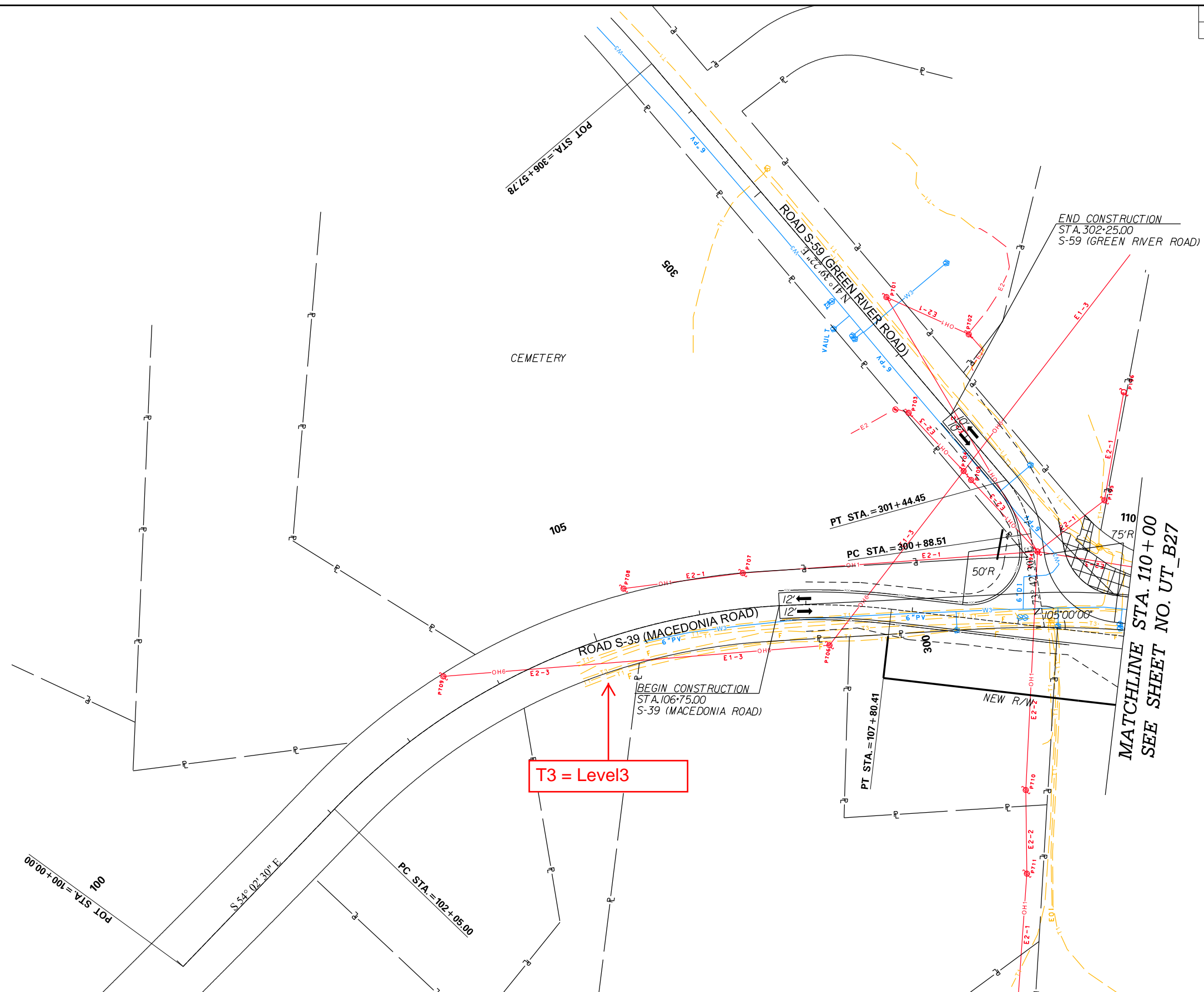
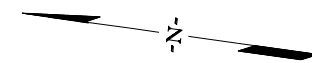
MATCHLINE STA. 1245+00
SEE SHEET NO. UT_B10

T3 = Level3

PRELIMINARY NOT FOR CONSTRUCTION		SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION INTERSTATE 85			
		UTILITY PLAN SHEET			
SCALE: 1" = 50' REV. NO. BY DATE DESCRIPTION OF REVISION		7			
		6			
		5			
		4			
		3			
2					
1					
		INTERSTATE 85 MILE MARKER 90-97 SEGMENT B			

Z:\Projects\14-60 185 Widening Cherokee Co MM80-96\Utilities\sheets\SHUT_UT_B09.dgn
 12/28/2015

FED. RD. DRW. NO.	STATE	COUNTY	PROJECT ID	ROAD / ROUTE NO.	SHEET NO.
3	SC	SPARTANBURG CHEROKEE	P027114	INTERSTATE 85	UT_B26

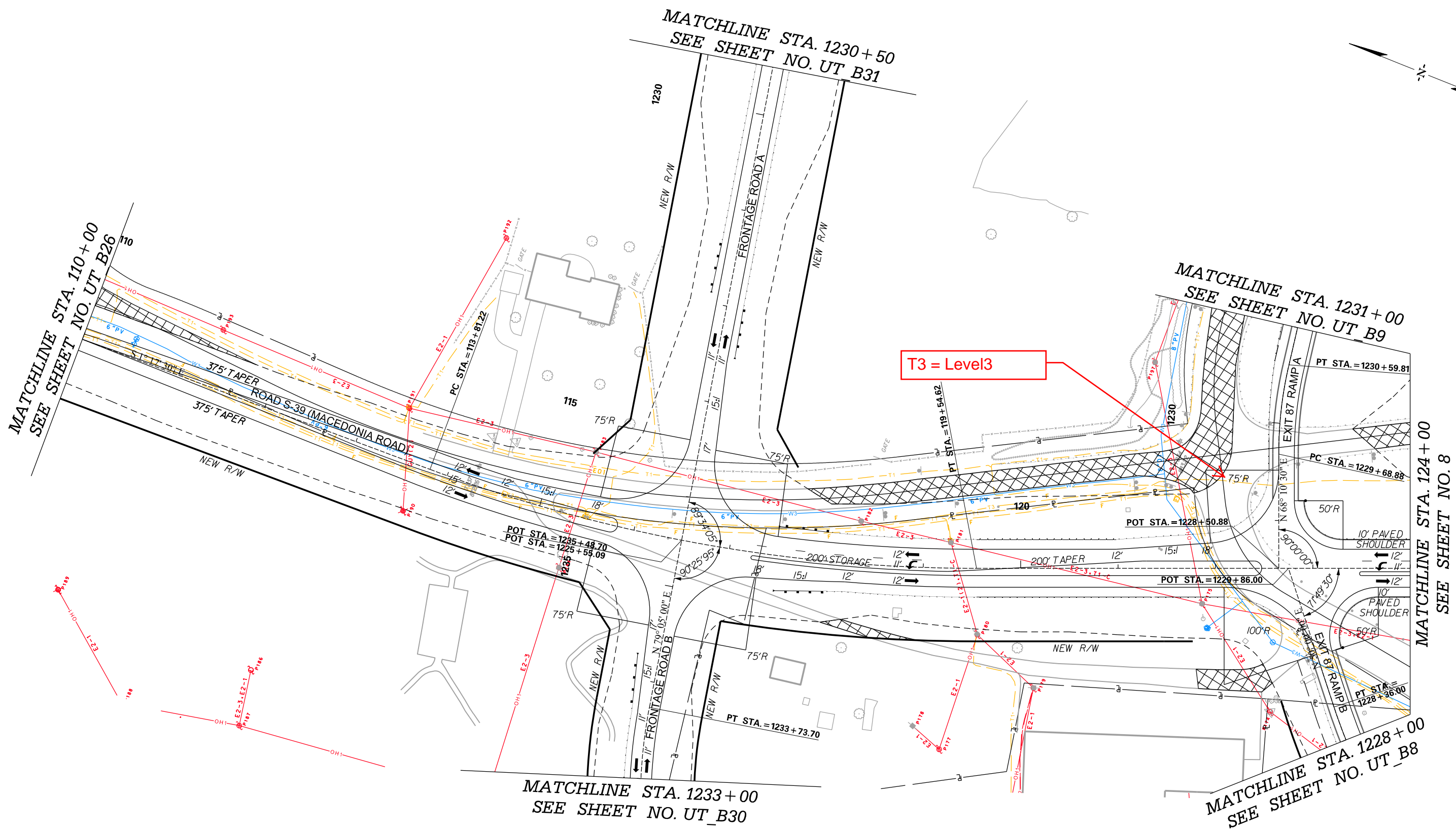
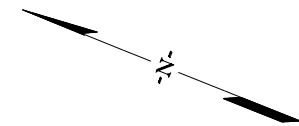


T3 = Level3

<p>PRELIMINARY NOT FOR CONSTRUCTION</p>	7				SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION INTERSTATE 85 UTILITY PLAN SHEET INTERSTATE 85 MILE MARKER 90-97 SEGMENT B
	6				
5					
4					
3					
2					
1					
SCALE: 1" = 50'	REV. NO.	BY	DATE	DESCRIPTION OF REVISION	

Z:\Projects\14-60 185 Widening Cherokee Co MM80-96\Utilities\sheets\SHT_UT_B26_S39.dgn
 12/28/2015

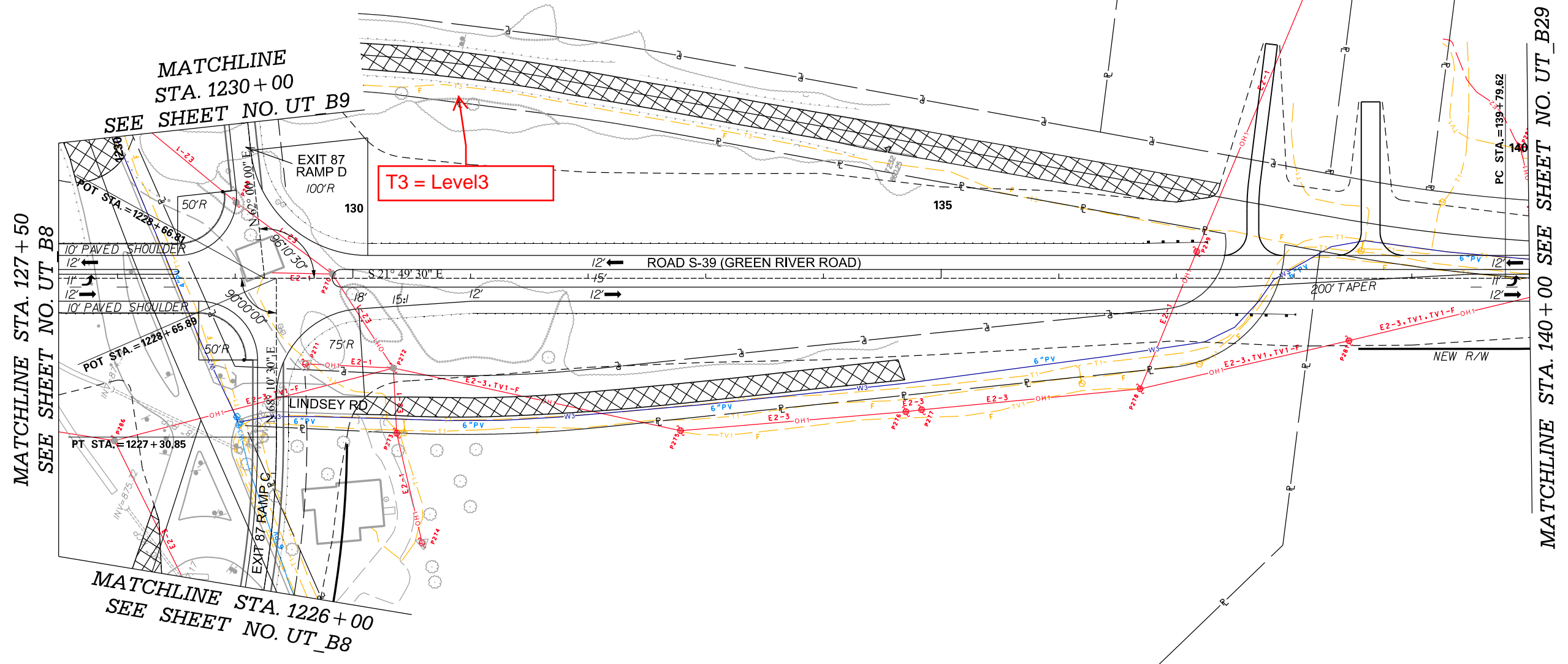
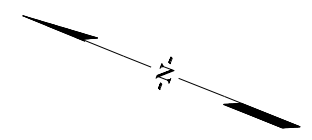
FED. RD. DRW. NO.	STATE	COUNTY	PROJECT ID	ROAD / ROUTE NO.	SHEET NO.
3	SC	SPARTANBURG CHEROKEE	P027114	INTERSTATE 85	UT_B27



Z:\Projects\14-60 185 Widening Cherokee Co MM80-96\Utilities\sheets\SHI_UT_B27_539.dgn 12/28/2015

<p>PRELIMINARY NOT FOR CONSTRUCTION</p>	7				SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION INTERSTATE 85
	6				
	5				UTILITY PLAN SHEET
	4				INTERSTATE 85 MILE MARKER 90-97 SEGMENT B
	3				
	2				
	1				
SCALE: 1" = 50'	REV. NO.	BY	DATE	DESCRIPTION OF REVISION	

FED. RD. DRW. NO.	STATE	COUNTY	PROJECT ID	ROAD / ROUTE NO.	SHEET NO.
3	SC	SPARTANBURG CHEROKEE	P027114	INTERSTATE 85	UT_B28



MATCHLINE STA. 127 + 50
SEE SHEET NO. UT B8

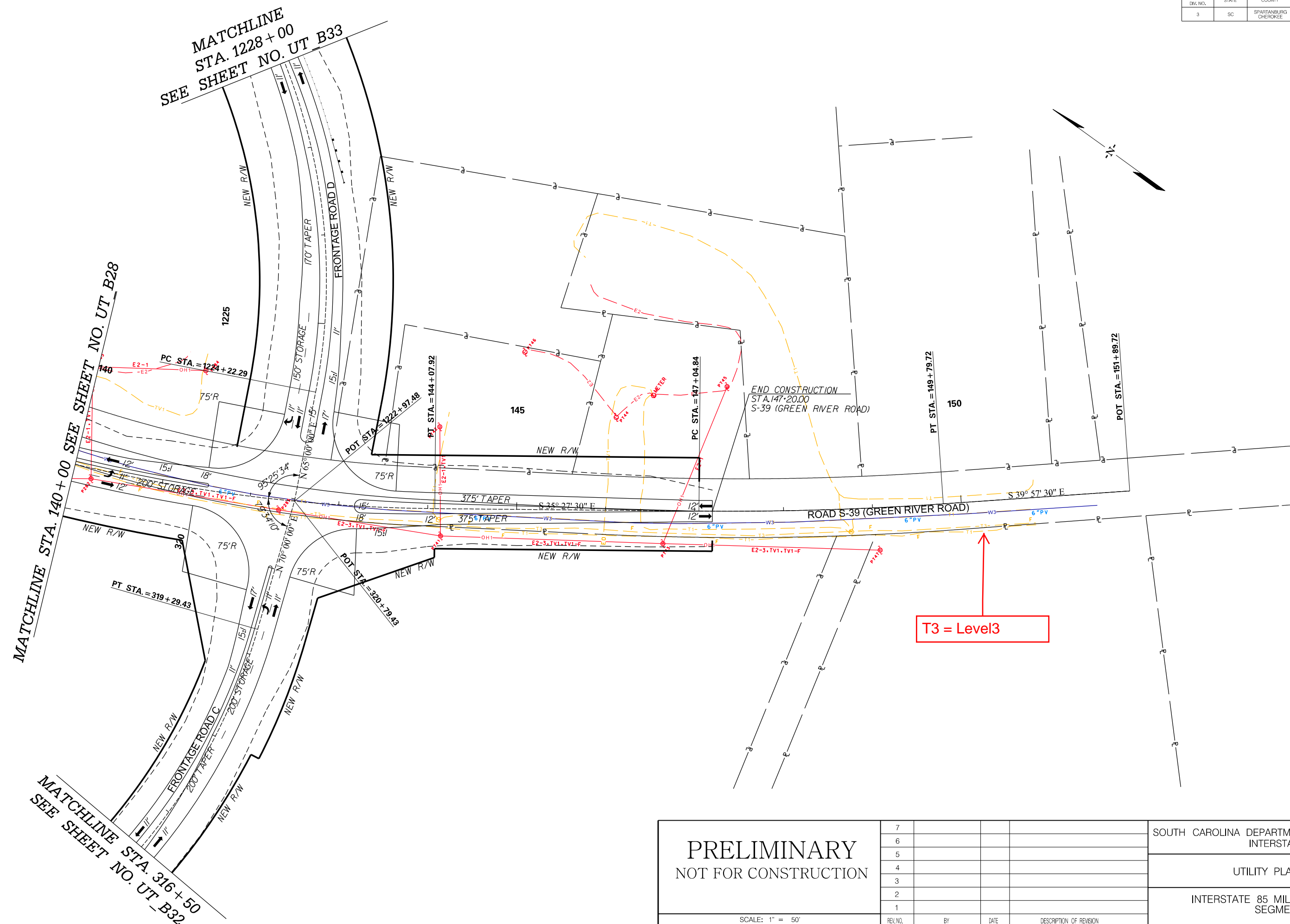
MATCHLINE STA. 140 + 00 SEE SHEET NO. UT_B29

MATCHLINE STA. 1226 + 00
SEE SHEET NO. UT_B8

PRELIMINARY NOT FOR CONSTRUCTION	7				SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION INTERSTATE 85 UTILITY PLAN SHEET INTERSTATE 85 MILE MARKER 90-97 SEGMENT B
	6				
	5				
	4				
	3				
	2				
	1				
SCALE: 1" = 50'	REV. NO.	BY	DATE	DESCRIPTION OF REVISION	

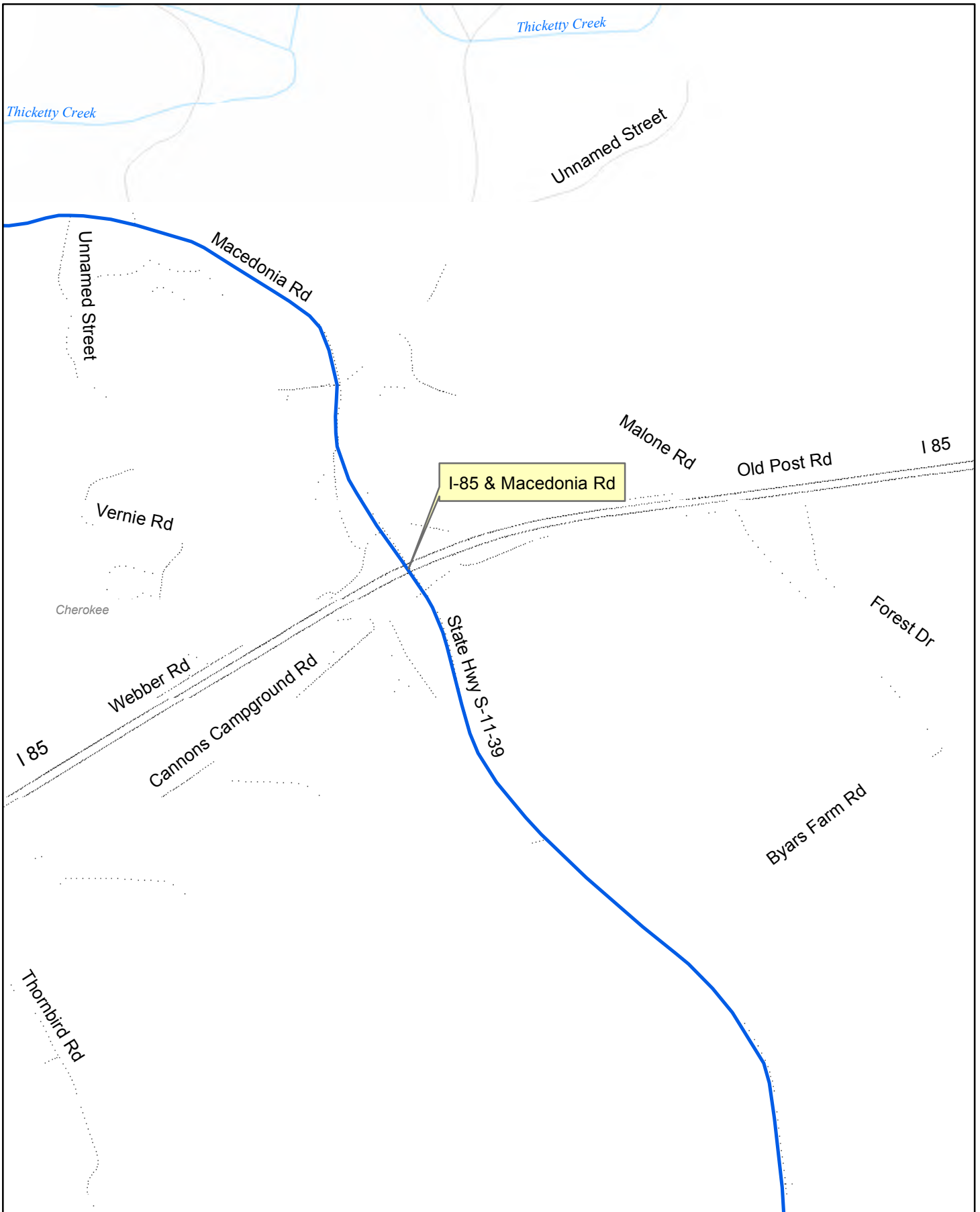
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12/28/2015

FED. RD. DRW. NO.	STATE	COUNTY	PROJECT ID	ROAD / ROUTE NO.	SHEET NO.
3	SC	SPARTANBURG CHEROKEE	P027114	INTERSTATE 85	UT_B29



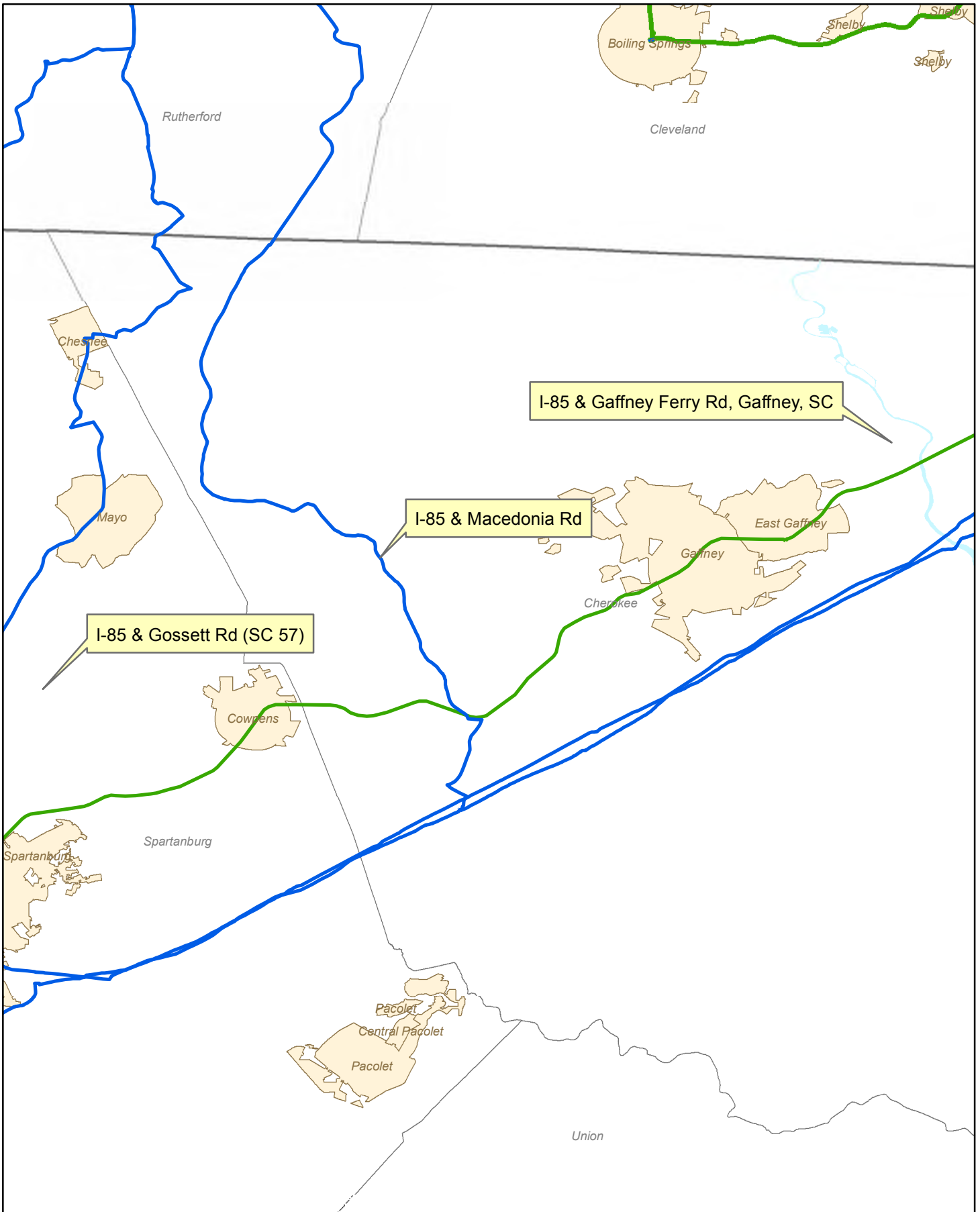
Z:\Projects\14-60 185 Widening Cherokee Co MM80-96\Utilities\sheets\SHT_UT_B29_539.dgn 12/28/2015

<p>PRELIMINARY NOT FOR CONSTRUCTION</p>	7				SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION INTERSTATE 85
	6				
	5				UTILITY PLAN SHEET
	4				
	3				
	2				
	1				INTERSTATE 85 MILE MARKER 90-97 SEGMENT B
SCALE: 1" = 50'	REV. NO.	BY	DATE	DESCRIPTION OF REVISION	



- Level 3 Facilities
- Non-Level 3 Fiber Optic Facilities

Note that the locations of Facilities shown on these drawings are only approximate and Level 3 hereby disclaims any responsibility to third parties for the accuracy of this information. Persons working in the area covered by these drawings must contact the statewide Call-Before-You-Dig System to ascertain the location of underground facilities prior to performing any excavation.



- Level 3 Facilities
- Non-Level 3 Fiber Optic Facilities

Note that the locations of Facilities shown on these drawings are only approximate and Level 3 hereby disclaims any responsibility to third parties for the accuracy of this information. Persons working in the area covered by these drawings must contact the statewide Call-Before-You-Dig System to ascertain the location of underground facilities prior to performing any excavation.

January 8, 2015

Mr. Tim Lowry
Macedonia Waterworks
3142 Union Highway
Gaffney, South Carolina 29430

Re: File P027114 – Contract Id. No. 8888860 – Relocation of Water Facilities – I-85 Widening from
Mile Marker 80 to 96 – Cherokee/Spartanburg Counties

Dear Mr. Lowry:

The South Carolina Department of Transportation is currently under contract with Infrastructure Consulting & Engineering (ICE) to perform Design Build Preparation Services relating to the above referenced project. As part of these design efforts, survey, subsurface utility engineering and utility coordination will be performed.

The purpose of this letter is to notify you that ICE, CH Engineering and Mead & Hunt will contact you to gather utility data necessary for this project. We ask that you cooperate with them concerning this request such that utility conflicts and concerns can be identified early in the project schedule.

If you should have any questions concerning this, please feel free to contact me.

Sincerely,

 keittcc@scdot.org
2015.01.08 13:54:02 -0500

Cedric C. Keitt
Utility Project Manager

MCA:krc

cc: Brad Reynolds, SCDOT, Program Manager
Robert Ryggs, SCDOT, Utility Coordinator District Three
Jamie Fowler Jr., SCDOT, Utility Coordinator District Four
Shane Parris, Resident Construction Engineer, Cherokee County
Mark C. Attaway, SCDOT, HQ State Utility Engineer Dennis
Joel Wimberly, SCDOT, HQ Utility Project Manager
Gus Kretschmer, ICE Engineering, Utility Relocation Coordinator Manager
File:RW/UM/CCK



PRELIMINARY UTILITY REPORT, UTILITY INFORMATION

Project Owner: SCDOT
File Number:
Project ID Number: P027114
Project Name: I-85 Widening Improvements Mile Marker 80 to 96
County: Spartanburg & Cherokee

Type: Water Distribution

SC811 & SUE Code: MWW & W3

Utility: Macedonia Waterworks

Contact: Tim Lowry, Superintendent
864.487.4596 timlowry1@hotmail.com
3142 Union HWY Gaffney, SC 29430

Vernon Atkinson, Summit Engineering (Consultant for MWW)
864.949.1111 vatkinson@summitengineeringgroup.com
9601 Warren Abernathy HWY Spartanburg, SC 29301

Existing Facility: Various size water distribution lines (3”PVC, 4”PVC, 6”PV, 8”PVC) along Frontage Roads (49,000+LF) beginning I-85 sta. 1081+00LT to and I-85 sta. 1140+00RT to 1185+00RT

Prior Rights: Water mains are inside present SCDOT ROW by encroachment, relocation cost the responsibility of Macedonia Waterworks

Impact: Realigned S665 (Webber RD), S131 (Sunny Slope DR) bridge replacement, I-85 Exit 87 S39 South Green River RD) interchange improvements, realigned S31 (Overbrook DR), realigned S665 (Old Post RD)

Relocation: Using SUE QLA (test hole) to determine impact/conflict with WL crossing I-85, replace crossing if in conflict. WL parallel with I-85 Frontage Roads verify impact/conflict with grading and MSE walls, relocate if in conflict. WL in interchange improvements, replace WL in the realigned Frontage Roads shoulder

Estimated Relocation Cost: \$1,500,000.00 responsibility of Macedonia Waterworks

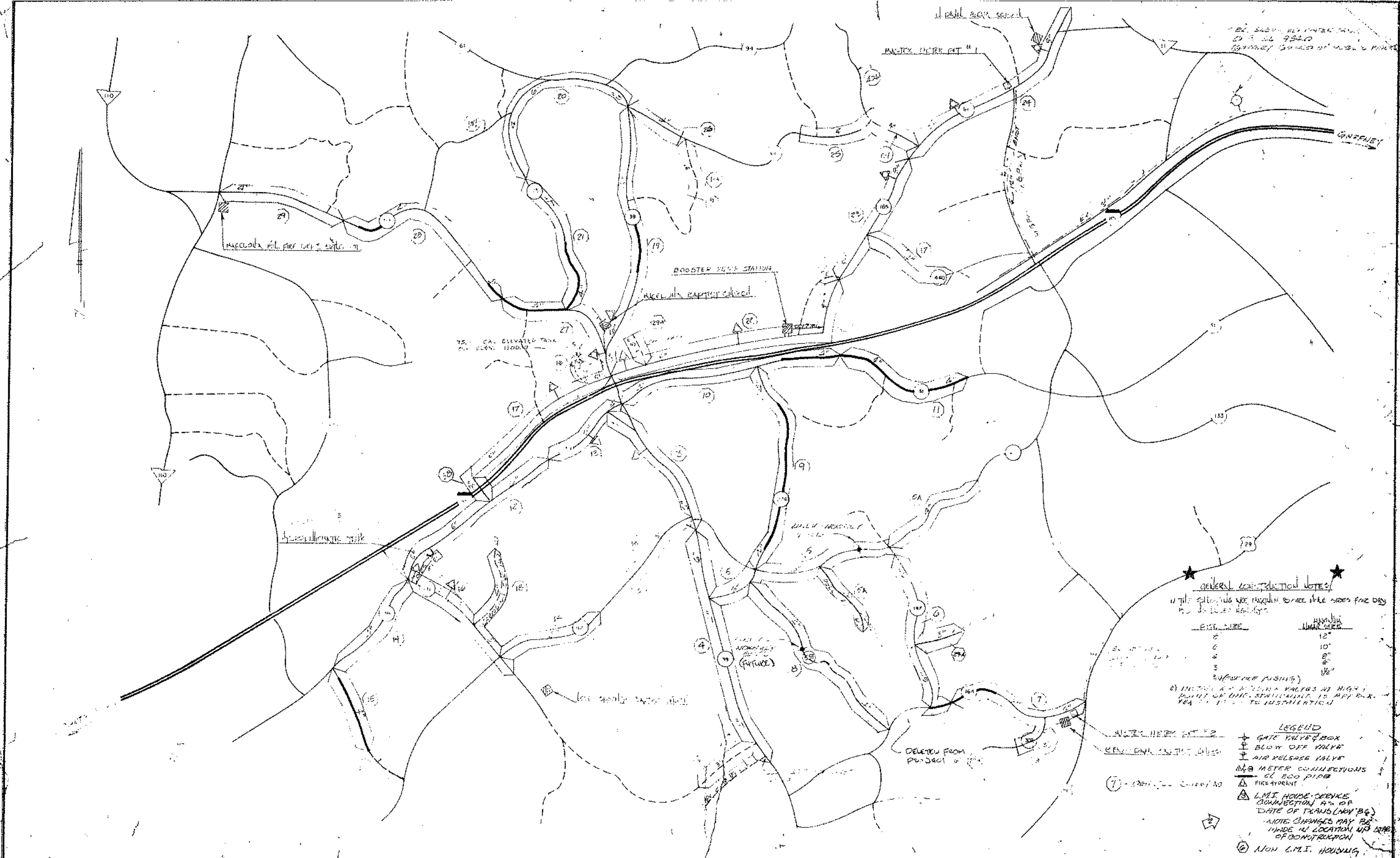
Future Facility: NONE anticipated

Restrictions and/or Moratoriums: Relocation water line tie-ins should be scheduled for low demand hours

Notice to Proceed:

Estimated Time to Relocate: 6 to 9 months

In-Contract Work: YES



GENERAL CONSTRUCTION NOTES

1) THE EXISTING PIPE MATERIALS SHALL BE REMOVED FOR DRY
AND TO BE REPLACED

PIPE SIZE	MINIMUM BURIED DEPTH
6"	12"
8"	10"
10"	8"
12"	6"
14"	18"

2) INCLUDE A 1/2" MIN. VALVE AT HIGH
POINT OF LINE. STATIONING IS APPROX.
VEA TO 10' TO INSTALLATION

LEGEND

- ⊕ GATE VALVE BOX
- ⊕ BLOW OFF VALVE
- ⊕ AIR RELEASE VALVE
- ⊕ METER CONNECTIONS
- ⊕ CL 200 PIPE
- ⊕ FIRE HYDRANT
- ⊕ L.M.I. HOUSE SERVICE CONNECTION AS OF DATE OF TRANS (MAY '84)
- ⊕ NOTE: CHANGES MAY BE MADE IN LOCATION AND SIZE OF CONSTRUCTION
- ⊕ Non L.M.I. HOUSING

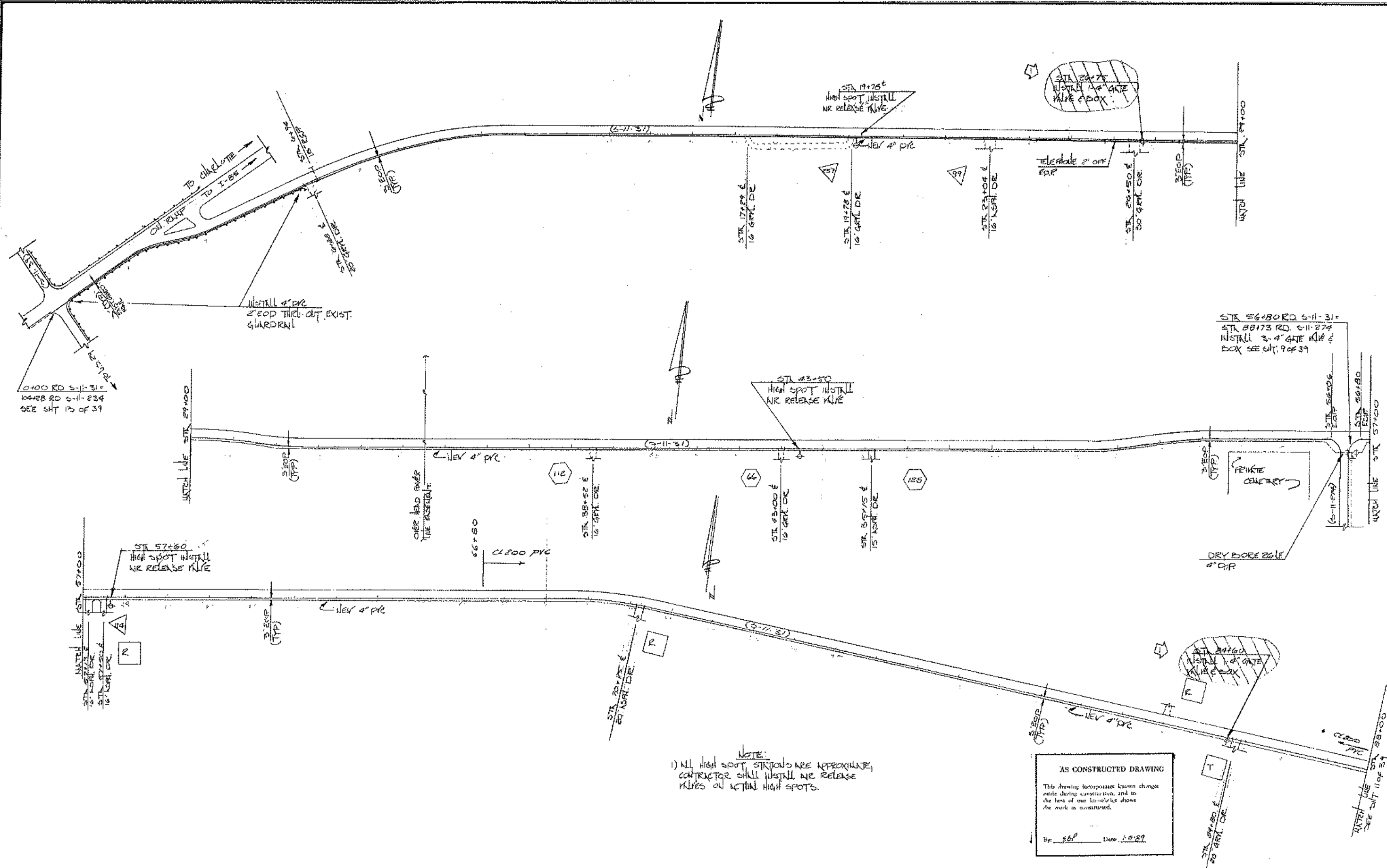
REVISIONS				APPROVALS				PROJECT	SHEET TITLE	DATE
NO.	DESCRIPTION	DATE	BY	DATE	BY	DATE	BY	MACE DONIA WATER WORKS INC	LOCKPORT N.Y.	10/1/86
1	Delic. 6" WL on Rd. 164 (Dug. 2A)	10/1/86	REAL							
2	ADD HOUSE LEGEND	4/18	125W							
3	DELETE HYD. TANK, ADDED HYD. STATION	5-19	EP							
4	ADD HYDRANTS, PAVED IN LINE	5-26	EP							
5	ADDED CLEARANCE LINES, SECTION 11-C	11-1	EP							



B. P. BARBER & ASSOCIATES, INC.
 ENGINEERS • SURVEYORS • PLANNERS
 301-C EAST BLACKSTOCK ROAD
 SPARTANBURG, S.C. 29301
 703-576-9910

PROJECT: **MACE DONIA WATER WORKS INC**
WATER SYSTEM

SHEET: 2
 OF 2
 REF: 21022
 N.B. NO. 1
 FILE NO. 109



NOTE:
 1) ALL HIGH SPOT STATIONS ARE APPROXIMATE.
 CONTRACTOR SHALL INSTALL NR RELEASE
 KNIVES ON ACTUAL HIGH SPOTS.

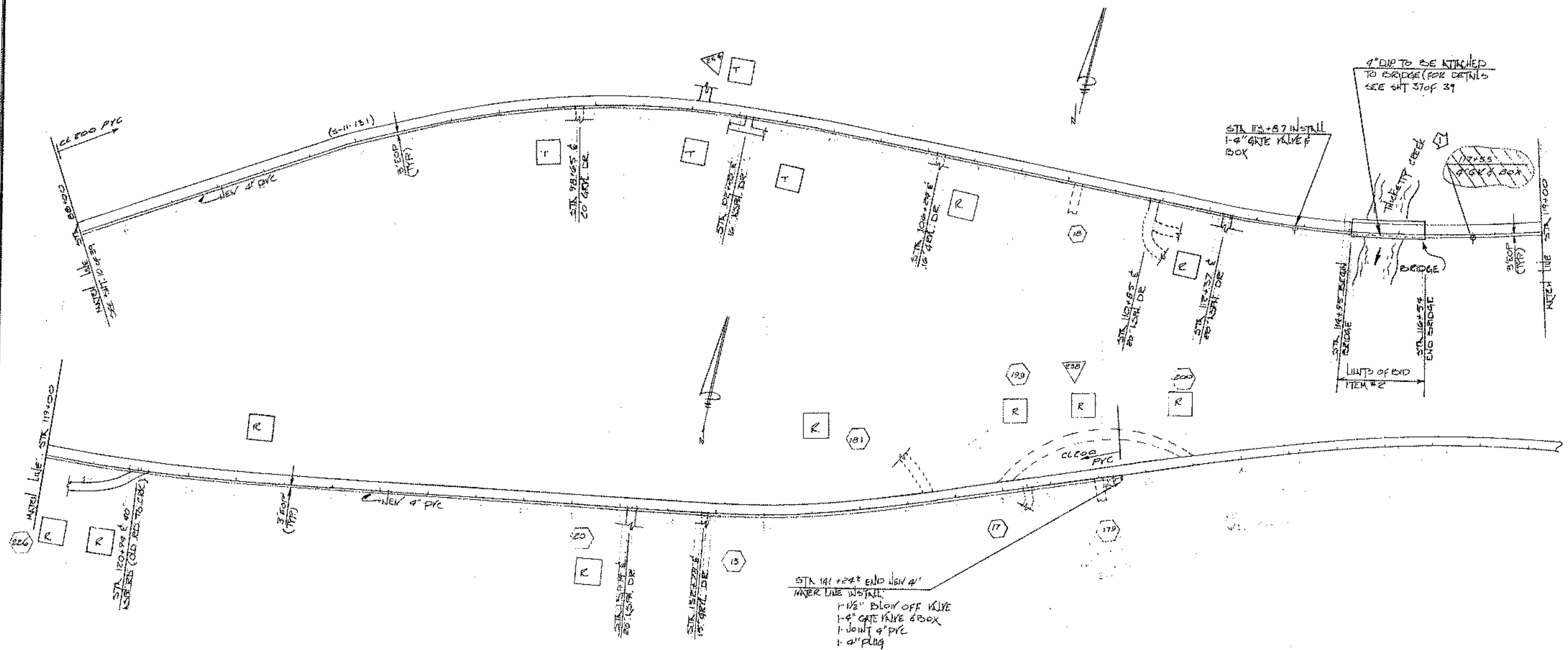
AS CONSTRUCTED DRAWING
 This drawing incorporates known changes
 made during construction, and to
 the best of our knowledge shows
 the work as constructed.
 By: EBP Date: 1-8-89

REVISIONS				APPROVALS				PROJECT		SHEET TITLE		SHEET	
LOCATION	DESCRIPTION	DATE	BY	APP.	LOCATION	DESCRIPTION	DATE	BY	APP.	PROJECT	SHEET TITLE	SHEET	OF
	CHANGED FROM 24\"/>	10/87	REL		PROJECT ENGR :	REL				MACEDONIA WATER WORKS INC.	ROAD S-11-31	10	39
					DESIGNED BY :	WH							
					DRAWN BY :	REL							
					CHECKED BY :	REL							
					APPROVED BY :	REL							



PROJECT: MACEDONIA WATER WORKS INC.
 WATER SYSTEM

SCALE: 1"=100' DATE: NOV 1988



STA 141+24.2 END NEW 4\"/>

WATER LINE INSTALL:

- 1-1/2" Blow off Valve
- 1-4" Gate Valve & Box
- 1 Joint 4" PVC
- 1 4" Plug

NOTE:

1) All High Spot Stations are Approximate, Contractor shall install NR Release Valves at actual high spots.

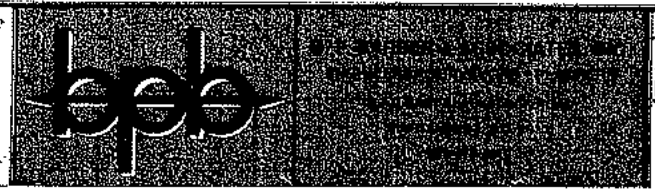
AS CONSTRUCTED DRAWING

This drawing incorporates known changes made during construction, and to the best of our knowledge shows the work as constructed.

By: EBP Date: 1-9-87

REVISIONS			
LOCATION	DESCRIPTION	DATE	BY
	DELETE 8" VALVE @ STA 111.85	10/87	LN

APPROVALS			
PROJECT ENGR	DESIGNED BY	DRAWN BY	CHECKED BY
RSW	LH's	RSW	RSW



PROJECT

MACEDONIA WATER WORKS INC.

WATER SYSTEM

SHEET TITLE

Road 5-11-31

SCALE: 1"=100'

DATE: Nov 1986

SHEET 11

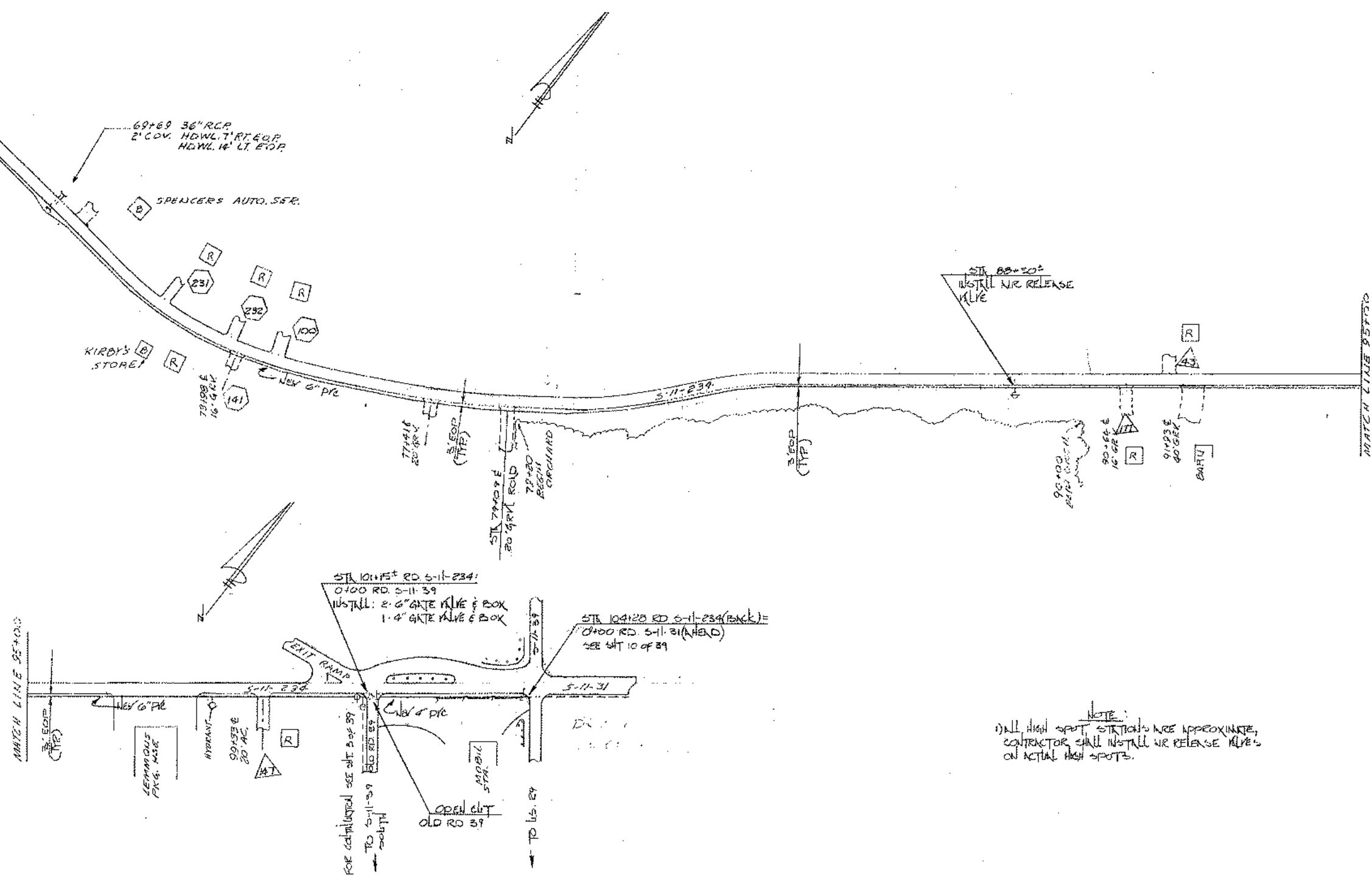
OF 39

REF B6082

N.B NO

FILE NO.

MATCH LINE 86650C
SEE SHEET 12

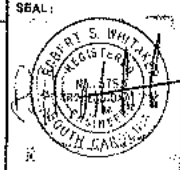


NOTE:
ALL HIGH SPOT STATIONS WERE APPROXIMATE,
CONTRACTOR SHALL INSTALL NR RELEASE VALVES
ON ACTUAL HIGH SPOTS.

AS CONSTRUCTED DRAWING
This drawing incorporates field changes
made during construction, and in
accordance with the knowledge of the
work as constructed.
By: EDP Date: 12-7-89

REVISIONS			
LOCATION	DESCRIPTION	DATE	BY

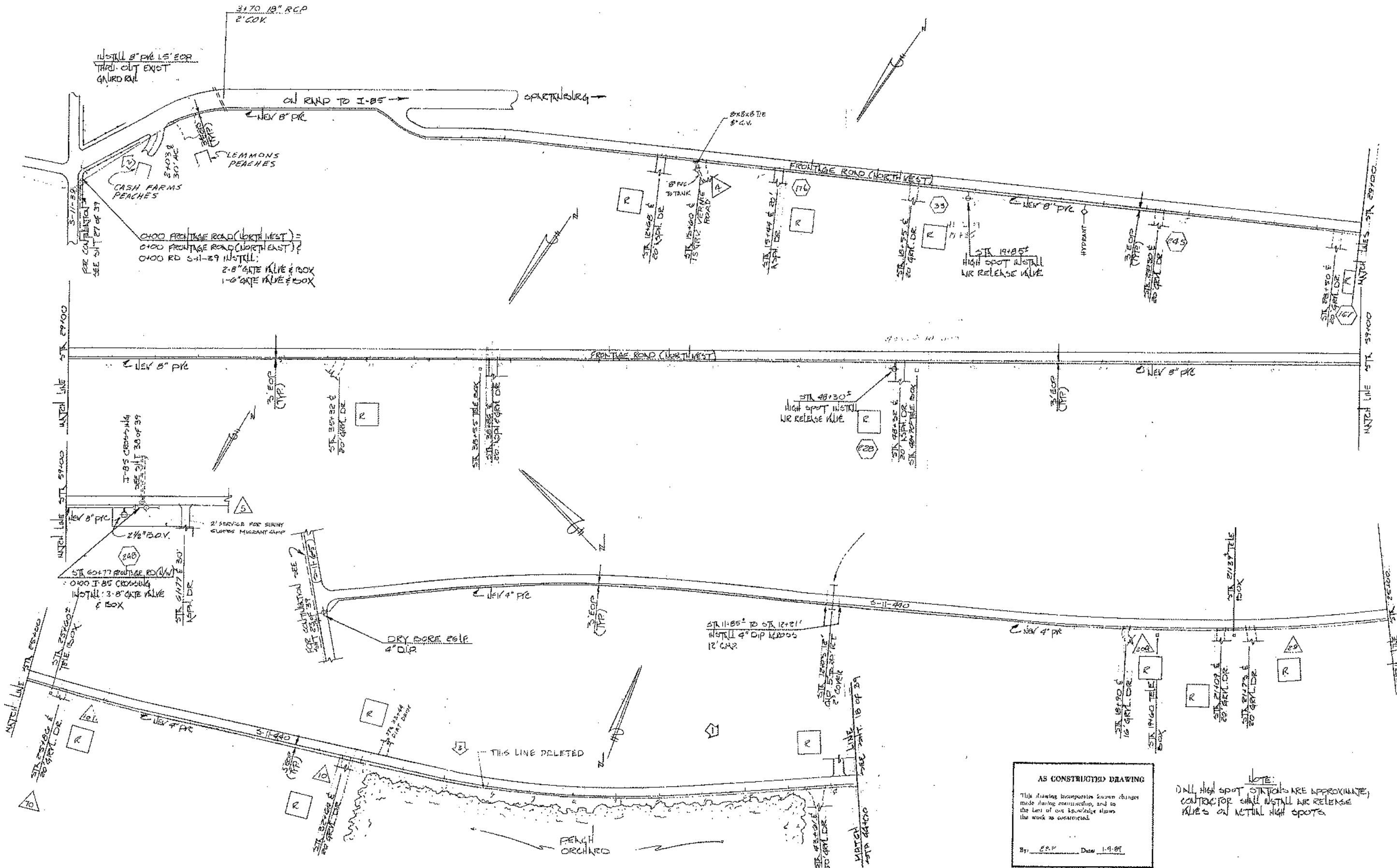
APPROVALS			
PROJECT ENGR.	DESIGNED BY	DRAWN BY	CHECKED BY
RSV	JHS	MRR	RSV



PROJECT	MACEDONIA WATER WORKS INC. WATER SYSTEM
---------	--

SHEET TITLE	ROAD 5-11-234
SCALE	1"=100'
DATE	Nov 1989

SHEET	13
OF	39
REF	B603E
N.B. NO.	
FILE NO.	



AS CONSTRUCTED DRAWING

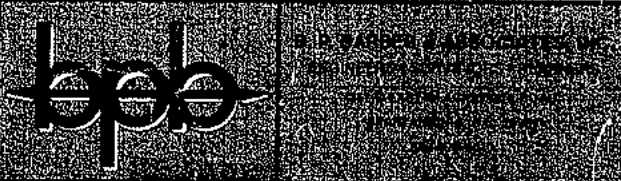
This drawing incorporates known changes made during construction, and to the best of our knowledge shows the work as constructed.

By: ESP Date: 1-9-89

NOTE:
 ALL HIGH SPOT STATIONS ARE APPROXIMATE; CONTRACTOR SHALL INSTALL AIR RELEASE VALVES ON ACTUAL HIGH SPOTS.

REVISIONS			
LOCATION	DESCRIPTION	DATE	BY
EXTENDED 4" ALONG 5-11-440	2/8/89	ESP	
NO CHANGES	1-9-89	ESP	
DELETED PORTION OF 4" MAIN 5-11-440	1-23-89	ESP	

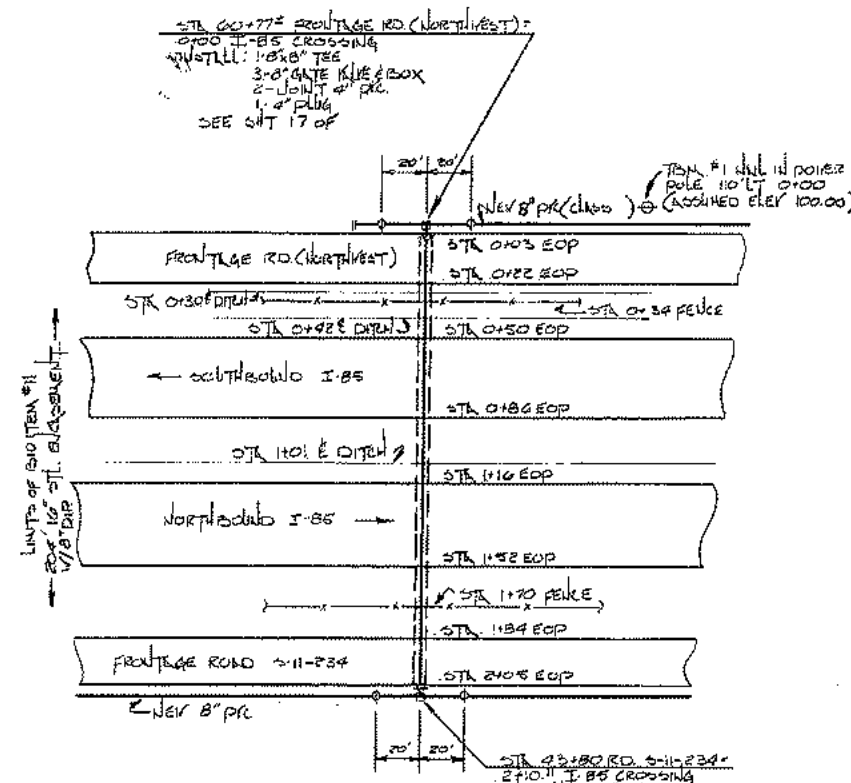
APPROVALS			
PROJECT ENGR	DESIGNED BY	CHECKED BY	APPROVED BY
ESP	JHS	ESP	ESP



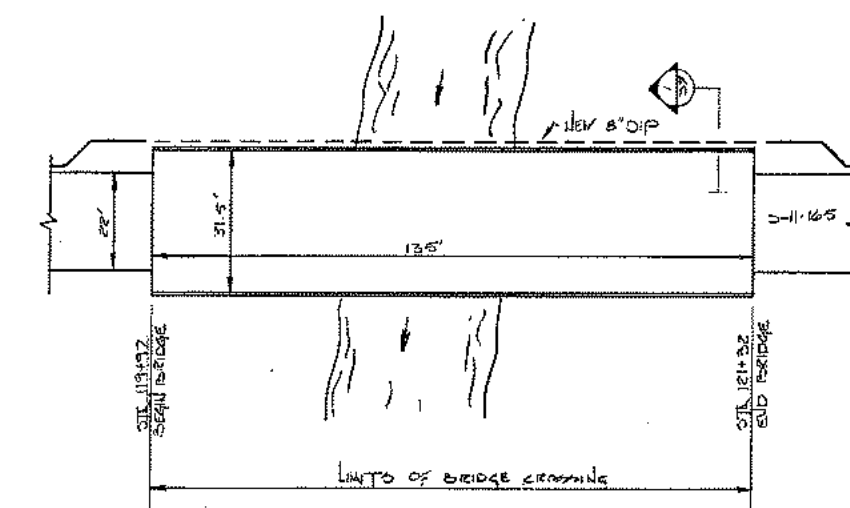
PROJECT	MACEDONIA WATER WORKS INC.
WATER SYSTEM	

SHEET TITLE	FRONTAGE ROAD (NORTHWEST) & ROAD 5-11-440
SCALE	1"=100'
DATE	1/9/89

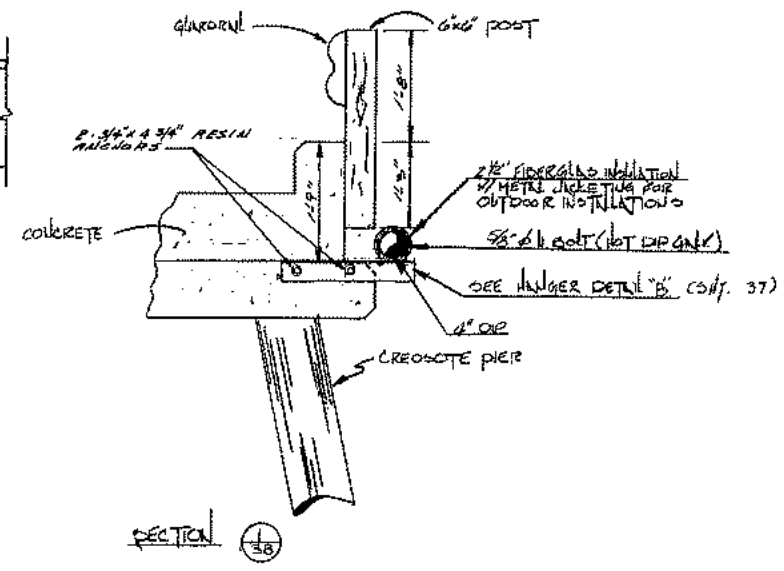
SHEET	17
OF	39
REF	86052
N.D. NO.	
FILE NO.	



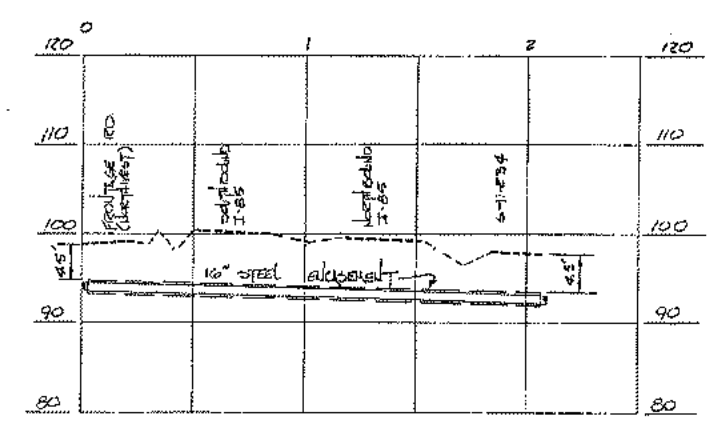
PLAN
SCALE: 1"=40'



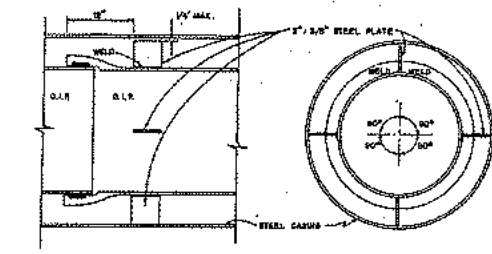
BRIDGE DETAIL 5-11-165
SCALE: 1"=20'



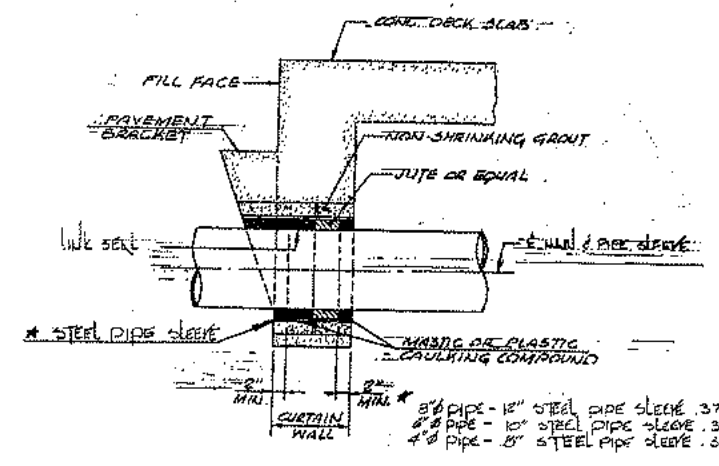
SECTION 36



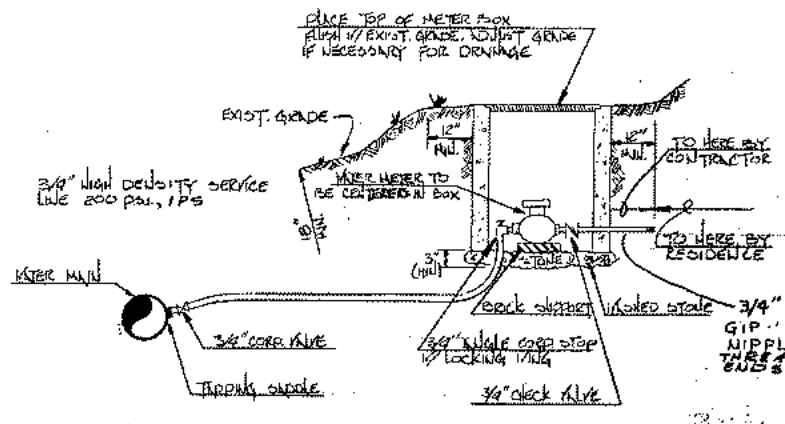
PROFILE
SCALE: HOR 1"=40' VERT 1"=10'



ENCASMENT PIPE DETAIL
N.T.S.



TYPICAL SECTION THROUGH CURTAIN WALL
N.T.S.



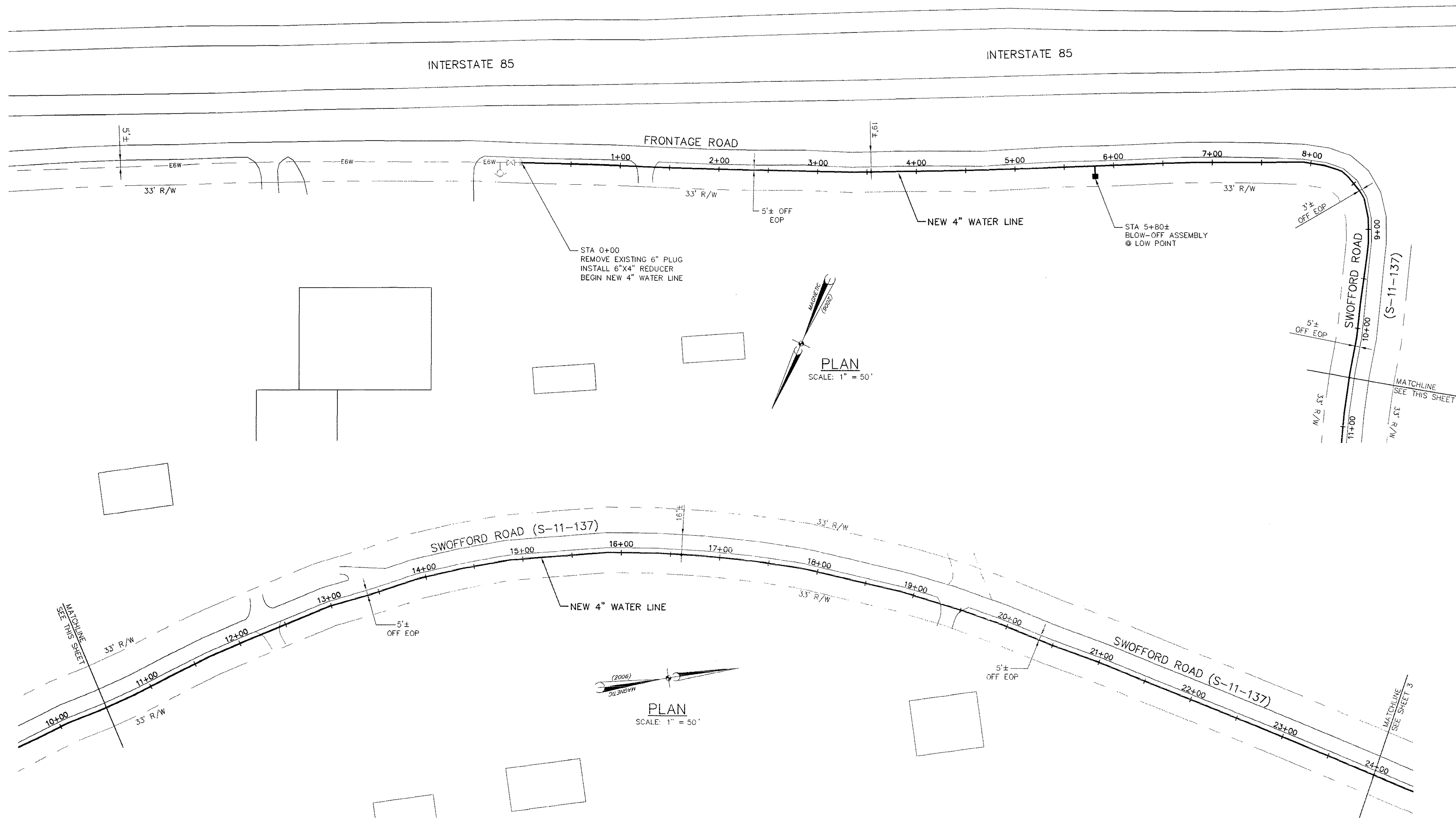
TYPICAL METER SECTION
N.T.S.

GENERAL NOTES FOR ATTACHMENTS OF WATER MAINS TO EXISTING BRIDGES AND CONCRETS

- Openings for steel pipe sleeves in end curtain walls shall be made in a neat and workmanlike manner.
- Openings for steel pipe sleeves shall be a maximum of 2" larger than the outside diameter of steel pipe sleeves.
- Openings for steel pipe sleeves shall be made with rotary drill, rotary-impact drill or a core drill only.
- Openings between end curtain walls and steel pipe sleeves shall be filled with non-shrinking grout which conforms in color with the existing concrete. Grout shall be finished smooth and flush with the existing concrete.
- Steel pipe sleeves shall be flush with both faces of end curtain walls. End of sleeves may be field cut to proper configuration, provided proper heat shielding is used to protect concrete.
- All exposed metallic material, except for bituminous coated pipe, that is not galvanized or aluminum, attached to the structure shall be given one (1) coat of approved primer, non-lead base, and two (2) coats of approved aluminum paint on all surfaces.
- An approved type link seal, lock seal or any similar modular wall and casing seal of rubber or similar material shall be placed around the main between the main and steel pipe sleeves in the end curtain walls and tightened by bolts to furnish stray current protection for the bridge and to waterproof the openings. A 2 inch recess shall be left at each face of the end curtain walls and shall be filled with an approved mastic or plastic caulking compound to conform in color with that of the existing concrete. Caulking shall be finished smooth and flush with the existing concrete. In the event the seal is not of a sufficient length to fill all of the opening except for the 2 inch recesses, the remaining portion of the opening shall be filled with jute prior to placing the mastic or plastic caulking compound in the 2 inch recesses.
- Holes for expansion anchors shall be made with a rotary drill or rotary-impact drill only. Maximum size of drill shall be 7/8 inch. Holes for anchors shall be drilled, squared and aligned as approved, as no over size drilling or re-drilling will be allowed, except when reinforcing steel is encountered. When reinforcing steel is encountered, the drilling is to be stopped and resumed at a location 3" from either side of the existing hole, but not at a distance to exceed the maximum allowable spacing. Any existing holes due to encountering reinforcing steel are to be thoroughly filled with a 1:3 portland grout and finished smooth and flush with the existing concrete. Depth of hole to be 4 inches.
- Approved anchors and hanger assemblies shall be placed on a maximum of 9'0" centers.

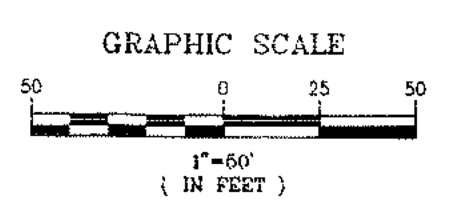
REVISIONS				APPROVALS				PROJECT		SHEET TITLE	
LOCATION	DESCRIPTION	DATE	BY	APP	LOCATION	DESCRIPTION	DATE	BY	APP	PROJECT	SHEET TITLE
										MACEDONIA WATER WORKS INC	I-85 CROSSING & BRIDGE DETAILS
										WATER SYSTEM	
											SHEET 38 OF 39
											REF. 86032
											N.B. NO.
											FILE NO.
											SCALE: AS NOTED
											DATE: NOV 28/02

THIS DRAWING IS THE PROPERTY OF SUMMIT ENGINEERING GROUP, INC. AND IS NOT TO BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC OR MECHANICAL, INCLUDING PHOTOCOPYING, RECORDING, OR BY ANY INFORMATION STORAGE AND RETRIEVAL SYSTEM, WITHOUT THE WRITTEN PERMISSION OF SUMMIT ENGINEERING GROUP, INC. AND IS NOT TO BE USED ON ANY OTHER PROJECT.



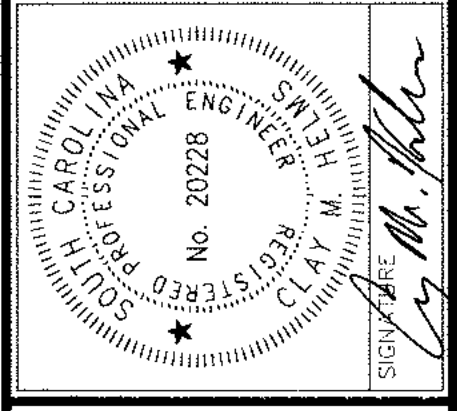
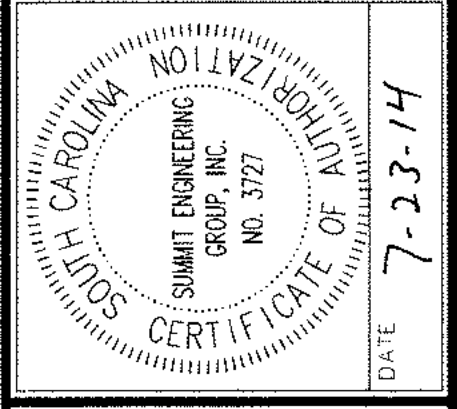
PLAN
SCALE: 1" = 50'

PLAN
SCALE: 1" = 50'



NO.	DESCRIPTION	DATE	BY

PROJECT ENG.	DESIGNED BY	DRAWN BY	CHECKED BY	APPROVED
CMH	CMH	AWH	CMH	JVA



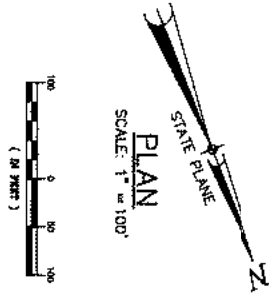
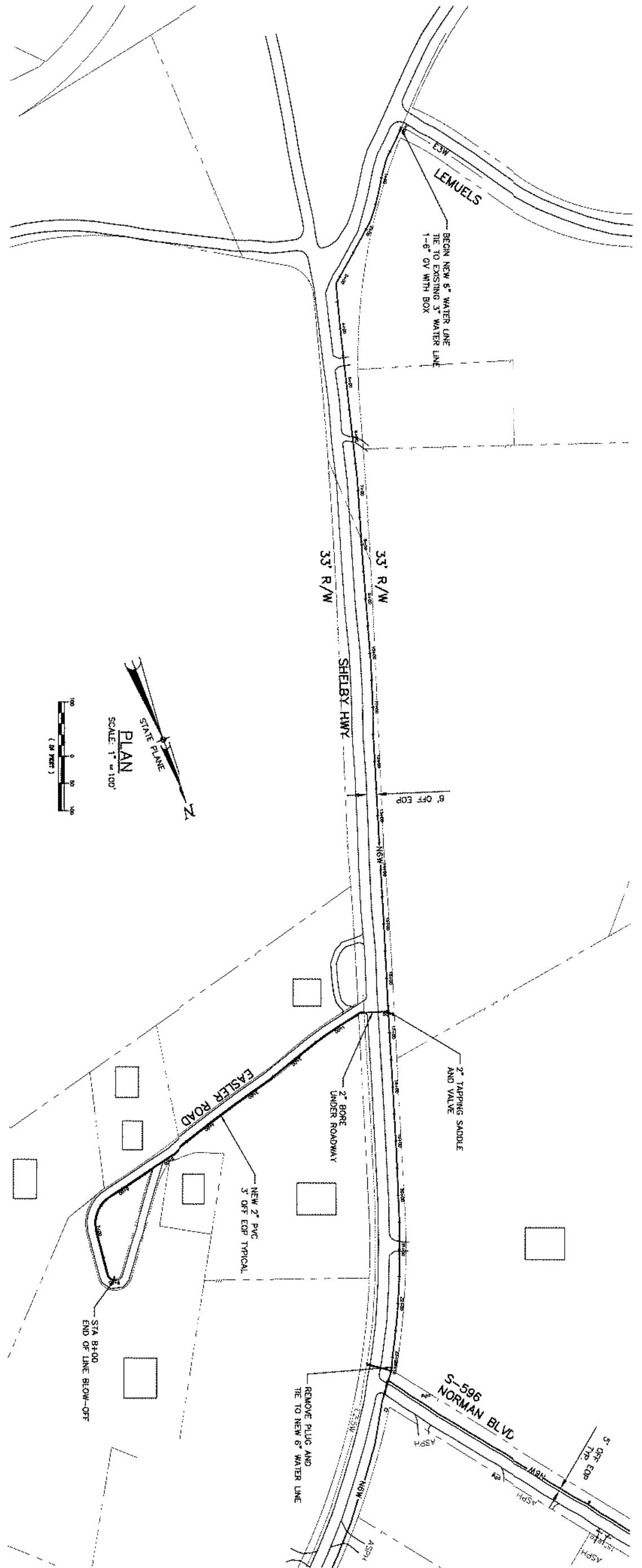
SUMMIT ENGINEERING GROUP, INC.
ENGINEERS • PLANNERS • SURVEYORS
9601 Warren H. Abernathy Hwy.
Spartanburg, SC 29301
(864)949-1111



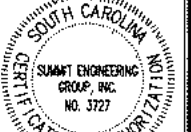
SHEET TITLE
NEW WATER LINE PLAN
DATE: JULY 2014 SCALE: AS SHOWN

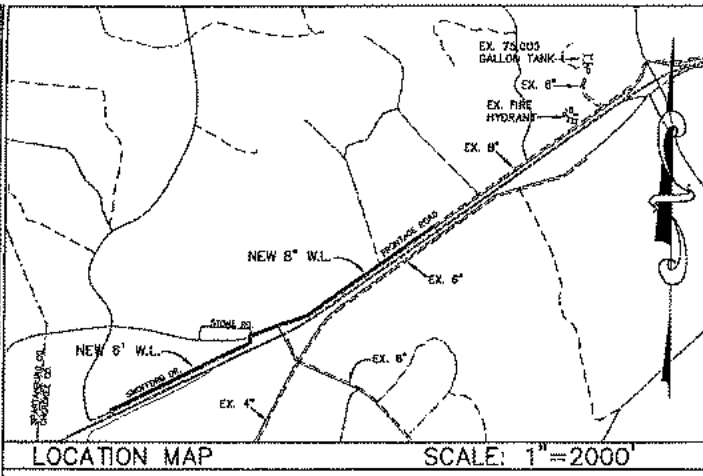
PROJECT
SWOFFORD ROAD AND WEBBER ROAD WATER LINE LOOP FOR MACEDONIA WATER WORKS, INC.
CHEROKEE COUNTY SOUTH CAROLINA

N.B. NO.	SHEET
REF.	2
PROJECT NO.	OF
14050	6

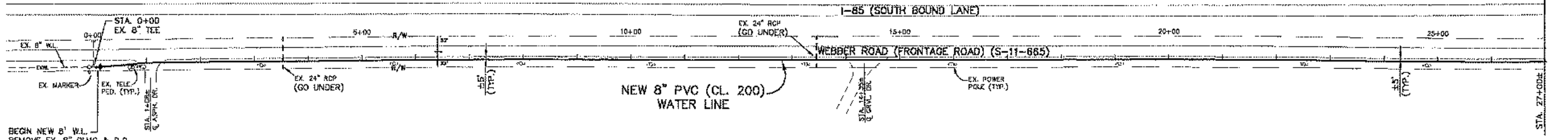
FILE: 14050-BASE



FILE: 10013-BASE	PROJECT NO. 10013	SHEET 2 OF	PROJECT SHELBY HIGHWAY WATERLINE EXTENSION FOR GRASSY POND WATER COMPANY INC. CHEROKEE COUNTY SOUTH CAROLINA	SHEET TITLE NEW 6" WATERLINE PLAN DATE: DEC 2011 SCALE: AS SHOWN	 <p>SUMMIT ENGINEERING GROUP INC. ENGINEERS • PLANNERS • SURVEYORS 9601 Warren H. Abernathy Hw., Spartanburg, SC 29301 (864)949-1111</p>	 <p>SIGNATURE</p>	 <p>GATE</p>	APPROVALS PROJECT ENG: RAA DESIGNED BY: RAA DRAWN BY: AWH CHECKED BY: RAA APPROVED: RAA	REVISIONS <table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th>NO.</th> <th>DESCRIPTION</th> <th>DATE</th> <th>BY</th> </tr> </thead> <tbody> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> </tbody> </table>	NO.	DESCRIPTION	DATE	BY																
NO.	DESCRIPTION	DATE	BY																										

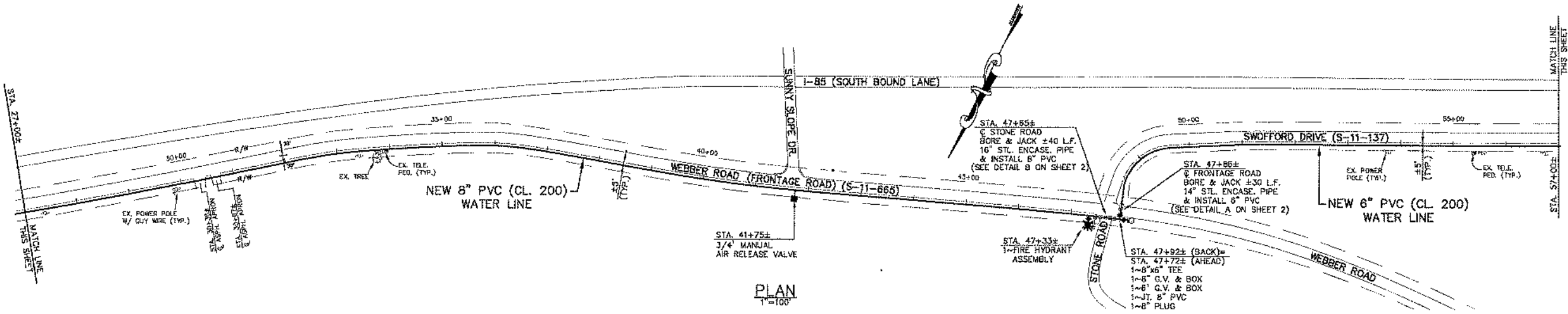


- GENERAL NOTES:**
1. The water line contractor shall not make connections to any existing water line without a minimum of 24-hour notice to the public water system owner.
 2. All nonmetallic water mains shall be installed with water system approved means if detection such as magnetic location tape or copper wire.
 3. All new water lines shall be installed with a minimum of 3 feet of cover.
 4. All new water line pressure/leakage tests shall be witnessed by a representative of either the public water system owner or the engineer.
 5. Pressure/leakage tests shall occur prior to flushing and bacteric testing.
 6. All new water line bacteria sample forms shall include the free chlorine residual measured at the time the samples were taken.
 7. Use Ramac Grip Ring joint restraint at all dip fittings on PVC pipe.
 8. Locate Fire Hydrants 10' minimum from edge of pavement.

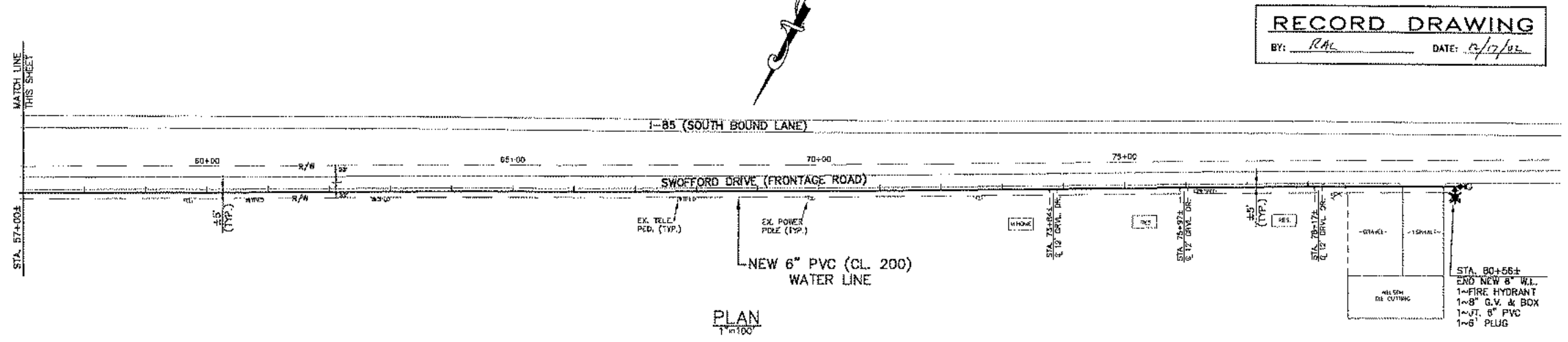


BEGIN NEW 8" W.L. REMOVE EX. 8" PLUG & B.O. CONNECT TO EX. 8" W.L. AS REQ'D. INSTALL 1-8" G.V. & BOX

PLAN 1-100



PLAN 1-100



PLAN 1-100

RECORD DRAWING
 BY: RAE DATE: 8/7/02

NO.	DESCRIPTION	DATE	BY

APPROVALS	DATE	BY



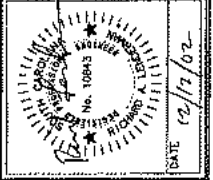
bpb
B. P. BARBER & ASSOCIATES, INC.
 ENGINEERS - PLANNERS - SURVEYORS
 COLUMBIA • SPARTANBURG • CHARLESTON • FLORENCE

PROJECT
MACEDONIA WATER WORKS
SWOFFORD DRIVE WATER LINE
 SHEROKEE COUNTY SOUTH CAROLINA

DISK	SHEET
RET.	1
N.B. NO.	OF
PROJECT NO.	2
02501	
FILE NO. 02501-01	

REVISIONS	DATE	BY
NO.	DESCRIPTION	DATE
1	ADD BORE DETAILS	10/24/02
2	ADD AIR RELEASE VALVE & REVISED	11/14/02
3	FIRE HYDRANT	11/14/02

APPROVALS	DESIGNED BY	DRAWN BY	CHECKED BY	APPROVED BY
DESIGNER	RAJ	RAJ	RAJ	RAJ
DRAWER	RAJ	RAJ	RAJ	RAJ

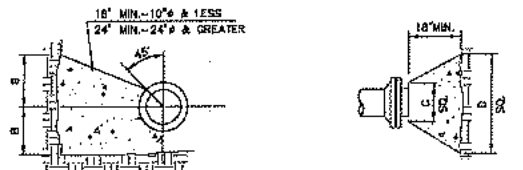
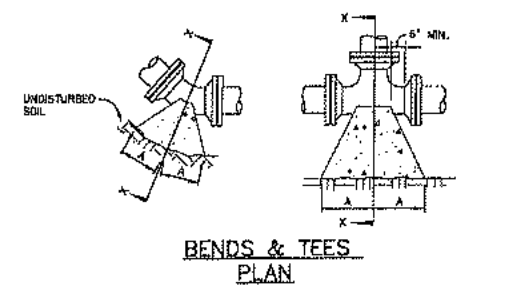


bbp
B. P. BARBER & ASSOCIATES, INC.
 ENGINEERS - PLANNERS - SURVEYORS
 COLUMBIA - SPARTANBURG - CHARLESTON - FLORENCE
 SOUTH CAROLINA

PROJECT: **MACEDONIA WATER WORKS**
SWOFFORD DRIVE WATER LINE
 CHEROKEE COUNTY SOUTH CAROLINA

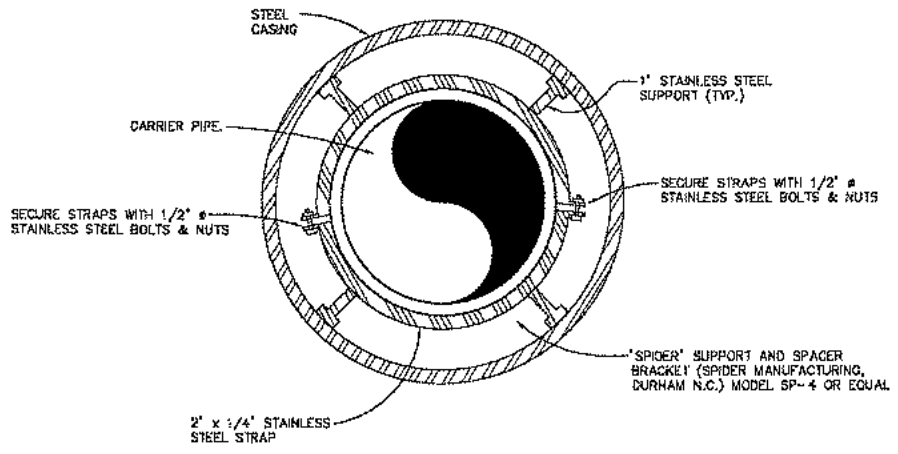
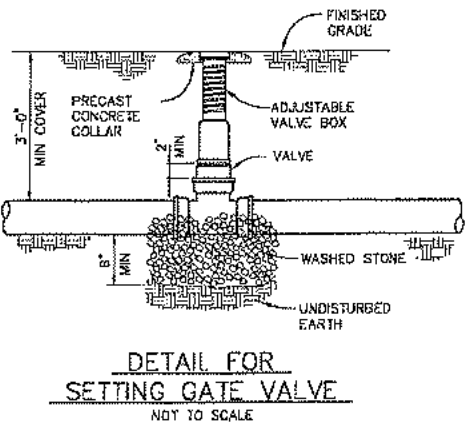
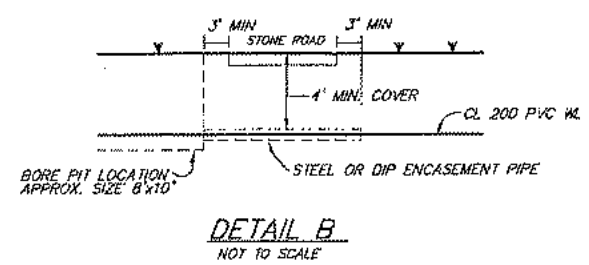
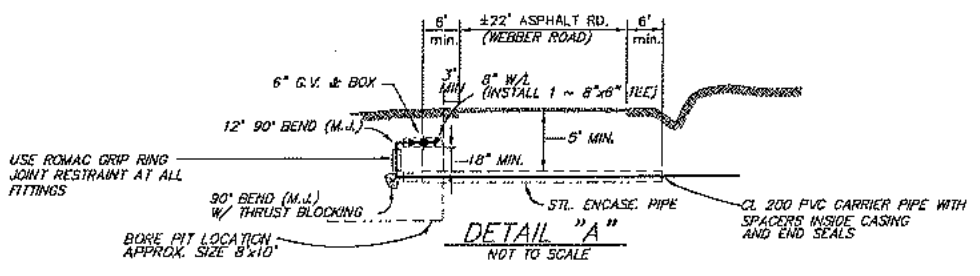
STANDARD DETAILS
 SCALE: AS SHOWN
 SEPTEMBER 2002

DISK	SHEET
REF.	2
N.B. NO.	07
PROJECT NO.	02501-01
FILE NO.	02501

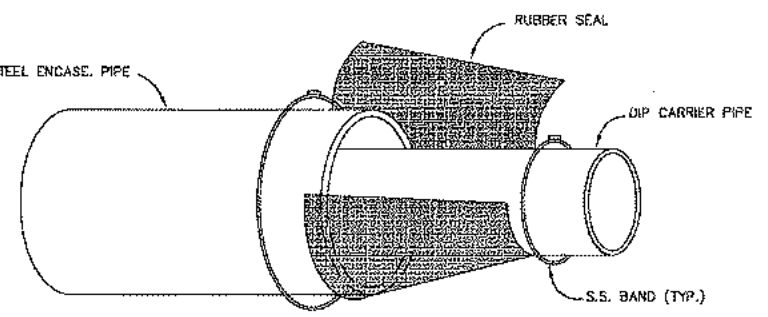


PIPE SIZE	BORE END	TEE END	PLUG
4"	8"	8"	8"
6"	10"	10"	10"
8"	12"	12"	12"
10"	14"	14"	14"
12"	16"	16"	16"
14"	18"	18"	18"
16"	20"	20"	20"
18"	22"	22"	22"
20"	24"	24"	24"
22"	26"	26"	26"
24"	28"	28"	28"
26"	30"	30"	30"
28"	32"	32"	32"
30"	34"	34"	34"
32"	36"	36"	36"
34"	38"	38"	38"
36"	40"	40"	40"
38"	42"	42"	42"
40"	44"	44"	44"
42"	46"	46"	46"
44"	48"	48"	48"
46"	50"	50"	50"
48"	52"	52"	52"
50"	54"	54"	54"
52"	56"	56"	56"
54"	58"	58"	58"
56"	60"	60"	60"
58"	62"	62"	62"
60"	64"	64"	64"
62"	66"	66"	66"
64"	68"	68"	68"
66"	70"	70"	70"
68"	72"	72"	72"
70"	74"	74"	74"
72"	76"	76"	76"
74"	78"	78"	78"
76"	80"	80"	80"
78"	82"	82"	82"
80"	84"	84"	84"
82"	86"	86"	86"
84"	88"	88"	88"
86"	90"	90"	90"
88"	92"	92"	92"
90"	94"	94"	94"
92"	96"	96"	96"
94"	98"	98"	98"
96"	100"	100"	100"

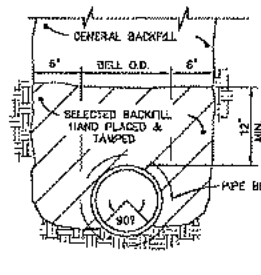
THRUST BLOCK DETAILS
 NOT TO SCALE



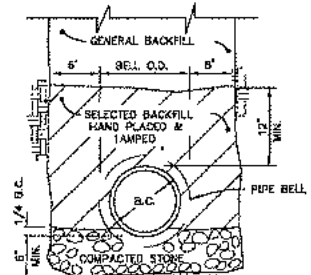
CARRIER PIPE IN CASING PIPE SPIDER DETAIL
 NOT TO SCALE



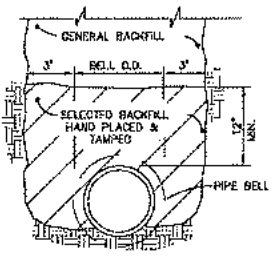
CASING END SEAL DETAIL
 NOT TO SCALE



NOTE: FOR USE WITH TRENCH EXCAVATED BY BACKHOE IN UNSTABLE SOIL, ROCK AND GROUNDWATER CONDITIONS APPLICABLE TO BOTH EARTH AND ROCK TRENCHES ONLY.



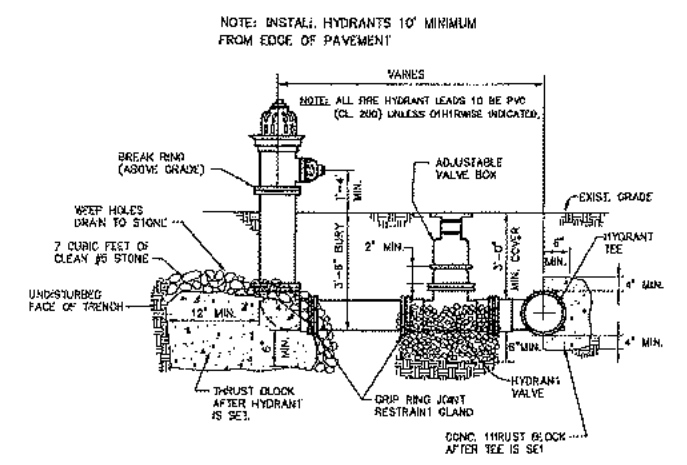
NOTE: FOR USE W/ TRENCH EXCAVATED BY BACKHOE IN UNSTABLE SOIL, ROCK AND GROUNDWATER CONDITIONS APPLICABLE TO BOTH EARTH AND ROCK TRENCHES ONLY.



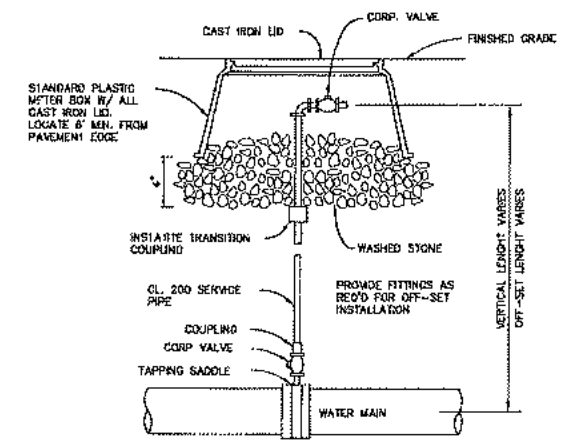
NOTE: FOR USE WITH TRENCHING MACHINE. USE IN DRY EARTH TRENCHES ONLY.

CLASS "C" BEDDING
 NOT TO SCALE

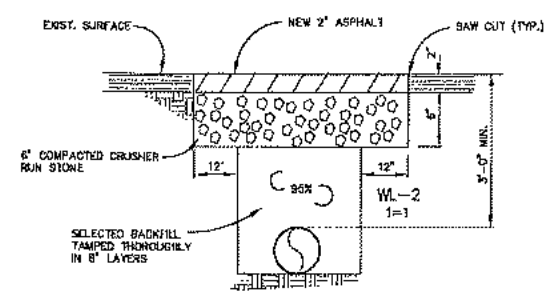
CLASS "D" BEDDING
 NOT TO SCALE



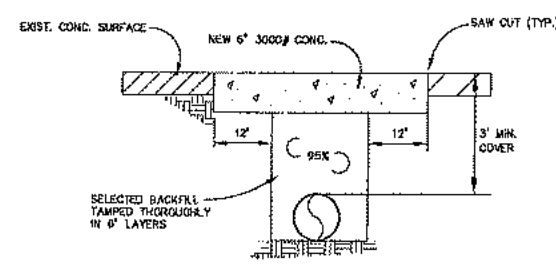
FIRE HYDRANT, VALVE & TEE SETTING
 NOT TO SCALE



TYPICAL AIR RELEASE VALVE CONNECTION
 NOT TO SCALE



DRIVEWAY & PARKING LOT ASPHALT REPLACEMENT DETAIL
 NOT TO SCALE



CONCRETE DRIVEWAY REPLACEMENT DETAIL
 NOT TO SCALE

RECORD DRAWING
 BY: RAJ DATE: 12/17/02



January 8, 2015

Mr. Joe Moss
Palmetto Net (Spirit)
491 Lakeshore Parkway
Rock Hill, South Carolina 29730

Re: File P027114 – Contract Id. No. 8888860 – Relocation of Telecommunication Facilities – I-85
Widening from Mile Marker 80 to 96 – Cherokee/Spartanburg Counties

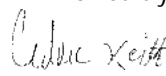
Dear Mr. Moss:

The South Carolina Department of Transportation is currently under contract with Infrastructure Consulting & Engineering (ICE) to perform Design Build Preparation Services relating to the above referenced project. As part of these design efforts, survey, subsurface utility engineering and utility coordination will be performed.

The purpose of this letter is to notify you that ICE, CH Engineering and Mead & Hunt will contact you to gather utility data necessary for this project. We ask that you cooperate with them concerning this request such that utility conflicts and concerns can be identified early in the project schedule.

If you should have any questions concerning this, please feel free to contact me.

Sincerely,


keittcc@scdot.org
2015.01.08
13:55:36 -05'00'
Cedric C. Keitt
Utility Project Manager

MCA:krc

cc: Brad Reynolds, SCDOT, Program Manager
Robert Ryggs, SCDOT, Utility Coordinator District Three
Jamie Fowler Jr., SCDOT, Utility Coordinator District Four
Shane Parris, Resident Construction Engineer, Cherokee County
Mark C. Attaway, SCDOT, HQ State Utility Engineer Dennis
Joel Wimberly, SCDOT, HQ Utility Project Manager
Gus Kretschmer, ICE Engineering, Utility Relocation Coordinator Manager
File:RW/UM/CCK





January 14, 2015

Mr. Robert Robinson
Spirit Communications
491 Lakeshore Parkway
Rock Hill, South Carolina 29730

Re: File P027114 – Contract Id. No. 8888860 – Relocation of Telecommunication Facilities – I-85
Widening from Mile Marker 80 to 96 – Cherokee/Spartanburg Counties

Dear Mr. Robinson:

The South Carolina Department of Transportation is currently under contract with Infrastructure Consulting & Engineering (ICE) to perform Design Build Preparation Services relating to the above referenced project. As part of these design efforts, survey, subsurface utility engineering and utility coordination will be performed.

The purpose of this letter is to notify you that ICE, CH Engineering and Mead & Hunt will contact you to gather utility data necessary for this project. We ask that you cooperate with them concerning this request such that utility conflicts and concerns can be identified early in the project schedule.

If you should have any questions concerning this, please feel free to contact me.

Sincerely,



keittcc@scdot.org
2015.01.08 13:58:53
-05'00"

Cedric C. Keitt
Utility Project Manager

MCA:krc

cc: Brad Reynolds, SCDOT, Program Manager
Robert Ryggs, SCDOT, Utility Coordinator District Three
Jamie Fowler Jr., SCDOT, Utility Coordinator District Four
Shane Parris, Resident Construction Engineer, Cherokee County
Mark C. Attaway, SCDOT, HQ State Utility Engineer
Dennis Joel Wimberly, SCDOT, HQ Utility Project Manager
Gus Kretschmer, ICE Engineering, Utility Relocation Coordinator Manager

File:RW/UM/CCK



PRELIMINARY UTILITY REPORT, UTILITY INFORMATION

Project Owner: SCDOT
File Number:
Project ID Number: P027114
Project Name: I-85 Widening Improvements Mile Marker 80 to 96
County: Spartanburg & Cherokee

Type: Telecommunications

SC811 & SUE Code: PETZ81 & T2

Utility: Spirit Communications (aka PalmettoNET)

Contact: Joey Adams, OSP Engineering
803.726.8319 joey.adams@spirit.com
491 Lakeshore Drive Rock Hill, SC 29730

TPRC Broadband (Consultant for Spirit)
Ryan McCumber, Senior Tech
336.483.4254 ryan@tprcbroadband.com
306 West JJ Drive Greensboro, NC 27406

Existing Facility: Fiber Optic cable along SC18 (Shelby HWY) from I-85 exit 95 (Pleasant School RD) to I-85 exit 96 (SC18 Shelby HWY) to Wind Hill RD cell tower

Prior Rights: Encroaching inside present SCDOT ROW by permit, relocation cost the responsibility of Spirit Communications

Impact: Reconstruction of Exit 95 & 96, realignment of SC18 (Shelby HWY), SC329 (Victory Trail RD) & S665 (Wind Hill RD)

Relocation: Follow SCDOT Utility Accommodations Policy to relocate to outside edge of proposed NEW ROW

Estimated Relocation Cost: \$100,000.00

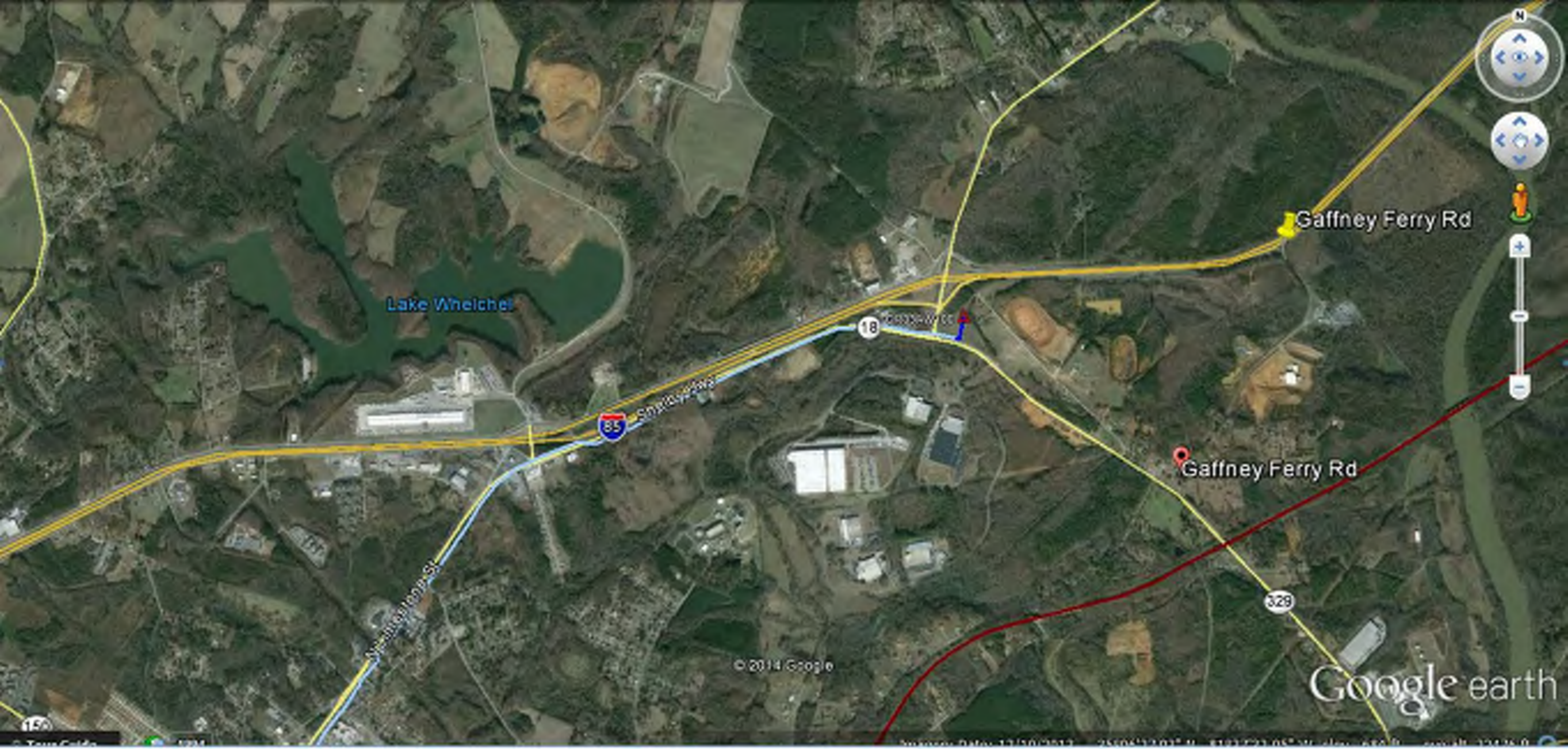
Future Facility: NONE anticipated

Restrictions and/or Moratoriums: Splicing/switch over schedule with customer outage window and service maintenance windows

Notice to Proceed: 30 days

Estimated Time to Relocate: 30 to 60 days

In-Contract Work: NONE



Lake Wheeler

Gaffney Ferry Rd

18

85

Gaffney Ferry Rd

329

© 2014 Google

Google earth



January 8, 2015

Mr. Milfred Brock
Piedmont Natural Gas
501 West Blackstock Road
Spartanburg, South Carolina 29301

Re: File P027114 – Contract Id. No. 8888860 – Relocation of Gas Facilities – I-85 Widening from Mile Marker 80 to 96 – Cherokee/Spartanburg Counties

Dear Mr. Brock:

The South Carolina Department of Transportation is currently under contract with Infrastructure Consulting & Engineering (ICE) to perform Design Build Preparation Services relating to the above referenced project. As part of these design efforts, survey, subsurface utility engineering and utility coordination will be performed.

The purpose of this letter is to notify you that ICE, CH Engineering and Mead & Hunt will contact you to gather utility data necessary for this project. We ask that you cooperate with them concerning this request such that utility conflicts and concerns can be identified early in the project schedule.

If you should have any questions concerning this, please feel free to contact me.

Sincerely,

 keittcc@scdot.org
2015.01.08 13:55:55 -05'00'

Cedric C. Keitt
Utility Project Manager

MCA:krc

ec: Brad Reynolds, SCDOT, Program Manager
Robert Ryggs, SCDOT, Utility Coordinator District Three
Jamie Fowler Jr., SCDOT, Utility Coordinator District Four
Shane Parris, Resident Construction Engineer, Cherokee County
Mark C. Attaway, SCDOT, HQ State Utility Engineer
Dennis Joel Wimberly, SCDOT, HQ Utility Project Manager
Gus Kretschmer, ICE Engineering, Utility Relocation Coordinator Manager
File:RW/UM/CCK





January 8, 2015

Mr. Jaon Hill
Piedmont Natural Gas
501 West Blackstock Road
Spartanburg, South Carolina 29301

Re: File P027114 – Contract Id. No. 8888860 – Relocation of Gas Facilities – I-85 Widening from Mile Marker 80 to 96 – Cherokee/Spartanburg Counties

Dear Mr. Hill:

The South Carolina Department of Transportation is currently under contract with Infrastructure Consulting & Engineering (ICE) to perform Design Build Preparation Services relating to the above referenced project. As part of these design efforts, survey, subsurface utility engineering and utility coordination will be performed.

The purpose of this letter is to notify you that ICE, CH Engineering and Mead & Hunt will contact you to gather utility data necessary for this project. We ask that you cooperate with them concerning this request such that utility conflicts and concerns can be identified early in the project schedule.

If you should have any questions concerning this, please feel free to contact me.

Sincerely,

keittcc@scdot.org
2015.01.08 13:55:55 -05'00'

Cedric C. Keitt
Utility Project Manager

MCA:krc

ec: Brad Reynolds, SCDOT, Program Manager
Robert Ryggs, SCDOT, Utility Coordinator District Three
Jamie Fowler Jr., SCDOT, Utility Coordinator District Four
Shane Parris, Resident Construction Engineer, Cherokee County
Mark C. Attaway, SCDOT, HQ State Utility Engineer
Dennis Joel Wimberly, SCDOT, HQ Utility Project Manager
Gus Kretschmer, ICE Engineering, Utility Relocation Coordinator Manager
File:RW/UM/CCK



PRELIMINARY UTILITY REPORT, UTILITY INFORMATION

Project Owner: SCDOT
File Number:
Project ID Number: P027114
Project Name: I-85 Widening Improvements Mile Marker 80 to 96
County: Spartanburg & Cherokee

Type: Natural Gas

SC811 & SUE Code: PNGZ81, PNSZ82, PNCZ57, PNSZ82 & G1

Utility: Piedmont Natural Gas

Contact: Carlos Roper, Construction Coordinator (Distribution)
864.286.7882 carlos.roper@piedmontng.com
100 Woodruff Industrial Lane Greenville, SC 29607

Jason Brown, Engineer Project Manager (Pipeline)
704.731.4681 jason.brown@piedmontng.com
4720 Piedmont Row Drive Charlotte, NC 29210

Existing Facility: Various size steel and plastic natural gas high pressure pipeline and distribution pressure gas lines (30,000LF+) along Frontage Roads; I-85 crossings sta. 914+00, sta. 9440+00, sta. 1368+00, sta. 1399+00, sta. 1407+00, sta. 1509+00, sta. 1558+50, sta. 1610+70; regulator station Dewberry RD I-85 SB sta. 944+00LT

Prior Rights: All gas lines are inside present SCDOT ROW by encroachment permit and relocation cost responsibility is Piedmont Natural Gas

Impact: Grading/excavation for Frontage Roads and interchange improvements, PNG is conducting preliminary design for the replacement RR overpass conflict I-85 sta. 898+00LT and realignment of Frontage RD

Relocation: Relocate inside present or proposed NEW ROW and a new PNG route off project limits

Estimated Relocation Cost: \$1,500,000.00

Future Facility: Proposed transmission gas PL east of I-85 Exit 83 SC110 (Battleground RD) sta. 1105+00,
Proposed distribution gas GL along S665 (Webber RD) sta. 1114+00LT to S (Allison RD) sta.1183+00LT

Restrictions and/or Moratoriums: Winter heating season, November to March

Notice to Proceed: 30 days

Estimated Time to Relocate: 6 to 9 months

PRELIMINARY UTILITY REPORT, UTILITY INFORMATION

Project Owner: SCDOT

File Number:

Project ID Number: P027114

Project Name: I-85 Widening Improvements Mile Marker 80 to 96

County: Spartanburg & Cherokee

In-Contract Work: NONE



Gas Facility Data Request

Date: 1/9/2015

Infrastructure Consulting & Engineering _____ (organization) has requested information from Piedmont Natural Gas related to the location of natural gas facilities for the following reason: (Required):

SCDOT Project I-85 Widening MM80 to 96 Spartanburg & Cherokee Counties
File # P027114 Contract ID# 8888860 POC:Cedric Keitt 803.737.1407

For the specific geographic area (Required):

See attached Project Survey limits map, I-85 from mile marker 80 to 96 including Frontage Roads and interchange areas shown on survey limits map.

Please include nearby intersection(s) and attach a map if available.

Recognizing the need for the information, Piedmont Natural Gas may be willing to provide it. However, because of the possibility that the information may fall into the hands of someone wishing to damage our facilities or otherwise be misused or incorrectly relied upon, we request that you read the following conditions and return an executed copy of this letter to us to acknowledge your acceptance of these conditions:

1. The Undersigned understands that in general, only 1-1/4 inch and larger distribution mains are displayed and that smaller pipe lines and other facilities may not be shown.
2. The Undersigned understands that Piedmont is expanding and revising its gas system on a daily basis and that the information is current only through the latest revised date stated thereon.
3. The Undersigned agrees to treat all such information on a confidential basis and to make the information available only to persons within the undersigned's organization that are listed below:

Name	Title	Phone
Gary Stroble PLS	Survey Director	843.266.3581 ext 4006
Wayne Wiley	SUE Analyst & Manager	919.256.5467
Steve Moore PLS	SUE	919.788.0224
Mark Cornelius PLS	Senior Surveyor	803.785.2090

4. The Undersigned agrees that no information or any portion thereof will be reproduced in any manner. The deliverable will be a secured PDF. The Undersigned understands that the deliverable cannot be edited, printed, or copied.

5. The Undersigned understands that the information should not be relied upon by anyone digging or drilling underground and that any such person should not undertake any such digging or drilling until he or she has had all underground utility facilities in the immediate area located by calling **811** in NC, SC, or TN.

The undersigned Frank August Kretschmer II (Gus) (print name), Utility Coordination Relocation Manager (title) on behalf of Infrastructure Consulting & Engineering (organization) has read, understands, and agrees to comply with the conditions set forth above by Piedmont Natural Gas.

Signature: F A Kretschmer Date: 1-9-2015



Gas Facility Data Request

Please send completed requests to:
Piedmont Natural Gas
c/o GIS Department
4720 Piedmont Row Dr.
Charlotte, NC 28210
or
GISHelpdesk@piedmontng.com







1000 DEWBERRY RD

1000 DEWBERRY RD





NP
GAI
PUE
ALLI
GN
S
THE
NATIONAL
DODGING
CALL
1-800-368-5828

WARNING
NO OPEN FLAMES
OR SMOKING
IN THIS AREA
FOR THE
LOCATION OF
A. E. M.
AND THE
FIRE

PRELIMINARY UTILITY REPORT, UTILITY INFORMATION

Project Owner: SCDOT
File Number:
Project ID Number: P027114
Project Name: I-85 Widening Improvements Mile Marker 80 to 96
County: Spartanburg & Cherokee

Type: Sanitary Sewer

SC811 & SUE Code: NONE & FS3

Utility: SCDOT Cherokee County Maintenance

Contact: Stephen Ellis, Cherokee County Resident Maintenance Engineer
864.489.2844 ellissv@scdot.org
1868 Old Georgia HWY Gaffney, SC 29340

Existing Facility: Approximately 8,400LF of 4 & 6-inch PVC force main and gravity sewer to Cole Creek sewer collector for supplying I-85 SB & NB Rest Area sta. with sanitary sewer. The SSFM route begins at the SB pump station I-85 sta. 1326+00LT to 1341+50LT/RT (I-85 xing) to NB pump station sta.1346+00RT to S645 (Lemmons RD) to S659 (Windslow RD) to Cole Creek collector.

Prior Rights: SCDOT owned SS & SSFM line, SCDOT responsible for relocation cost

Impact: Outside grading I-85 NB shoulder sta. 1345+00 for MSE wall, sta. 1355+00 to 1380+00 and realignment of S645 (Lemmons RD) and relocation to sta. 1390+00

Relocation: Maintain 10FT horizontal or 5FT vertical separation from SCDOT 3-inch WL in NB shoulder

Estimated Relocation Cost: \$234,000.00

Future Facility: NONE anticipated

Restrictions and/or Moratoriums: NONE, both Rest Areas are currently closed

Notice to Proceed: 30days

Estimated Time to Relocate: 1 week

In-Contract Work: YES

SOUTH CAROLINA DEPARTMENT OF HIGHWAYS AND PUBLIC TRANSPORTATION

GAFFNEY REST STOPS SEWER PROJECT

LOCATED NEAR GAFFNEY, SC
IN CHEROKEE COUNTY

INDEX

SHEET	TITLE
1	COVER SHEET
2	LOCATION MAP
3	GENERAL LAYOUT PLAN
4	SOUTHBOUND REST STOP & FORCE MAIN "A" (STA. 0+00 - STA. 22+25.66) SITE PLAN
5	NORTHBOUND REST STOP & FORCE MAIN "B" (STA. 0+00 - STA. 32+00) SITE PLAN
6	FORCE MAIN "B" (STA. 32+00 - STA. 64+17.26) SITE PLAN
7	GRAVITY LINE "A", "B", & "C" (STA. 0+00 - STA. 14+01.65) SITE PLAN
8	FORCE MAIN "A" (STA. 0+00 - STA. 22+25.66) PROFILE
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11	GRAVITY LINE "A", "B", & "C" PROFILES
12	NORTHBOUND & SOUTHBOUND PUMP STATION DETAILS
13	SEWER DETAILS
14	SEWER, DRAINAGE & EROSION CONTROL DETAILS

PREPARED BY

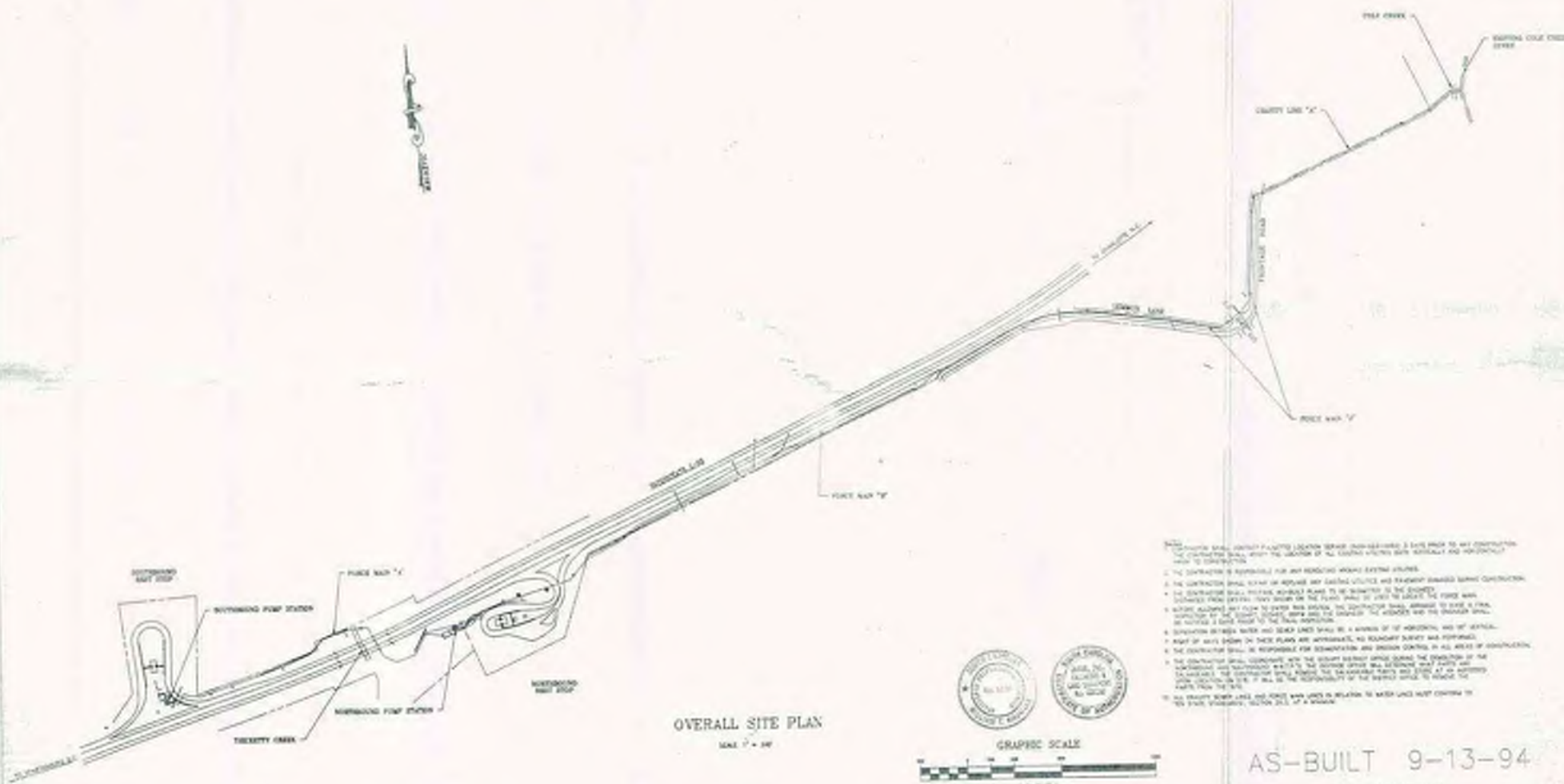
JOHNSON, KNOWLES, BURGIN, & BOUKNIGHT, INC.
ENGINEERS/ARCHITECTS/PLANNERS

COLUMBIA, SC

AS-BUILT 9-13-94

AS-BUILT DRAWINGS





OVERALL SITE PLAN
SCALE 1" = 50'



1. THE CONTRACTOR SHALL VERIFY THE LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING CONSTRUCTION.
2. THE CONTRACTOR IS RESPONSIBLE FOR ANY REQUIRED PERMITS AND OBTAINING NECESSARY CONSTRUCTION.
3. THE CONTRACTOR SHALL NOTIFY ALL AFFECTED UTILITIES AND OBTAIN NECESSARY CONSTRUCTION.
4. THE CONTRACTOR SHALL NOTIFY ALL AFFECTED UTILITIES AND OBTAIN NECESSARY CONSTRUCTION.
5. ALL UTILITIES SHALL BE PROTECTED AND MAINTAINED THROUGHOUT THE CONSTRUCTION PERIOD.
6. THE CONTRACTOR SHALL MAINTAIN ACCESS TO ALL ADJACENT PROPERTIES AND PUBLIC ROADS.
7. THE CONTRACTOR SHALL MAINTAIN ACCESS TO ALL ADJACENT PROPERTIES AND PUBLIC ROADS.
8. THE CONTRACTOR SHALL MAINTAIN ACCESS TO ALL ADJACENT PROPERTIES AND PUBLIC ROADS.
9. THE CONTRACTOR SHALL MAINTAIN ACCESS TO ALL ADJACENT PROPERTIES AND PUBLIC ROADS.
10. THE CONTRACTOR SHALL MAINTAIN ACCESS TO ALL ADJACENT PROPERTIES AND PUBLIC ROADS.

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AS-BUILT DRAWINGS



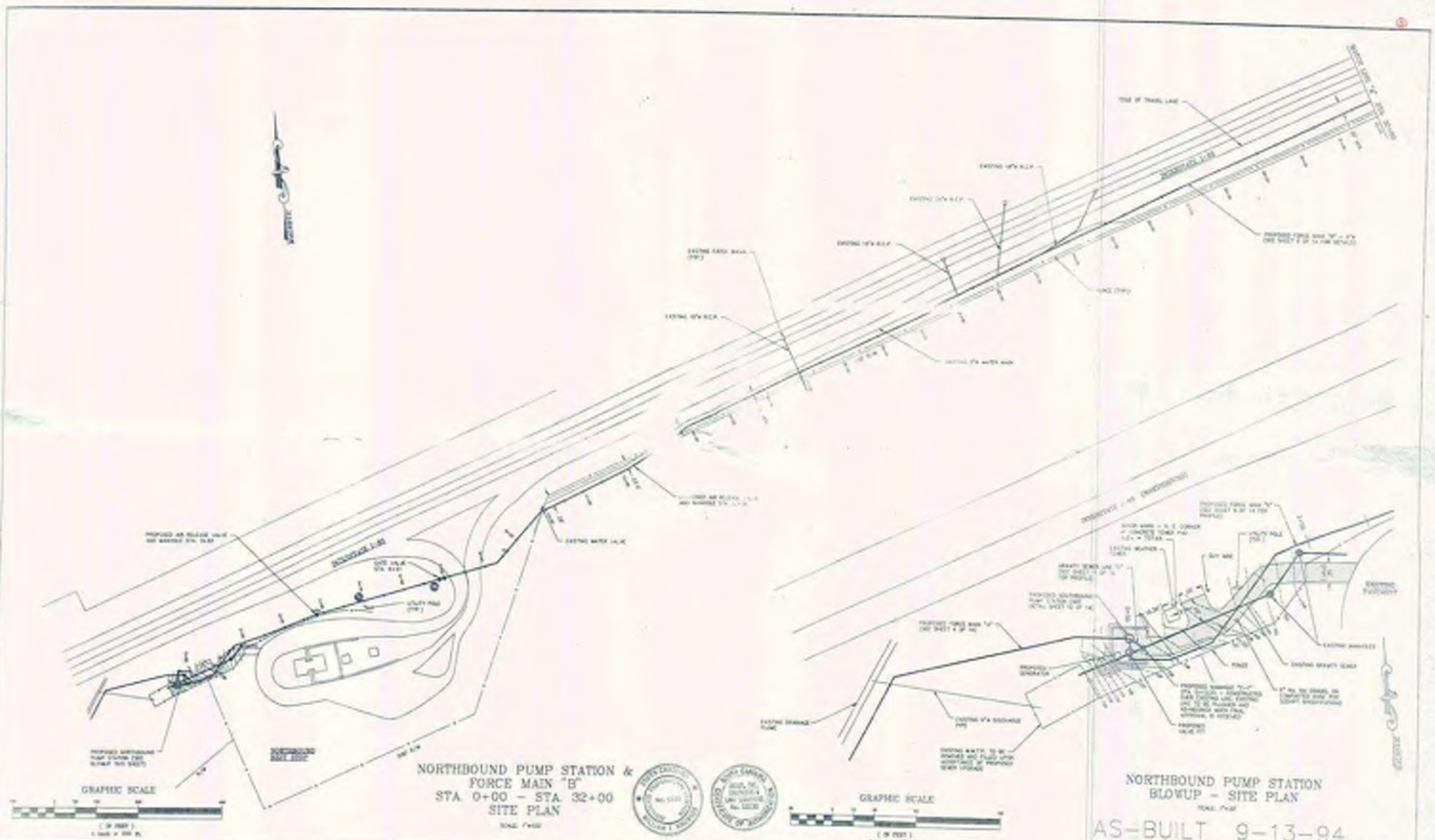
ADDRESS
JOHNSON, KINCAID, BURTON AND BOUNIE, INC.
1315 BRADSHAW ROAD
P.O. BOX 1425
COLUMBIA, S.C. 29903
PHONE: (803) 732-2988
FAX: (803) 732-4145

PREPARED FOR
SOUTH CAROLINA DEPARTMENT
OF HIGHWAYS &
PUBLIC TRANSPORTATION

TITLE
OVERALL SITE PLAN

NO.	REVISIONS	DATE BY
1	ISSUED FOR PERMITS	9/13/94 JKB
2	AS-BUILT	9/13/94 JKB
3	AS-BUILT	9/13/94 JKB
4	AS-BUILT	9/13/94 JKB
5	AS-BUILT	9/13/94 JKB
6	AS-BUILT	9/13/94 JKB
7	AS-BUILT	9/13/94 JKB
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9	AS-BUILT	9/13/94 JKB
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	APPROVED BY: JKB
	PROJECT NO. 94-01
	DATE: 9-13-94



NORTHBOUND PUMP STATION &
FORCE MAIN "B"
STA 0+00 - STA 32+00
SITE PLAN
SCALE 1"=40'

NORTHBOUND PUMP STATION
BLOWUP - SITE PLAN
SCALE 1"=8'
AS-BUILT 9-13-94
AS-BUILT DRAWINGS

JK&B
JOHNSON, KNOWLES, BURTON & BOURNIGHT, INC.
ENGINEERS, ARCHITECTS, SURVEYORS & PLANNERS

ADDRESS
JOHNSON, KNOWLES, BURTON AND BOURNIGHT, INC.
7225 BRAD RIVER ROAD
P.O. BOX 1423
INDO, S.C. 29010
PHONE: (803)733-0900
FAX: (803)732-0485

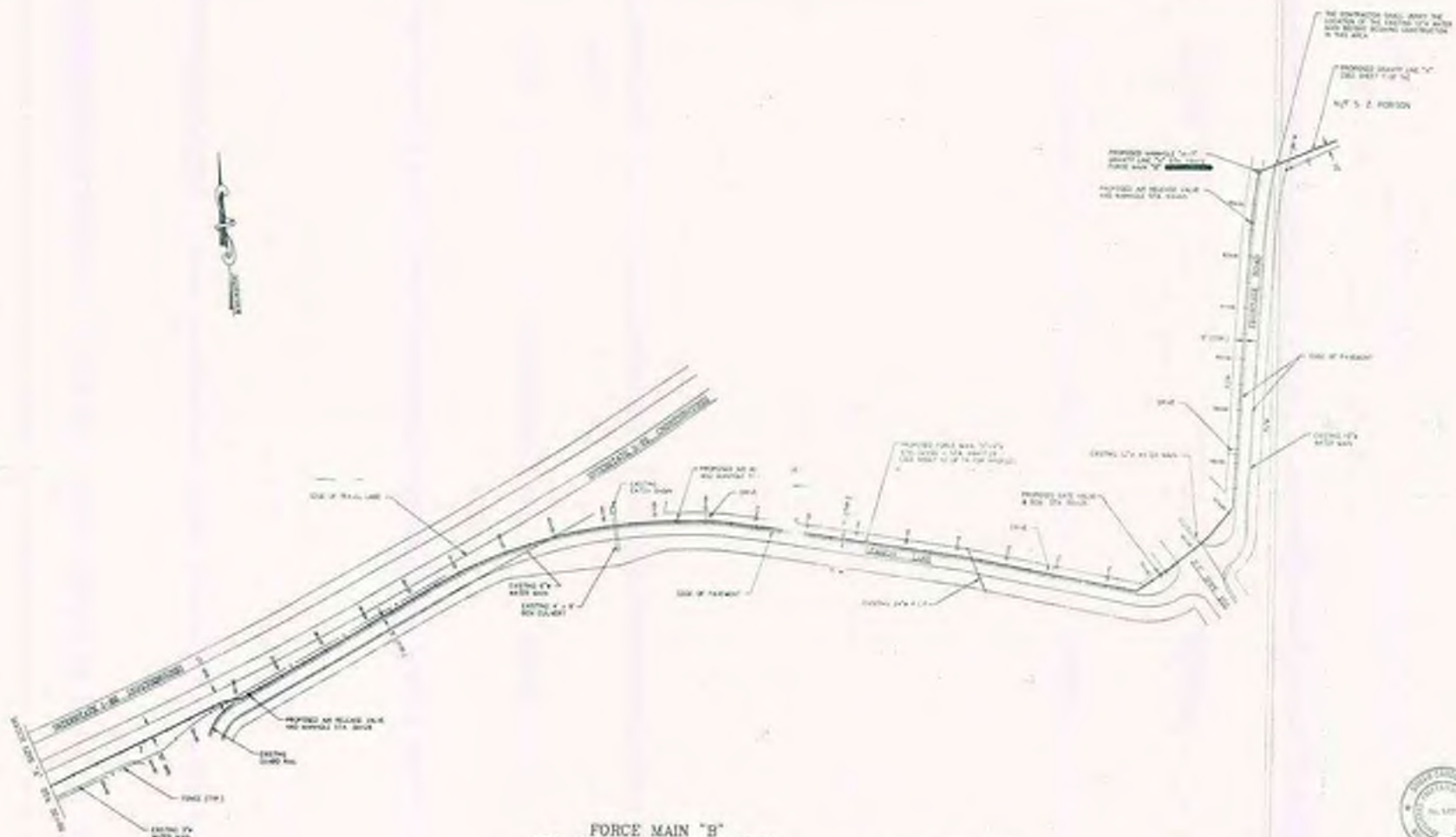
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**SOUTH CAROLINA DEPARTMENT
OF HIGHWAYS &
PUBLIC TRANSPORTATION**

TITLE
**NORTHBOUND PUMP STATION &
FORCE MAIN "B"
STA 0+00 - STA 32+00
SITE PLAN**

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3	ISSUED FOR RECORD DRAWING	12/15/94

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CHECKED BY: JWS
APPROVED BY: JWS
PROJECT NUMBER: 94-114
SHEET NO. 1 OF 1



FORCE MAIN "B"
 STA 32+00 - STA 64+17.26
 SITE PLAN
 SHEET 7-02



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 AS-BUILT DRAWINGS



ADDRESS
 JOHNSON, ANGLADE, BURTON AND SCHEIDT, INC.
 7015 BRIDGE BLVD. ROAD
 P.O. BOX 1000
 AND, S.C. 29621
 PHONE: (803) 752-2800
 FAX: (803) 752-0182

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TITLE
 FORCE MAIN "B"
 STA 32+00 - STA 64+17.26
 SITE PLAN

NO.	REVISIONS	DATE	BY
1	ISSUED FOR CONSTRUCTION	08-15-94	JAS
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 DESIGNED BY: JAS
 DRAWN BY: JAS
 CHECKED BY: WJC
 APPROVED BY: WJC
 SCALE: AS SHOWN
 SHEET NO. 7-02 OF 14



- NOTE:
1. THE CONTRACTOR SHALL VERIFY ALL EXISTING UTILITIES AND RECORD THEM ON THE SITE PLAN. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE LOCATION OF ALL UTILITIES AND SHALL BE RESPONSIBLE FOR THE LOCATION OF ALL UTILITIES.
 2. THE CONTRACTOR SHALL VERIFY THE LOCATION OF ALL UTILITIES AND SHALL BE RESPONSIBLE FOR THE LOCATION OF ALL UTILITIES.
 3. ALL GRAVITY PIPES SHALL BE 30\"/>

GRAVITY SEWER LINE "A"
SITE PLAN
SCALE: 1"=100'



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AS-BUILT DRAWINGS



ADDRESS
JOHNSON, ANGLER, BURKH AND BOURNIGHT, INC.
1725 BROAD RIVER ROAD
P.O. BOX 1435
FLORENCE, S.C. 29502
PHONE: (803) 751-0880
FAX: (803) 751-0880

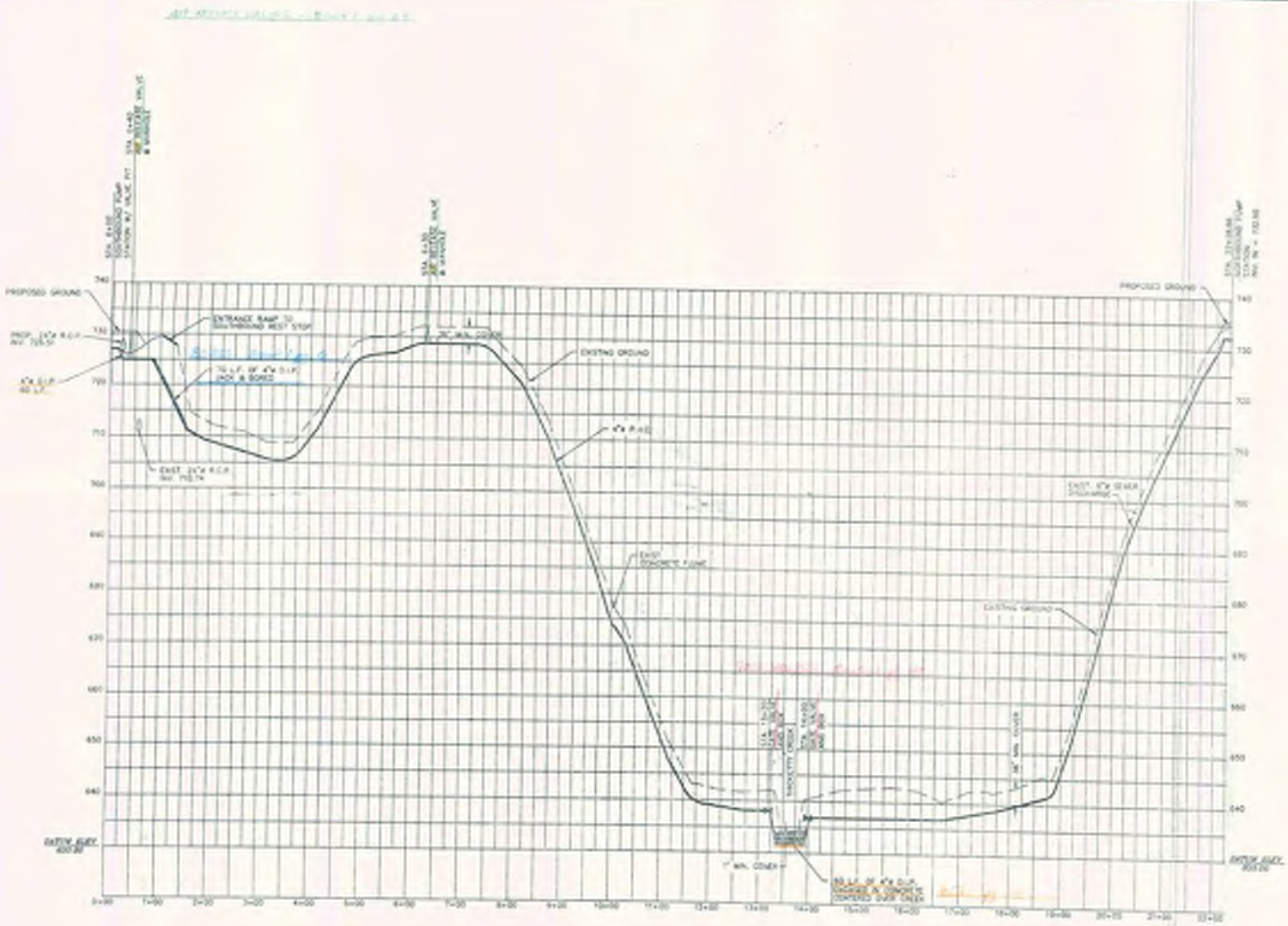
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TITLE
GRAVITY SEWER LINE "A"
SITE PLAN

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APPROVED BY: JAB
PROJECT NO: 94-01-01
DATE: 9/13/94



FORCE MAIN "A"

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AS-BUILT DRAWINGS



SCALE: HORIZ. 1"=40'
VERT. 1"=4'



JOHNSON, KNOWLES, BURSON AND BOUNDARY, INC.
7515 BRISLAW RIVER ROAD
SUITE 200
FLORENCE, S.C. 29505
PHONE: (803) 781-0980
FAX: (803) 781-0980

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PUBLIC TRANSPORTATION**

TITLE
FORCE MAIN "A"
STA. 0+00 - STA. 22+28.66

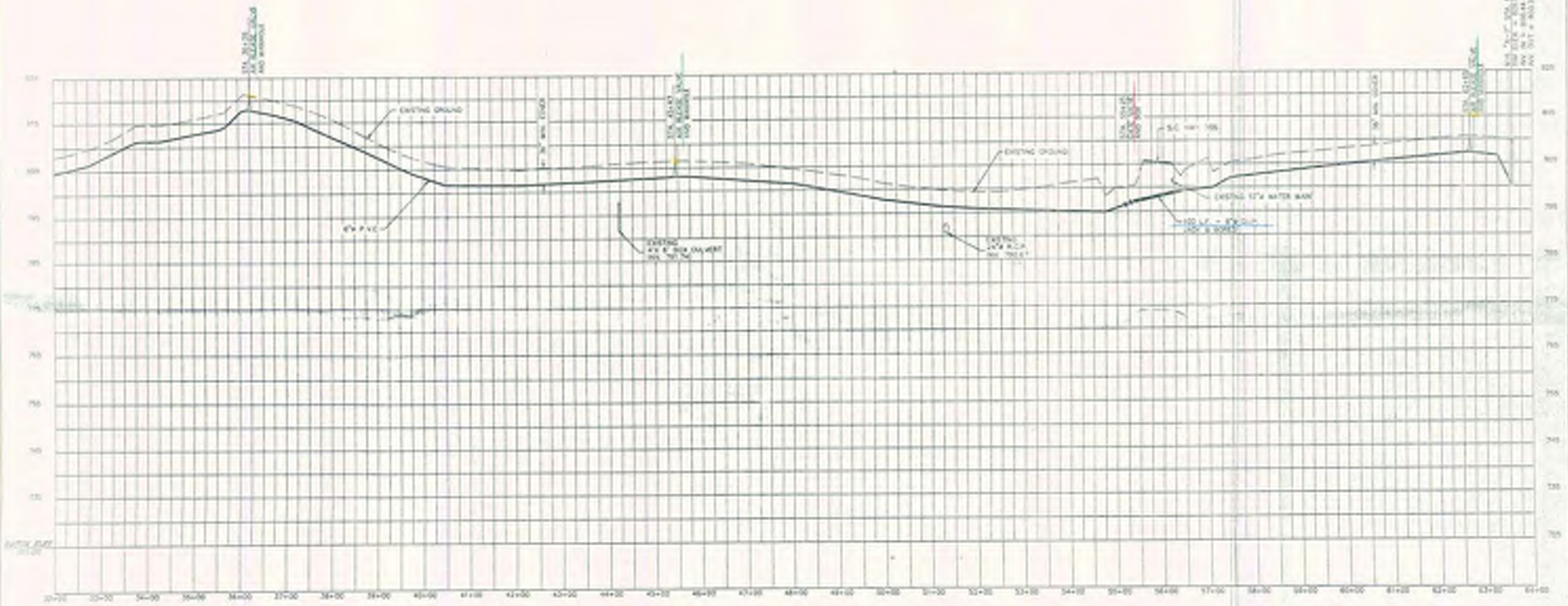
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JOB INFORMATION	
DESIGNED BY	JFB
DRAWN BY	JFB
CHECKED BY	JFB
APPROVED BY	JFB
PROJECT NO.	94-001

DATE: 9-13-94
 A.E. RICHARDS, ENGINEER
 REG. NO. 10124

DATE: 9-13-94
 BY: J.A. JONES
 CHECKED BY: J.A. JONES



FORCE MAIN "B"

SCALE: HORIZ. 1"=40'
 VERT. 1"=10'



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ADDRESS:
 JOHNSON, KINZEL, SURAN AND BOURNOFF, INC.
 7020 BROAD BLVD. ROAD
 P.O. BOX 1402
 IRMO, S.C. 29929
 PHONE: (803) 770-1880
 FAX: (803) 770-0185

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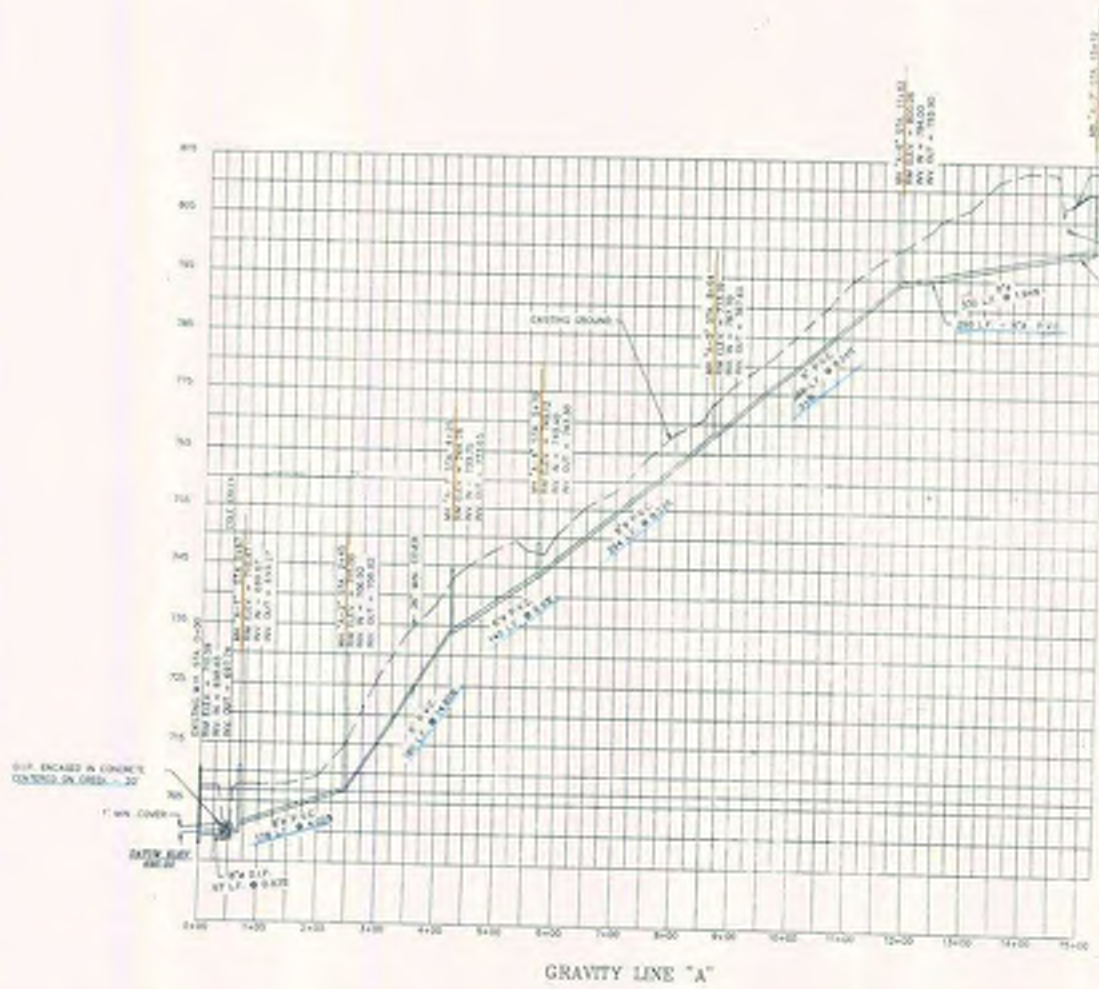
TITLE:
 FORCE MAIN "B"
 STA. 32+00 - STA. 64+17.26

NO.	REVISIONS	DATE	BY
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GRAVITY LINE "A" GRAVITY LINE "B" GRAVITY LINE "C"



GRAVITY LINE "C"



GRAVITY LINE "B"

NOTE: 12" P.V.C. GRAVITY SEWER PIPE IS 12" I.D. 12" O.D.

SCALE: HORIZ. 1"=100' VERT. 1"=10' AS-BUILT DRAWINGS

AS-BUILT 9-13-94



DESIGNED BY: JONAS, HOGAN, BURNETT AND BOWEN, INC.
 1515 BRAD RIVER ROAD
 P.O. BOX 1475
 FLEMING, S.C. 29525
 PHONE: (803) 753-1980
 FAX: (803) 753-0949

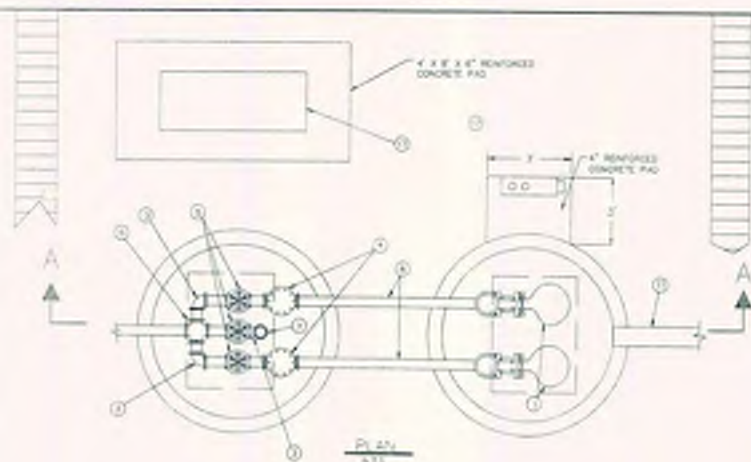
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SOUTH CAROLINA DEPARTMENT OF HIGHWAYS & PUBLIC TRANSPORTATION

TITLE:
 GRAVITY LINE "A"
 GRAVITY LINE "B"
 GRAVITY LINE "C"

NO.	REVISIONS	DATE	BY
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2	AS-BUILT	9-13-94	JAS
3	AS-BUILT	9-13-94	JAS

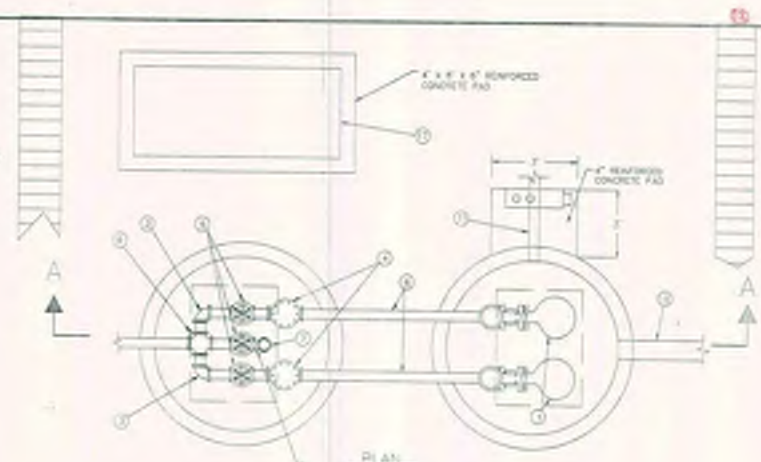
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 PROJECT NO. 94-13-94



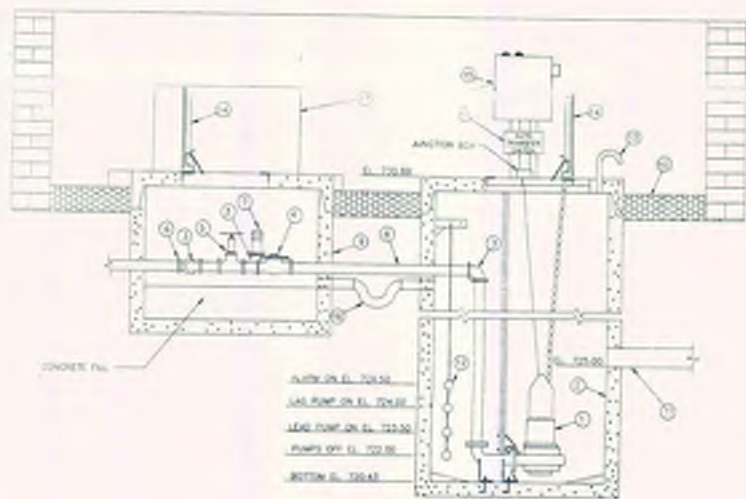
EQUIPMENT SCHEDULE (NORTHBOUND P.S.)

- 1 20 HP SUBMERSIBLE PUMP WITH SLIDE AWAY COUPLERS (2 REQUIRED)
- 2 6"-8" DIA. MET WELL
- 3 4" PVC ELBOW
- 4 4" CHECK VALVE
- 5 4" GATE VALVE
- 6 4" ORISK
- 7 4" CAP
- 8 4" DIA. S.I.P.
- 9 3"-4" DIA. VALVE FIT
- 10 ENTRANCE ROAD & PUMP STATION ENCLOSURE TO HAVE 2" THICK OVERALL, 5/8" DIA. GALV. OVER COMPACTED BASE
- 11 INFLUENT PIPE SL. 708.00
- 12 SEALED MERVENT SWITCH (4 REQUIRED)
- 13 2" X SCREENED JUNT PIPE
- 14 2" X 4" X 4" ALUMINUM FLOOR DOOR WITH HESIP & LOCK (2 REQUIRED)
- 15 PUMP CONTROL PANEL & DUPLEX PUMP CONTROL IN NEAR & ENCLOSED WITH HESIP & LOCK. NO CONTROLS TO BE VISIBLE WHEN DOOR IS CLOSED WITH FLASHING HIGH WATER ALARM, LIGHT & BELL ALARMS
- 16 FLOOR DRAIN 2" X PVC DRAIN TO MET WELL
- 17 12 KW GENERATOR, ENCLOSED AND AUTOMATIC POWER TRANSFER SWITCH

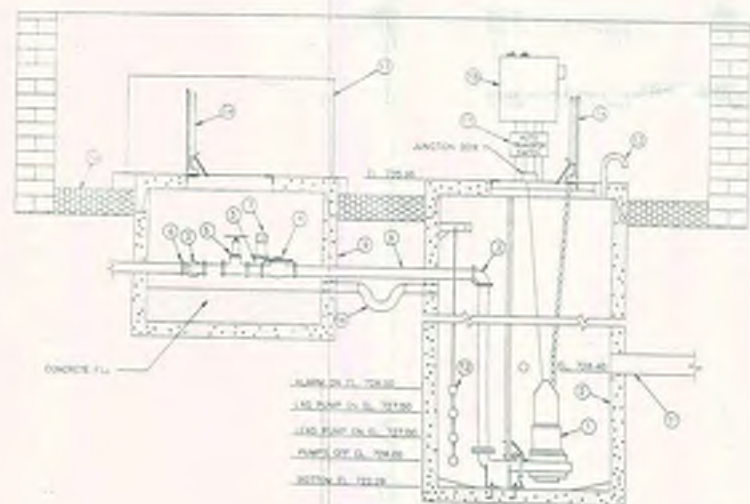


EQUIPMENT SCHEDULE (SOUTHBOUND P.S.)

- 1 2 HP SUBMERSIBLE PUMP WITH SLIDE AWAY COUPLERS (2 REQUIRED)
- 2 6"-8" DIA. MET WELL
- 3 4" PVC ELBOW
- 4 4" CHECK VALVE
- 5 4" GATE VALVE
- 6 4" ORISK
- 7 4" CAP
- 8 4" DIA. S.I.P.
- 9 3"-4" DIA. VALVE FIT
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- 16 FLOOR DRAIN 2" X PVC DRAIN TO MET WELL
- 17 12 KW GENERATOR, ENCLOSED AND AUTOMATIC POWER TRANSFER SWITCH



SECTION A-A
N.T.S.
SOUTHBOUND
PUMP STATION



SECTION A-A
N.T.S.
NORTHBOUND
PUMP STATION

AS-BUILT 9-13-94
AS-BUILT DRAWINGS



JK&B
JOHNSON, ANDREWS, BURNES & BOURNIGHT, INC.
1705 BROAD AVENUE ROAD
P.O. BOX 14175
RDU, N.C. 27615
PHONE: (919) 732-0865
FAX: (919) 732-0885

ADDRESSES:
JOHNSON, ANDREWS, BURNES AND BOURNIGHT, INC.
1705 BROAD AVENUE ROAD
P.O. BOX 14175
RDU, N.C. 27615
PHONE: (919) 732-0865
FAX: (919) 732-0885

PREPARED FOR
**SOUTH CAROLINA DEPARTMENT
OF HIGHWAYS &
PUBLIC TRANSPORTATION**

TITLE
**NORTHBOUND & SOUTHBOUND
PUMP STATION DETAILS**

NO.	REVISIONS	DATE	BY
1	AS-BUILT	9-13-94	JK&B

CONTRACT
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AND BOURNIGHT, INC.
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AND BOURNIGHT, INC.
UNAUTHORIZED USE OF ANY KIND,
INCLUDING USE ON OTHER PROJECTS,
IS PROHIBITED.

DATE: 9/13/94
DESIGNED BY: JKS
DRAWN BY: JKS
CHECKED BY: WBN
APPROVED BY: WBN
PROJECT NO.: 2002-17
SHEET NO.: 11 OF 11



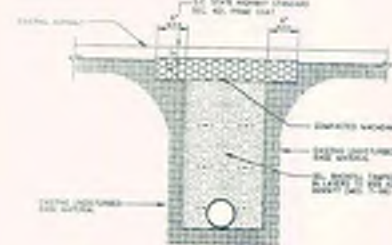
NO.	DESCRIPTION	DATE
1	AS-BUILT	9-13-94

THRUST BLOCKING DETAIL

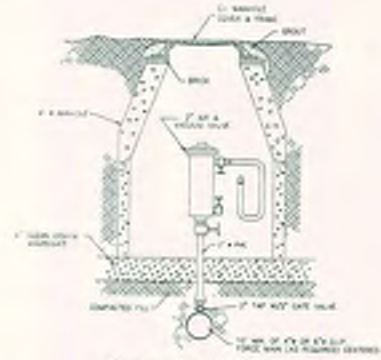
GENERAL NOTES:
 1. ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE LATEST EDITIONS OF THE SOUTH CAROLINA DEPARTMENT OF HIGHWAYS & PUBLIC TRANSPORTATION STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION, LATEST EDITION, AND THE LATEST EDITIONS OF THE SOUTH CAROLINA DEPARTMENT OF HIGHWAYS & PUBLIC TRANSPORTATION STANDARD SPECIFICATIONS FOR STRUCTURES, LATEST EDITION.
 2. ALL MATERIALS SHALL BE OF THE BEST QUALITY AVAILABLE AND SHALL BE SUBJECT TO INSPECTION AND APPROVAL BY THE ENGINEER.
 3. ALL DIMENSIONS SHALL BE IN FEET AND INCHES UNLESS OTHERWISE SPECIFIED.
 4. ALL DIMENSIONS SHALL BE TO FACE UNLESS OTHERWISE SPECIFIED.
 5. ALL DIMENSIONS SHALL BE TO CENTERLINE UNLESS OTHERWISE SPECIFIED.
 6. ALL DIMENSIONS SHALL BE TO THE OUTSIDE UNLESS OTHERWISE SPECIFIED.
 7. ALL DIMENSIONS SHALL BE TO THE INSIDE UNLESS OTHERWISE SPECIFIED.
 8. ALL DIMENSIONS SHALL BE TO THE CENTERLINE UNLESS OTHERWISE SPECIFIED.
 9. ALL DIMENSIONS SHALL BE TO THE OUTSIDE UNLESS OTHERWISE SPECIFIED.
 10. ALL DIMENSIONS SHALL BE TO THE INSIDE UNLESS OTHERWISE SPECIFIED.

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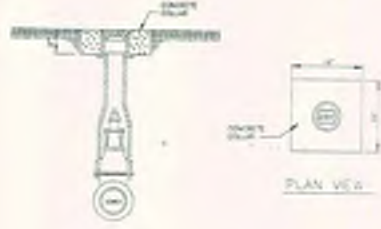
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 10. ALL DIMENSIONS SHALL BE TO THE INSIDE UNLESS OTHERWISE SPECIFIED.



DRIVEWAY REPAIR DETAIL



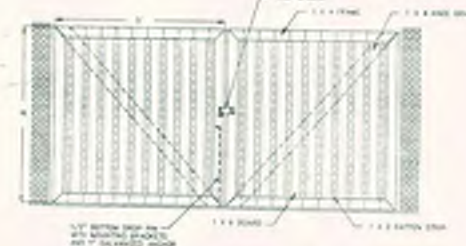
AIR RELEASE VALVE DETAIL



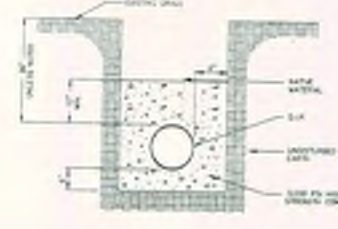
VALVE BOX & COLLAR DETAIL



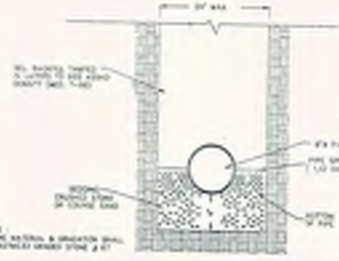
PIERCED BRICK WALL



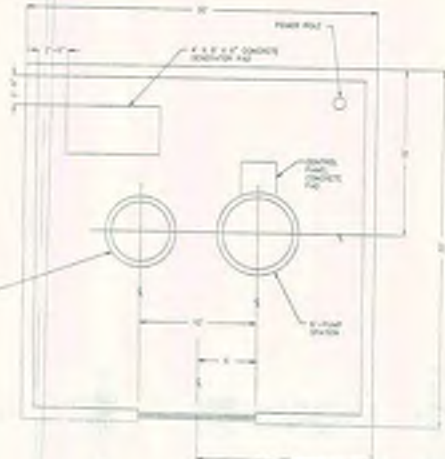
PIERCED WALL GATE DETAIL



CONCRETE PIPE ENCASEMENT



GRAVITY PIPE EMBEDMENT



PUMP STATION ENCLOSURE LAYOUT



NO TRESPASSING IN AN EMERGENCY SIGN DETAIL



FORCE MAIN CONNECTION DETAIL



AS-BUILT 9-13-94

AS-BUILT DRAWINGS

JKBB
 JOHN K. BURNETT & SONS, INC.
 ENGINEERS, ARCHITECTS & SURVEYORS

ADDRESS:
 JOHN K. BURNETT & SONS, INC.
 7515 BRADLEY ROAD
 P.O. BOX 1425
 RFD, S.C. 29685
 PHONE: (803) 734-1880
 FAX: (803) 732-0285

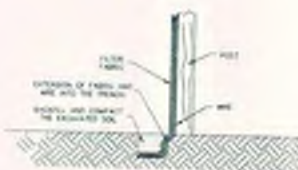
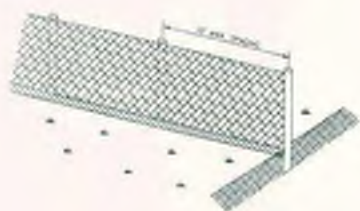
PREPARED FOR:
**SOUTH CAROLINA DEPARTMENT
 OF HIGHWAYS &
 PUBLIC TRANSPORTATION**

TITLE:
SEWER DETAILS

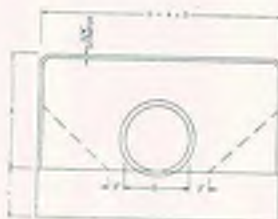
NO.	REVISIONS	DATE	BY
1	AS-BUILT	9-13-94	JKB

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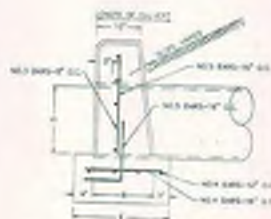
DESIGNED BY: JKB
 DRAWN BY: JKB
 CHECKED BY: WTC
 APPROVED BY: WTC
 PROJECT NO: 377-4155
 SHEET NO: 113 OF 120



SILT FENCE DETAIL
N.T.S.



FRONT ELEVATION



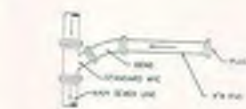
END ELEVATION

DIMENSIONS		MATERIALS	
DESCRIPTION	SIZE	QUANTITY	REMARKS
CONCRETE HEADWALL	12" x 12" x 12"	1	SEE SPECIFICATIONS
STEEL PIPE	12" DIA. x 12' LONG	1	SEE SPECIFICATIONS
STEEL PIPE	12" DIA. x 12' LONG	1	SEE SPECIFICATIONS
STEEL PIPE	12" DIA. x 12' LONG	1	SEE SPECIFICATIONS
STEEL PIPE	12" DIA. x 12' LONG	1	SEE SPECIFICATIONS
STEEL PIPE	12" DIA. x 12' LONG	1	SEE SPECIFICATIONS
STEEL PIPE	12" DIA. x 12' LONG	1	SEE SPECIFICATIONS
STEEL PIPE	12" DIA. x 12' LONG	1	SEE SPECIFICATIONS
STEEL PIPE	12" DIA. x 12' LONG	1	SEE SPECIFICATIONS
STEEL PIPE	12" DIA. x 12' LONG	1	SEE SPECIFICATIONS

TYPICAL STRAIGHT HEADWALL
N.T.S.



O-RING JOINT DETAIL "A"
N.T.S.



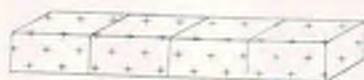
PLAN



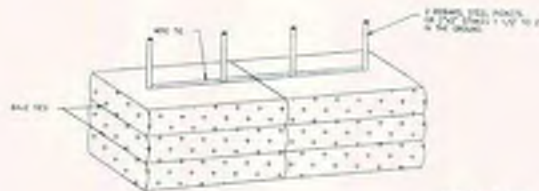
SECTION

STANDARD 4" SERVICE TAP
N.T.S.

OTHER DETAILS AS SHOWN AND LISTED IN THE SPECIFICATIONS AND STANDARD DRAWINGS FOR THE PROJECT.



FRONT VIEW



ANCHORING BALES

TEMPORARY STRAW OR HAY BALE BARRIER
N.T.S.



CROSS SECTION
DROP MANHOLE
N.T.S.



CROSS SECTION
STANDARD MANHOLE
AS-BUILT DRAWINGS



AS-BUILT 9-13-94

JKBB
JOHNSON, KIMBLE, BURTON & BOURNIGHT, INC.
Civil, Survey, Survey & Mapping
CONSULTANTS AND ENGINEERS

ADDRESS
JOHNSON, KIMBLE, BURTON AND BOURNIGHT, INC.
1000 BROAD BLVD. FLOOR 1425
INGW. S.C. 29163
PHONE: (803) 732-0800
FAX: (803) 732-0800

PREPARED FOR
SOUTH CAROLINA DEPARTMENT
OF HIGHWAYS &
PUBLIC TRANSPORTATION

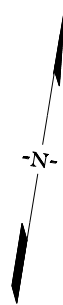
TITLE
SEWER DRAINAGE &
EROSION CONTROL DETAILS

NO.	REVISIONS	DATE	BY
1	AS-BUILT	9-13-94	JKBB

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DATE PLOTTED
DRAWN BY: JKB
CHECKED BY: JKB
APPROVED BY: JKB
PROJECT NUMBER: 94-1024

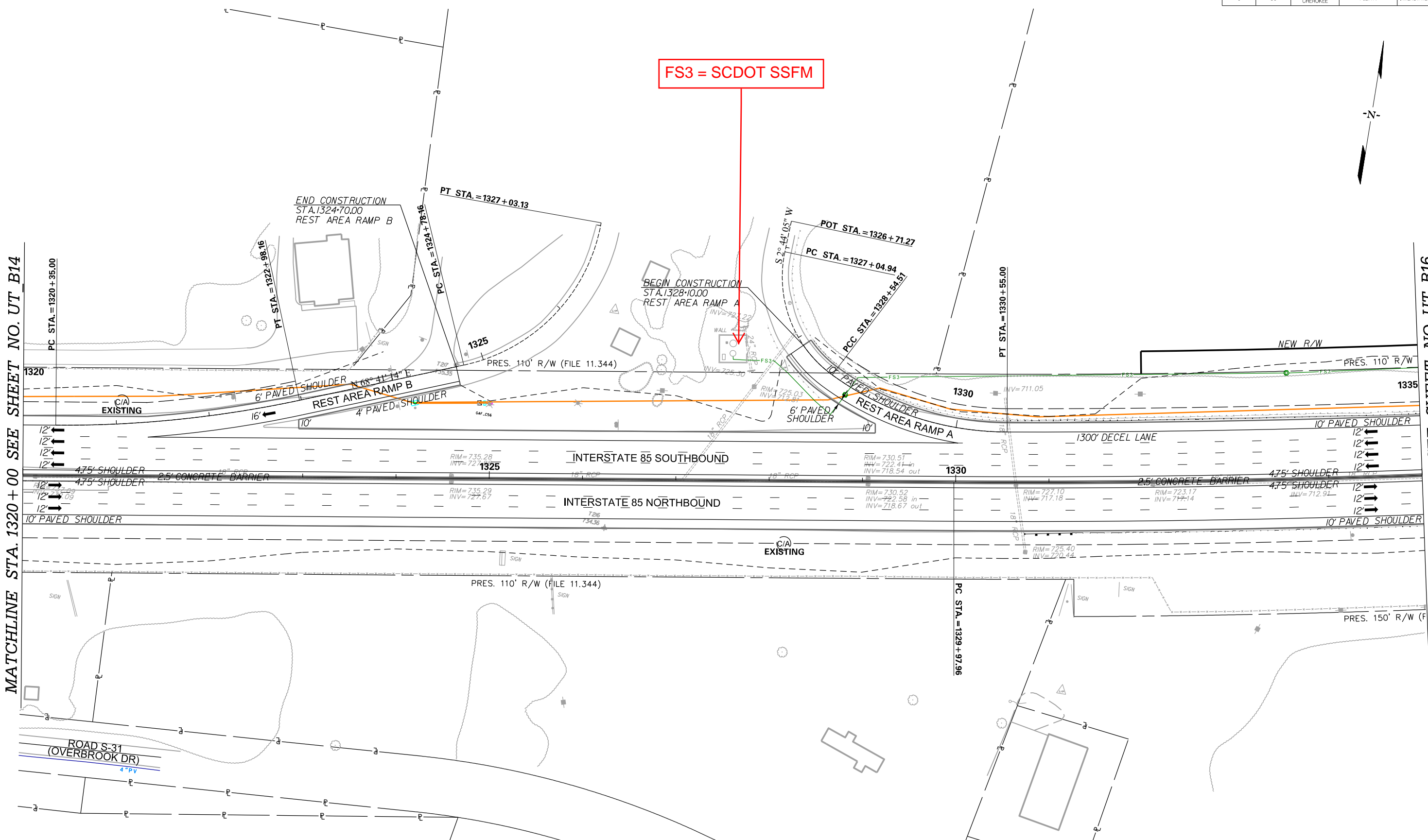
FED. RD. DRW. NO.	STATE	COUNTY	PROJECT ID	ROAD / ROUTE NO.	SHEET NO.
3	SC	SPARTANBURG CHEROKEE	P027114	INTERSTATE 85	UT_B15



FS3 = SCDOT SSFM

MATCHLINE STA. 1320 + 00 SEE SHEET NO. UT_B14

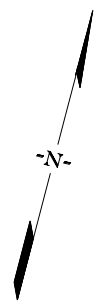
MATCHLINE STA. 1335 + 00 SEE SHEET NO. UT_B16



<p>PRELIMINARY NOT FOR CONSTRUCTION</p>	7				SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION INTERSTATE 85
	6				
	5				UTILITY PLAN SHEET
	4				
	3				
	2				
	1				INTERSTATE 85 MILE MARKER 90-97 SEGMENT B
	REV. NO.	BY	DATE	DESCRIPTION OF REVISION	

SCALE: 1" = 50'

FED. RD. DR. NO.	STATE	COUNTY	PROJECT ID	ROAD / ROUTE NO.	SHEET NO.
3	SC	SPARTANBURG CHEROKEE	P027114	INTERSTATE 85	UT_B16

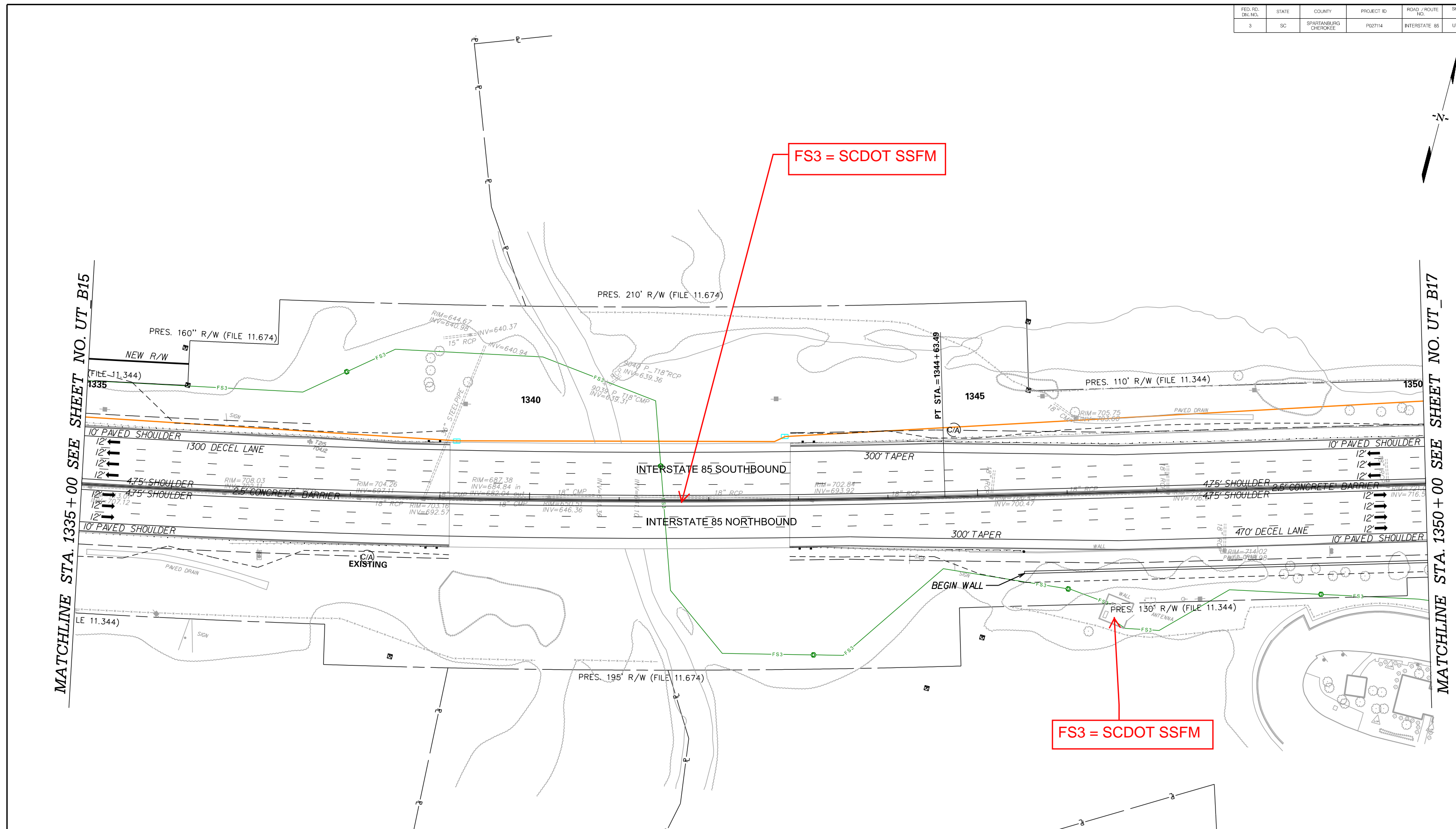


FS3 = SCDOT SSFM

FS3 = SCDOT SSFM

MATCHLINE STA. 1335 + 00 SEE SHEET NO. UT_B15

MATCHLINE STA. 1350 + 00 SEE SHEET NO. UT_B17



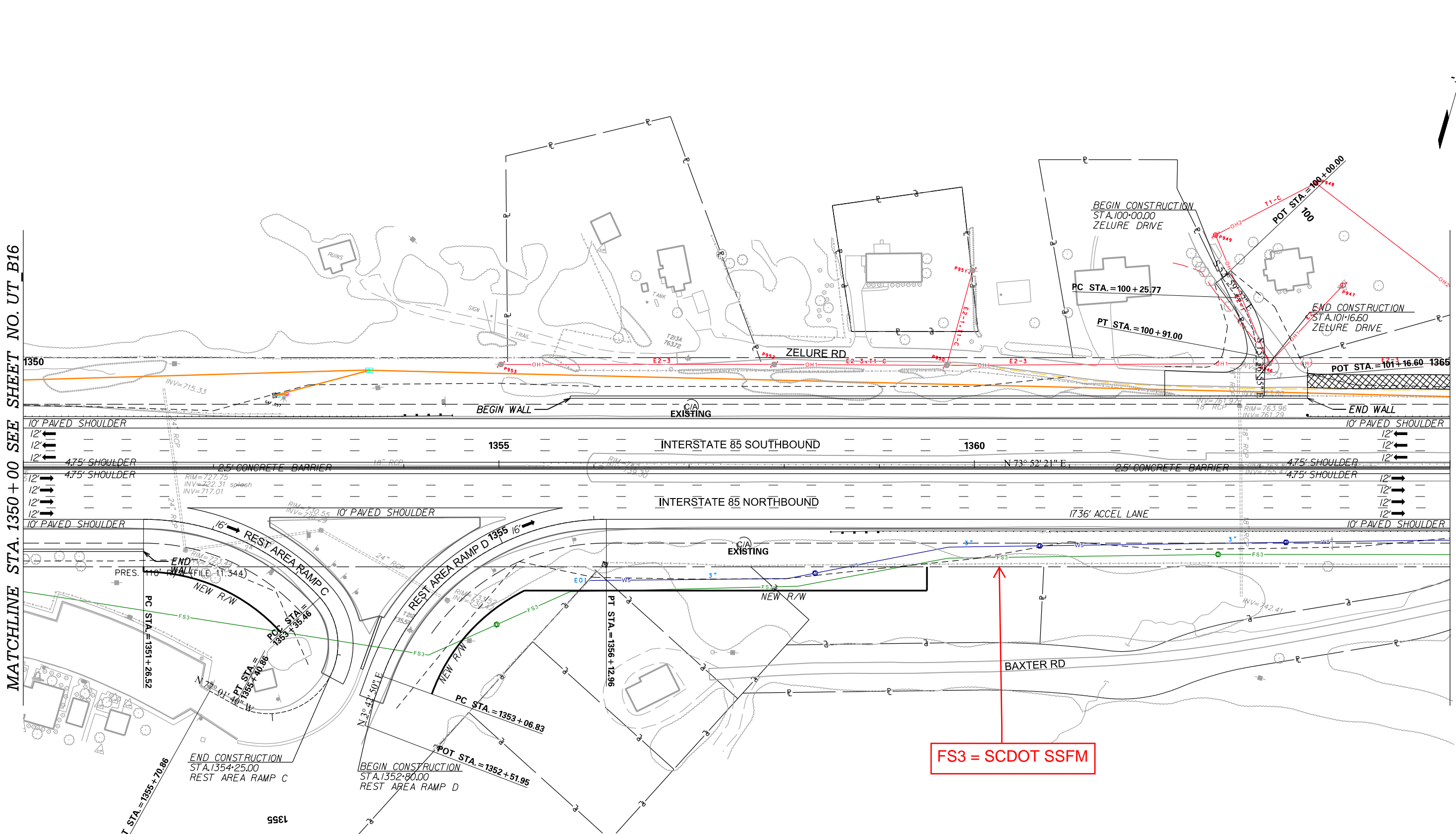
<p>PRELIMINARY NOT FOR CONSTRUCTION</p>	7				SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION INTERSTATE 85
	6				
	5				UTILITY PLAN SHEET
	4				INTERSTATE 85 MILE MARKER 90-97 SEGMENT B
	3				
	2				
	1				
SCALE: 1" = 50'	REV. NO.	BY	DATE	DESCRIPTION OF REVISION	

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12/28/2015

FED. RD. DR. NO.	STATE	COUNTY	PROJECT ID	ROAD / ROUTE NO.	SHEET NO.
3	SC	SPARTANBURG CHEROKEE	P027114	INTERSTATE 85	UT_B17

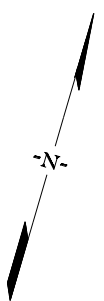
MATCHLINE STA. 1350 + 00 SEE SHEET NO. UT_B16

MATCHLINE STA. 1365 + 00 SEE SHEET NO. UT_B18



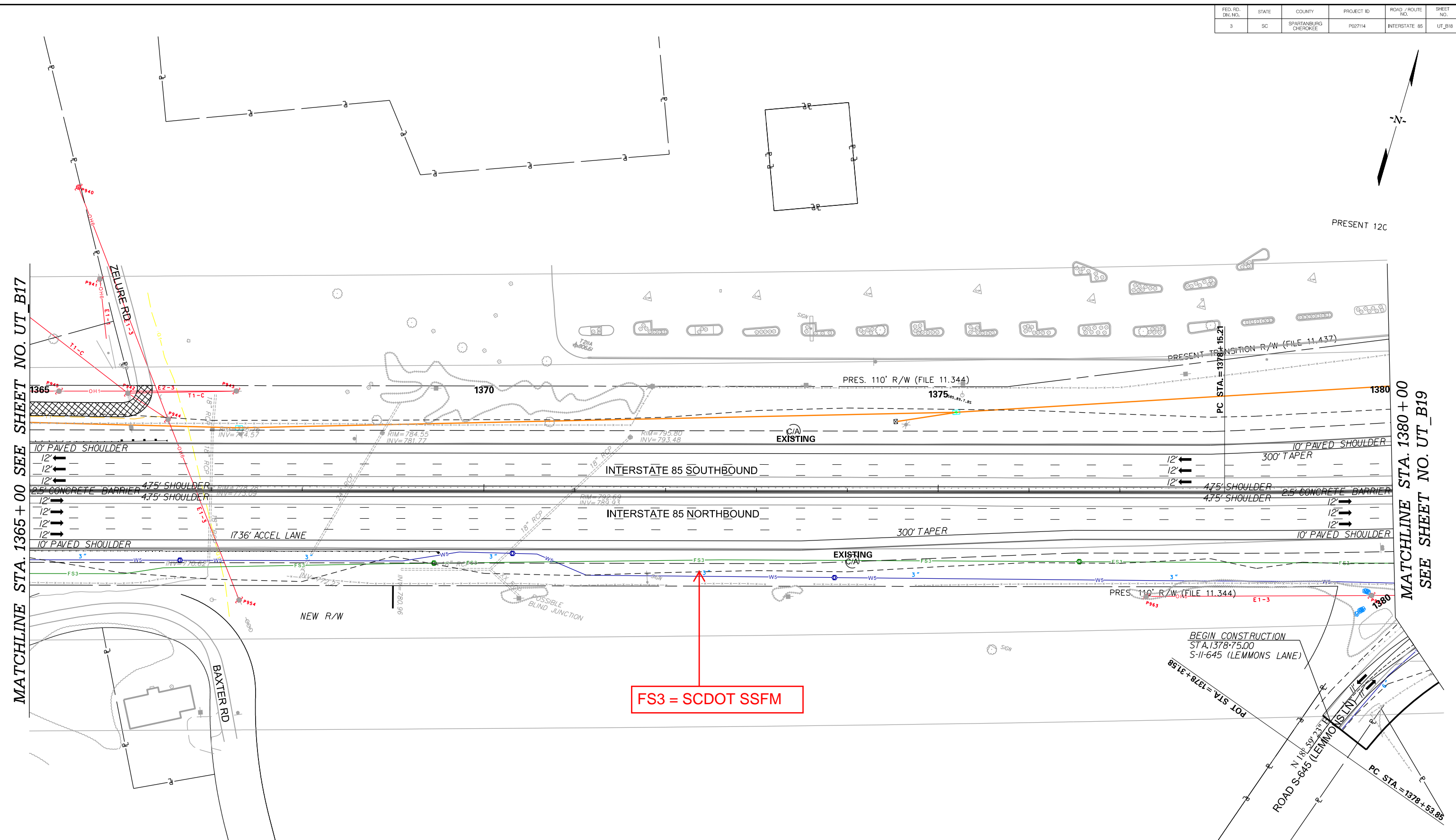
<p>PRELIMINARY NOT FOR CONSTRUCTION</p>	7				<p>SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION INTERSTATE 85</p> <p>UTILITY PLAN SHEET</p> <p>INTERSTATE 85 MILE MARKER 90-97 SEGMENT B</p>
	6				
	5				
	4				
	3				
2					
1					
SCALE: 1" = 50'	REV. NO.	BY	DATE	DESCRIPTION OF REVISION	

FED. RD. DIST. NO.	STATE	COUNTY	PROJECT ID	ROAD / ROUTE NO.	SHEET NO.
3	SC	SPARTANBURG CHEROKEE	P027114	INTERSTATE 85	UT_B18



MATCHLINE STA. 1365 + 00 SEE SHEET NO. UT_B17

MATCHLINE STA. 1380 + 00 SEE SHEET NO. UT_B19

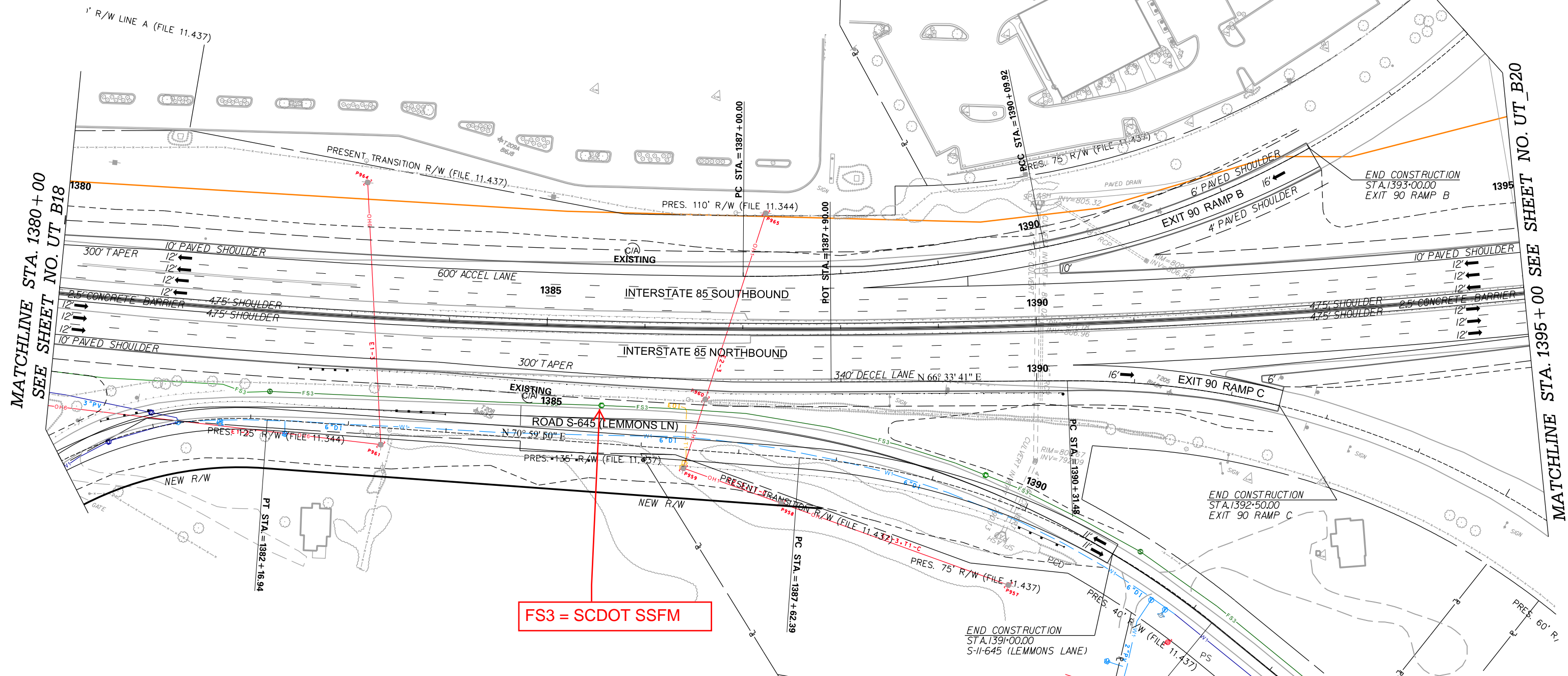
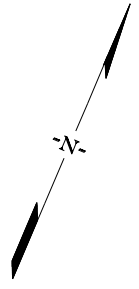


FS3 = SCDOT SSFM

<p>PRELIMINARY NOT FOR CONSTRUCTION</p>	7				SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION INTERSTATE 85
	6				
	5				UTILITY PLAN SHEET
	4				
	3				
	2				
	1				INTERSTATE 85 MILE MARKER 90-97 SEGMENT B
SCALE: 1" = 50'	REV. NO.	BY	DATE	DESCRIPTION OF REVISION	

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FED. RD. DRW. NO.	STATE	COUNTY	PROJECT ID	ROAD / ROUTE NO.	SHEET NO.
3	SC	SPARTANBURG CHEROKEE	P027114	INTERSTATE 85	UT_B19



MATCHLINE STA. 1380 + 00
SEE SHEET NO. UT_B18

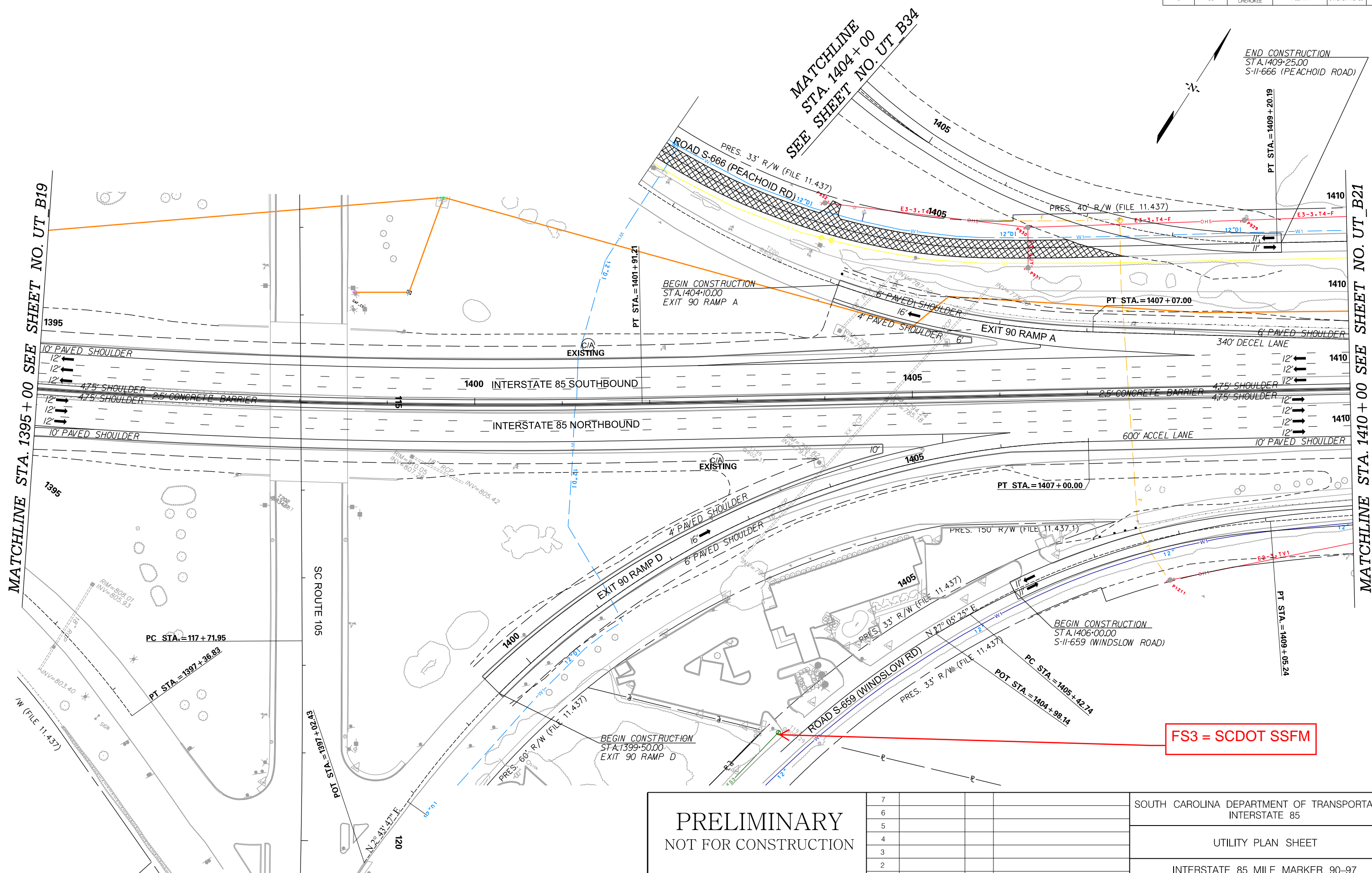
MATCHLINE STA. 1395 + 00 SEE SHEET NO. UT_B20

FS3 = SCDOT SSFM

<p>PRELIMINARY NOT FOR CONSTRUCTION</p>						<p>SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION INTERSTATE 85</p> <p>UTILITY PLAN SHEET</p> <p>INTERSTATE 85 MILE MARKER 90-97 SEGMENT B</p>
SCALE: 1" = 50'	REV. NO.	BY	DATE	DESCRIPTION OF REVISION		

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12/28/2015

FED. RD. DIST. NO.	STATE	COUNTY	PROJECT ID	ROAD / ROUTE NO.	SHEET NO.
3	SC	SPARTANBURG CHEROKEE	P027114	INTERSTATE 85	UT_B20



MATCHLINE STA. 1395 + 00 SEE SHEET NO. UT B19

MATCHLINE STA. 1410 + 00 SEE SHEET NO. UT B21

MATCHLINE
STA. 1404 + 00
SEE SHEET NO. UT B34

END CONSTRUCTION
STA. 1409+25.00
S-II-666 (PEACHOID ROAD)

BEGIN CONSTRUCTION
STA. 1404+10.00
EXIT 90 RAMP A

PT STA. = 1407 + 07.00

PT STA. = 1407 + 00.00

BEGIN CONSTRUCTION
STA. 1406+00.00
S-II-659 (WINDSLOW ROAD)

PT STA. = 1409 + 05.24

PC STA. = 117 + 71.95

PT STA. = 1397 + 36.93

BEGIN CONSTRUCTION
STA. 1399+50.00
EXIT 90 RAMP D

POT STA. = 1404 + 98.14

PC STA. = 1405 + 42.74

FS3 = SCDOT SSFM

<p>PRELIMINARY NOT FOR CONSTRUCTION</p>	7				SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION INTERSTATE 85
	6				
	5				UTILITY PLAN SHEET
	4				INTERSTATE 85 MILE MARKER 90-97 SEGMENT B
	3				
	2				
	1				
	0				
SCALE: 1" = 50'	REV. NO.	BY	DATE	DESCRIPTION OF REVISION	

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12/28/2015

PRELIMINARY UTILITY REPORT, UTILITY INFORMATION

Project Owner: SCDOT
File Number:
Project ID Number: P027114
Project Name: I-85 Widening Improvements Mile Marker 80 to 96
County: Spartanburg & Cherokee

Type: Water

SC811 & SUE Code: NONE & W5

Utility: SCDOT Cherokee County Maintenance

Contact: Stephen Ellis, Cherokee County Resident Maintenance Engineer
864.489.2844 ellissv@scdot.org
1868 Old Georgia HWY Gaffney, SC 29340

Existing Facility: Approximately 2,500LF of 3-inch water line for supplying I-85 NB Rest Area sta. 1356+00RT to 13+82+00 RT tie to 6-inch DIPW1 (GBPW) on S645 (Lemmons LN)

Prior Rights: SCDOT owned water line, SCDOT responsible for relocation cost

Impact: Realignment of S645 (Lemmons RD) and relocation of 6-inch DIPW1 (GBPW) tie in location

Relocation: Coordinate with GBPW for relocation of tie in location

Estimated Relocation Cost: \$10,000.00

Future Facility: NONE anticipated

Restrictions and/or Moratoriums: NONE, Rest Area is currently closed

Notice to Proceed: 30days

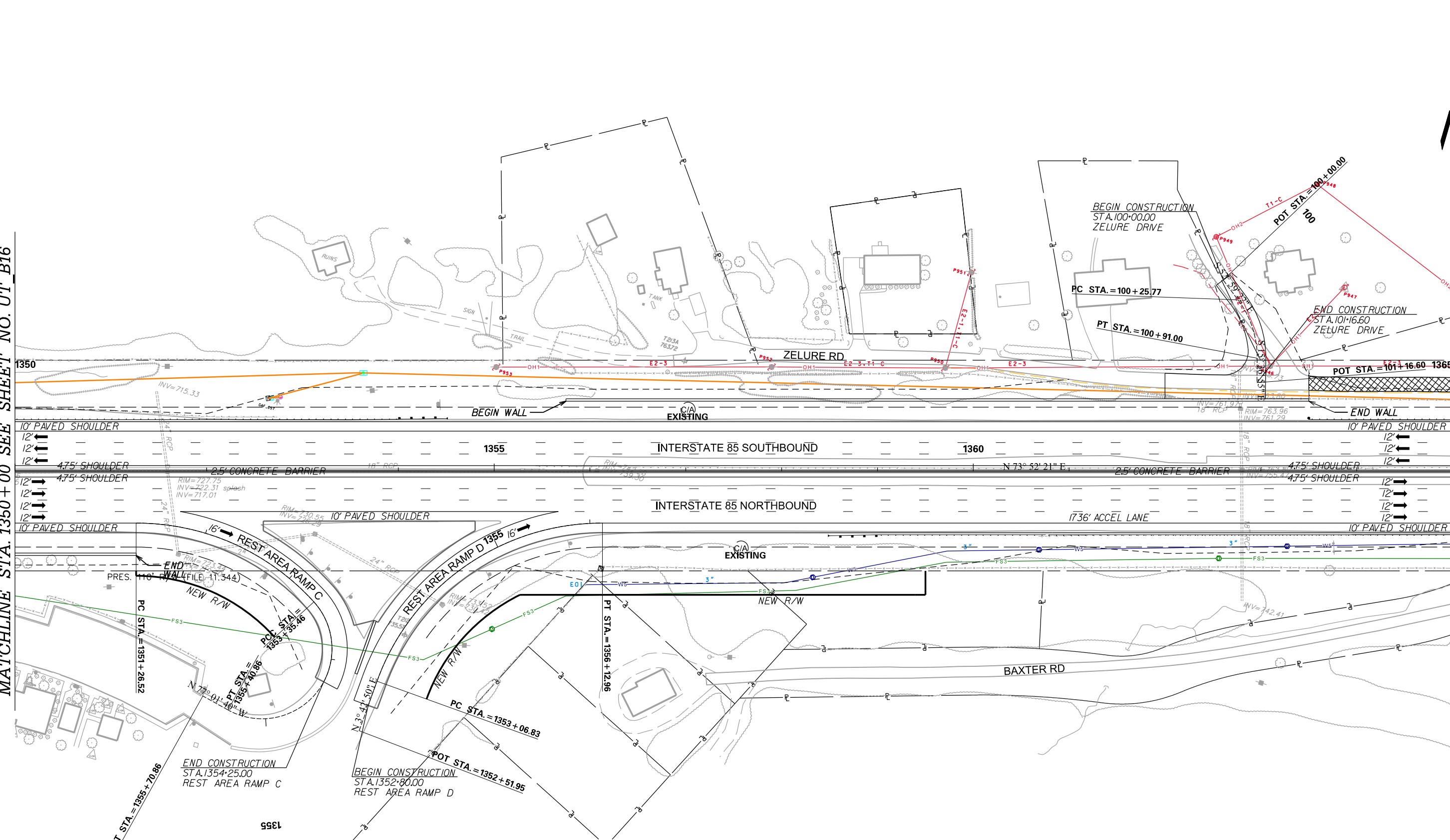
Estimated Time to Relocate: 1 week

In-Contract Work: YES

FED. RD. DIST. NO.	STATE	COUNTY	PROJECT ID	ROAD / ROUTE NO.	SHEET NO.
3	SC	SPARTANBURG CHEROKEE	P027114	INTERSTATE 85	UT_B17

MATCHLINE STA. 1350 + 00 SEE SHEET NO. UT_B16

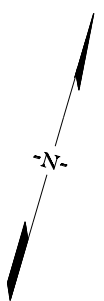
MATCHLINE STA. 1365 + 00 SEE SHEET NO. UT_B18



<p>PRELIMINARY NOT FOR CONSTRUCTION</p>	7				SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION INTERSTATE 85 UTILITY PLAN SHEET INTERSTATE 85 MILE MARKER 90-97 SEGMENT B
	6				
	5				
	4				
	3				
	2				
	1				
SCALE: 1" = 50'	REV. NO.	BY	DATE	DESCRIPTION OF REVISION	

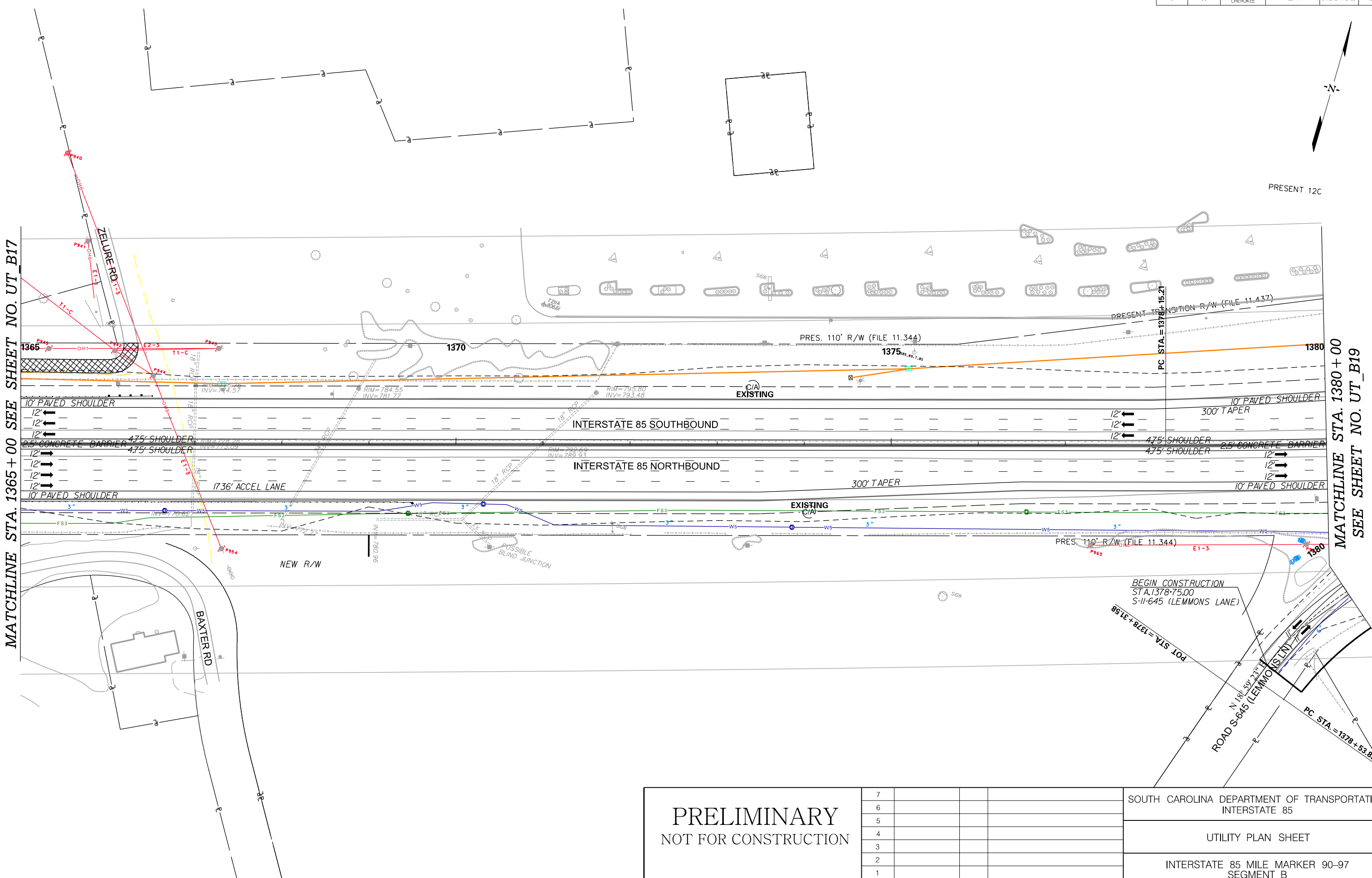
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FED. RD. DIST. NO.	STATE	COUNTY	PROJECT ID	ROAD / ROUTE NO.	SHEET NO.
3	SC	SPARTANBURG CHEROKEE	P027114	INTERSTATE 85	UT_B18



MATCHLINE STA. 1365 + 00 SEE SHEET NO. UT_B17

MATCHLINE STA. 1380 + 00
SEE SHEET NO. UT_B19



PRELIMINARY
NOT FOR CONSTRUCTION

SCALE: 1" = 50'

7				
6				
5				
4				
3				
2				
1				
REV. NO.	BY	DATE	DESCRIPTION OF REVISION	

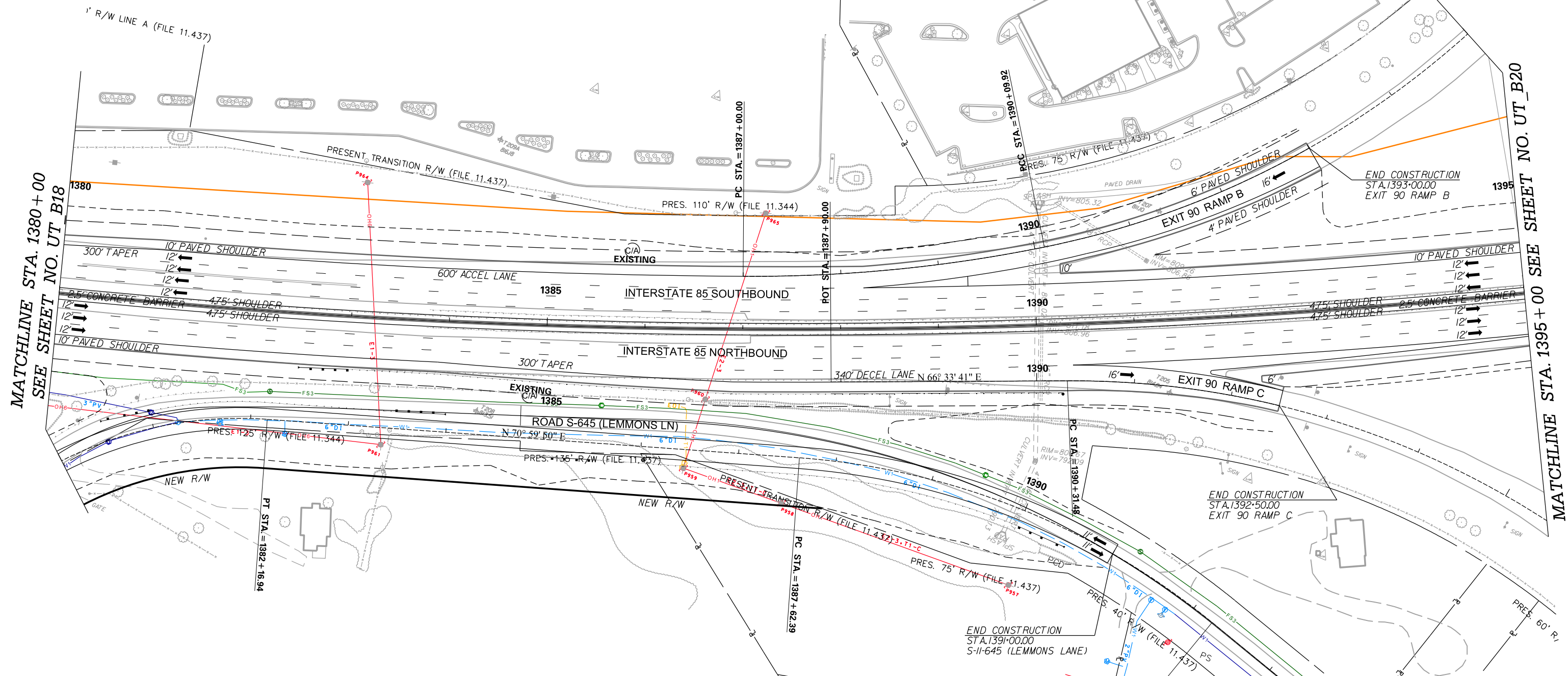
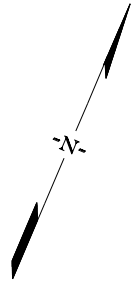
SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION
INTERSTATE 85

UTILITY PLAN SHEET

INTERSTATE 85 MILE MARKER 90-97
SEGMENT B

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12/28/2015

FED. RD. DRW. NO.	STATE	COUNTY	PROJECT ID	ROAD / ROUTE NO.	SHEET NO.
3	SC	SPARTANBURG CHEROKEE	P027114	INTERSTATE 85	UT_B19



MATCHLINE STA. 1380 + 00
SEE SHEET NO. UT_B18

MATCHLINE STA. 1395 + 00 SEE SHEET NO. UT_B20

**PRELIMINARY
NOT FOR CONSTRUCTION**

SCALE: 1" = 50'

7			
6			
5			
4			
3			
2			
1			
REV. NO.	BY	DATE	DESCRIPTION OF REVISION

SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION
INTERSTATE 85

UTILITY PLAN SHEET

INTERSTATE 85 MILE MARKER 90-97
SEGMENT B

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12/28/2015

PRELIMINARY UTILITY REPORT, UTILITY INFORMATION

Project Owner: SCDOT
File Number:
Project ID Number: P027114
Project Name: I-85 Widening Improvements Mile Marker 80 to 96
County: Spartanburg & Cherokee

Type: Water & Sewer

SC811 & SUE Code: SWS58 & W4/S2

Utility: Spartanburg Water & Sanitary Sewer District (Town of Cowpens)

Contact: Kevin Smith, Project Engineer
864.580.5649 ksmith@sws-sssd.org
175 North Liberty Street Spartanburg, SC 29306

Existing Facility: Varies size water lines (22,000LF+) and gravity sanitary sewer lines (9,000LF+) following Frontage Roads in Spartanburg County. WL crossing I-85 are at sta. 880+00 (WL), sta.919+00 (WL), sta. 959+00 (Pump Station WPS-03), sta. 968+00 (WL), sta. 1018+00 (SS), sta. 1031+00 (WL). Spartanburg Water & Sewer is maintaining the Town of Cowpens sewer facilities around I-85 Exit 83 SC110 (Battleground RD)

Prior Rights: Most water and sewer lines are inside present SCDOT ROW by encroachment. There are some water and sewer lines outside present SCDOT ROW in a Spartanburg easement; 16"WL from I-85 sta. 920+00 RT to sta. 965+00RT

Impact: Realignment of Frontage Road (Shady Lane) 16"WL, replacement of CSXRR Bridge over I-85 16"WL, proposed NEW I-85 ROW encroaching in 16"WL easement I-85, I-85 Exit 83 SC110 (Battleground RD) interchange rebuild WL & SS,

Relocation: Follow SCDOT Utility Accommodations Policy and relocate inside present and proposed NEW SCDOT ROW.

Estimated Relocation Cost: \$1,000,000.00

Future Facility: NONE anticipated

Restrictions and/or Moratoriums: Tie-ins restricted to off hours (night) and customer demand with 1 to 2 week notice

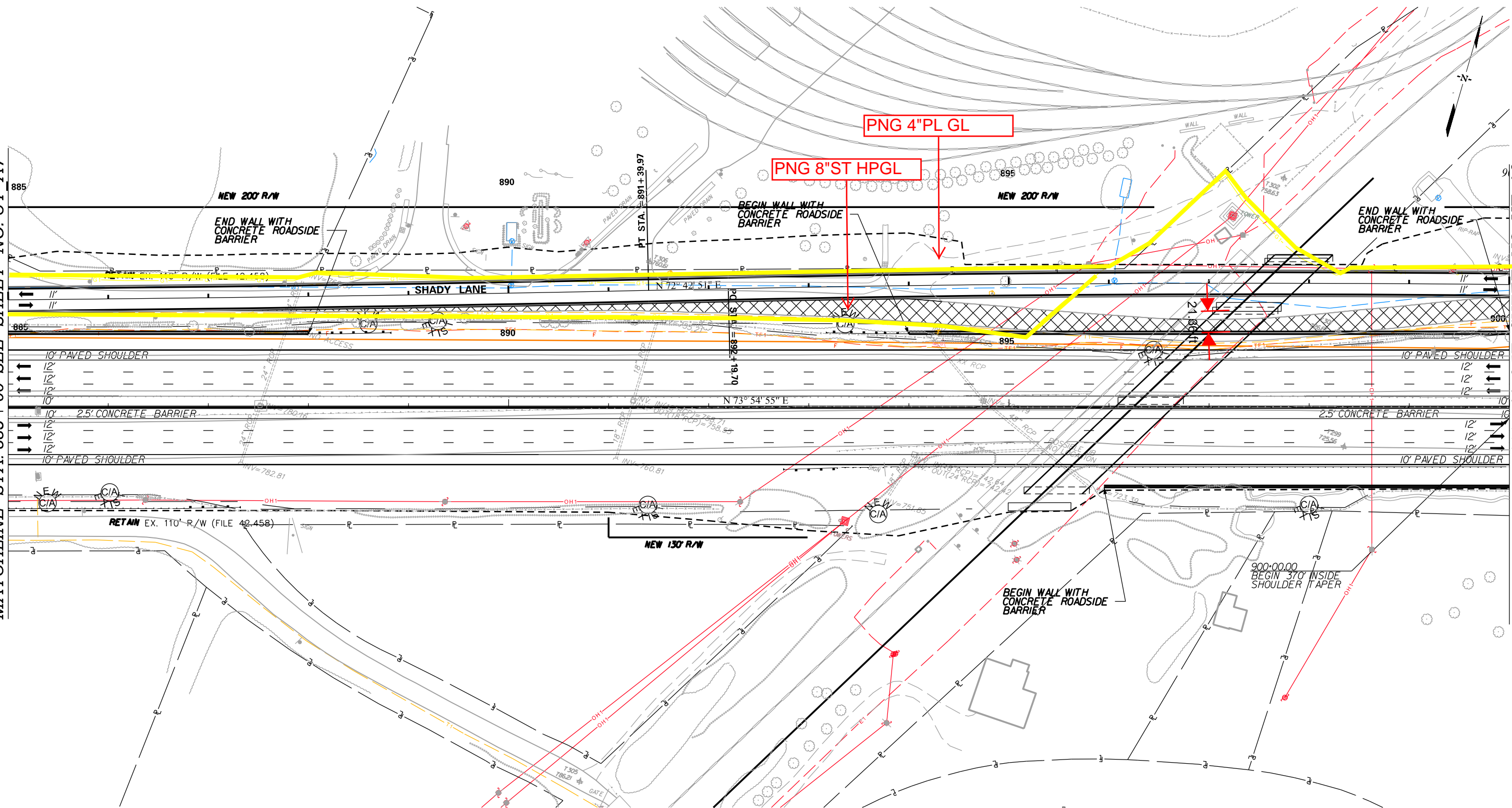
Notice to Proceed: 30 Days

Estimated Time to Relocate: 3 to 6 months after proposed new SCDOT ROW is acquired

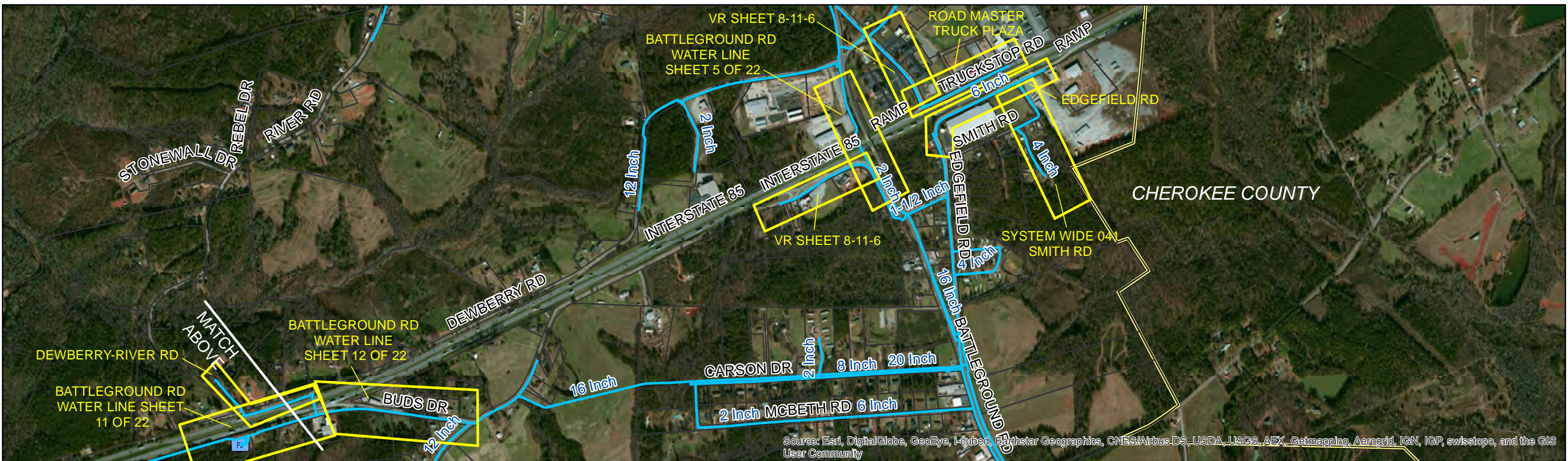
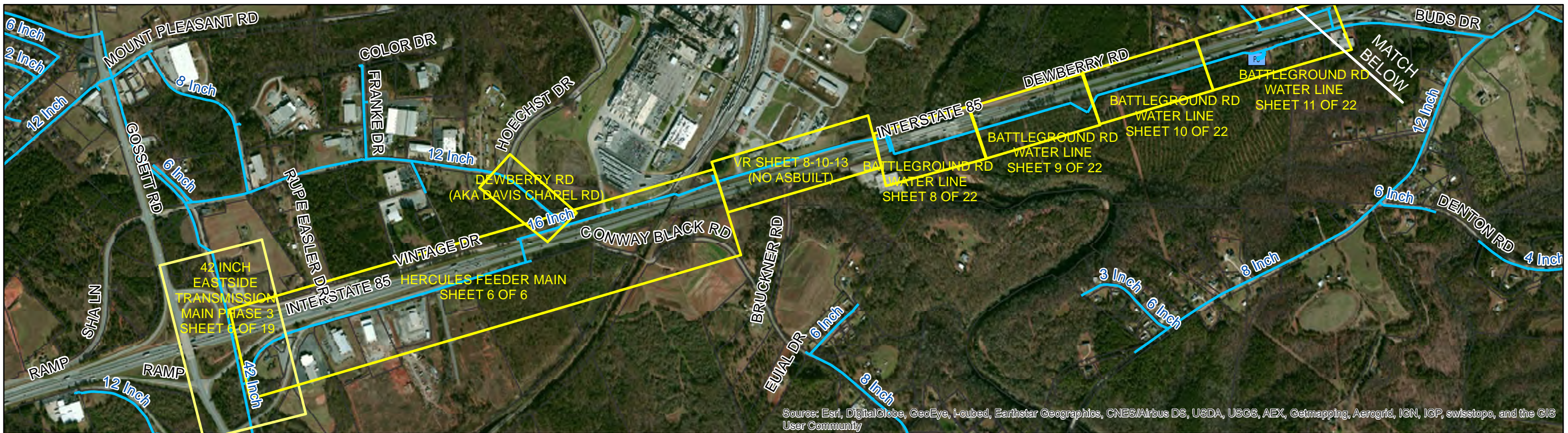
In-Contract Work: YES

MATCHLINE STA. 885 + 00 SEE SHEET NO. UT A7

MATCHLINE STA. 900 + 00 SEE SHEET NO. UT A9



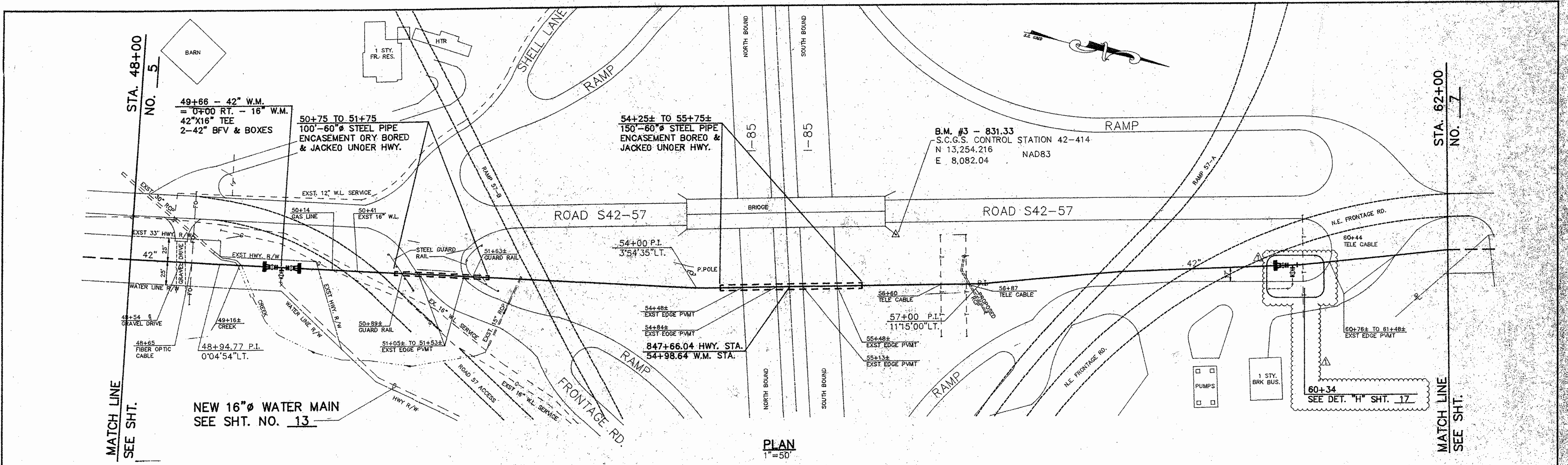
<p>PRELIMINARY NOT FOR CONSTRUCTION</p> <p>SCALE: 1" = 50'</p>	7				<p>SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION INTERSTATE 85</p> <p>UTILITY PLAN SHEET</p> <p>INTERSTATE 85 MILE MARKER 80-96 SEGMENT A</p>
	6				
	5				
4					
3					
2					
1					
REV. NO.	BY	DATE	DESCRIPTION OF REVISION		



I-85 WIDENING PROJECT WATER ASBUILT REFERENCE

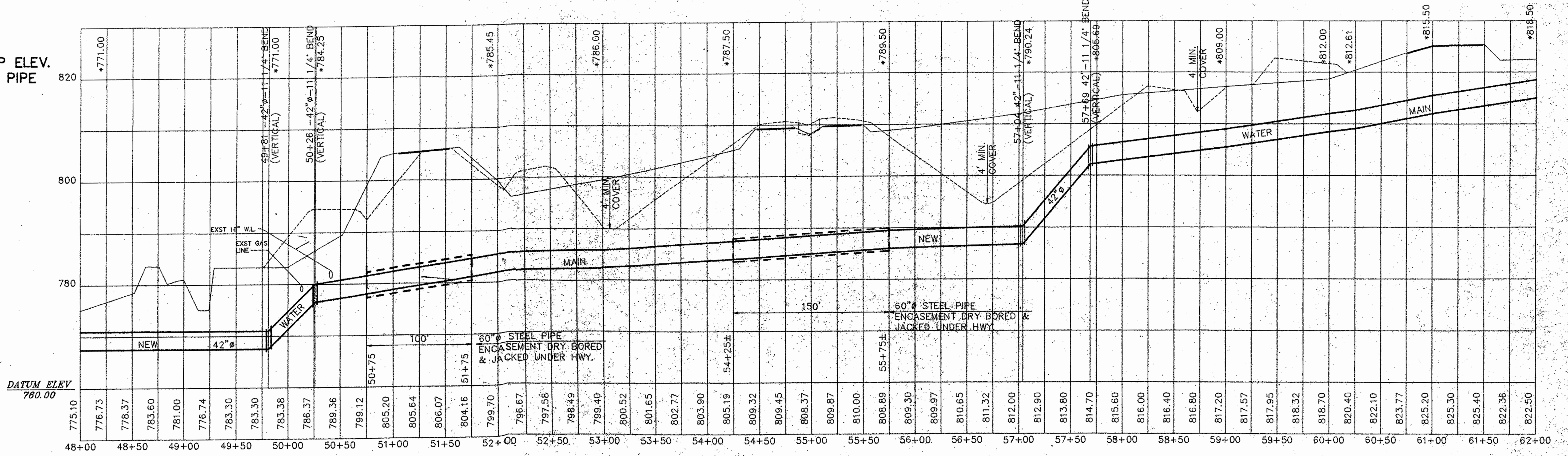
1 inch = 1,000 feet





PLAN
1"=50'

* TOP ELEV. OF PIPE



PROFILE
1"=50' HORIZ.
1"=10' VERT.

RECORD DRAWING

This drawing has been revised to show all known changes made during construction and is based on the marked-up drawings furnished to us by the contractor.

Hayes, Seay, Mattern, Mattern, Inc.
Date 08-25-94 By DNF

DRAWINGS PREPARED BY:
HAYES, SEAY, MATTERN & MATTERN, INC.
ARCHITECTS • ENGINEERS • PLANNERS
SPARTANBURG, SOUTH CAROLINA

NO.	BY	DATE	REVISIONS
1	DNF	08-25-94	RECORD DRAWING
2	DMW	11-12-92	ISSUED FOR CONSTRUCTION
3	DMW	7-27-92	ISSUED FOR BID
4	DMW	7-27-92	ISSUED FOR SCDHEC REVIEW
5	DMW	7-21-92	ISSUED FOR S.W.S. FINAL REVIEW
6	DMW	7-2-92	ISSUED FOR S.W.S. REVIEW

SPARTANBURG WATER SYSTEM
ENGINEERING DEPARTMENT

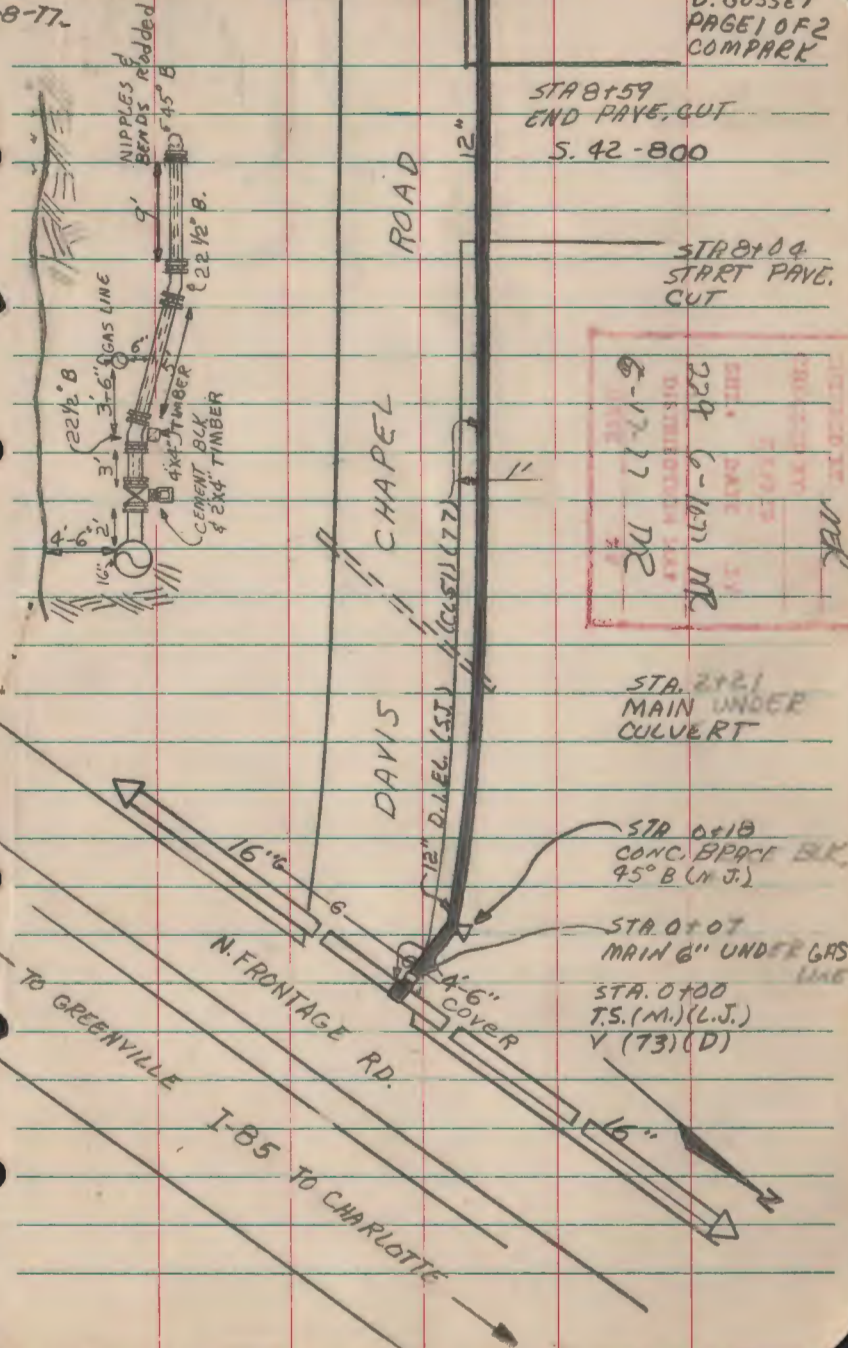
EASTSIDE TRANSMISSION MAIN
PHASE III - S.C. HIGHWAY 57

JOB NO. 95-7000-670	DR. BY: D.M.WYLIE
FILE NO. 4711-4.0WG	CHK. BY: R.D.WELLS
DATE: JULY 1992	SHEET
SCALE: AS NOTED	6 OF 19

MRB
6-8-77.

CONT'D PG. 2

W. WORKS
B. GOSSET
PAGE 1 OF 2
COMPARK



STA 8+59
END PAVE. CUT
S. 42-800

STA 8+04
START PAVE.
CUT

6-17-77 MR

229 (6-17-77) MR

MR

STA 2+21
MAIN UNDER
CULVERT

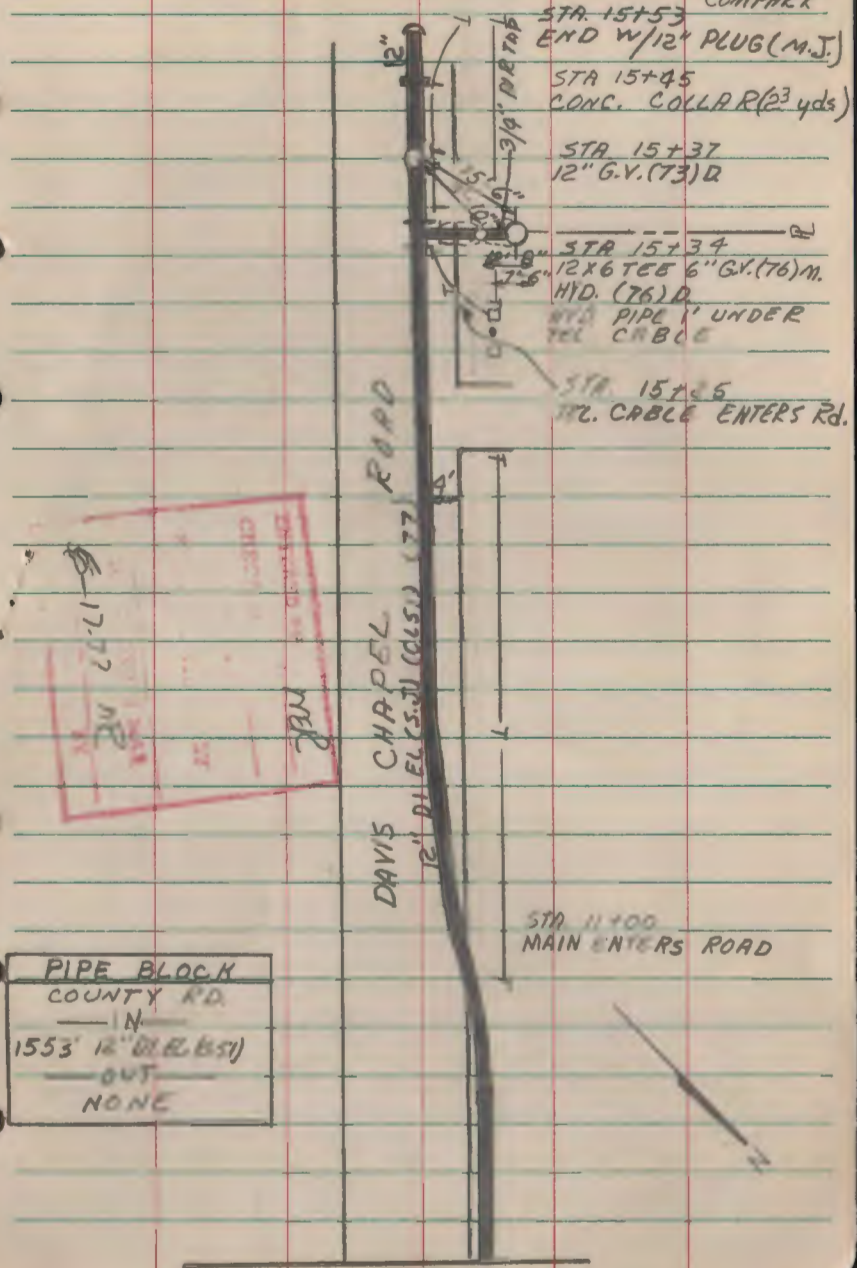
STA 0+18
CONC. BRIDGE BLK.
95' B (M.J.)

STA 0+07
MAIN 6" UNDER GAS
LINE

STA. 0+00
T.S. (M.) (L.J.)
V (73) (D)

MRB
6-8-77.

W. WORKS
B. GOSSET
PAGE 2 OF 2
COMPARK



STA 15+53
END W/12" PLUG (M.J.)

STA 15+45
CONC. COLLAR (23 yds)

STA 15+37
12" G.V. (73) D

STA 15+34
12X6 T&B 6" G.V. (76) M.
HYD. (76) D.
HYD. PIPE 1" UNDER
TEL. CABLE

STA 15+25
TEL. CABLE ENTERS RD.

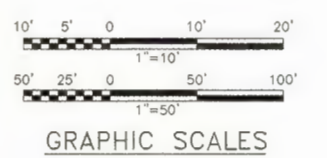
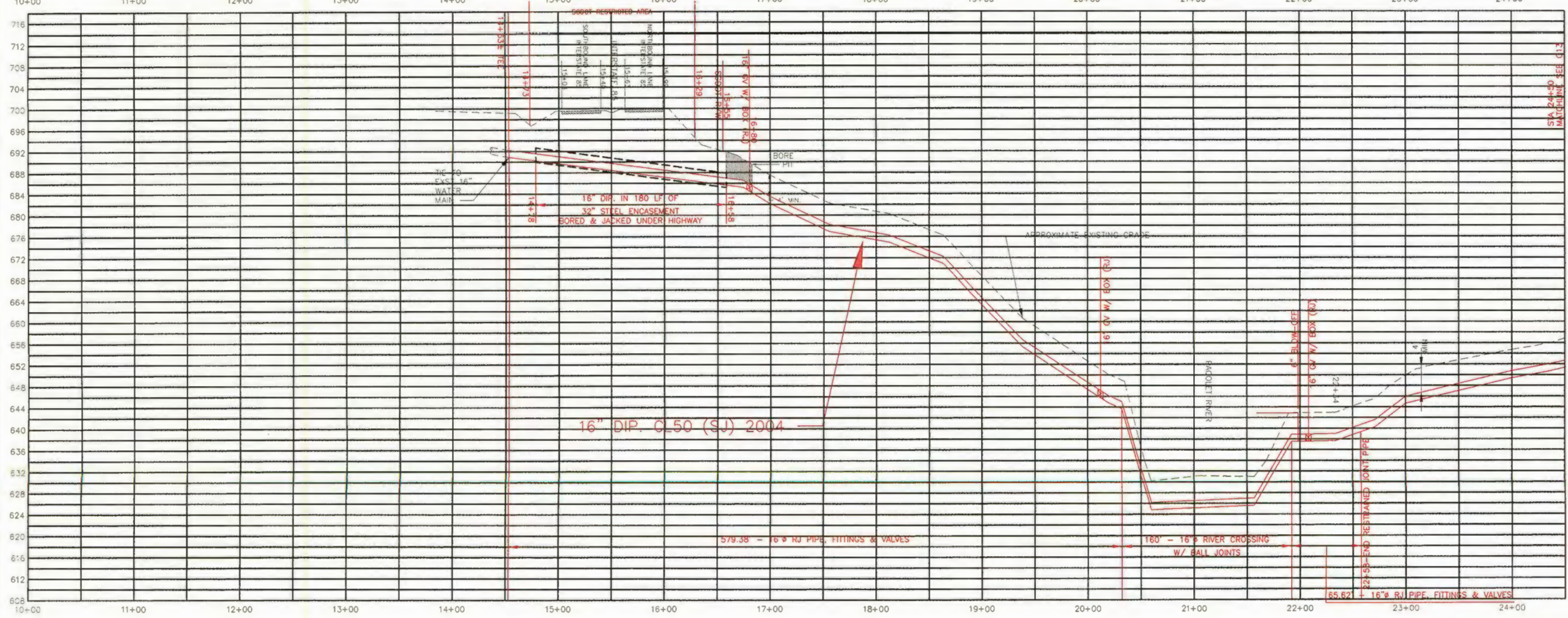
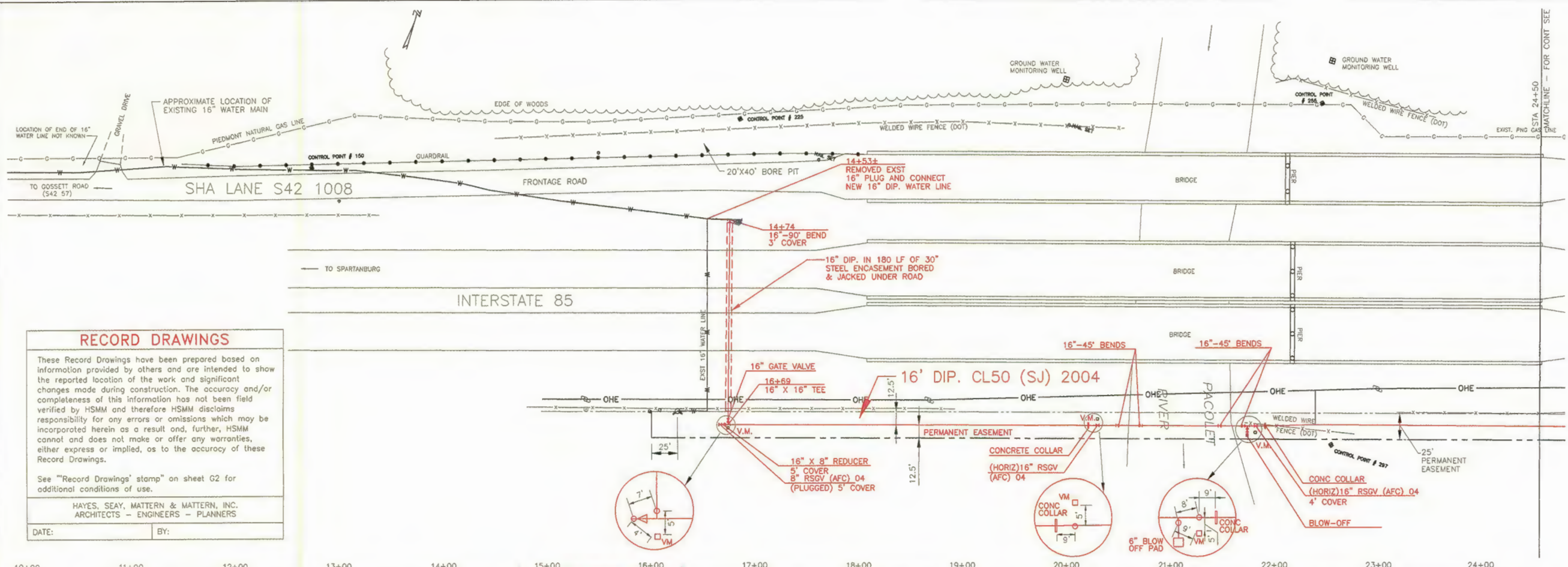
6-17-77 MR

MR

STA 11+00
MAIN ENTERS ROAD

PIPE BLOCK
COUNTY R.D.
N
1553' 12" (BLK. BS1)
OUT
NONE

CONT'D. PG. 1



NEW 16" WATER MAIN
10+00 TO 24+50

DMW

JCT
DJD

ASBUILT
SHEET C12

SOUTH BOUND
TO GREENVILLE, S.C. ←

NORTH BOUND
TO CHARLOTTE, N.C. →

39+98
(1) 16" 45° BEND (RJ)
N 65644.84
E 47194.22

41+87
EXIST. GAS LINE
GO UNDER

8" PIEDMONT NATURAL GAS LINE

16" DIP. 6" RSGV (AFC) 04

STA 39+00
MATCHLINE - FOR CONT SEE SH C13

RECORD DRAWINGS

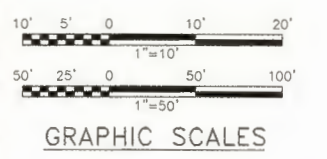
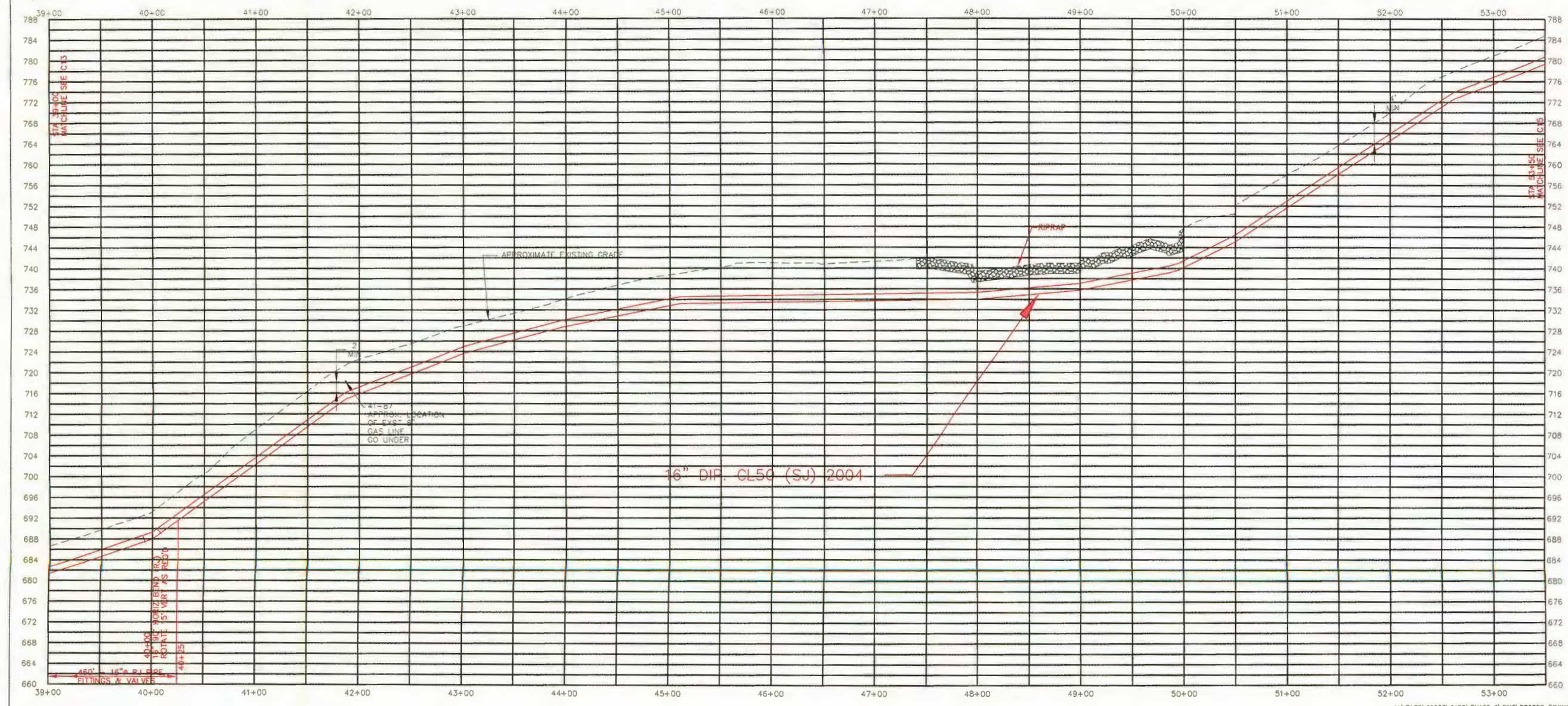
These Record Drawings have been prepared based on information provided by others and are intended to show the reported location of the work and significant changes made during construction. The accuracy and/or completeness of this information has not been field verified by HSMM and therefore HSMM disclaims responsibility for any errors or omissions which may be incorporated herein as a result and, further, HSMM cannot and does not make or offer any warranties, either express or implied, as to the accuracy of these Record Drawings.

See "Record Drawings" stamp on sheet G2 for additional conditions of use.

HAYES, SEAY, MATTERN & MATTERN, INC.
ARCHITECTS - ENGINEERS - PLANNERS

DATE: BY:

16" DIP. CL50 (SJ) 2004



NEW 16" WATER MAIN
39+00 TO 53+00

DMW JCT
DJD

ASBUILT
SHEET C14

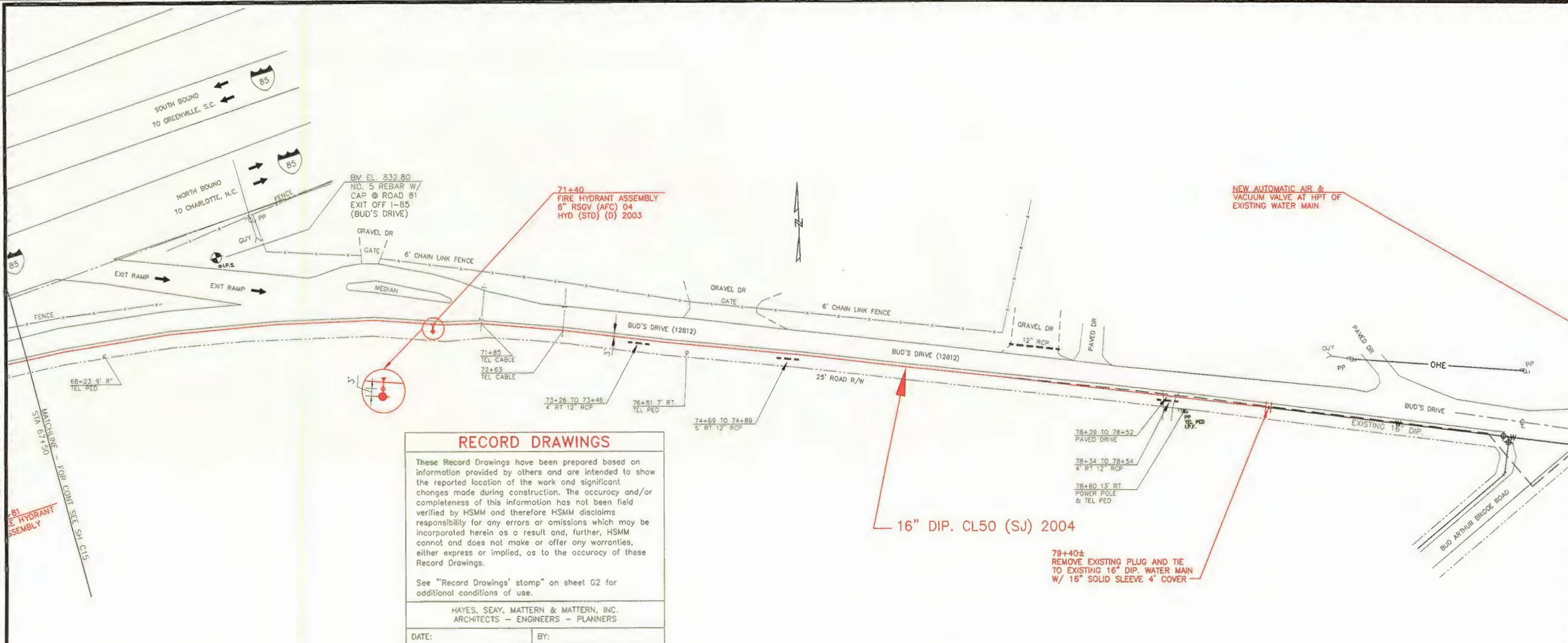


ENGINEERING DEPARTMENT

HSMM

ARCHITECTS ENGINEERS PLANNERS
HAYES, SEAY, MATTERN & MATTERN, INC.
145 NORTH CHURCH STREET
SPARTANBURG, SC 29306
(864) 585-0185 WWW.HSMM.COM

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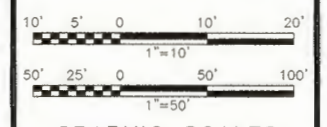
RECORD DRAWINGS

These Record Drawings have been prepared based on information provided by others and are intended to show the reported location of the work and significant changes made during construction. The accuracy and/or completeness of this information has not been field verified by HSMM and therefore HSMM disclaims responsibility for any errors or omissions which may be incorporated herein as a result and, further, HSMM cannot and does not make or offer any warranties, either express or implied, as to the accuracy of these Record Drawings.

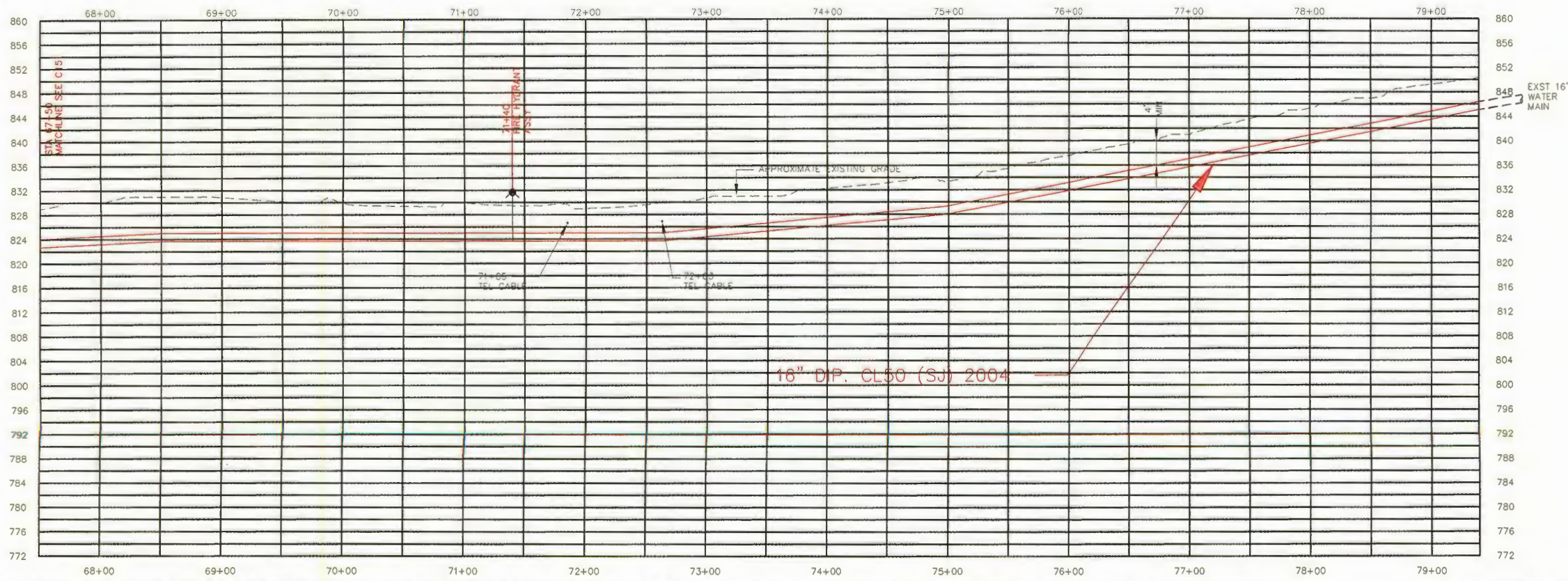
See "Record Drawings" stamp on sheet G2 for additional conditions of use.

HAYES, SEAY, MATTERN & MATTERN, INC.
ARCHITECTS - ENGINEERS - PLANNERS

DATE: _____ BY: _____



GRAPHIC SCALES



Project:
**BATTLEGROUND ROAD AREA
WATER SYSTEM
IMPROVEMENTS**

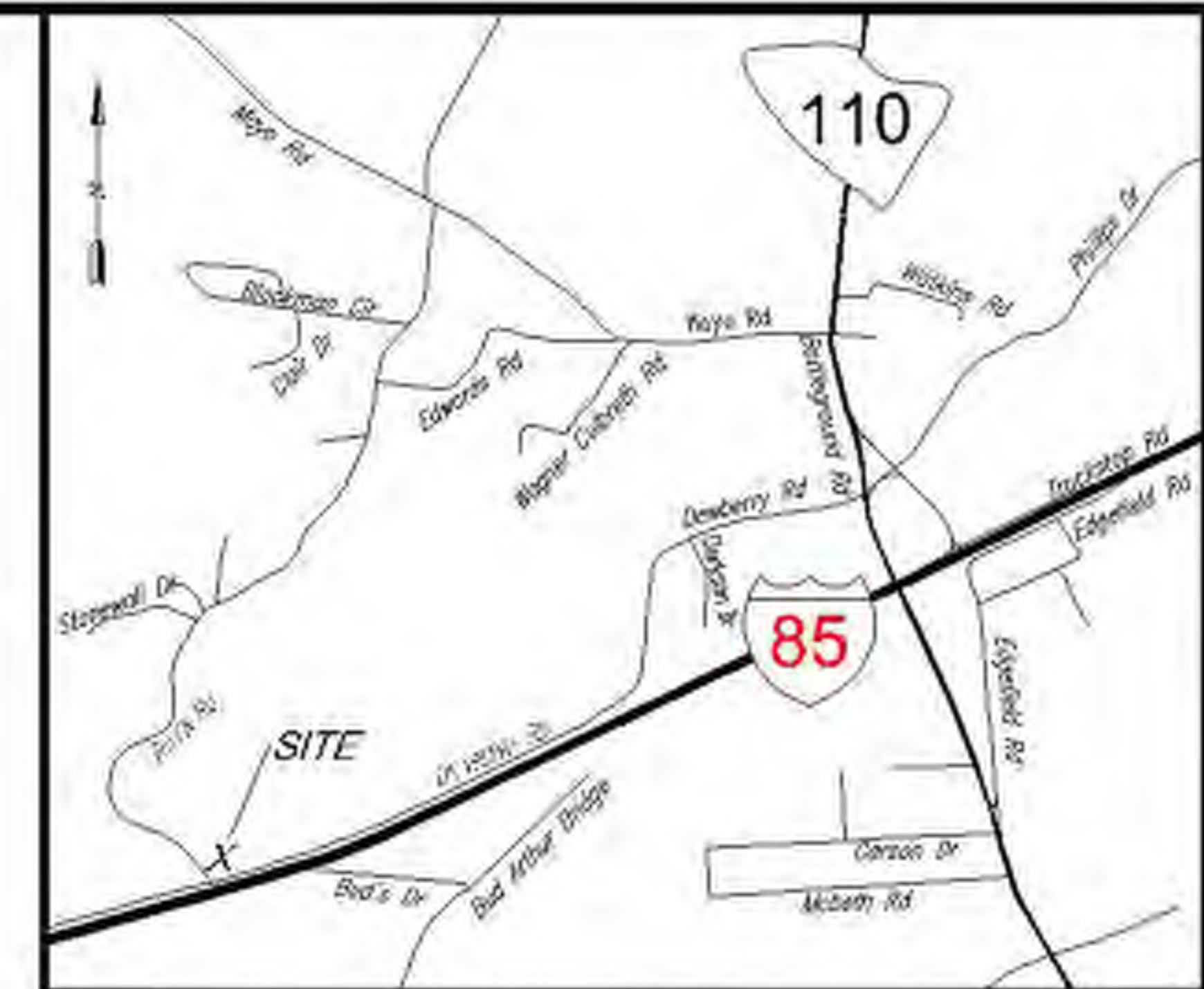
Sheet Title: DIVISION I
**NEW 16" WATER MAIN
67+50 TO 79+40±**

SPARTANBURG WATER SYSTEM
AND
SPARTANBURG SANITARY
SEWER DISTRICT

Date: MAY 2003 Approved By: JCT

Drawn By: DMW Checked By: D.D

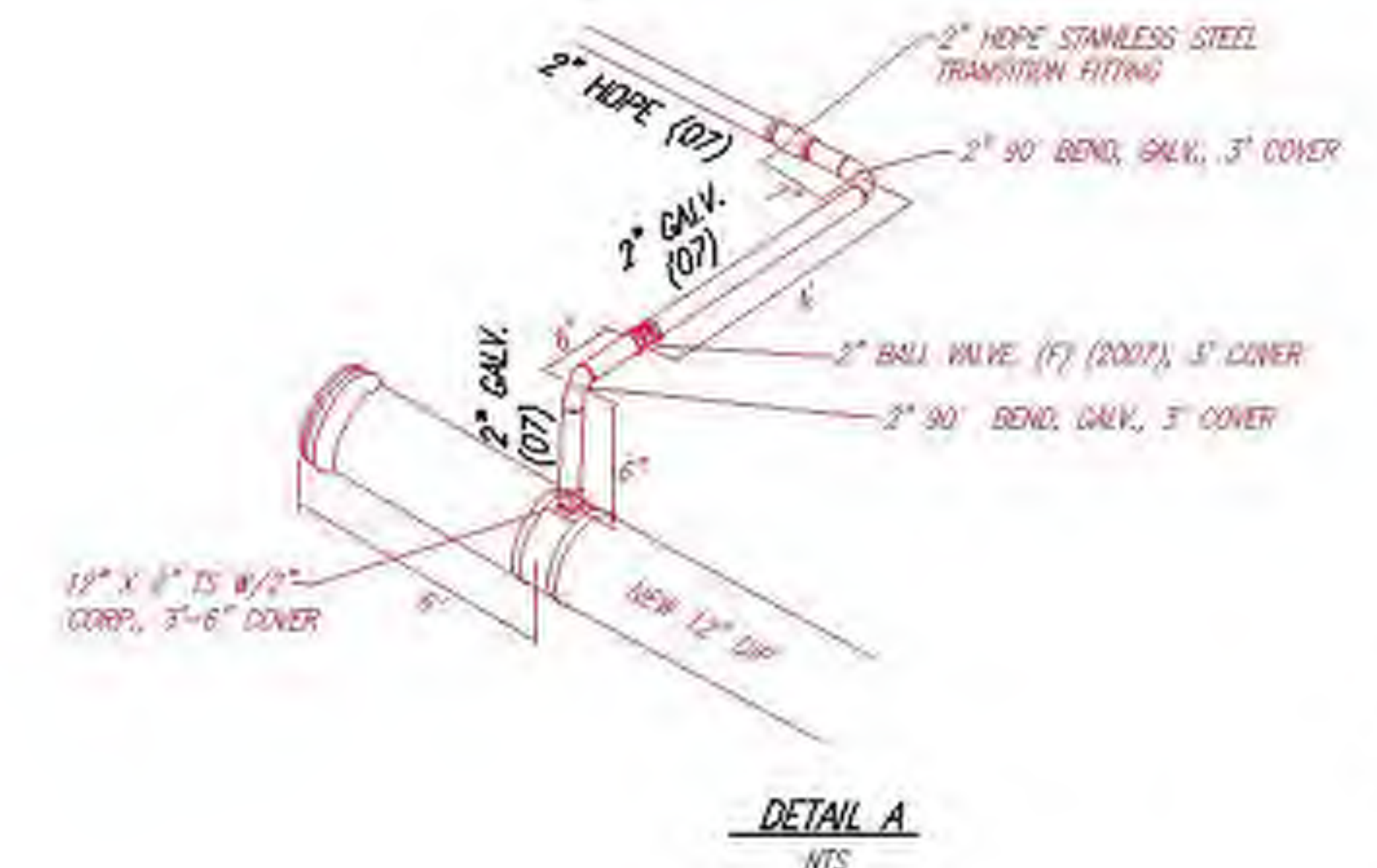
Job # _____
Sheet No: **ASBUILT**
SHEET C16



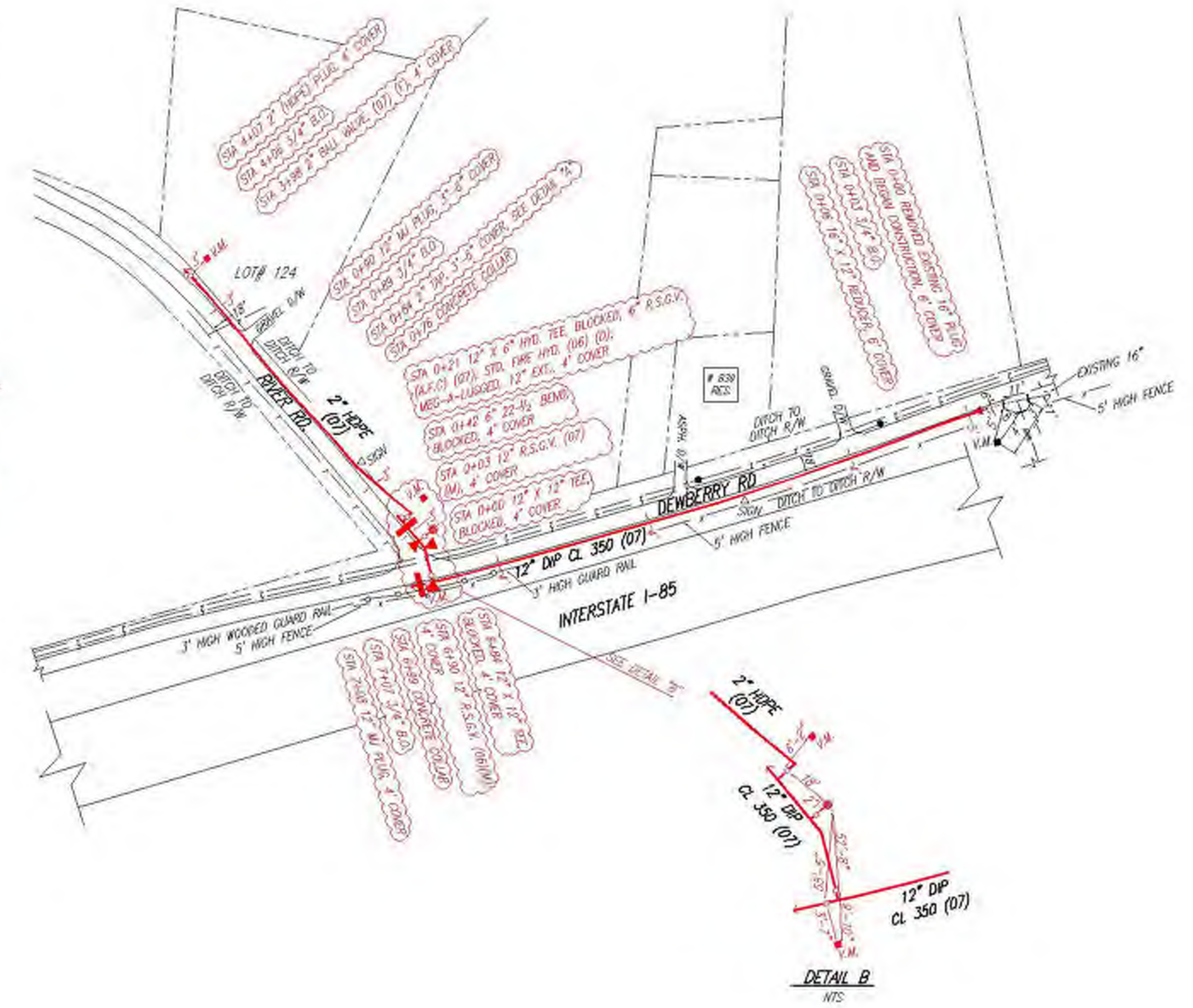
LOCATION MAP
NTS

LEGEND

- NEW FIRE HYDRANT
- NEW VALVE
- NEW PUMP
- NEW REDUCER
- NEW CONCRETE COLLAR
- NEW CONCRETE THROTTLE RESTRAINT
- EXISTING FIRE HYDRANT
- EXISTING FIRE SERVICE
- EXISTING VALVE
- EXISTING PUMP
- MILEAGE
- UTILITY POLE
- EXISTING WATER METER
- EXISTING WASTE MANHOLE
- EXISTING PEDESTAL
- EXISTING SIGN
- GAS VALVE
- EXISTING SERVICE VEHICLE
- WELL
- DRAINAGE
- HOUSE
- STORM DRAIN
- NEW WATER LINE
- EXISTING SAS LINE
- GAS LINE
- SEWER FORCE LINE
- SEWER GRAVITY LINE
- TELEPHONE LINE
- POWER LINE
- FIBER OPTIC LINE
- CABLE TV
- FENCE



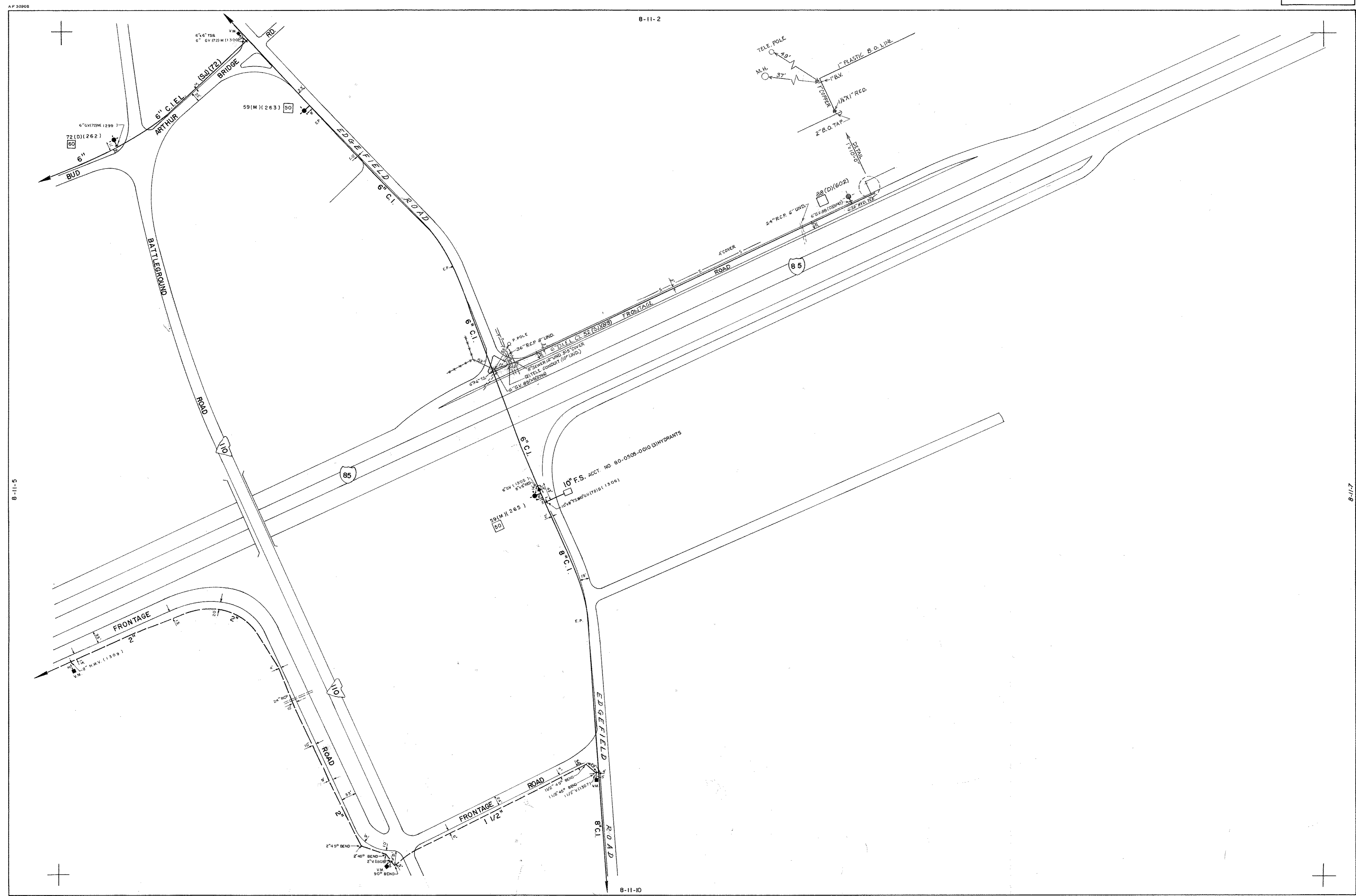
DETAIL A
NTS



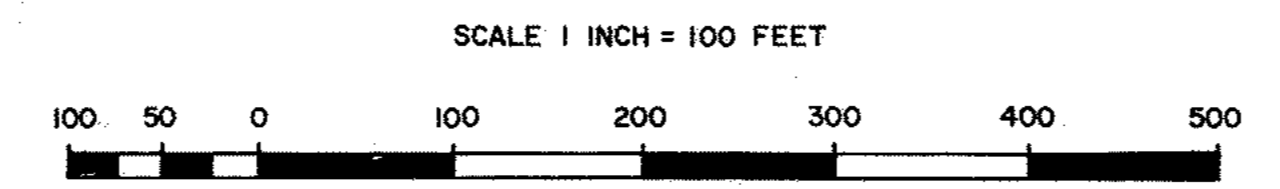
DETAIL B
NTS

CONTRACTOR: SWS - GRANT ALLEN
 DEVELOPER: N/A
 DATE STARTED: 7/5/07
 DATE COMPLETED: 8/15/07
 DATE SAMPLE TAKEN: X
 DATE SAMPLE APPROVED: X
 DATE VALVE TURNED ON: X
 INSPECTOR: DAVID JAMES
 GRID NUMBER(S): 2146
 ASBUILT

REFERENCES 2146			DEWBERRY - RIVER ROAD ENGINEERING DEPARTMENT
T	ISSUED FOR RECORD		
NO.	DATE	REVISION	SHEET 1 of 1

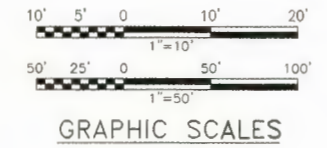
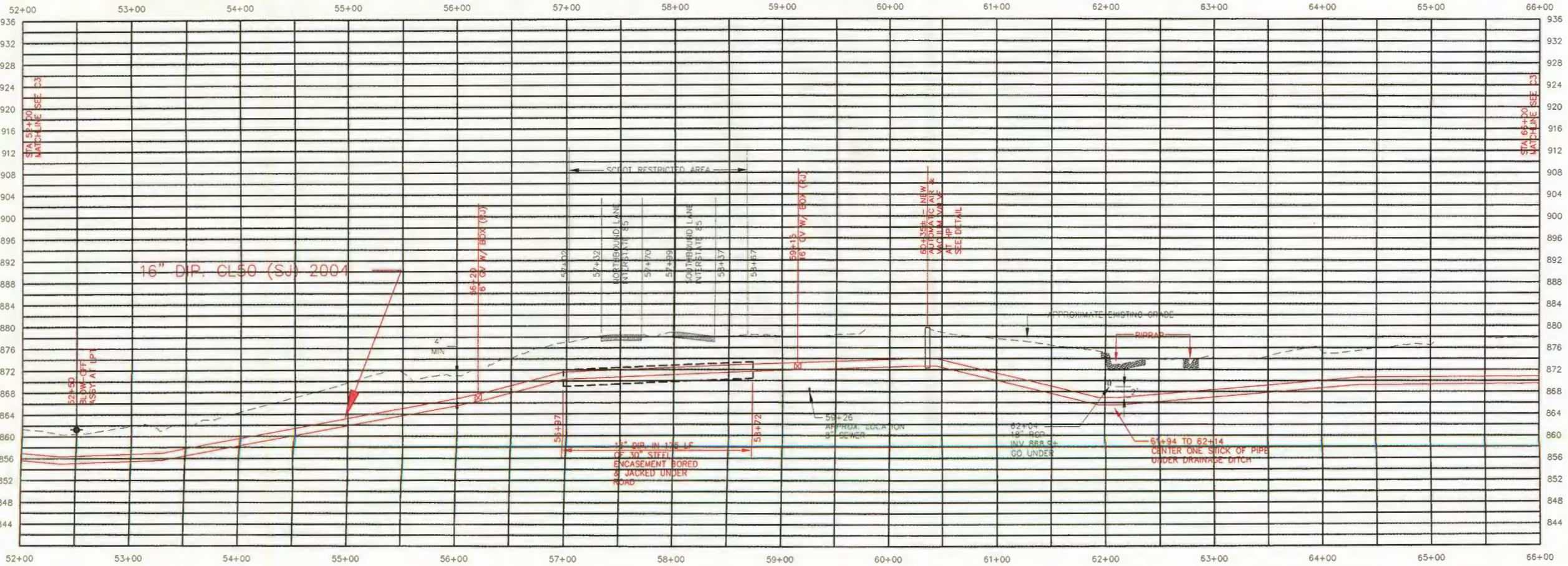
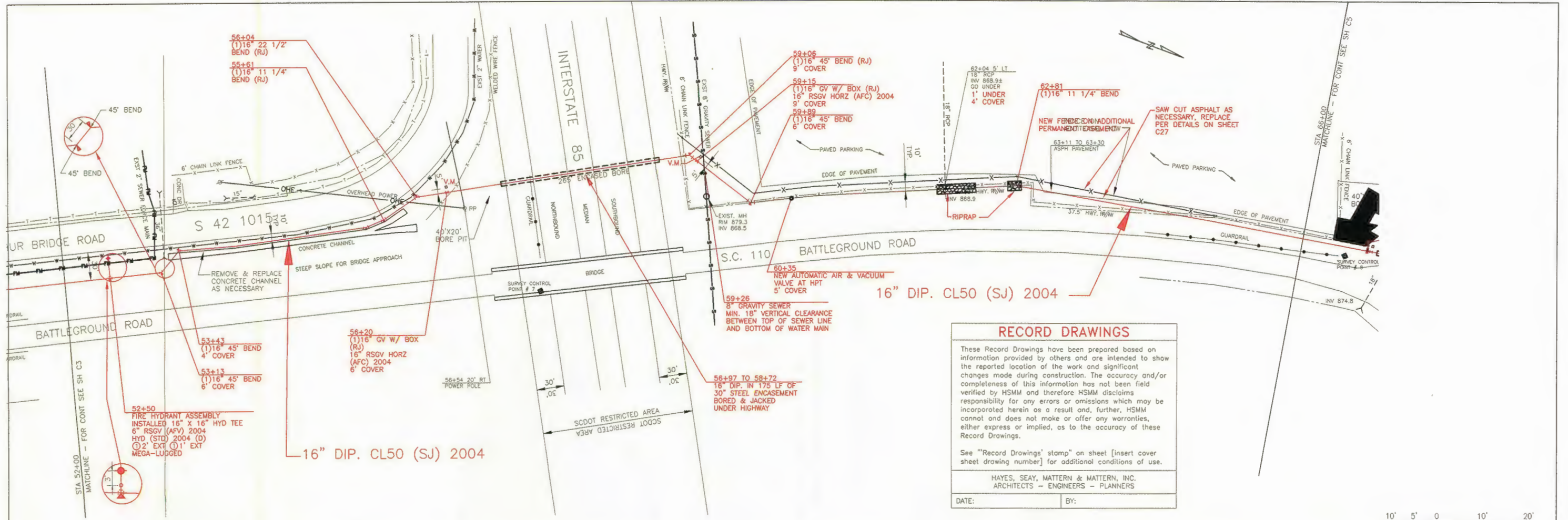


BLOCK MAP SHEET REFERENCE NO.	INSIDE CITY	OUTSIDE CITY
3-7		
	PRESSURE ZONE	
	COWPENS	



SPARTANBURG WATER WORKS

SHEET NO. 8-11-6



**NEW 16" WATER MAIN
52+00 TO 66+00**

DMW

**ASBUILT
SHEET C4**

JCT
DJD

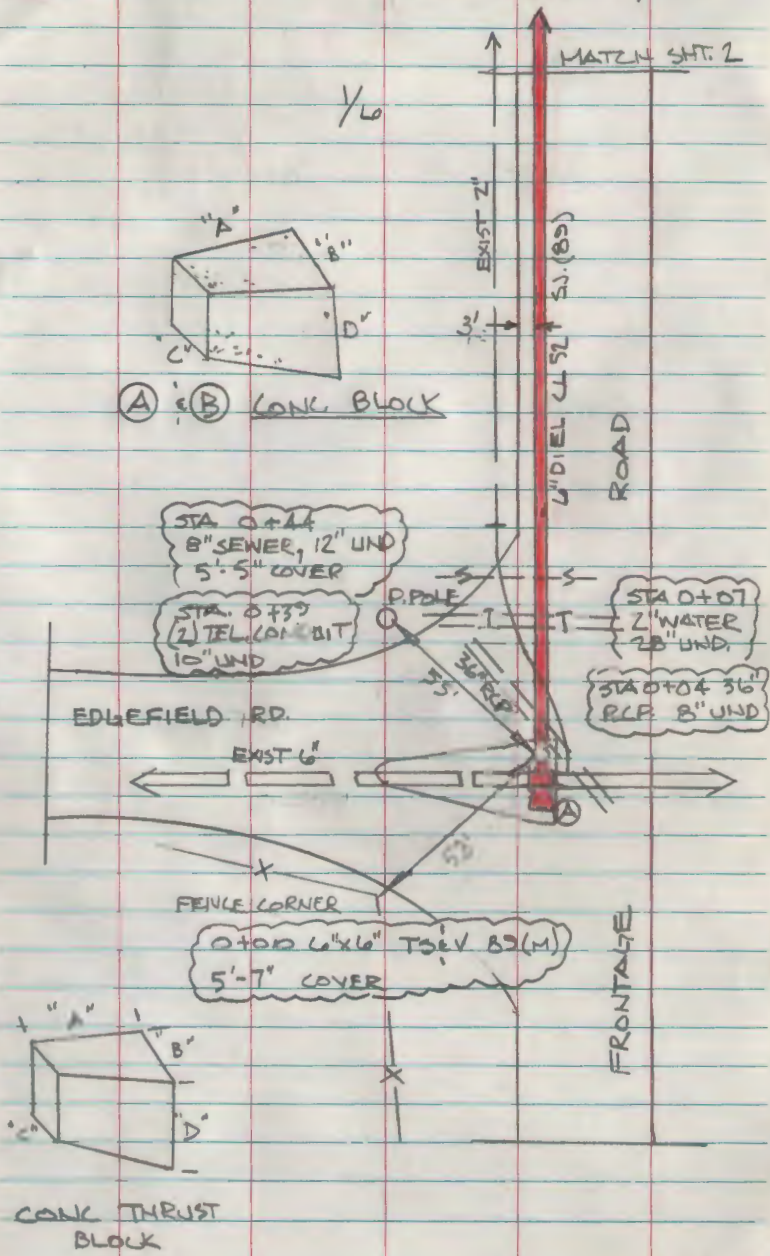
(9)

JOB NAME: ROAD MASTER
 TRUCK PLAZA (I-85, FRONTAGE)
 JOB NO: 890403-567
 FILE NO: I-20
 CONTRACTOR: J. Fowler
 DEVELOPER: SNS
 DATE STARTED: 7-14-89
 DATE COMPLETED: 7-24-89
 DATE SAMPLE TAKEN: 8-3-89
 DATE SAMPLE APPROVED: 8-4-89
 DATE VALVE TURNED ON: 8-7-89
 INSPECTOR: J. Fowler
 VALVE RECORD SHEET: 8-11-89
 NO. OF PAGES: 6

V.T

P. BRYANT
7-14-89
SUNNY, 90°

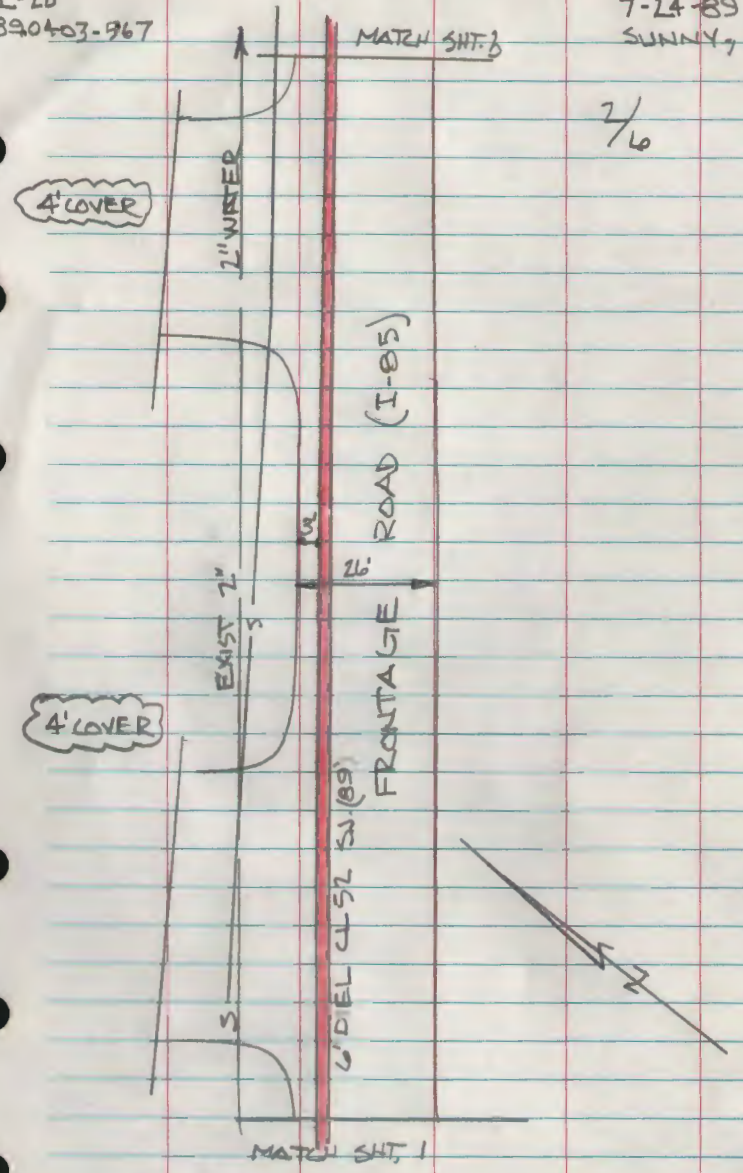
1/6



J.F.
I-20
890403-967

P. BRYANT
7-24-89
SUNNY, 90°

2/6

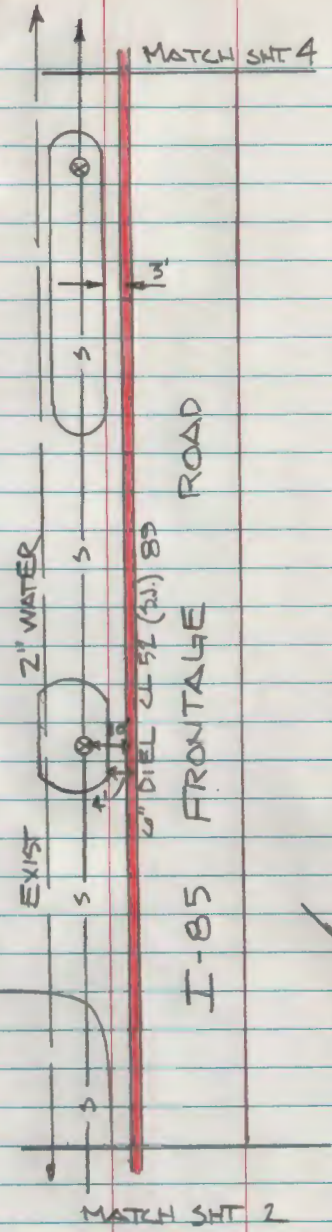


J.F.
I-20
890403-567

P.BRYANT
7-24-89
SUNNY, 90°

STA 6+23
SMH.

3/6



STA. 4+11
SMH

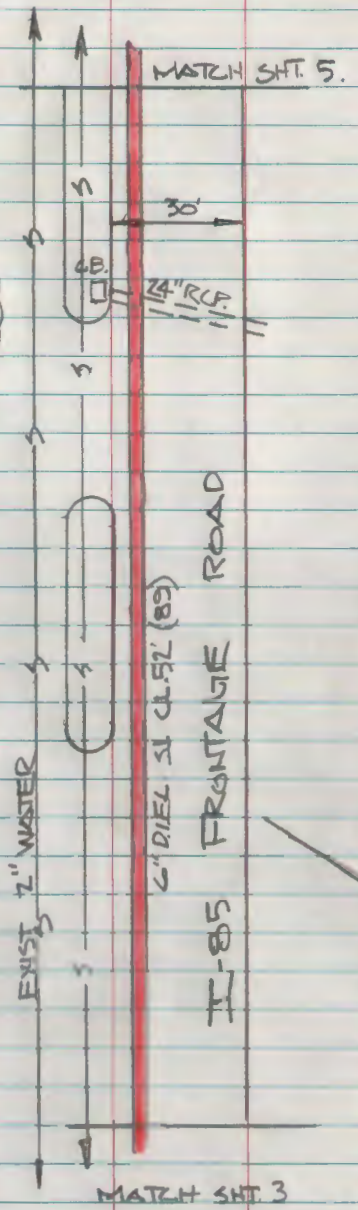
MATCH SHT 2

J.F.
I-20
890403-567

P.BRYANT
7-24-89
SUNNY, 90°

STA 8+11
24\"/>

4/6



4' LOWER

MATCH SHT 3

J.F.
I-20
890403-567

P.BRYANT
7-24-89
SUNNY, 90°

5/6

STA 10+10 END
W/ 6\"/>

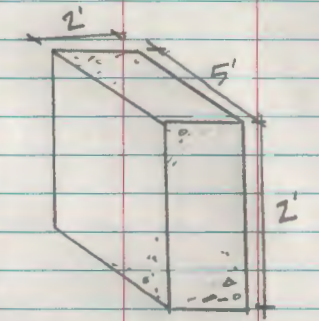
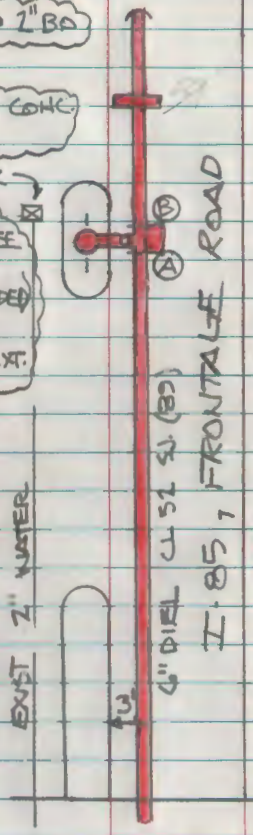
STA 10+09 2\"/>

STA 10+01 CONC.
COLLAR

EXIST METER

STA 9+51
6\"/>

4' LOWER



(A) CONC. COLLAR

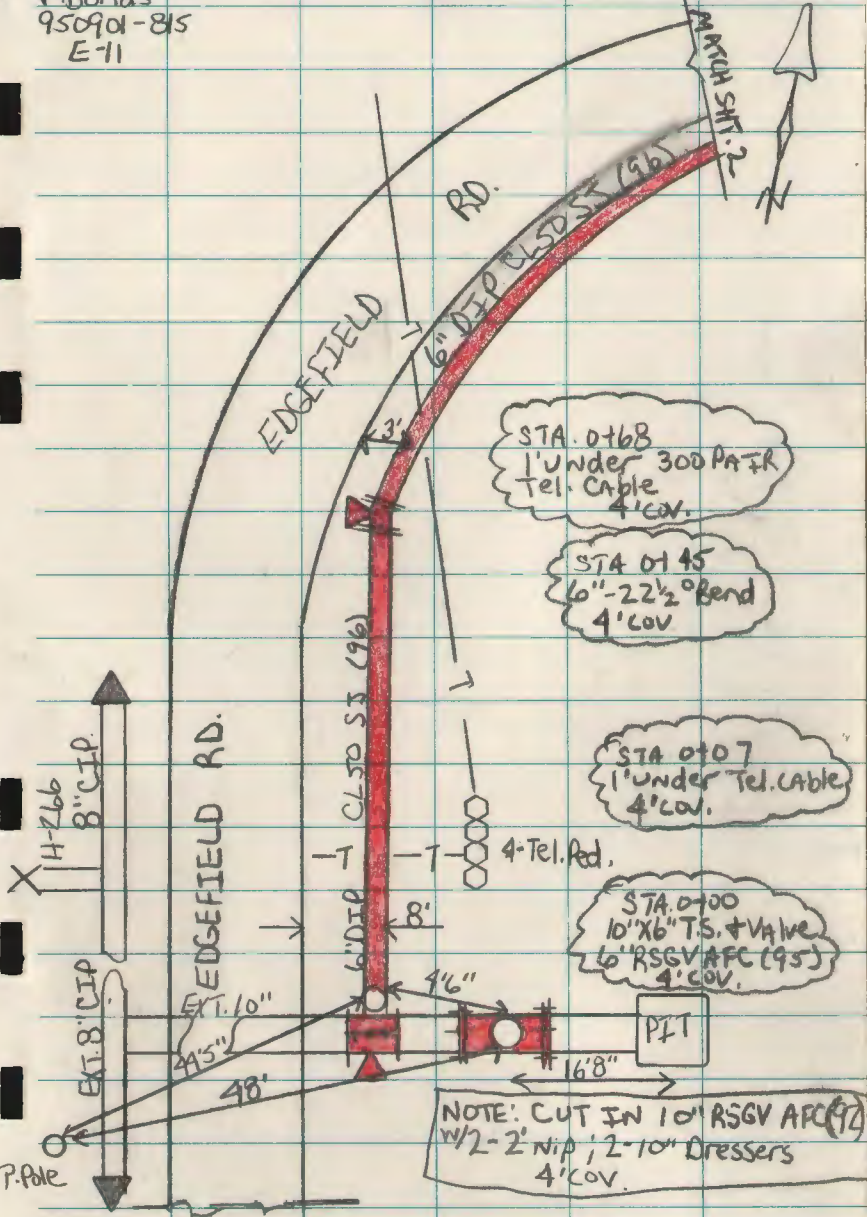
MATCH SHT 2

MATCH SHT 3

V. Bonds
950901-815
E-11

1/4

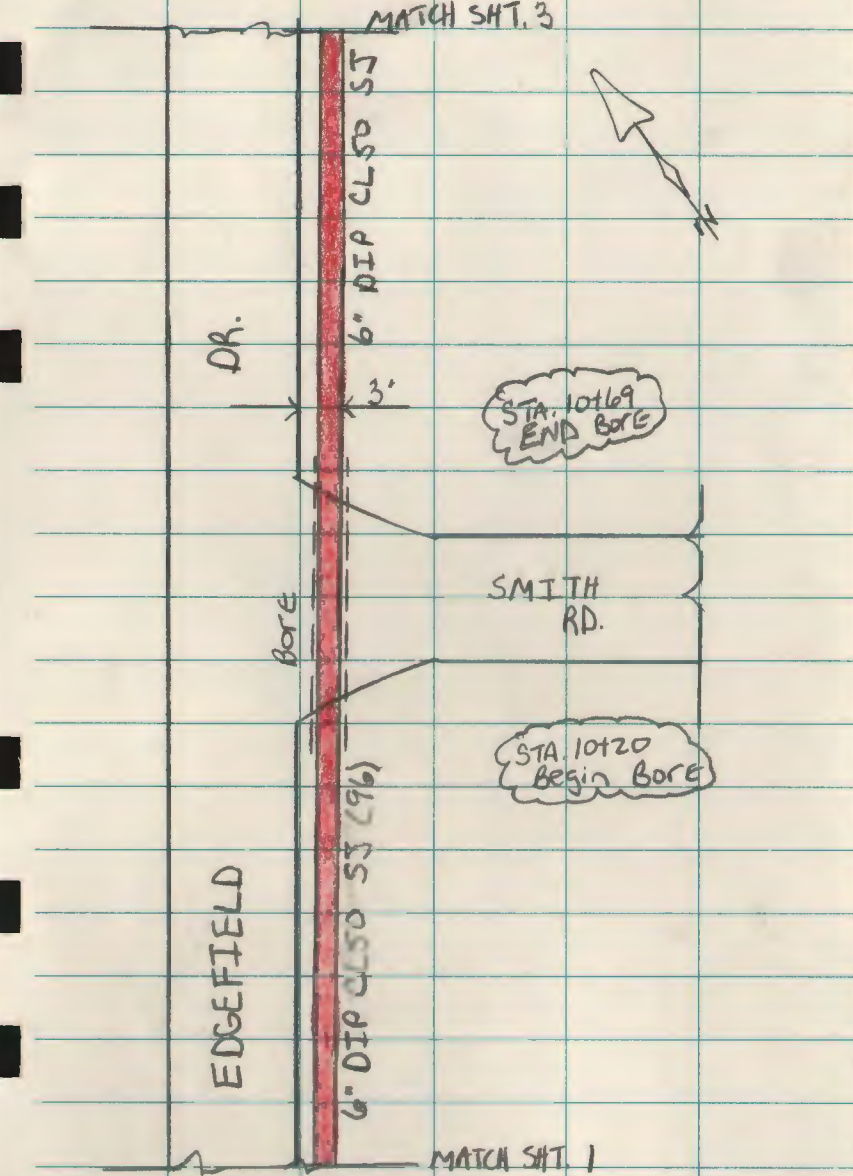
RICK JONES
S.W.S.
3-11-96



V. Bonds
950901-815
E-11

2/4

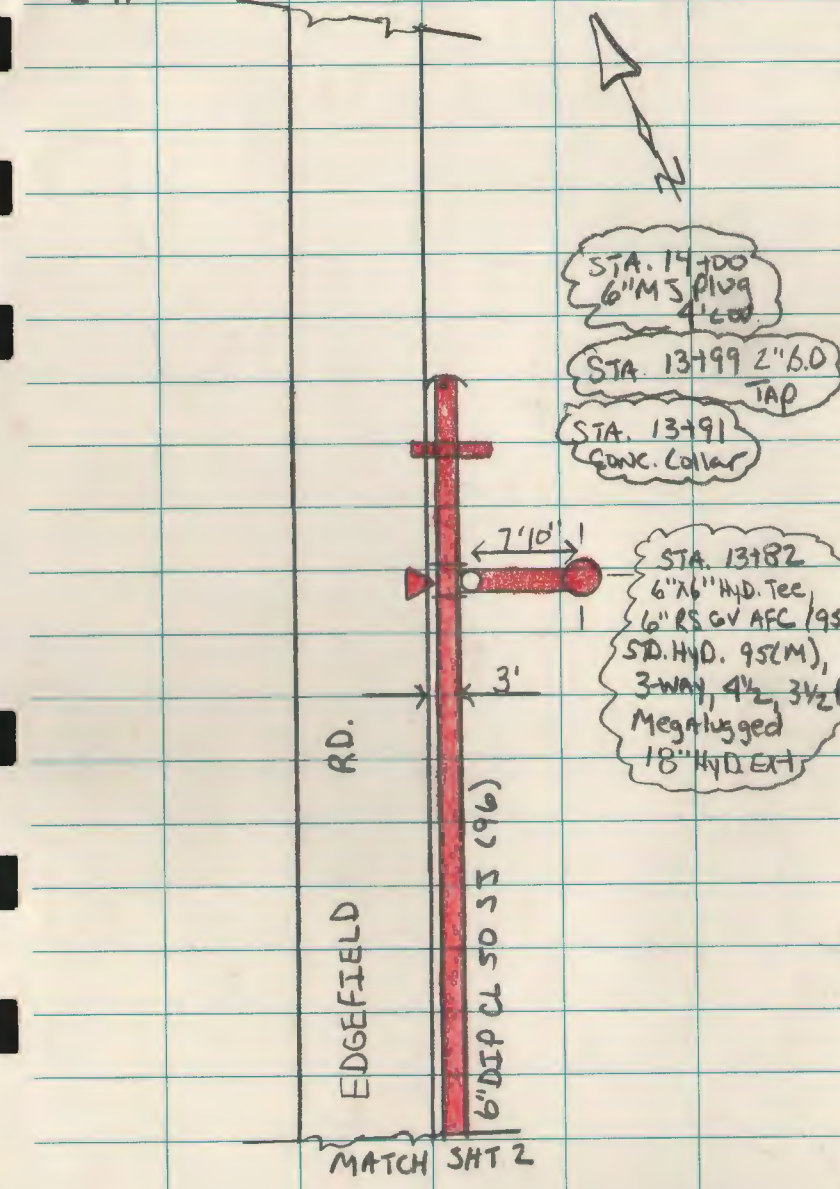
RICK JONES
S.W.S.
3-11-96

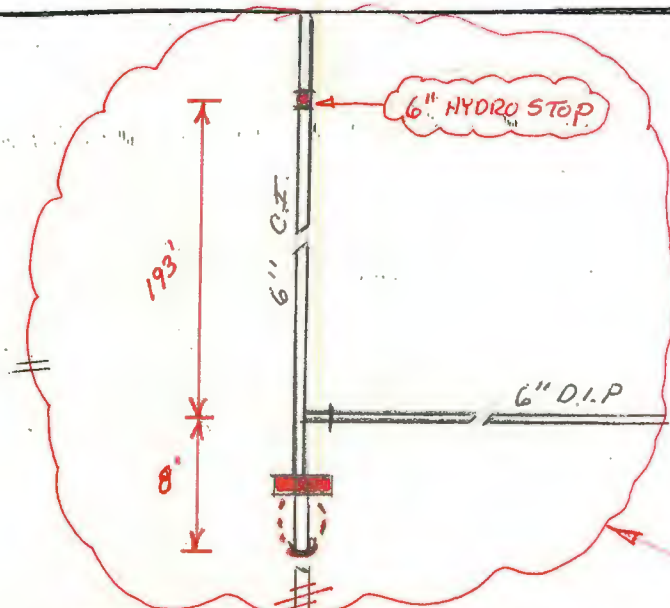


V. Bonds
950901-815
E-11

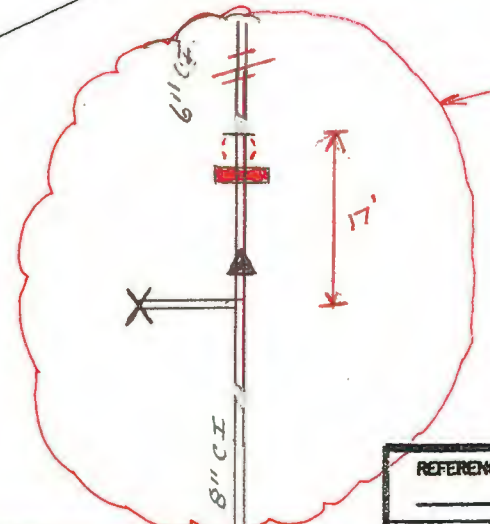
3/4

RICK JONES
S.W.S.
3-11-96

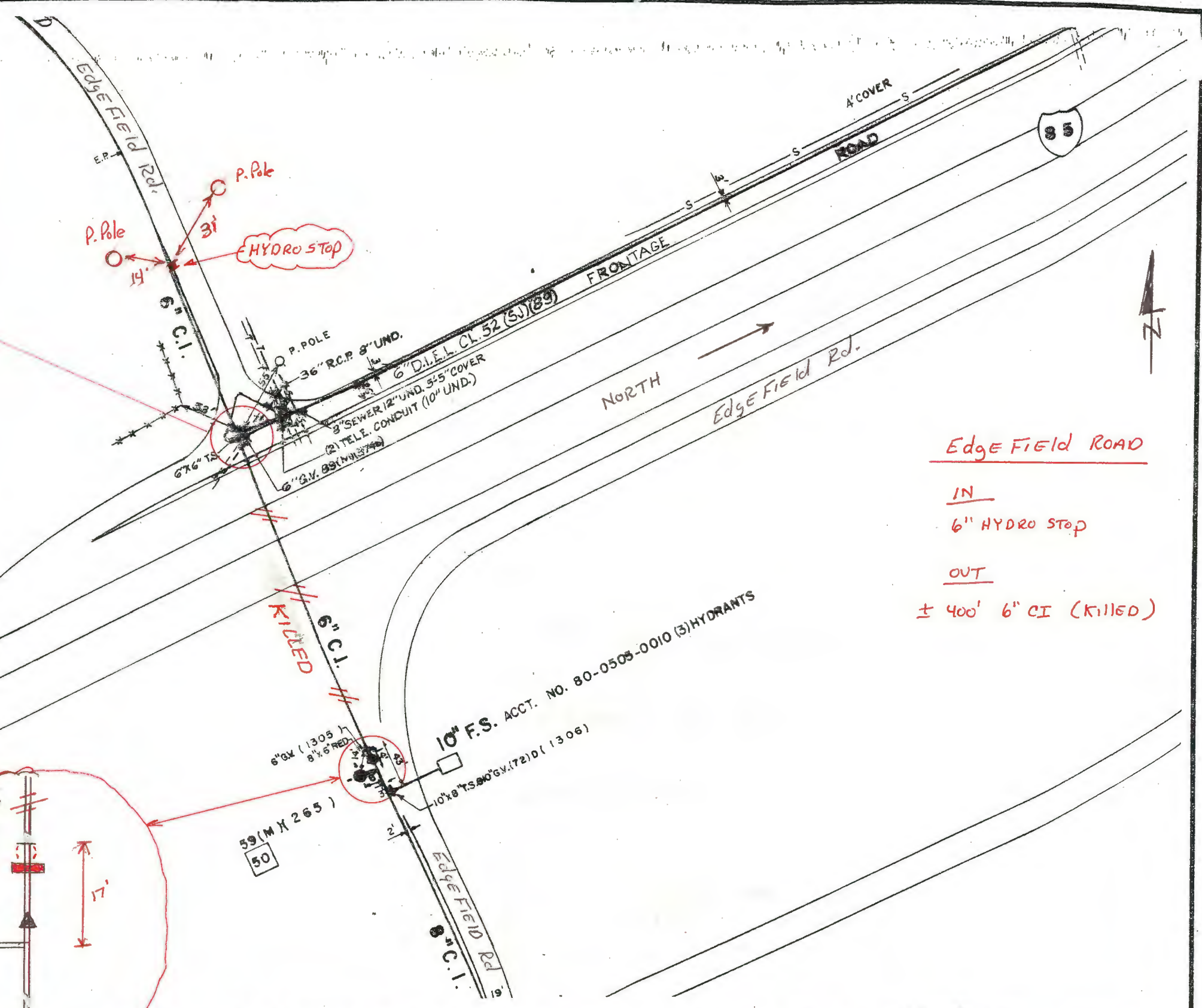




1-10-05
 SWS - UNIT #615 - GRANT A.
 CUT EXIST 6" MAIN. INSTALLED
 6" CAP PLUG AND ROLLED TO
 COLLAR. 4' COVER



1-12-05 SWS - #615 - GRANT A.
 CUT EXIST 6" MAIN. PLUGGED
 EXIST 6" VALVE AND ROLLED
 TO COLLAR. 4' COVER



Edgefield Road
IN
 6" HYDRO STOP
OUT
 ± 400' 6" CI (KILLED)

NO.	BY	DATE	REVISION

LEGEND	
PROPOSED	
—+—	WATER MAIN VALVE AND HYDRANT
—○—	RESTRAINED JOINT PIPE VALVE
EXISTING	
—+—	WATER MAIN VALVE AND HYDRANT
—○—	RESTRAINED JOINT PIPE VALVE



URS 8-11-6

Edgefield Road
 (Compens)

JOB NO.	DR. BY DT
FILE NO.	CHK. BY
DATE: 1-28-05	SHEET 1 OF 1

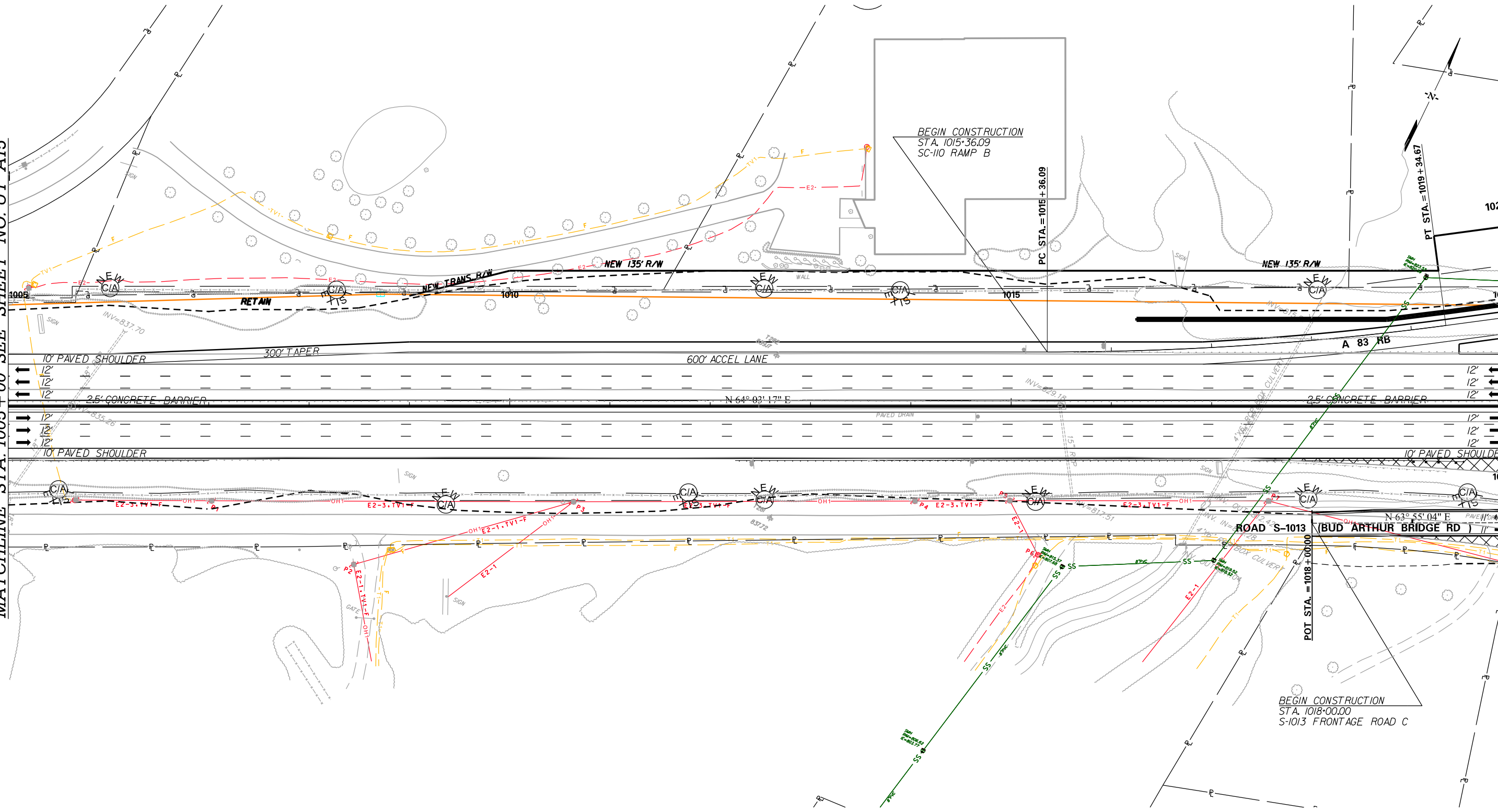
ISSUED FOR CONSTRUCTION

ENGINEERING DEPARTMENT

FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROAD / ROUTE NO.	SHEET NO.
3	SC	SPARTANBURG CHEROKEE	P02714	INTERSTATE 85	UT_A16

MATCHLINE STA. 1005+00 SEE SHEET NO. UT_A15

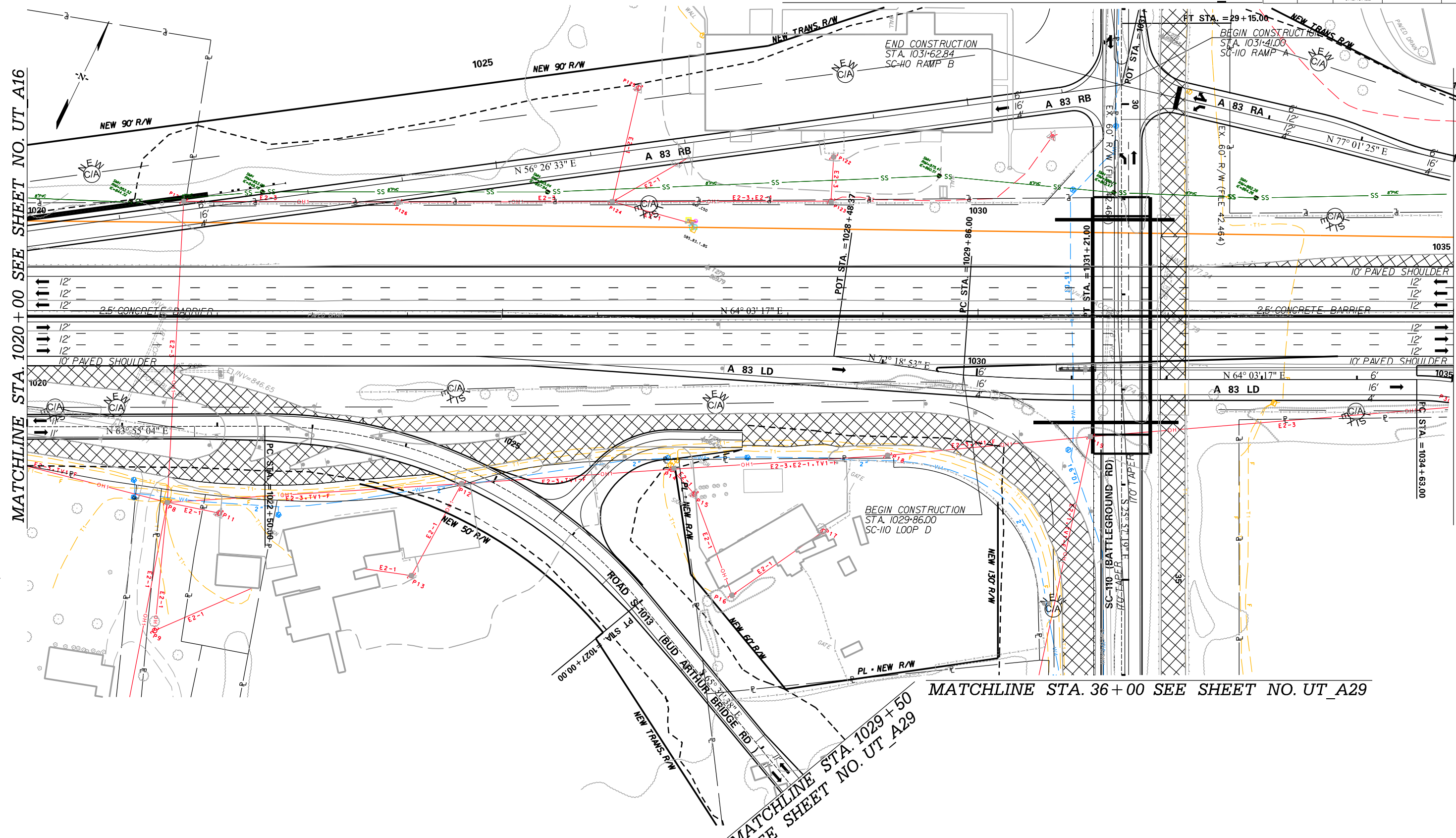
MATCHLINE STA. 1020+00 SEE SHEET NO. UT_A17



<p>PRELIMINARY NOT FOR CONSTRUCTION</p>	7				<p>SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION INTERSTATE 85</p> <p>UTILITY PLAN SHEET</p> <p>INTERSTATE 85 MILE MARKER 80-96 SEGMENT A</p>
	6				
5					
4					
3					
2					
1					
SCALE: 1" = 50'	REV. NO.	BY	DATE	DESCRIPTION OF REVISION	

Z:\Projects\14-60 185 Widening Cherokee Co MM80-96\Utilities\sheets\A_06-35 PLAN SHEETS.dgn 12/28/2015

FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROAD / ROUTE NO.	SHEET NO.
3	SC	SPARTANBURG CHEROKEE	P02714	INTERSTATE 85	UT_A17



MATCHLINE STA. 1020+00 SEE SHEET NO. UT_A16

MATCHLINE STA. 1035+00 SEE SHEET NO. UT_A18

MATCHLINE STA. 36+00 SEE SHEET NO. UT_A29

MATCHLINE STA. 1029+50
SEE SHEET NO. UT_A29

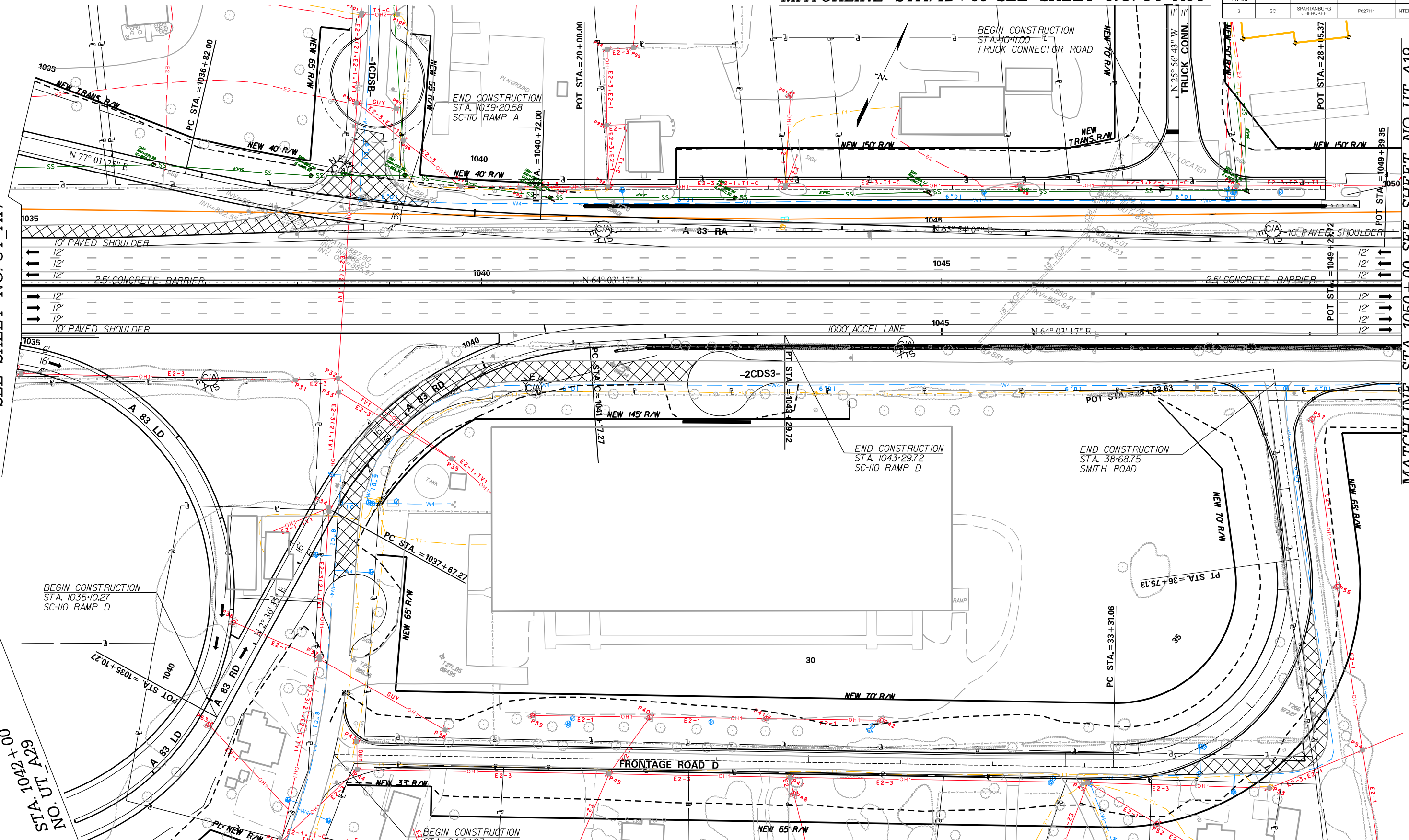
<p>PRELIMINARY NOT FOR CONSTRUCTION</p> <p>SCALE: 1" = 50'</p>	7					<p>SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION INTERSTATE 85</p> <p>UTILITY PLAN SHEET</p> <p>INTERSTATE 85 MILE MARKER 80-96 SEGMENT A</p>
	6					
	5					
	4					
	3					
2						
1						
	REV. NO.	BY	DATE	DESCRIPTION OF REVISION		

MATCHLINE STA. 12+00 SEE SHEET NO. UT_A34

FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROAD / ROUTE NO.	SHEET NO.
3	SC	SPARTANBURG CHEROKEE	P02714	INTERSTATE 85	UT_A18

MATCHLINE STA. 1035+00
SEE SHEET NO. UT_A17

MATCHLINE STA. 1050+00 SEE SHEET NO. UT_A19



**PRELIMINARY
NOT FOR CONSTRUCTION**

SCALE: 1" = 50'

7				
6				
5				
4				
3				
2				
1				
REV. NO.	BY	DATE	DESCRIPTION OF REVISION	

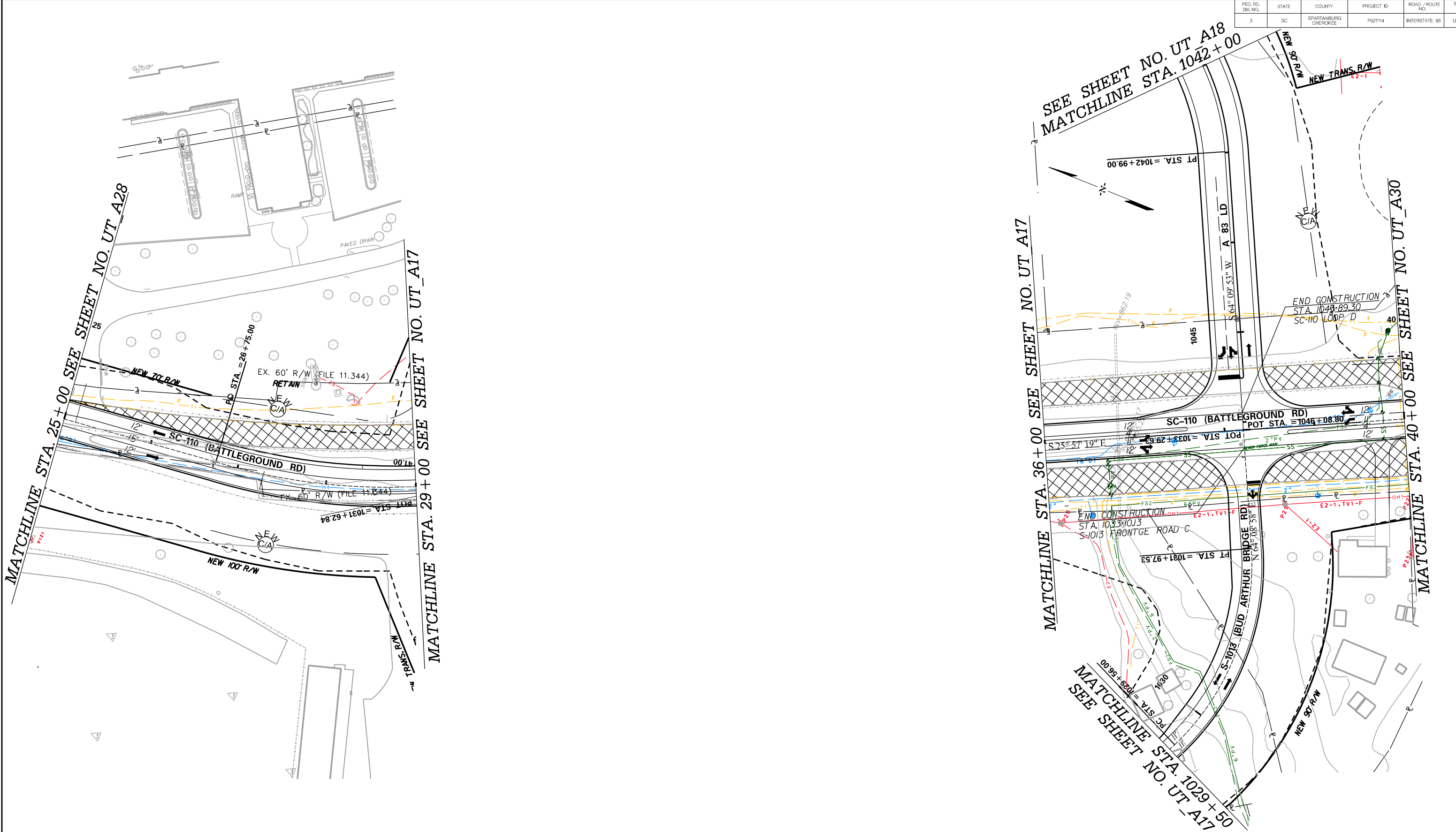
SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION
INTERSTATE 85

UTILITY PLAN SHEET

INTERSTATE 85 MILE MARKER 80-96
SEGMENT A

Z:\Projects\14-60 185 Widening Cherokee Co MM80-96\Utilities\sheets\A\SHEETS_A_06-35 PLAN SHEETS.dgn
12/28/2015

FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROAD / ROUTE NO.	SHEET NO.
3	SC	SPARTANBURG CHEROKEE	P02714	INTERSTATE 85	UT_A29



<p>PRELIMINARY NOT FOR CONSTRUCTION</p>	7				<p>SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION INTERSTATE 85</p> <p>UTILITY PLAN SHEET</p> <p>INTERSTATE 85 MILE MARKER 80-96 SEGMENT A</p>
	6				
	5				
	4				
	3				
	2				
	1				
	REV. NO.	BY	DATE	DESCRIPTION OF REVISION	

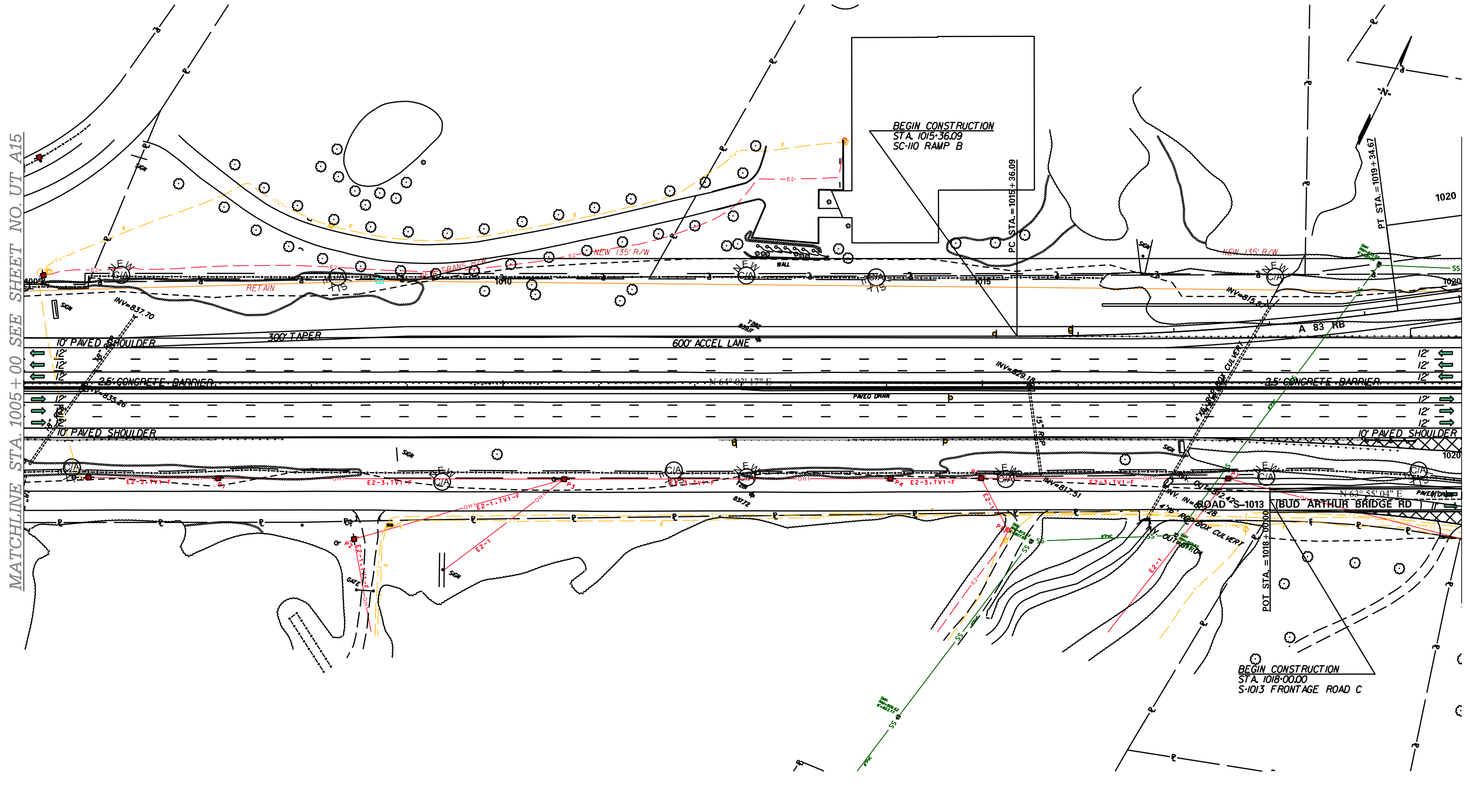
SCALE: 1" = 50'

Z:\Projects\14-60 185 Widening Cherokee Co MM80-96\Utilities\sheets\A_06-35 PLAN SHEETS.dgn
12/28/2015

FED. RD. DIV. NO.	STATE	COUNTY	PROJECT ID	ROAD / ROUTE NO.	SHEET NO.
3	SC	SPARTANBURG CHEROKEE	P02714	INTERSTATE 85	UT_A16

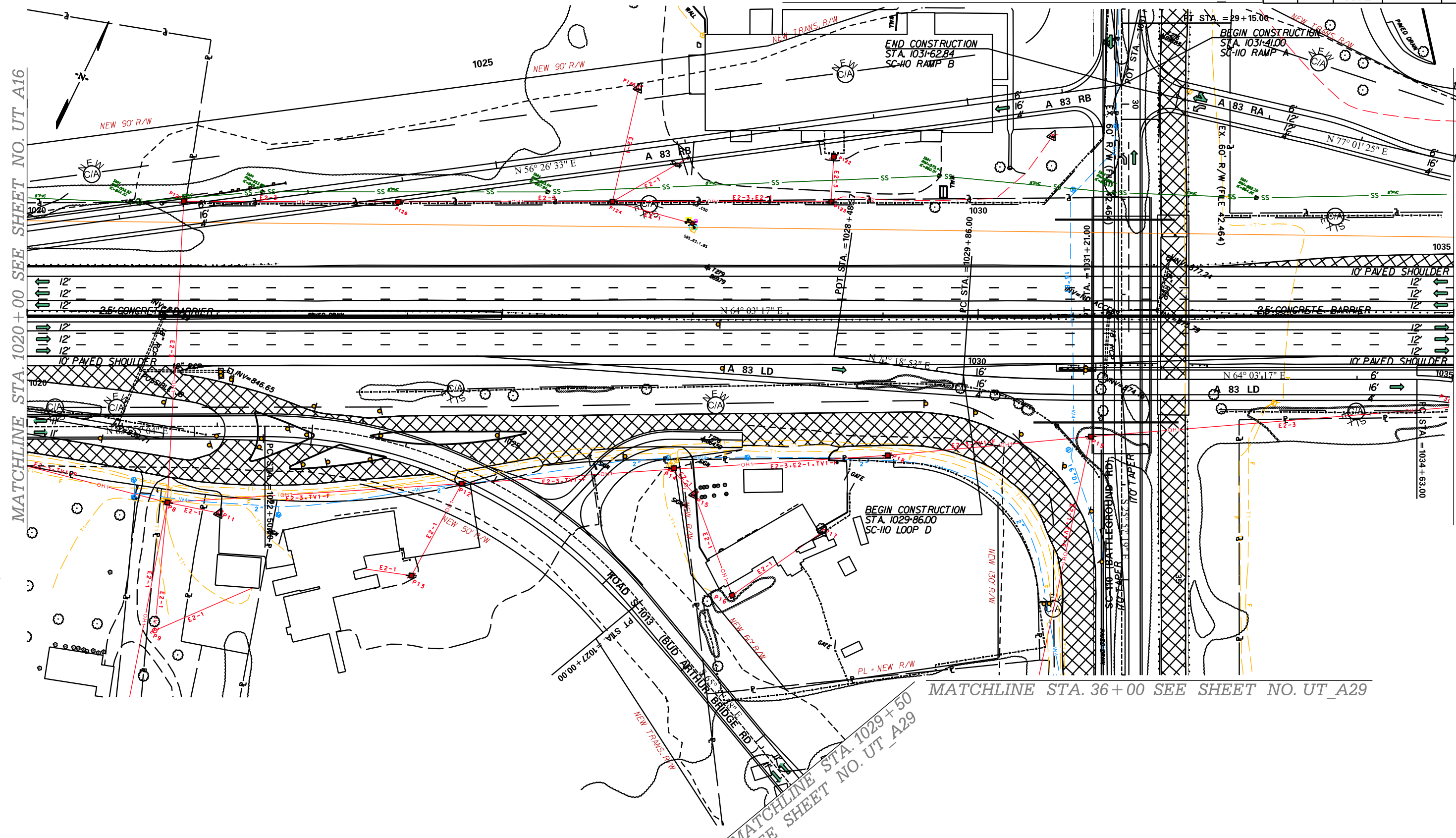
MATCHLINE STA. 1005+00 SEE SHEET NO. UT_A15

MATCHLINE STA. 1020+00 SEE SHEET NO. UT_A17



<p>PRELIMINARY NOT FOR CONSTRUCTION</p>	7				<p>SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION INTERSTATE 85</p> <p>UTILITY PLAN SHEET</p> <p>INTERSTATE 85 MILE MARKER 80-96 SEGMENT A</p>
	6				
5					
4					
3					
2					
1					
SCALE: 1" = 50'	REV. NO.	BY	DATE	DESCRIPTION OF REVISION	

Z:\Projects\14-60 185 Widening Cherokee Co MM80-96\Utilities\Sheets\A_06-35 PLAN SHEETS.dgn 12/7/2015



MATCHLINE STA. 1020+00 SEE SHEET NO. UT_A16

MATCHLINE STA. 1035+00 SEE SHEET NO. UT_A18

MATCHLINE STA. 36+00 SEE SHEET NO. UT_A29

MATCHLINE STA. 1029+50
SEE SHEET NO. UT_A29

**PRELIMINARY
NOT FOR CONSTRUCTION**

SCALE: 1" = 50'

7				
6				
5				
4				
3				
2				
1				
REV. NO.	BY	DATE	DESCRIPTION OF REVISION	

SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION
INTERSTATE 85

UTILITY PLAN SHEET

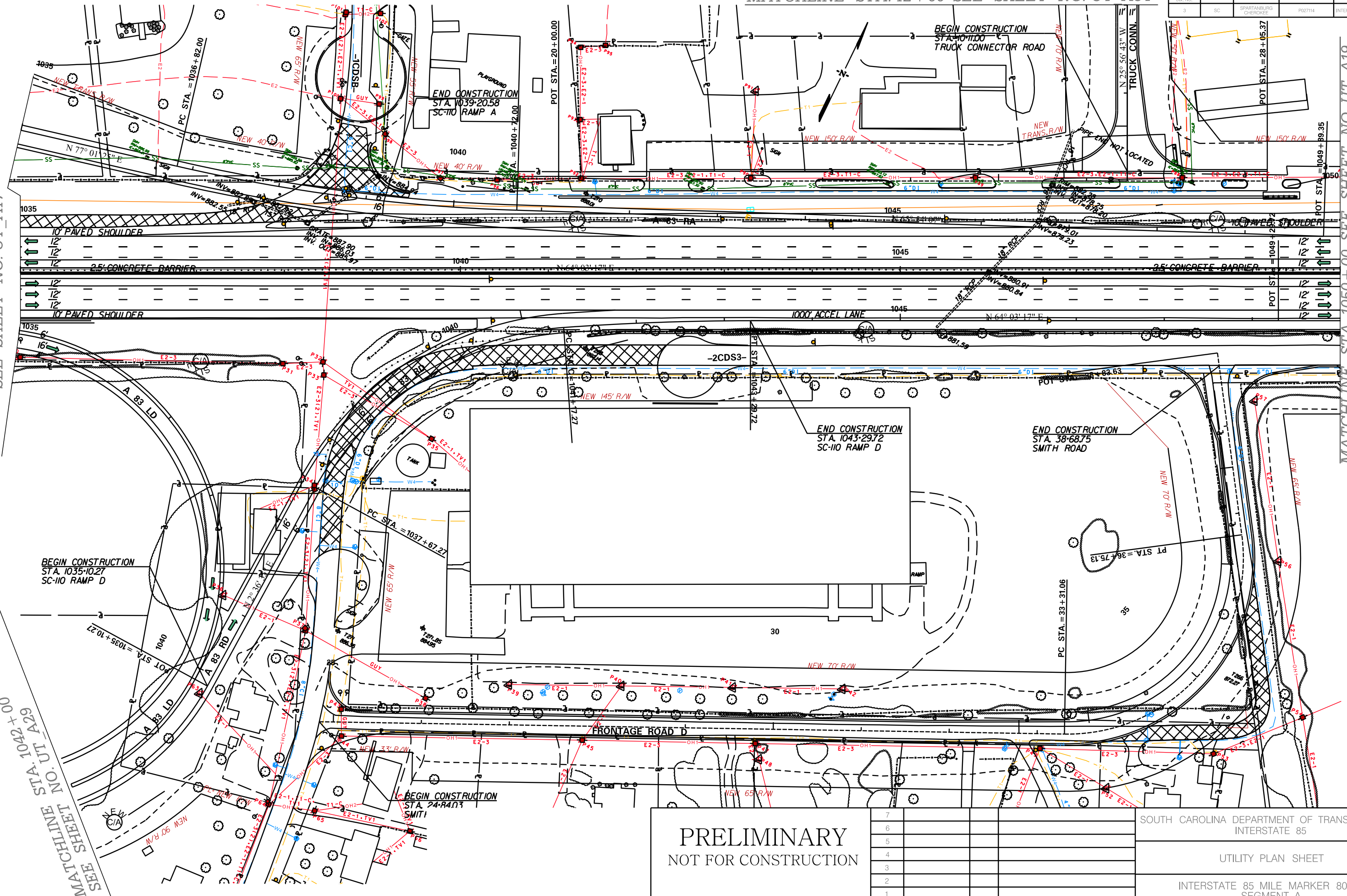
INTERSTATE 85 MILE MARKER 80-96
SEGMENT A

MATCHLINE STA. 12+00 SEE SHEET NO. UT A34

FED. PROJ. NO.	STATE	COUNTY	PROJECT ID	ROAD / ROUTE	SHEET NO.
3	SC	SPARTANBURG	P02714	INTERSTATE 85	UT_A19

MATCHLINE STA. 1035+00
SEE SHEET NO. UT_A17

MATCHLINE STA. 1050+00 SEE SHEET NO. UT_A19



**PRELIMINARY
NOT FOR CONSTRUCTION**

SCALE: 1" = 50'

7				
6				
5				
4				
3				
2				
1				
REV. NO.	BY	DATE	DESCRIPTION OF REVISION	

SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION
INTERSTATE 85

UTILITY PLAN SHEET

INTERSTATE 85 MILE MARKER 80-96
SEGMENT A

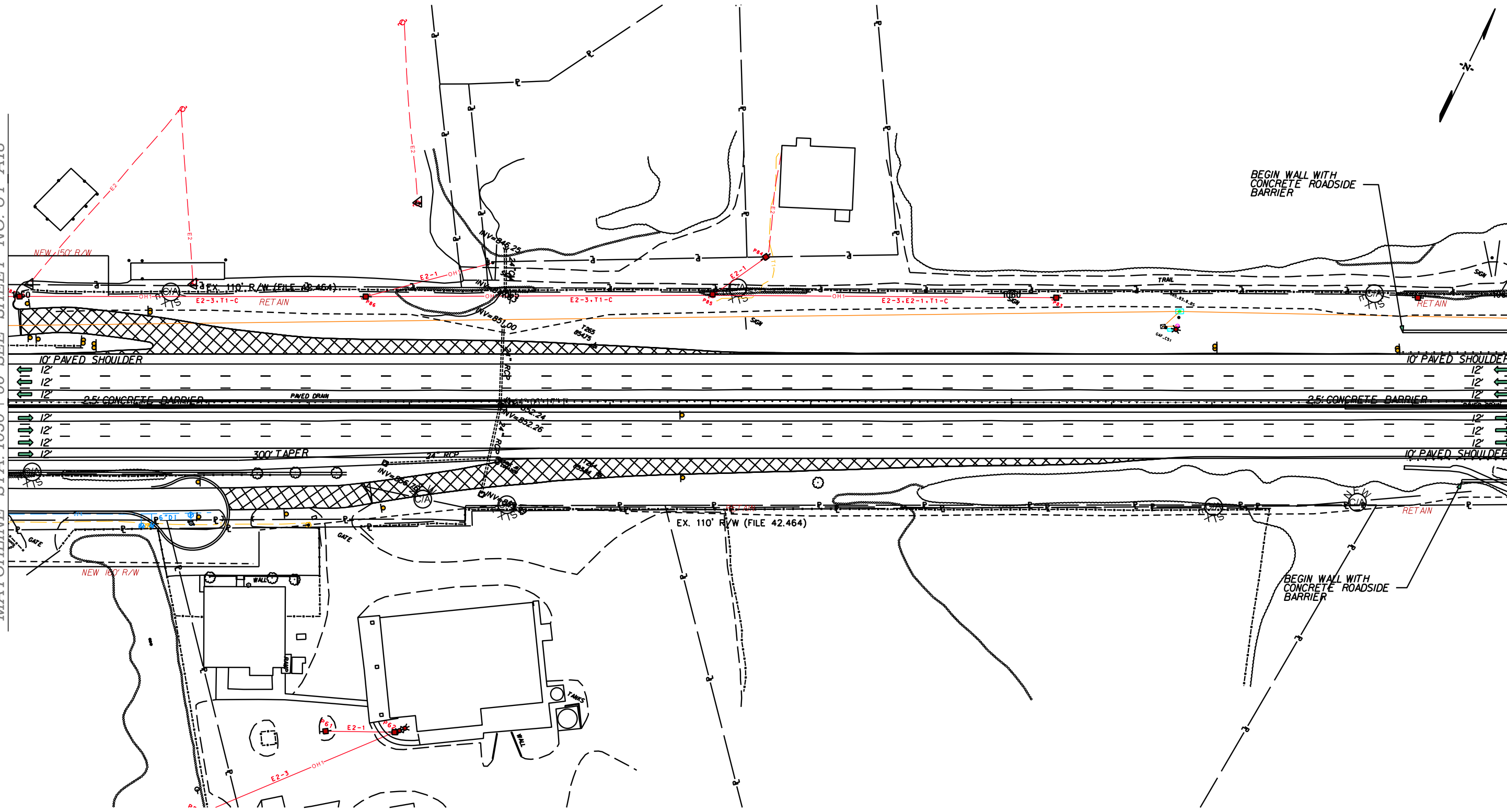
Z:\Projects\14-60 185 Widening Cherokee Co MM80-96\Utilities\Sheets\A.06-35 PLAN SHEETS.dgn
12/7/2015

MATCHLINE STA. 1042+00
SEE SHEET NO. UT_A18

FED. RD. DIST. NO.	STATE	COUNTY	PROJECT ID	ROAD / ROUTE NO.	SHEET NO.
3	SC	SPARTANBURG CHEROKEE	P027114	INTERSTATE 85	UT_A19

MATCHLINE STA. 1050 + 00 SEE SHEET NO. UT_A18

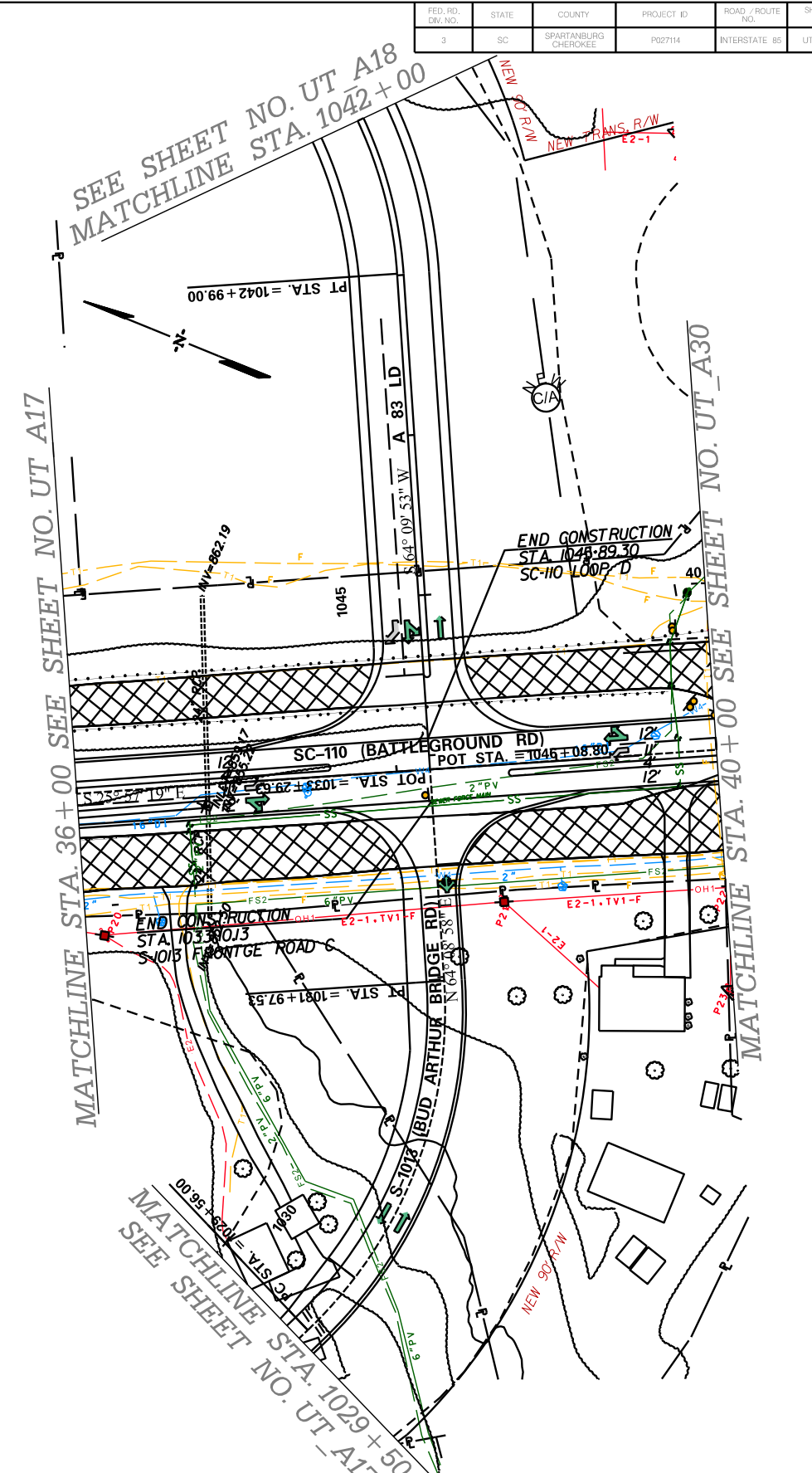
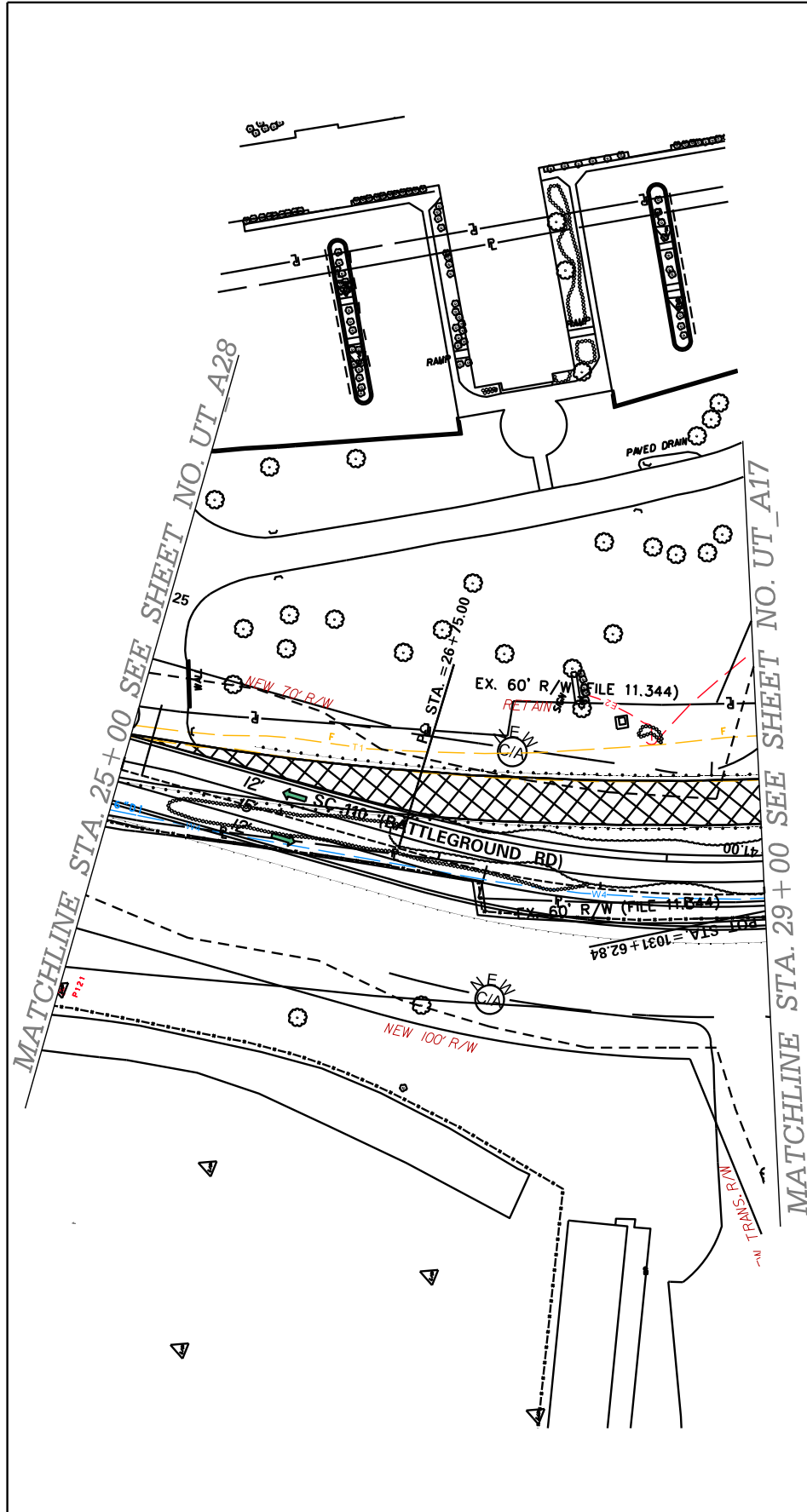
MATCHLINE STA. 1065 + 00 SEE SHEET NO. UT_A20



<p>PRELIMINARY NOT FOR CONSTRUCTION</p> <p>SCALE: 1" = 50'</p>	7				<p>SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION INTERSTATE 85</p> <p>UTILITY PLAN SHEET</p> <p>INTERSTATE 85 MILE MARKER 80-96 SEGMENT A</p>
	6				
	5				
	4				
	3				
	2				
	1				
REV. NO.	BY	DATE	DESCRIPTION OF REVISION		

Z:\Projects\14-60 185 Widening Cherokee Co MM80-96\Utilities\Sheets\A_06-35 PLAN SHEETS.dgn 12/7/2015

FED. RD. DIST. NO.	STATE	COUNTY	PROJECT ID	ROAD / ROUTE NO.	SHEET NO.
3	SC	SPARTANBURG CHEROKEE	P027114	INTERSTATE 85	UT_A29



<p>PRELIMINARY NOT FOR CONSTRUCTION</p>	7					<p>SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION INTERSTATE 85</p> <p>UTILITY PLAN SHEET</p> <p>INTERSTATE 85 MILE MARKER 80-96 SEGMENT A</p>
	6					
	5					
	4					
	3					
	2					
	1					
SCALE: 1" = 50'	REV. NO.	BY	DATE	DESCRIPTION OF REVISION		

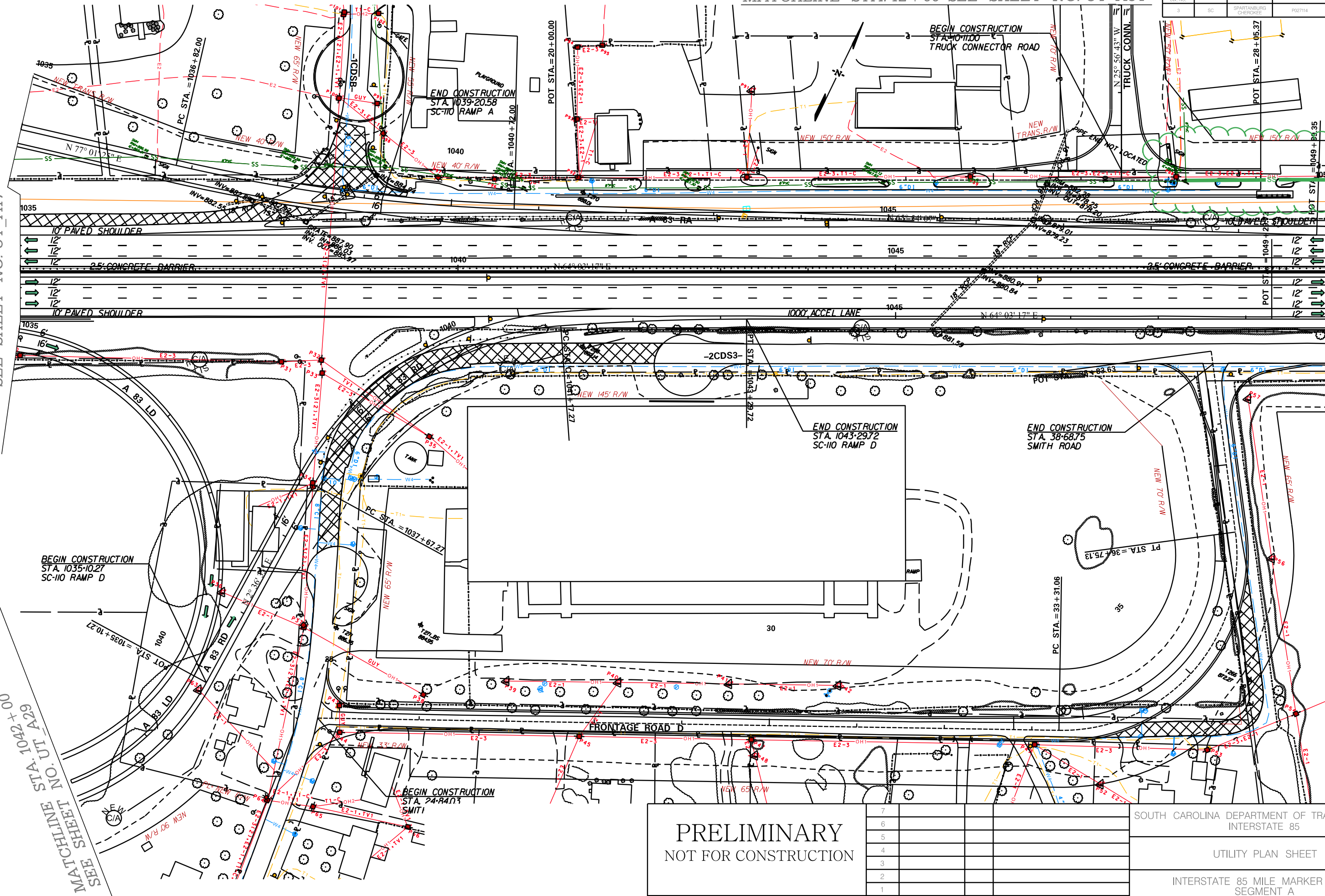
Z:\Projects\14-60 185 Widening Cherokee Co MM80-96\Utilities\sheets\A_06-35 PLAN SHEETS.dgn
 12/7/2015

MATCHLINE STA. 12+00 SEE SHEET NO. UT A34

FED. PROJ. NO.	STATE	COUNTY	PROJECT ID	ROAD / ROUTE	SHEET NO.
3	SC	SPARTANBURG	P02714	INTERSTATE 85	UT_A19

MATCHLINE STA. 1035+00
SEE SHEET NO. UT_A17

MATCHLINE STA. 1050+00 SEE SHEET NO. UT_A19



**PRELIMINARY
NOT FOR CONSTRUCTION**

SCALE: 1" = 50'

7				
6				
5				
4				
3				
2				
1				
REV. NO.	BY	DATE	DESCRIPTION OF REVISION	

SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION
INTERSTATE 85

UTILITY PLAN SHEET

INTERSTATE 85 MILE MARKER 80-96
SEGMENT A

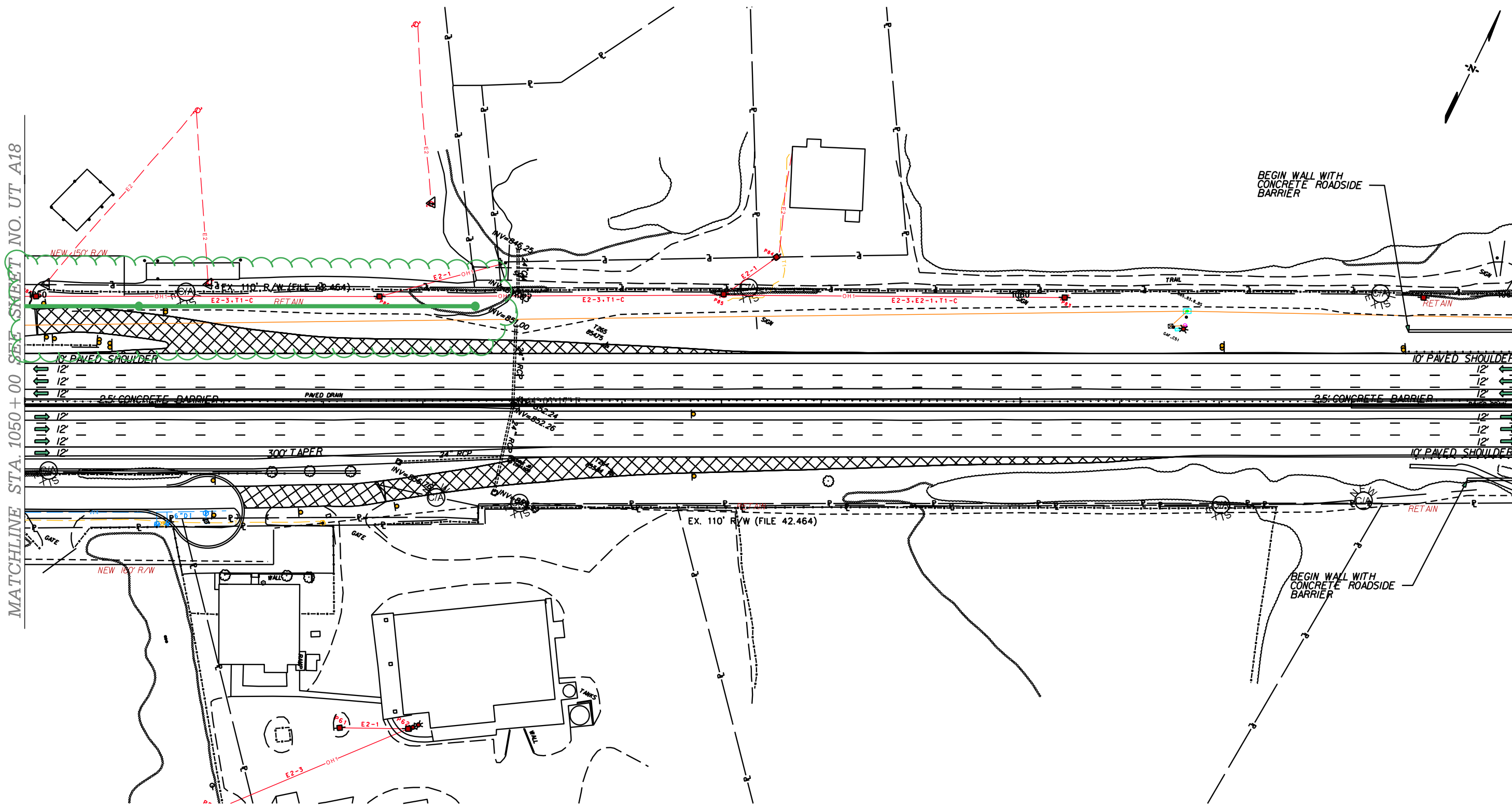
Z:\Projects\14-60 185 Widening Cherokee Co MM80-96\Utilities\Sheets\A.06-35 PLAN SHEETS.dgn
12/7/2015

MATCHLINE STA. 1042+00
SEE SHEET NO. UT_A18

FED. RD. DIST. NO.	STATE	COUNTY	PROJECT ID	ROAD / ROUTE NO.	SHEET NO.
3	SC	SPARTANBURG CHEROKEE	P027114	INTERSTATE 85	UT_A19

MATCHLINE STA. 1050 + 00 SEE SHEET NO. UT_A18

MATCHLINE STA. 1065 + 00 SEE SHEET NO. UT_A20



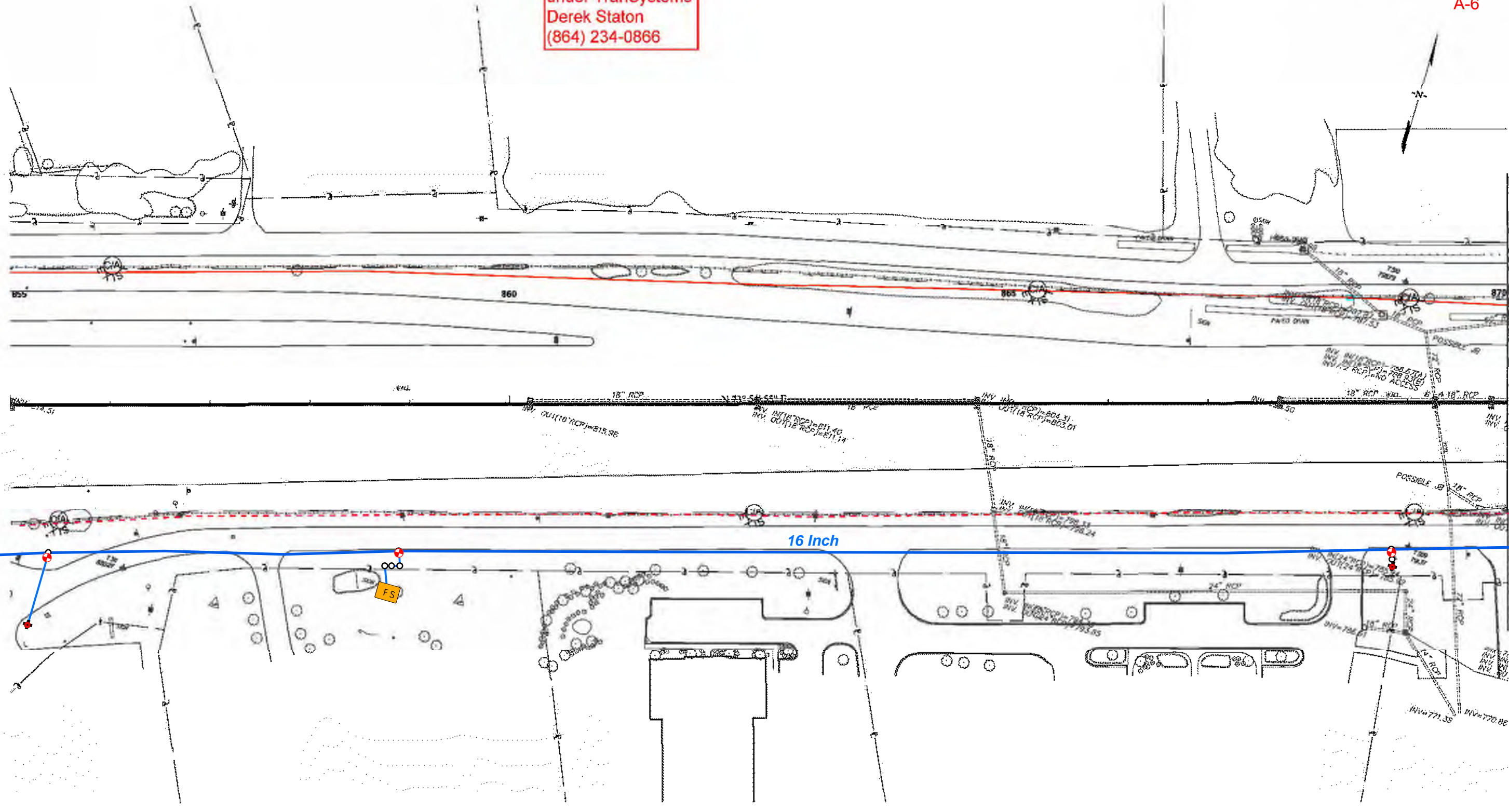
<p>PRELIMINARY NOT FOR CONSTRUCTION</p> <p>SCALE: 1" = 50'</p>	7				<p>SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION INTERSTATE 85</p> <p>UTILITY PLAN SHEET</p> <p>INTERSTATE 85 MILE MARKER 80-96 SEGMENT A</p>
	6				
	5				
	4				
	3				
	2				
	1				
REV. NO.	BY	DATE	DESCRIPTION OF REVISION		

Z:\Projects\14-60 185 Widening Cherokee Co MM80-96\Utilities\Sheets\A_06-35 PLAN SHEETS.dgn 12/7/2015

DATE	BY	REVISION	PROJECT	SHEET
11/14/18	BC	ISSUED FOR PERMIT	Interstate 85	A-6

Utility Coordination
under TranSystems
Derek Staton
(864) 234-0866

A-6



MATCHLINE STA. 870+00 SEE SHEET NO. UT_A7

<p>PRELIMINARY NOT FOR CONSTRUCTION</p>	7				<p>SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION INTERSTATE 85</p> <p>UTILITY PLAN SHEET</p> <p>INTERSTATE 85 MILE MARKER 80-96 SEGMENT A</p>
	6				
	6				
	4				
	3				
2					
1					

11/14/18

Utility Coordination
under TranSystems
Derek Staton
(864) 234-0866

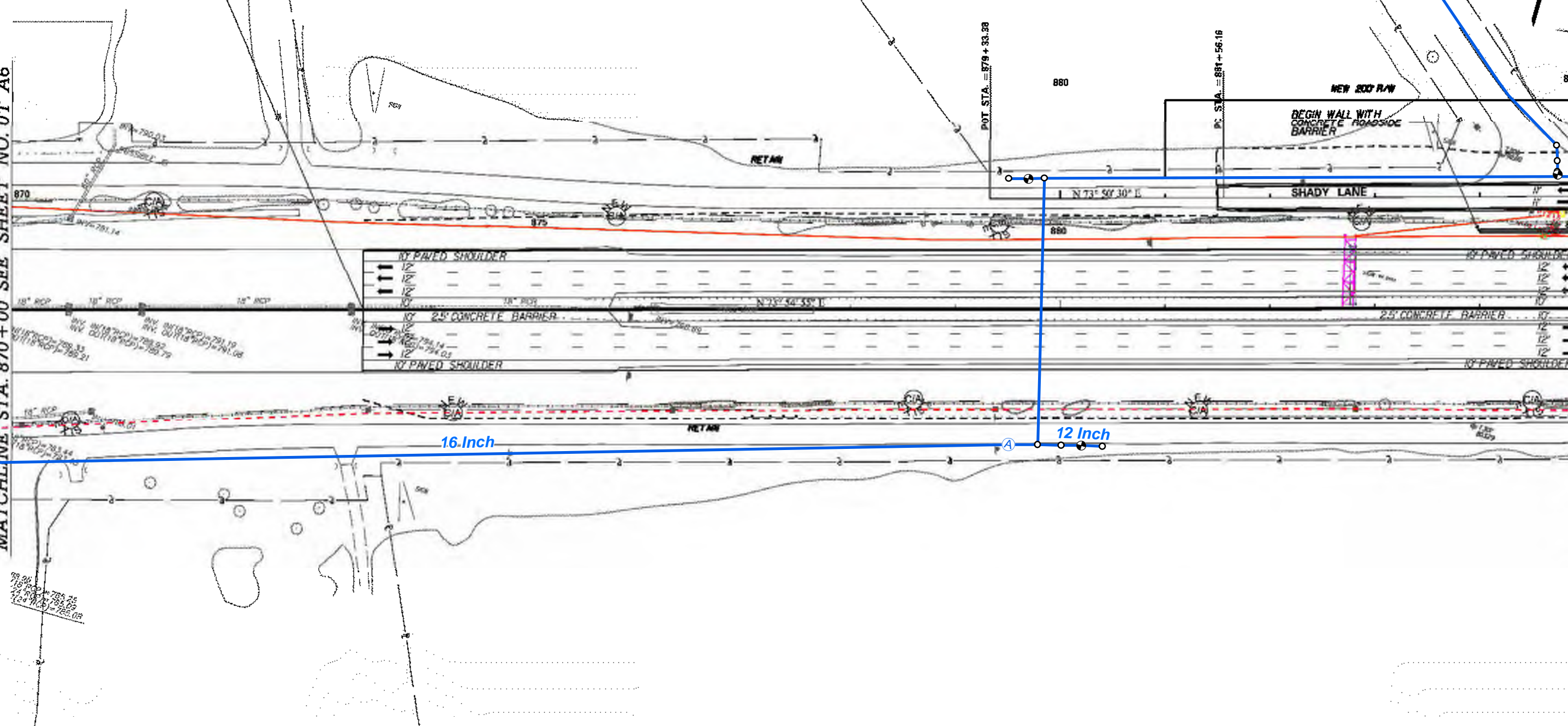
DATE	BY	REVISION

MATCHLINE STA. 870+00 SEE SHEET NO. UT_A6

MATCHLINE STA. 885+00 SEE SHEET NO. UT_A8

BEGIN CONSTRUCTION
STA. 873+55.00
I-85 SEGMENT A

A-7



PRELIMINARY
NOT FOR CONSTRUCTION

7			
6			
5			
4			
3			
2			
1			

SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION
INTERSTATE 85
UTILITY PLAN SHEET
INTERSTATE 85 MILE MARKER 80-96
SEGMENT A

172572015

Utility Coordination
 under TranSystems
 Derek Staton
 (864) 234-0866

DATE	BY	GROUP	PROJECT	SCALE
11/14/11	DC	ROADSIDE	Inter 85	1"=40'

A-8

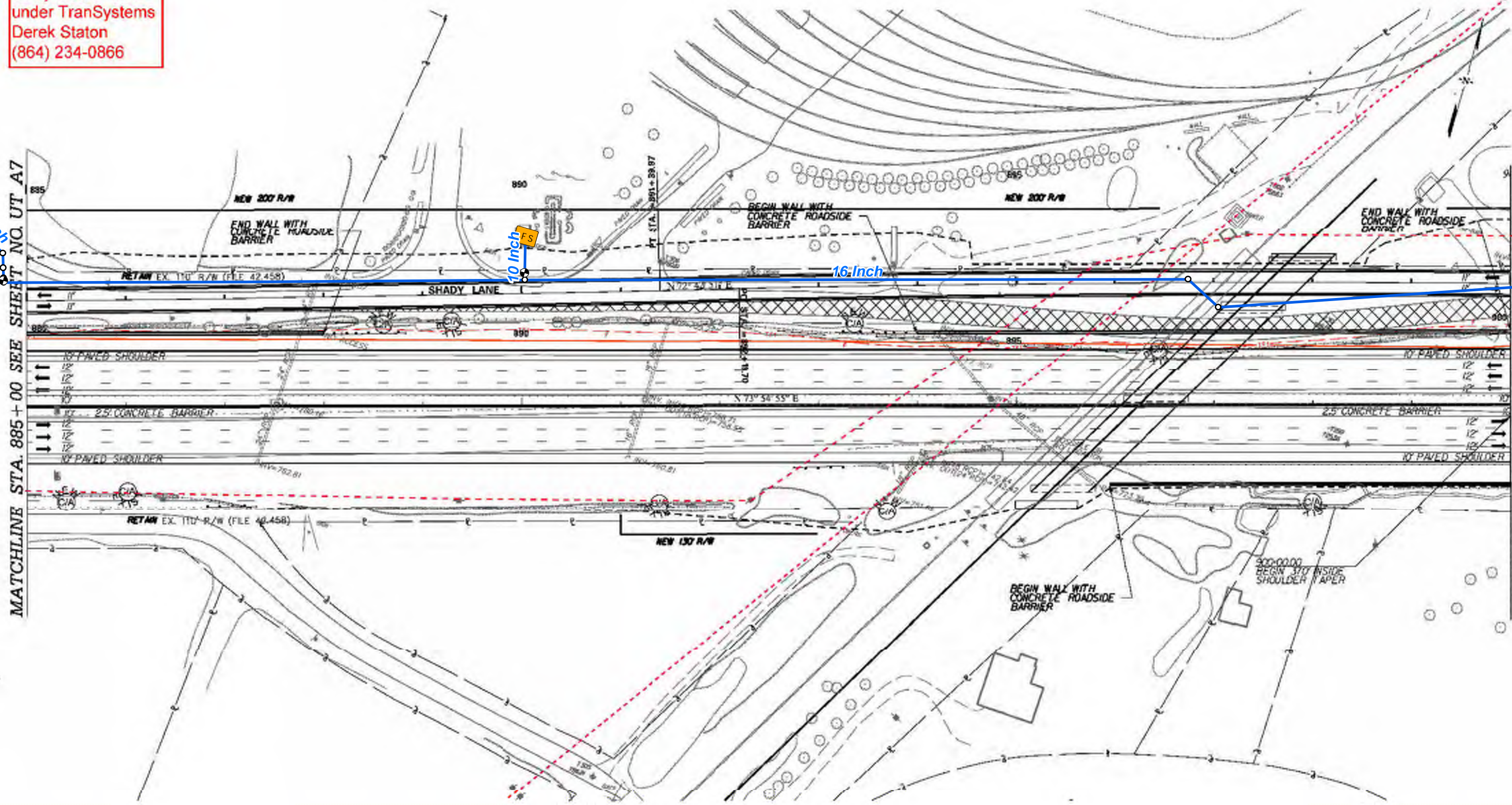
MATCHLINE STA. 885 + 00 SEE SHEET NO. UT_A7

MATCHLINE STA. 900 + 00 SEE SHEET NO. UT_A9

12 Inch

10 Inch

16 Inch



PRELIMINARY
 NOT FOR CONSTRUCTION

7			
6			
6			
4			
3			
2			
1			

SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION
 INTERSTATE 85
 UTILITY PLAN SHEET
 INTERSTATE 85 MILE MARKER 80-96
 SEGMENT A

11/21/11

SCALE: 1" = 40'

REVISIONS

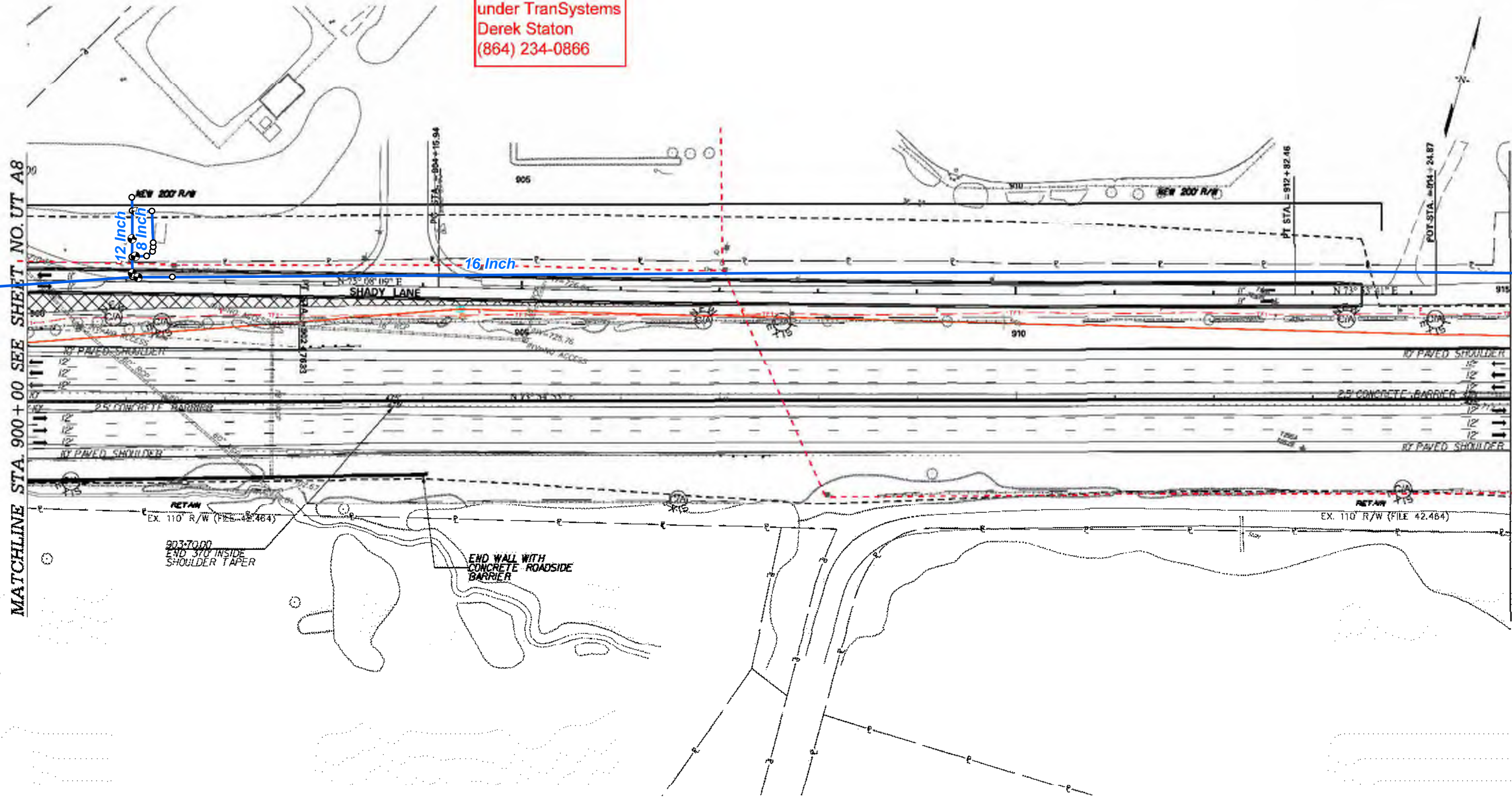
DATE	BY	SCALE	PROJECT	NO.
1	DC			

A-9

Utility Coordination
under TranSystems
Derek Staton
(864) 234-0866

MATCHLINE STA. 900+00 SEE SHEET NO. UT_A8

MATCHLINE STA. 915+00 SEE SHEET NO. UT_A10



PRELIMINARY NOT FOR CONSTRUCTION	7			SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION INTERSTATE 85 UTILITY PLAN SHEET INTERSTATE 85 MILE MARKER 80-96 SEGMENT A
	6			
	6			
	4			
	3			
2				
1				

172472018

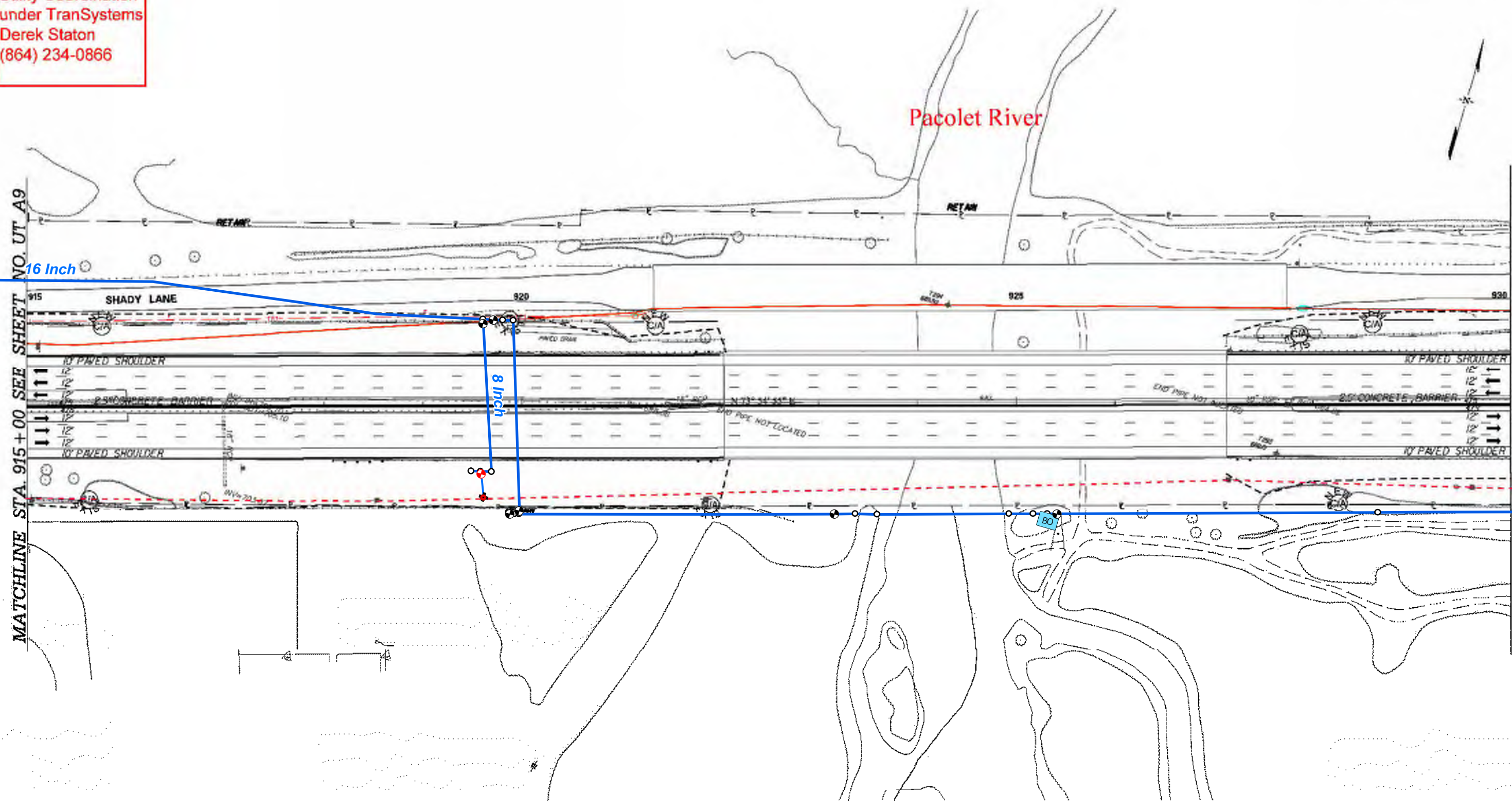
DATE	BY	CHKD	LODGE	PROJECT	SHEET NO.	TOTAL SHEETS
11/15/16	DC			INTERSTATE 85	A-10	10

Utility Coordination
under TranSystems
Derek Staton
(864) 234-0866

Pacolet River

MATCHLINE STA. 915 + 00 SEE SHEET NO. UT A9

MATCHLINE STA. 930 + 00 SEE SHEET NO. UT A11



<p>PRELIMINARY NOT FOR CONSTRUCTION</p>	7				<p>SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION INTERSTATE 85</p>
	6				
	6				
	4				
	3				
2					UTILITY PLAN SHEET
1					INTERSTATE 85 MILE MARKER 80-96 SEGMENT A

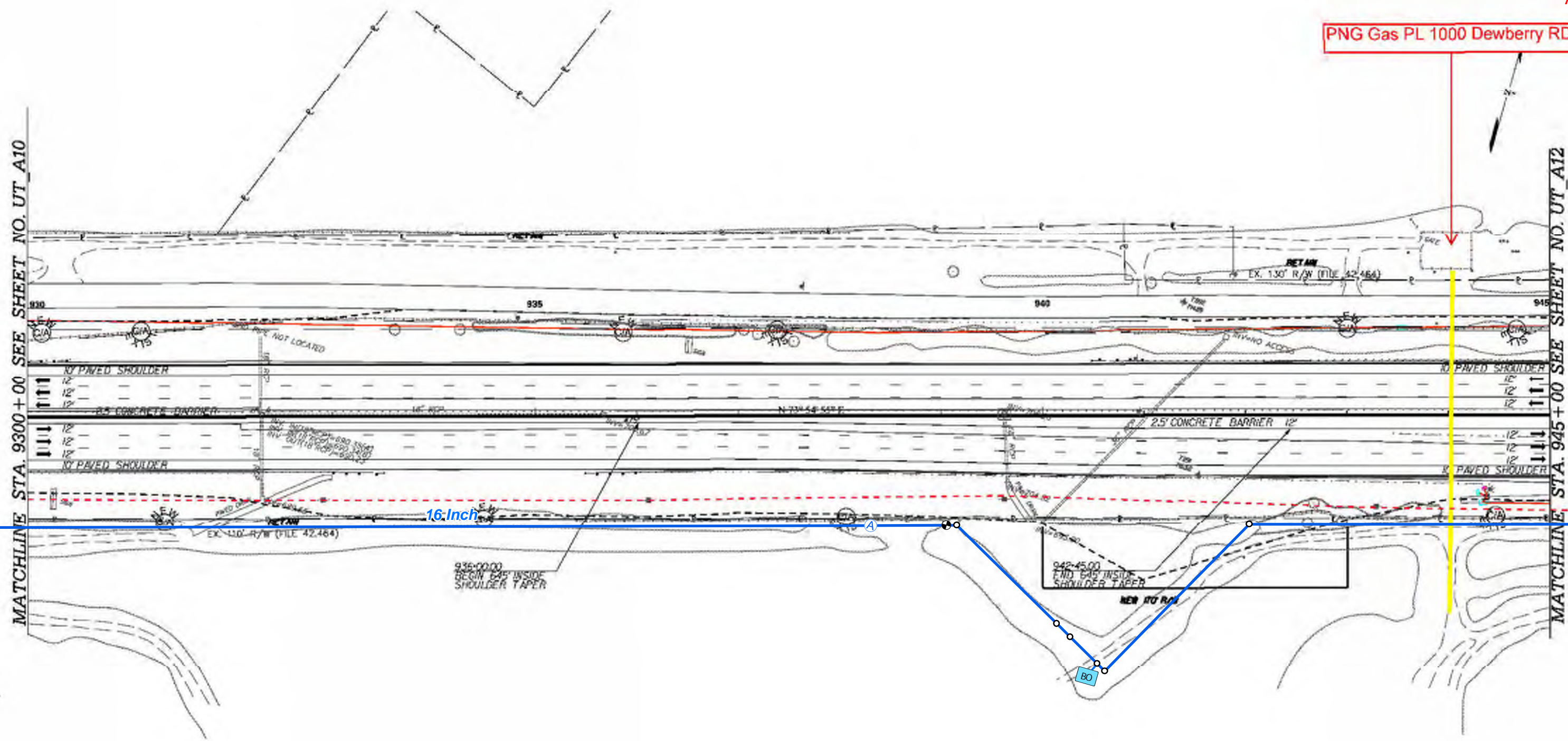
DATE	BY	SCALE	PROJECT	SHEET NO.	TOTAL SHEETS
11/11/11	DC		INTERSTATE 85	11	11

A-111

PNG Gas PL 1000 Dewberry RD

MATCHLINE STA. 9300 + 00 SEE SHEET NO. UT_A10

MATCHLINE STA. 945 + 00 SEE SHEET NO. UT_A12



PRELIMINARY
NOT FOR CONSTRUCTION

7			
6			
5			
4			
3			
2			
1			

SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION
INTERSTATE 85
UTILITY PLAN SHEET
INTERSTATE 85 MILE MARKER 80-96
SEGMENT A

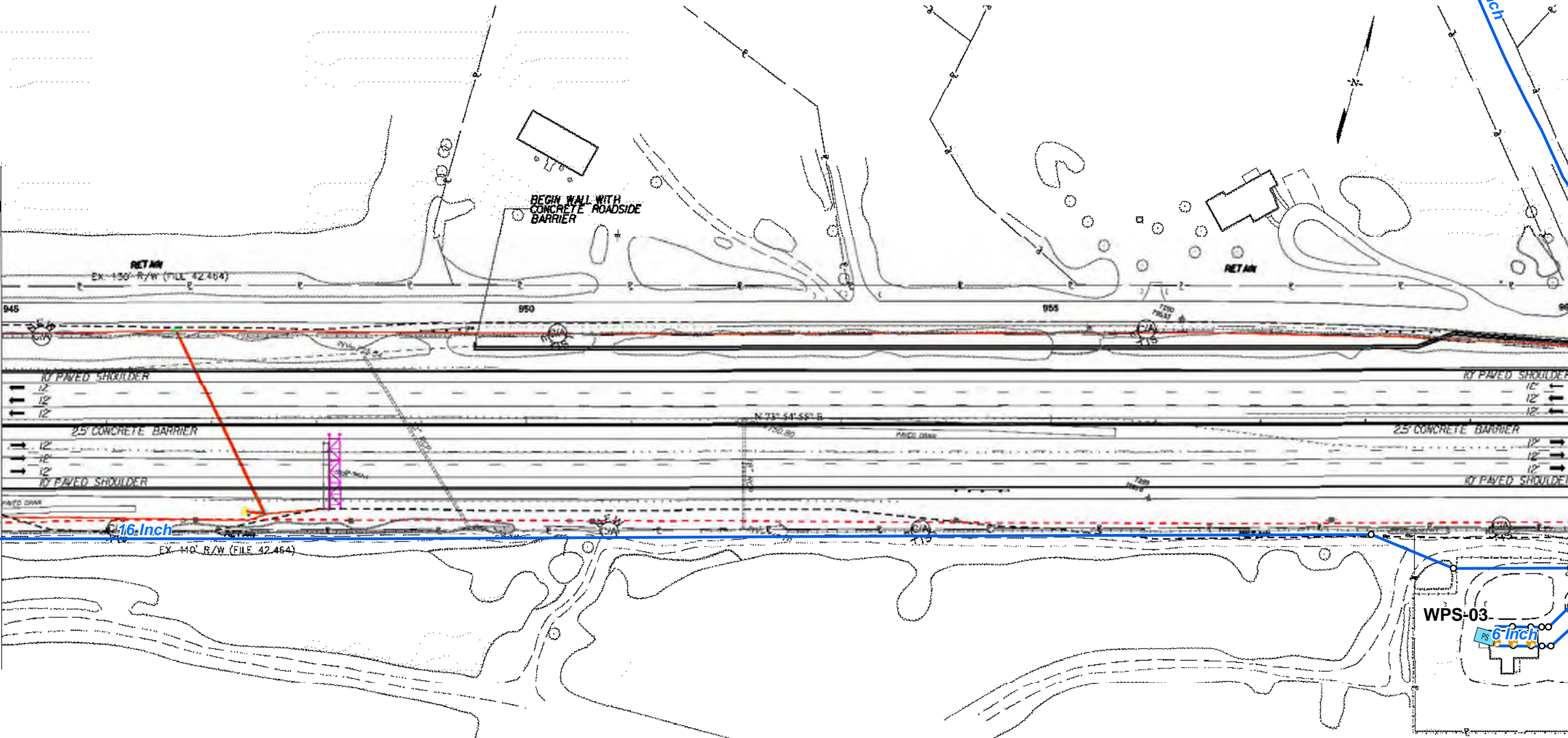
11/24/11

CDOT DIST. NO.	STATE	COUNTY	POLLING DISTRICT	PRECINCT	PRECINCT NO.	UTILITY
H	SC	SPRINGFIELD	1st	1st	1st	UT A1

A-12

MATCHLINE STA. 945+00 SEE SHEET NO. UT A11

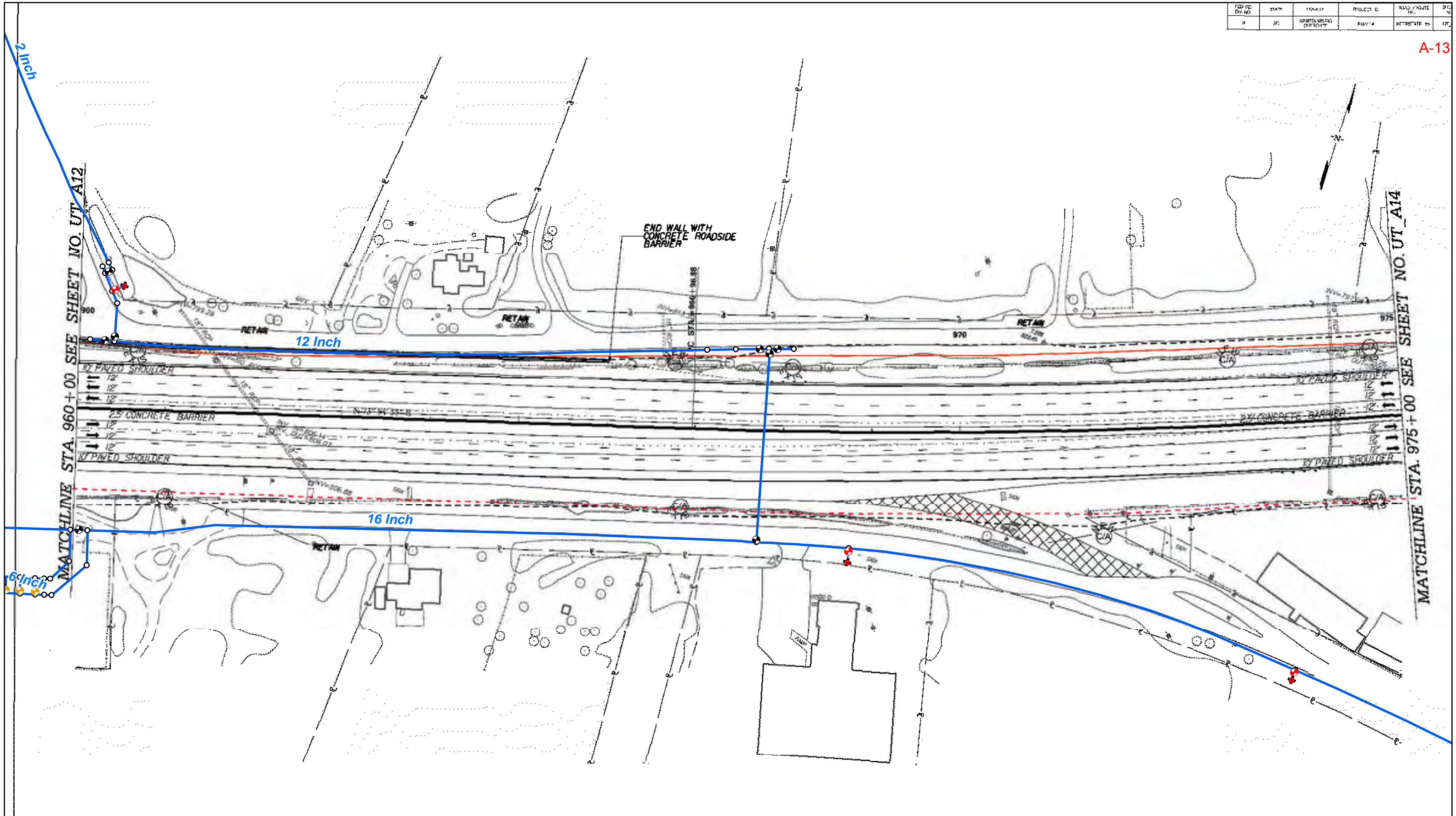
MATCHLINE STA. 960+00 SEE SHEET NO. UT A13



<p>PRELIMINARY NOT FOR CONSTRUCTION</p>	7				SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION INTERSTATE 85 UTILITY PLAN SHEET INTERSTATE 85 MILE MARKER 80-96 SEGMENT A
	6				
	6				
	4				
	3				
	2				
	1				

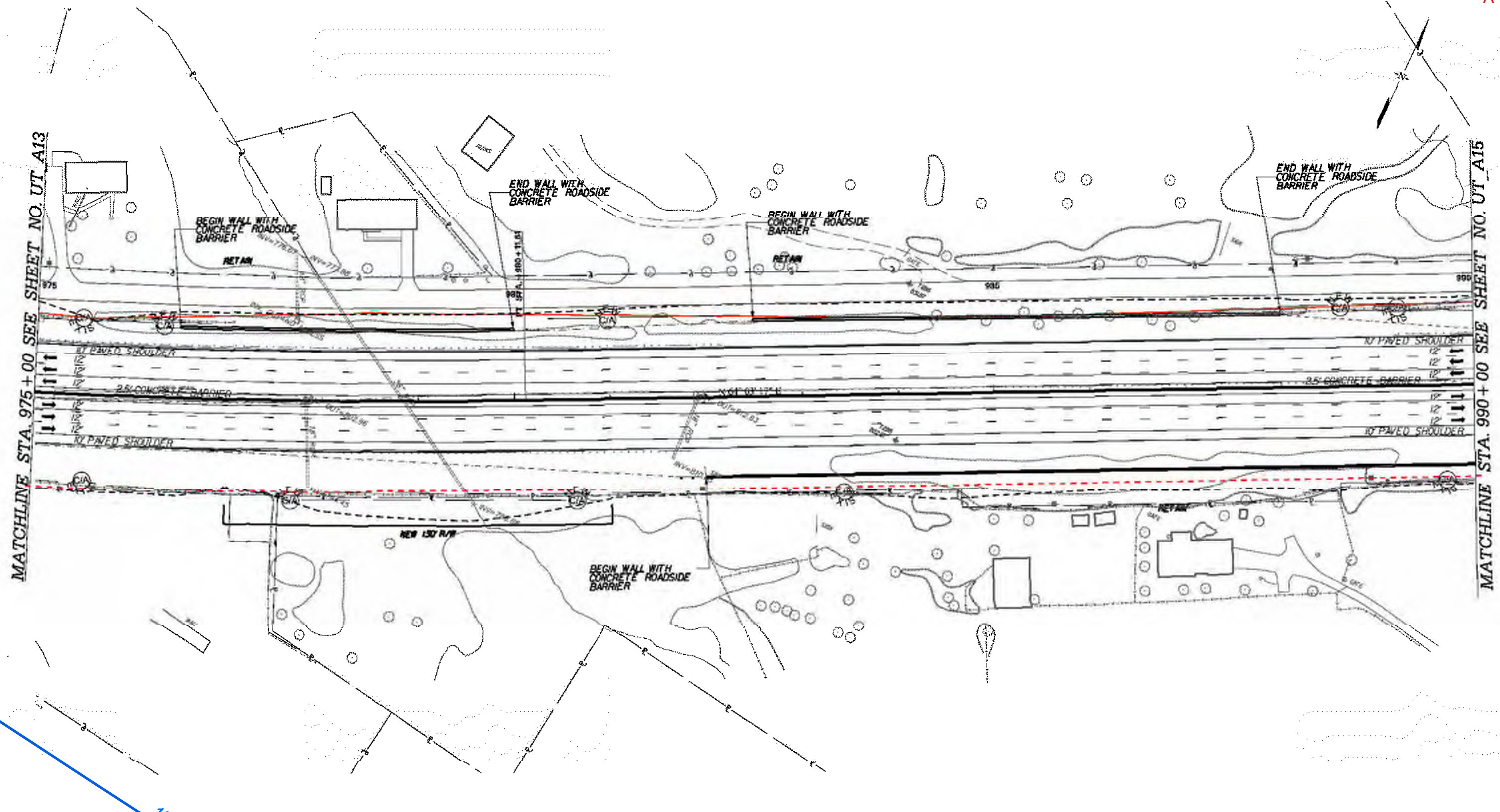
9/24/2005

FED. RD. DIST. NO.	STATE	TOWNSHIP	PROJECT NO.	ROAD ROUTE	SHEET NO.
87	SC	SPRENTAN WOOD	85-96	INTERSTATE 85	13



<p>PRELIMINARY NOT FOR CONSTRUCTION</p>	7			<p>SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION INTERSTATE 85</p>
	6			
	5			
	4			
	3			
2			<p>UTILITY PLAN SHEET</p>	
1			<p>INTERSTATE 85 MILE MARKER 80-96 SEGMENT A</p>	

3/27/21



16 Inch

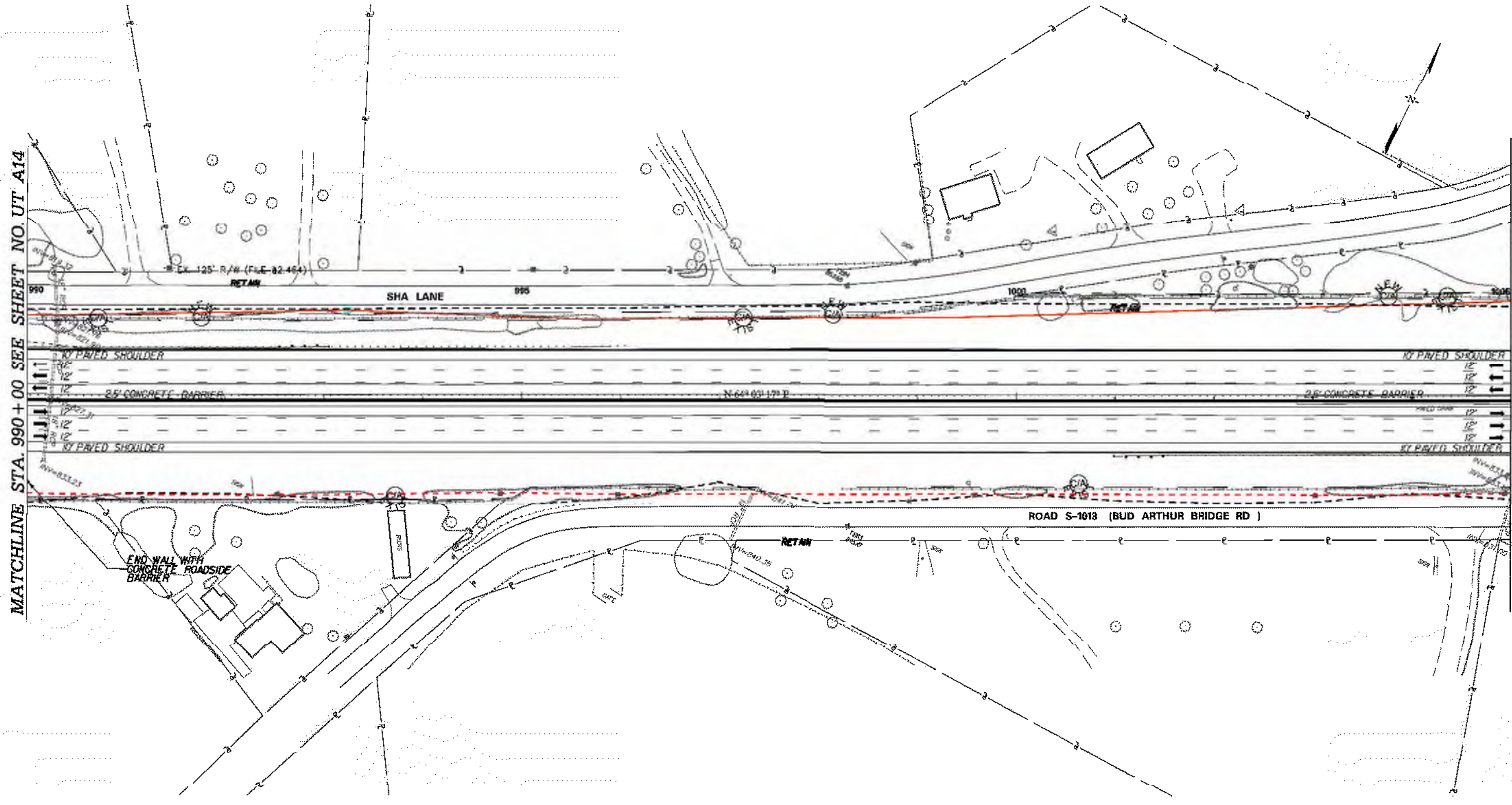
<p>PRELIMINARY NOT FOR CONSTRUCTION</p>	7				SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION INTERSTATE 85	
	6					UTILITY PLAN SHEET
	5					
	4				INTERSTATE 85 MILE MARKER 80-96 SEGMENT A	
	3					
	2					
	1					

DATE	BY	SCALE	PROJECT	REVISION	INTERFERE BY

A-15

MATCHLINE STA. 990 + 00 SEE SHEET NO. UT A14

MATCHLINE STA. 1005 + 00 SEE SHEET NO. UT A16



END WALL WITH CONCRETE ROADSIDE BARRIER

<p>PRELIMINARY NOT FOR CONSTRUCTION</p>	7				<p>SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION INTERSTATE 85</p> <p>UTILITY PLAN SHEET</p> <p>INTERSTATE 85 MILE MARKER 80-96 SEGMENT A</p>
	6				
	5				
	4				
	3				
	2				
	1				

16 Inch

3/25/2003

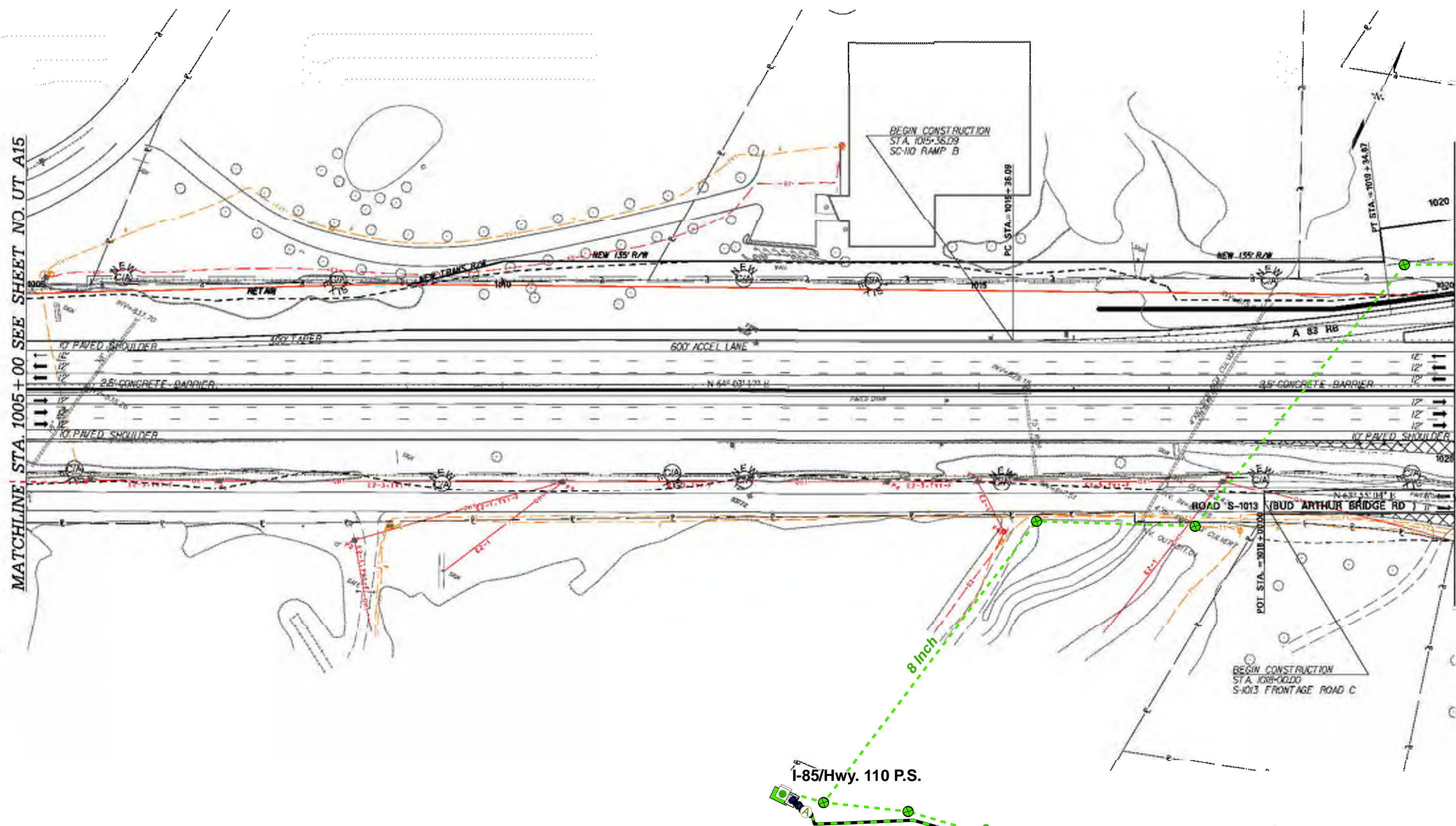
ROUTE	STATE	COUNTY	PROJECT	NO. / DATE	DATE
85	SC	SPARTANBURG	INTERSTATE 85	80-06	UT. A

SWSD Gravity Sewer for survey to pick up

A-16

MATCHLINE STA. 1005+00 SEE SHEET NO. UT_A15

MATCHLINE STA. 1020+00 SEE SHEET NO. UT_A17



I-85/Hwy. 110 P.S.

<p>PRELIMINARY NOT FOR CONSTRUCTION</p>	7			<p>SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION INTERSTATE 85</p>
	6			
	5			
	4			
	3			
	2			<p>UTILITY PLAN SHEET</p>
	1			<p>INTERSTATE 85 MILE MARKER 80-06 SEGMENT A</p>

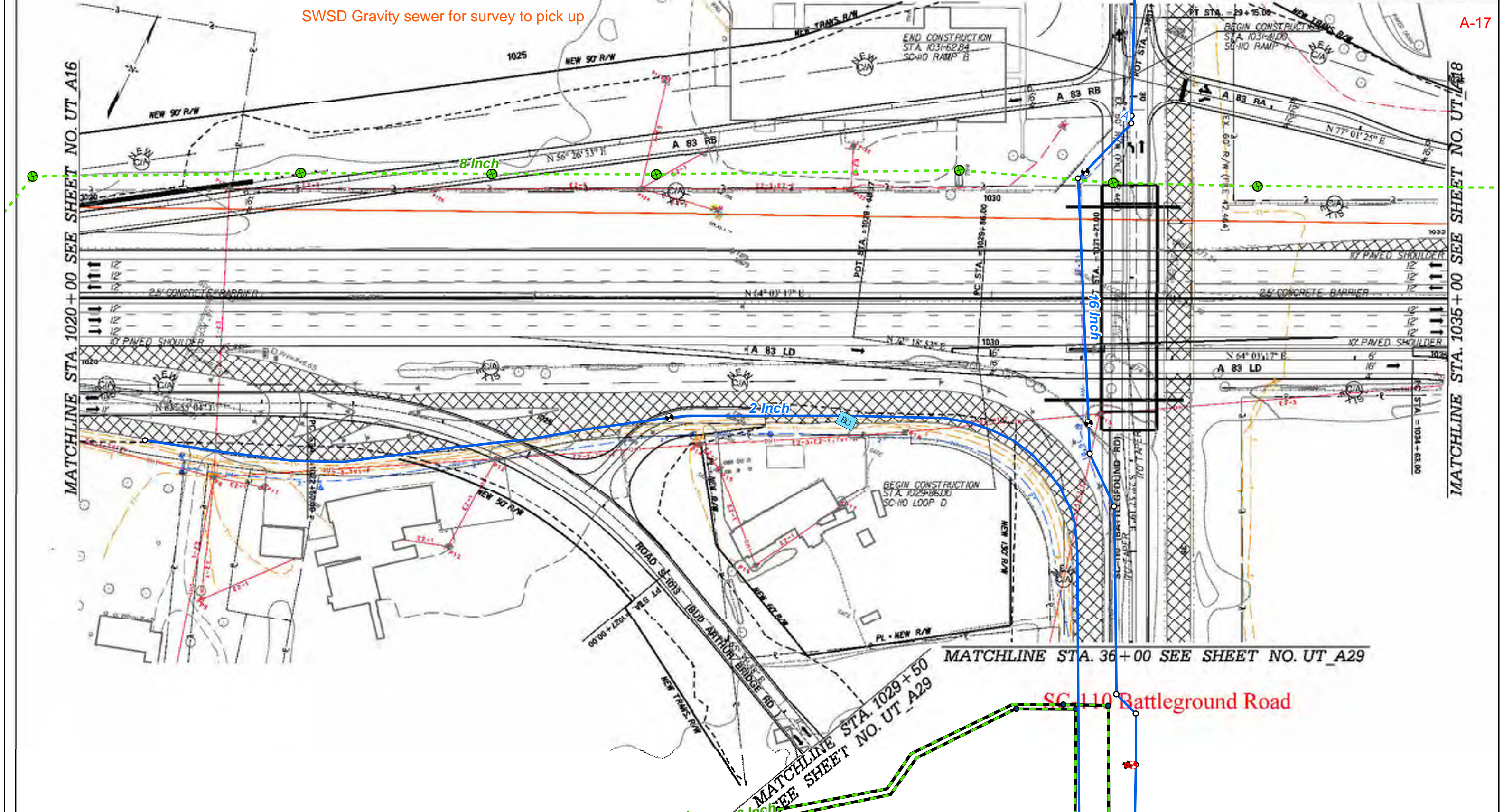
9/27/20

DATE	BY	QUALITY	PROJECT	SCALE

SWSD Gravity sewer for survey to pick up

MATCHLINE STA. 1020+00 SEE SHEET NO. UT A16

MATCHLINE STA. 1035+00 SEE SHEET NO. UT A18



MATCHLINE STA. 36+00 SEE SHEET NO. UT A29

PRELIMINARY
NOT FOR CONSTRUCTION

7			
6			
5			
4			
3			
2			
1			

SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION
INTERSTATE 85
UTILITY PLAN SHEET
INTERSTATE 85 MILE MARKER 80-96
SEGMENT A

3725-10-10

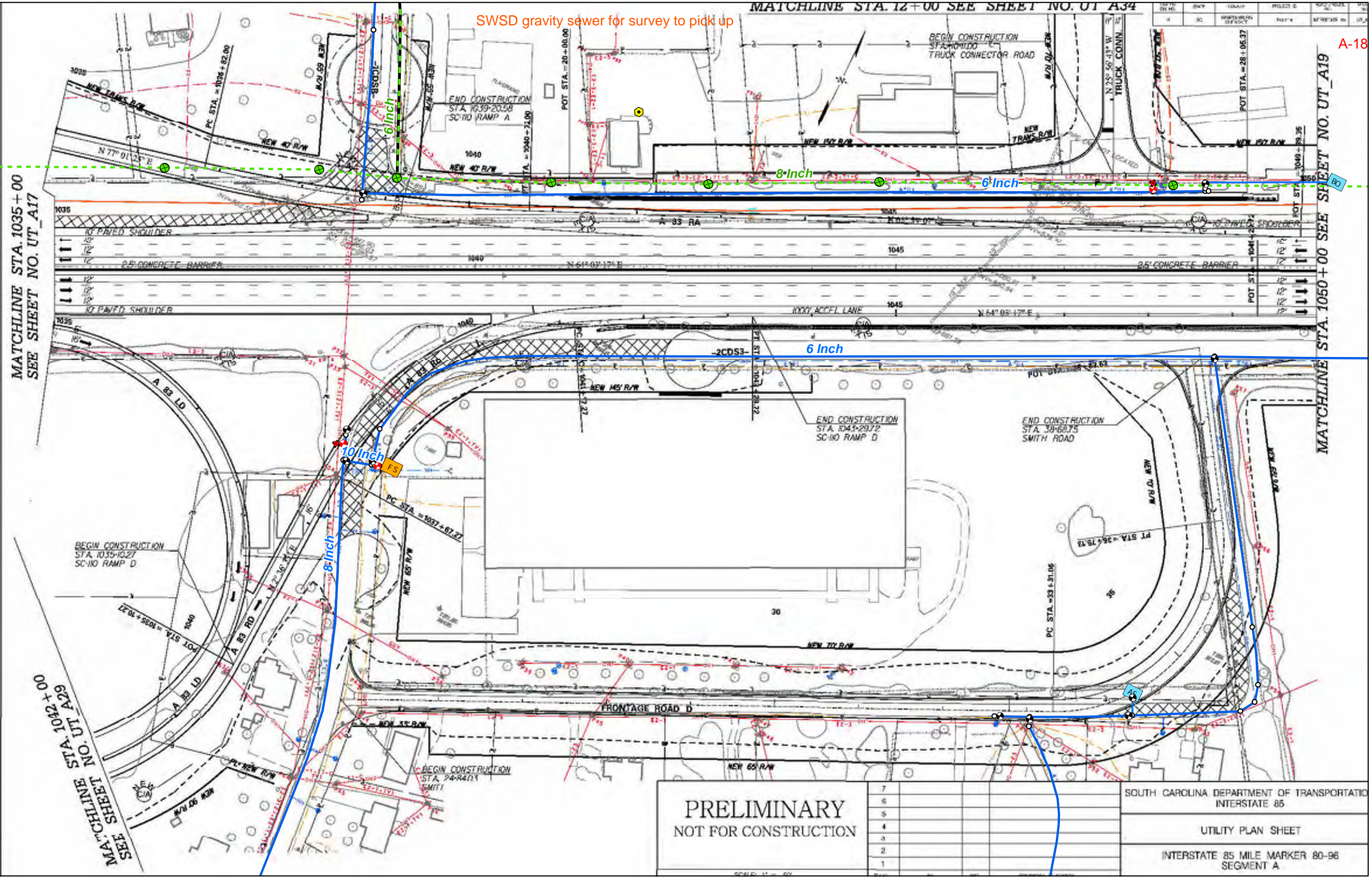
NO.	DATE	BY	REVISION
1			
2			
3			
4			
5			
6			
7			

A-18

SWSD gravity sewer for survey to pick up

MATCHLINE STA. 1035+00
SEE SHEET NO. UT_A17

MATCHLINE STA. 1050+00 SEE SHEET NO. UT_A19



**PRELIMINARY
NOT FOR CONSTRUCTION**

SCALE: 1" = 60'

7			
6			
5			
4			
3			
2			
1			

SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION
INTERSTATE 85

UTILITY PLAN SHEET

INTERSTATE 85 MILE MARKER 80-96
SEGMENT A

07/24/2023

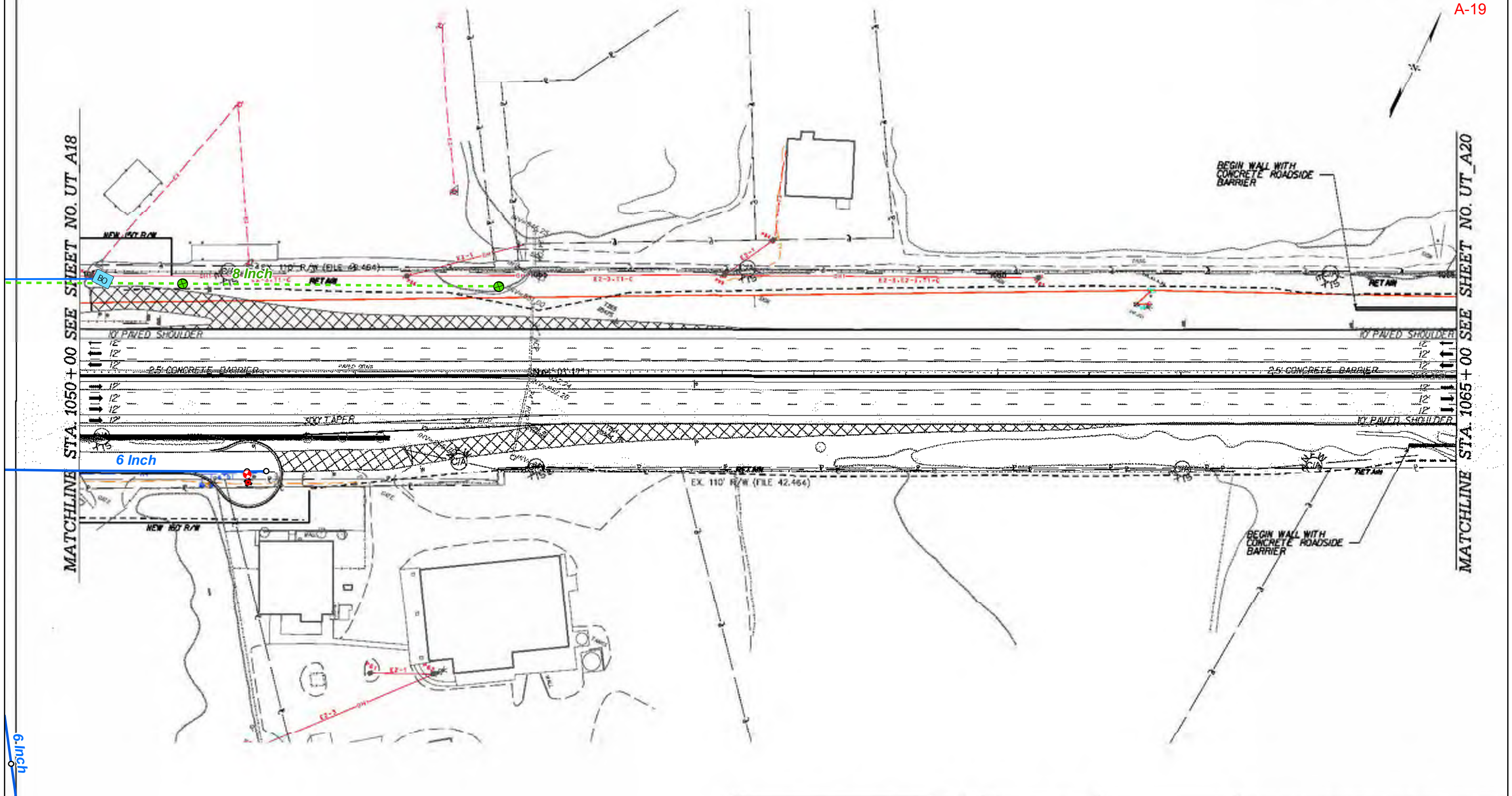
SWSD gravity sewer for survey to pick

DATE	BY	SCALE	PROJECT	NO.
11/14	SC	AS SHOWN	10014	10014

A-19

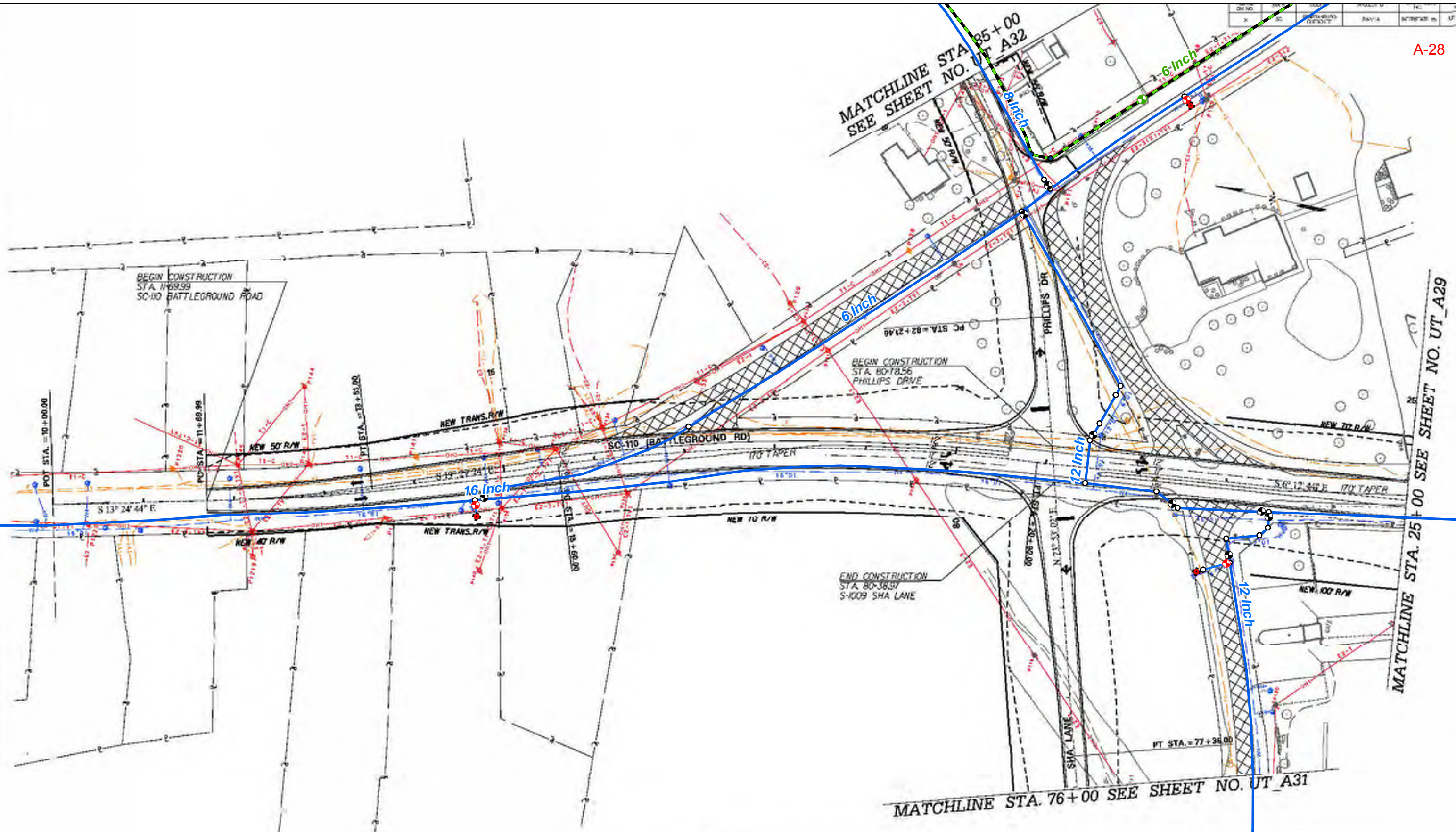
MATCHLINE STA. 1050 + 00 SEE SHEET NO. UT_A18

MATCHLINE STA. 1065 + 00 SEE SHEET NO. UT_A20



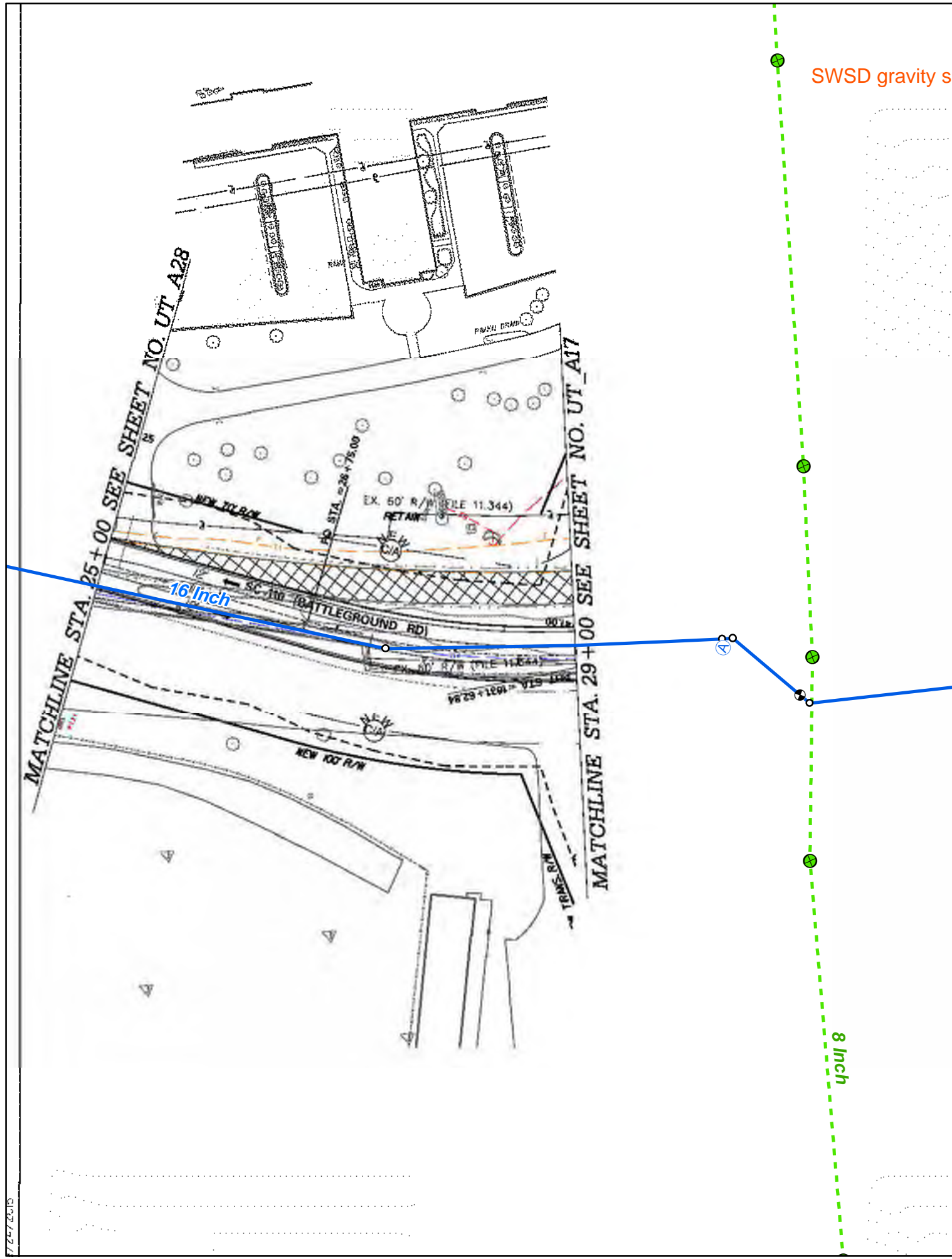
<p>PRELIMINARY NOT FOR CONSTRUCTION</p> <p>SCALE: 1" = 60'</p>	7				SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION INTERSTATE 85
	6				
	5				UTILITY PLAN SHEET
	4				INTERSTATE 85 MILE MARKER 80-96 SEGMENT A
	3				
	2				
	1				

6 inch

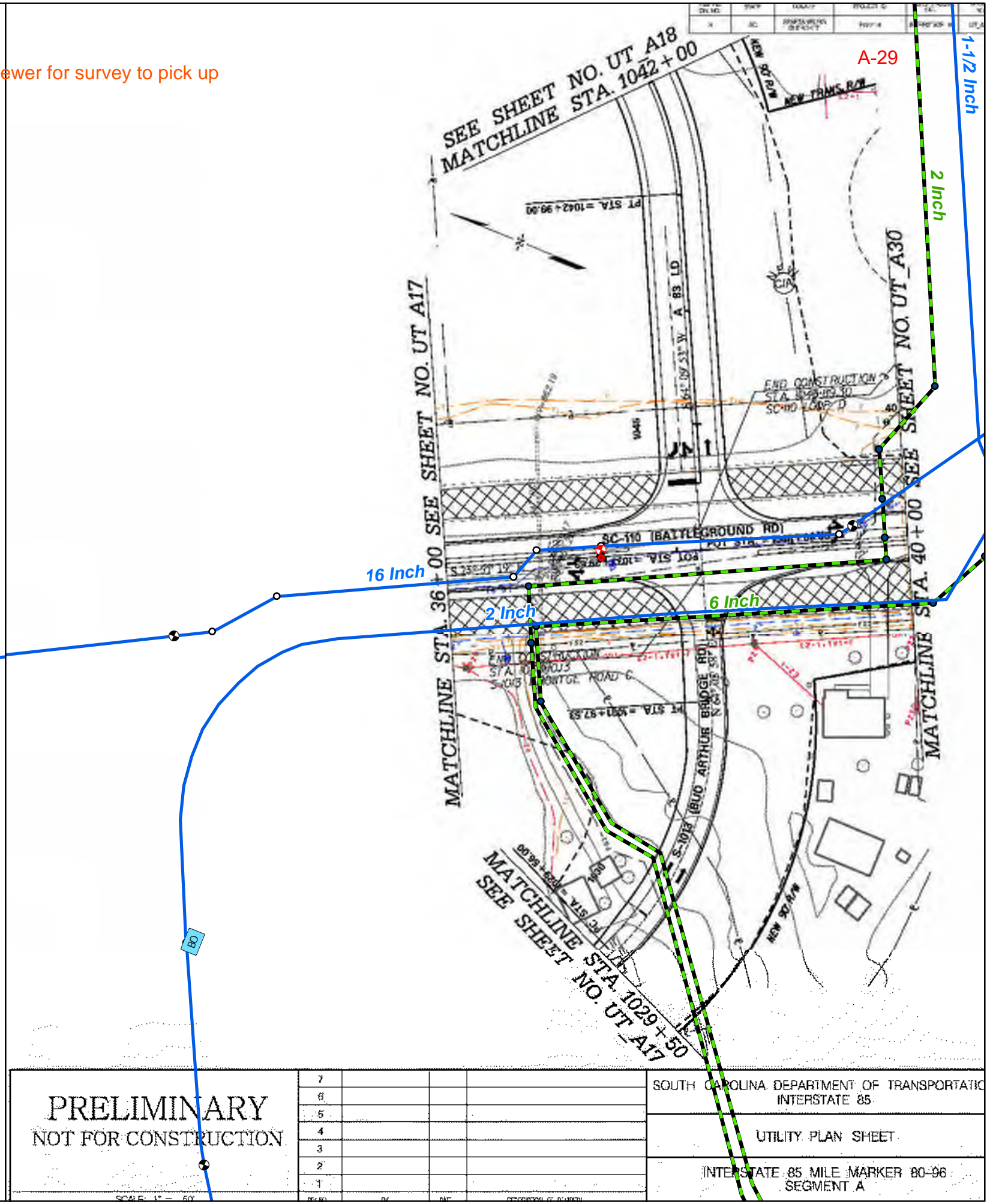


PRELIMINARY NOT FOR CONSTRUCTION	7				SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION INTERSTATE 85
	6				
	5				UTILITY PLAN SHEET
	4				INTERSTATE 85 MILE MARKER 80-96 SEGMENT A
	3				
	2				
	1				
	0				

72472315



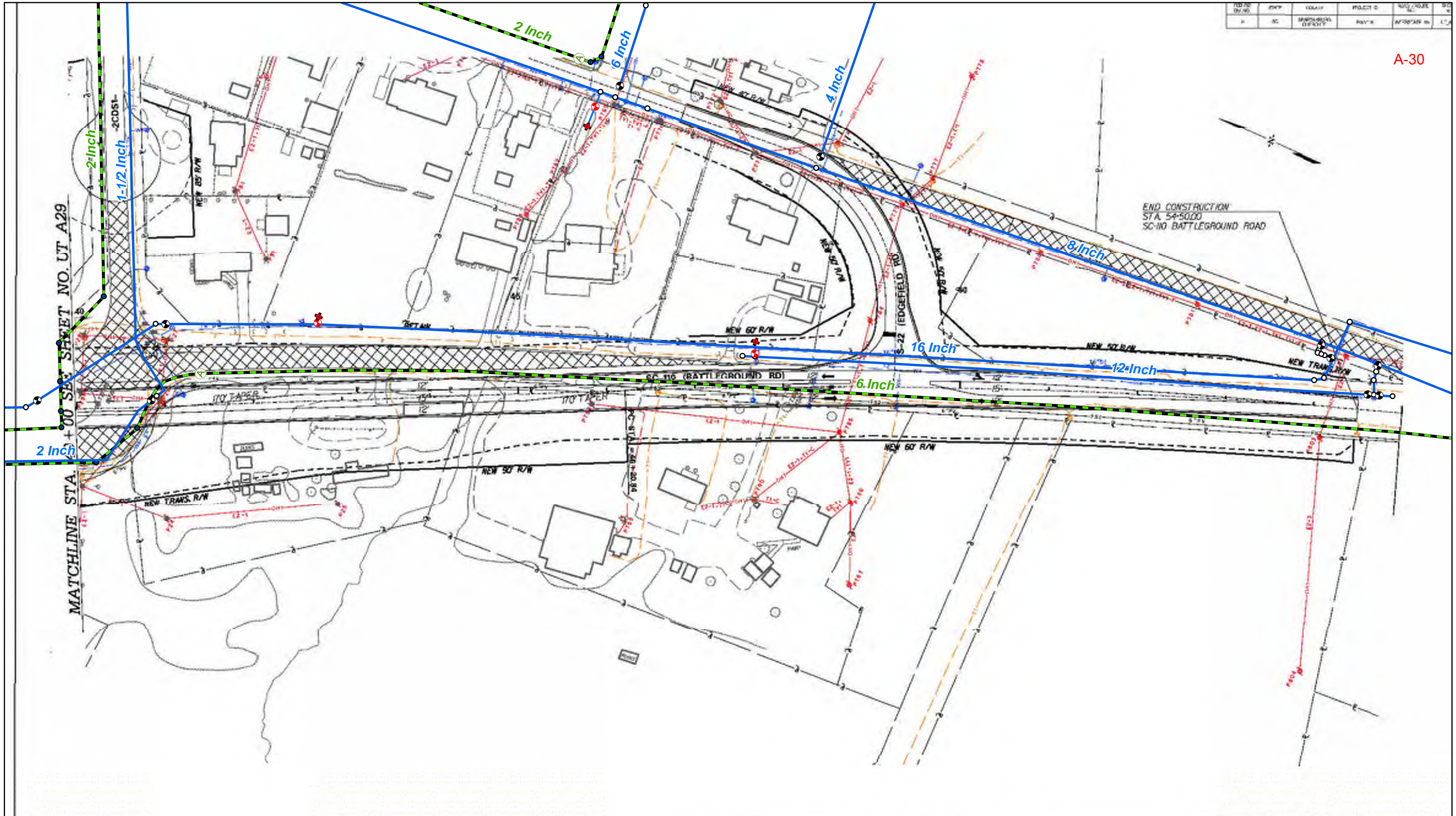
SWSD gravity sewer for survey to pick up



PRELIMINARY NOT FOR CONSTRUCTION	7				SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION INTERSTATE 85
	6				
	5				INTERSTATE 85 MILE MARKER 80-96 SEGMENT A
	4				
	3				
	2				
	1				

NO.	DATE	BY	PROJECT	SCALE
1	SC	SPROCKERS	PROJ	AS SHOWN

A-30



END CONSTRUCTION
STA. 54+50.00
SC-NO BATTLEGROUND ROAD

MATCHLINE STA. +00 SEE SHEET NO. UT A29

<p>PRELIMINARY NOT FOR CONSTRUCTION</p>	7				<p>SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION INTERSTATE 85</p> <p>UTILITY PLAN SHEET</p> <p>INTERSTATE 85 MILE MARKER 80-96 SEGMENT A</p>
	6				
	5				
	4				
	3				
2					
1					

07/2/25

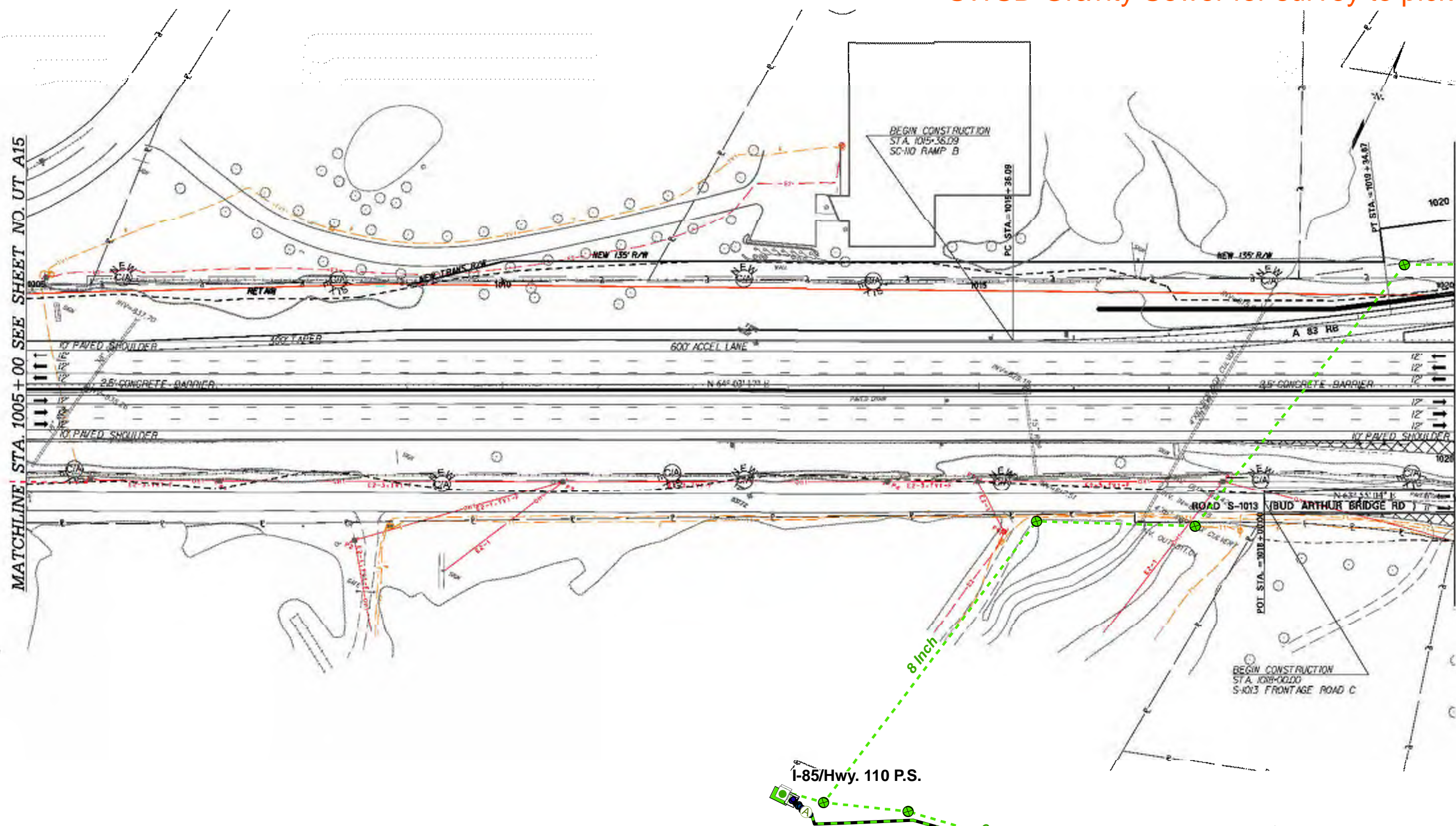
PROJECT NO.	STATE	COUNTY	PROJECT D.	SECTION	SHEET NO.
1015	SC	SPARTANBURG	INTERSTATE 85	80-06	UT_A16

SWSD Gravity Sewer for survey to pick up

A-16

MATCHLINE STA. 1005+00 SEE SHEET NO. UT_A15

MATCHLINE STA. 1020+00 SEE SHEET NO. UT_A17



I-85/Hwy. 110 P.S.

8 Inch

6 Inch

<p>PRELIMINARY NOT FOR CONSTRUCTION</p>	7		<p>SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION INTERSTATE 85</p>
	6		
	5		
4			UTILITY PLAN SHEET
3			
2			
1			INTERSTATE 85 MILE MARKER 80-06 SEGMENT A

9/27/20

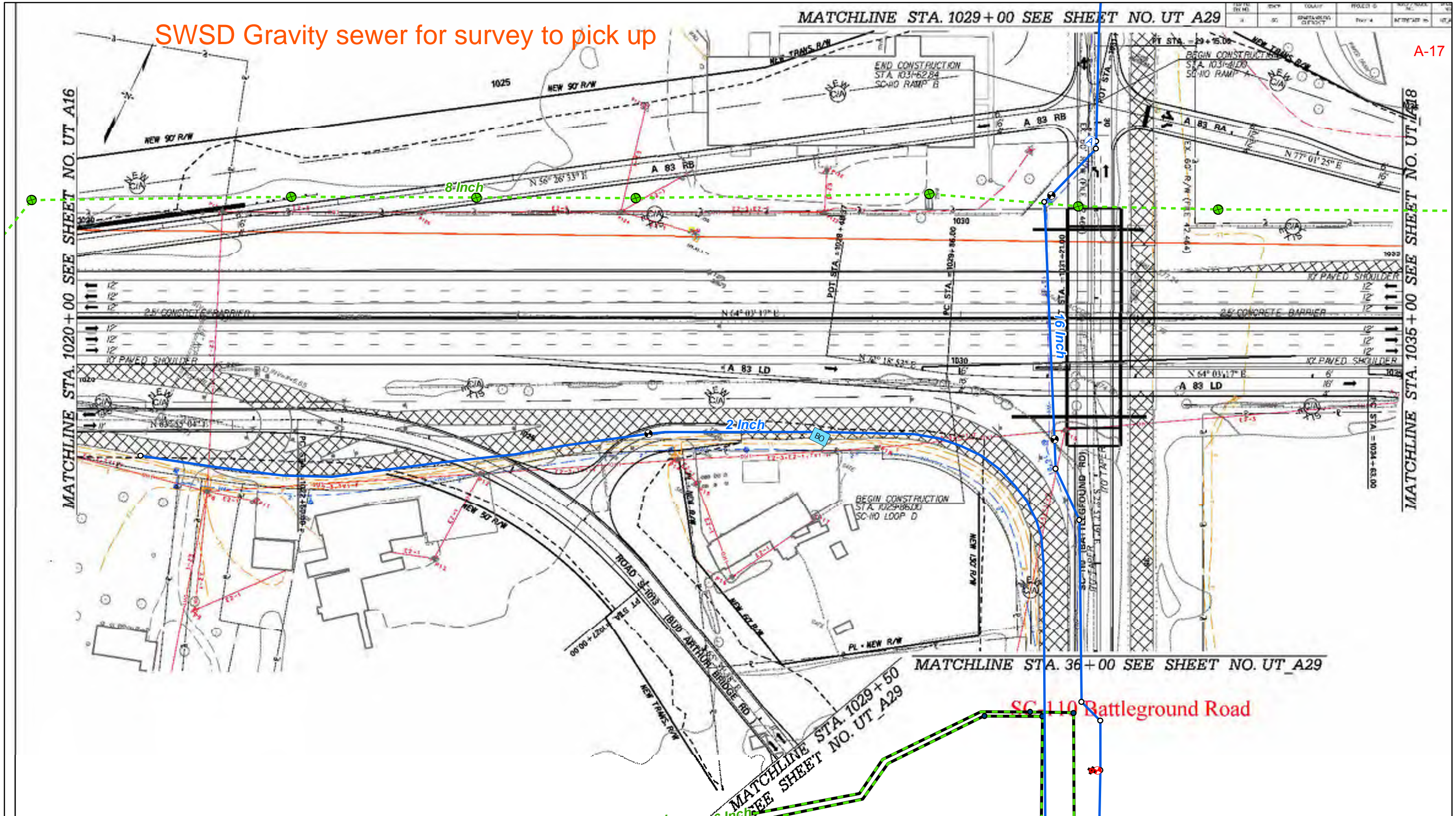
SWSD Gravity sewer for survey to pick up

MATCHLINE STA. 1029+00 SEE SHEET NO. UT A29

A-17

MATCHLINE STA. 1020+00 SEE SHEET NO. UT A16

MATCHLINE STA. 1035+00 SEE SHEET NO. UT A18



MATCHLINE STA. 36+00 SEE SHEET NO. UT A29

PRELIMINARY
NOT FOR CONSTRUCTION

7			
6			
5			
4			
3			
2			
1			

SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION
INTERSTATE 85
UTILITY PLAN SHEET
INTERSTATE 85 MILE MARKER 80-96
SEGMENT A

3725-10-10

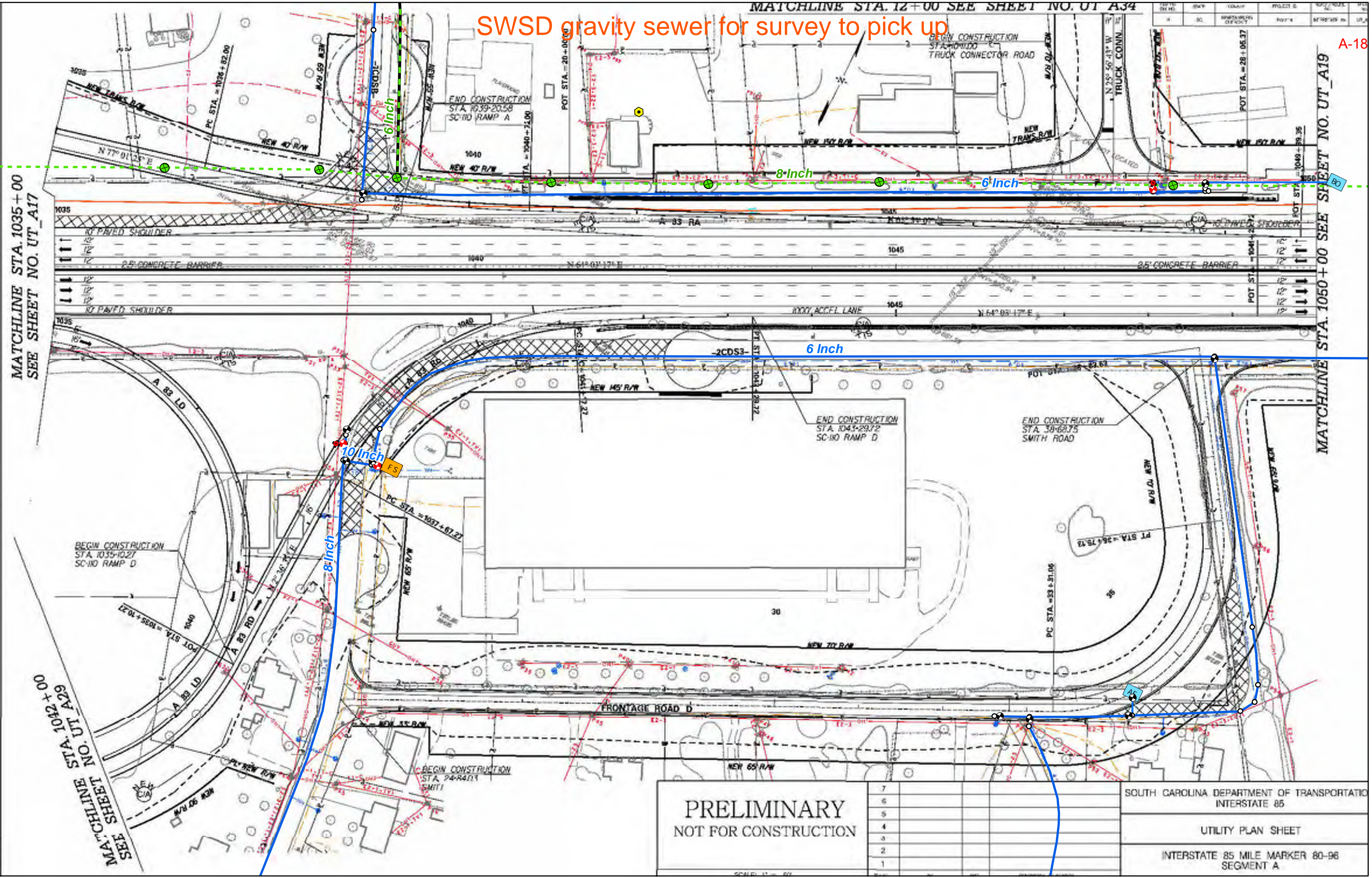
NO.	DATE	BY	REVISION
1			
2			
3			
4			
5			
6			
7			

SWSD gravity sewer for survey to pick up

A-18

MATCHLINE STA. 1035+00
SEE SHEET NO. UT_A17

MATCHLINE STA. 1050+00 SEE SHEET NO. UT_A19



PRELIMINARY
NOT FOR CONSTRUCTION

SCALE: 1" = 40'

7			
6			
5			
4			
3			
2			
1			

SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION
INTERSTATE 85

UTILITY PLAN SHEET

INTERSTATE 85 MILE MARKER 80-96
SEGMENT A

17/2/2023

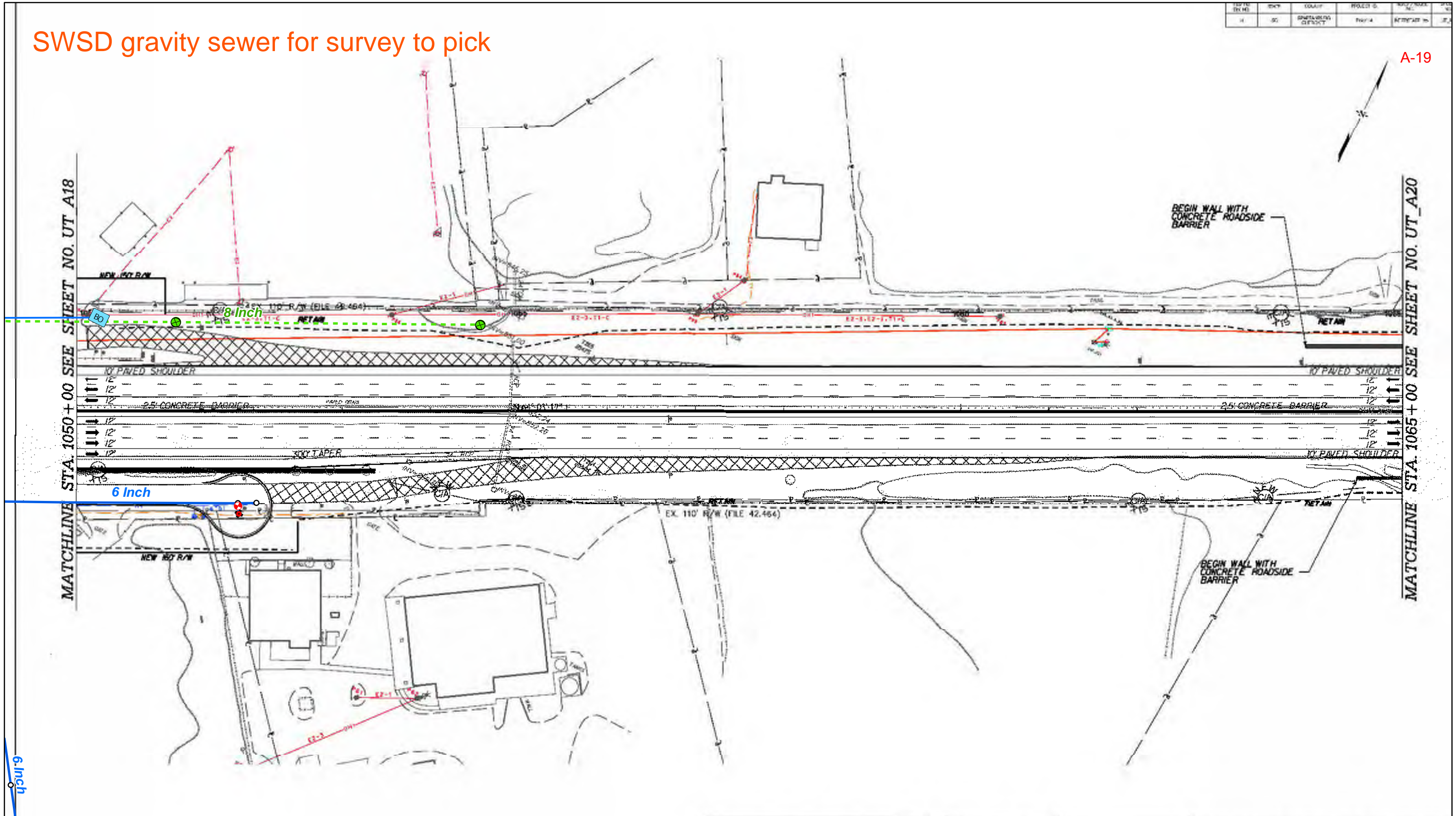
SWSD gravity sewer for survey to pick

DATE	BY	SCALE	PROJECT	SHEET NO.
11/14	SC	AS SHOWN	FILE 4	19

A-19

MATCHLINE STA. 1050 + 00 SEE SHEET NO. UT_A18

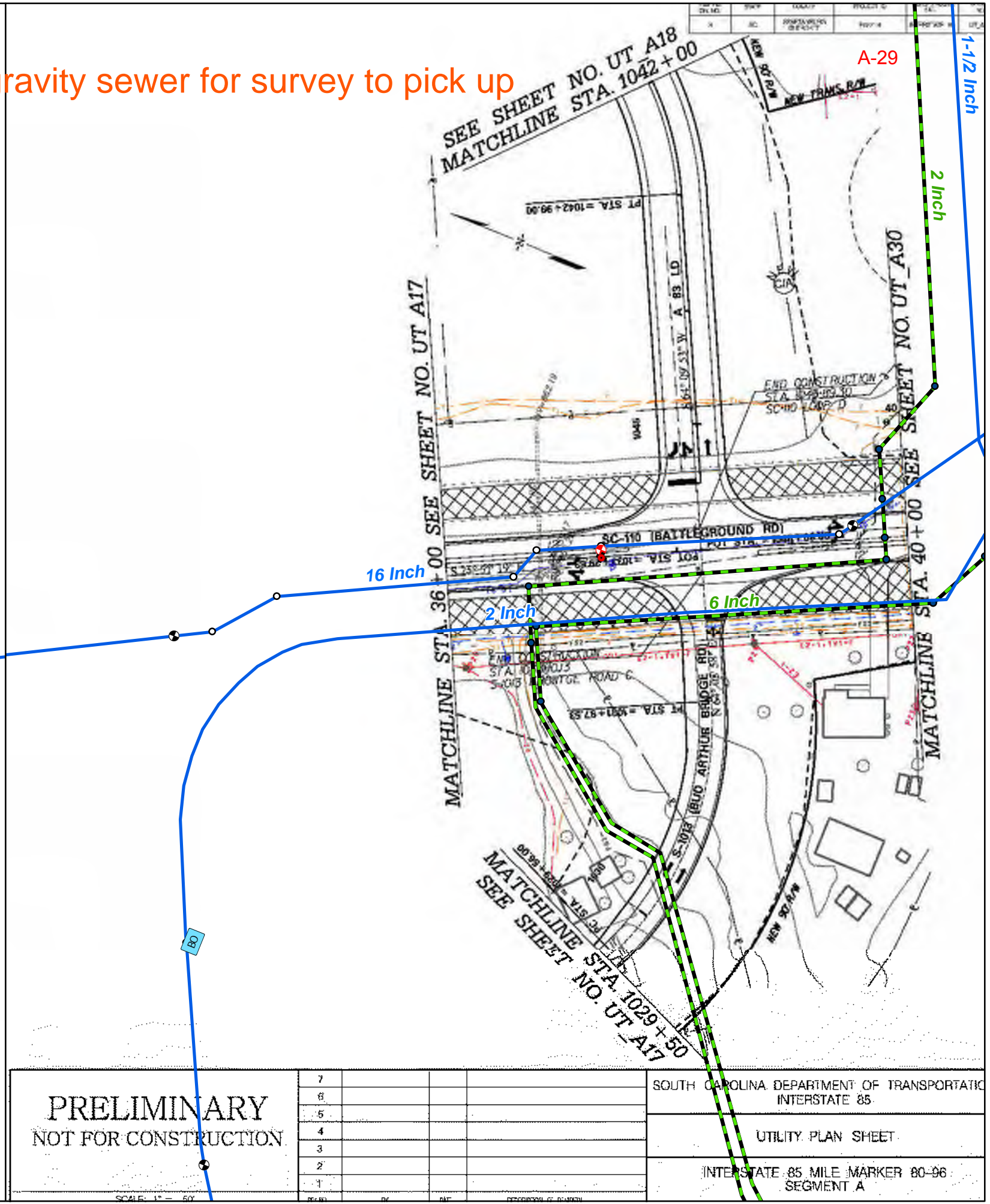
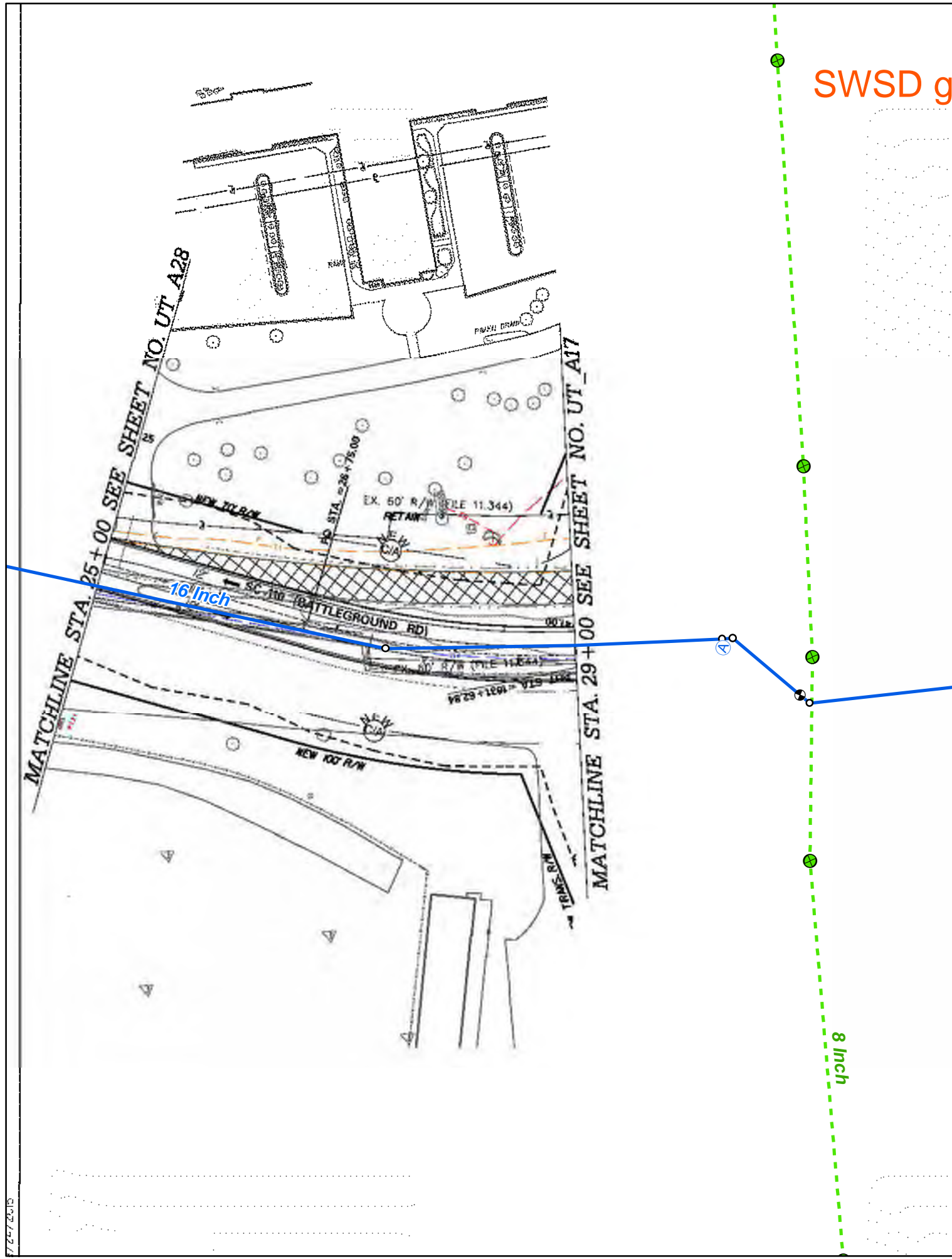
MATCHLINE STA. 1065 + 00 SEE SHEET NO. UT_A20



<p>PRELIMINARY NOT FOR CONSTRUCTION</p> <p>SCALE: 1" = 60'</p>	7				SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION INTERSTATE 85
	6				
	5				UTILITY PLAN SHEET
	4				INTERSTATE 85 MILE MARKER 80-96 SEGMENT A
	3				
	2				
	1				

6 inch

SWSD gravity sewer for survey to pick up



SCDOT I-85 Widening MM 80 to 96 Spartanburg/Cherokee County - Comments to Draws RE Spartanburg
Water Water/Sewer Utilities

11/20/2015 EMAIL

Sheet A6 – Waterline not shown. Please show.

Sheet A7 – Only a portion of the waterline is shown. From where the 16” waterline stops on the sheet, on the south side of the interstate, our line continues to the west. Also it may be intentional, but the waterline is also not shown crossing I-85, which it does.

Sheet A8 – No comments

Sheet A9 – No comments

Sheet A10 – Waterline not shown. Please show. This sheet should show two crossings of I-85, include an 8” and a 16”. This also begins a portion of the 16” waterline (south of I-85) that is in our own easement (outside of SCDOT R/W)

Sheet A11 – Waterline not shown. Please show. A portion of the new SCDOT R/W at approximately Sta 942+45, overlaps our existing waterline easement.

Sheet A12 – Waterline not shown. Please show.

Sheet A13 – Waterlines not shown. Please show. This sheet begins a 12” waterline on the north side of I-85, that crosses I-85 and ties to our 16” waterline that is also not shown. Our 16” waterline and easement stops on this sheet and our line returns to the SCDOT R/W.

Sheet A14 – No comments

Sheet A15 – No comments

Sheet A16 – Our sewer infrastructure is not shown on this sheet. Please show. We have an 8” gravity sewer that runs cross country into the Bud Arthur Bridge Rd R/W, south of I-85, parallels Bud Arthur Bridge Rd for a couple hundred feet, and then crosses I-85.

Sheet A17- No comments on waterlines on this sheet. Sewer Infrastructure is not shown. Please show. We have an 8” gravity sewer that runs parallel to I-85, crossing entrance ramp on north side of I-85

Sheet A18 – No comments on waterlines on this sheet. Sewer running east/west along I-85 not shown. Please show. 6” sewer force main, across new cul-de-sac (running north/south) appears to be shown correctly.

Sheet A19 – No comments on waterline on this sheet. Sewer not shown. Please show. We have an 8” gravity sewer that runs east/west parallel to I-85 for a portion of this sheet.

Sheet A28 – No comments on waterline on this sheet. 6” sewer force main appears ok as well.

Sheet A29 – No comments on waterline on this sheet. Only 1 force main is shown running north/south across Bud Arthur Bridge Rd and we have two. Please show additional force main.

Sheet A30 – No comments

General Comment – Will sizes be added to the sheets?

Please let me know if you have any questions.

Thanks,

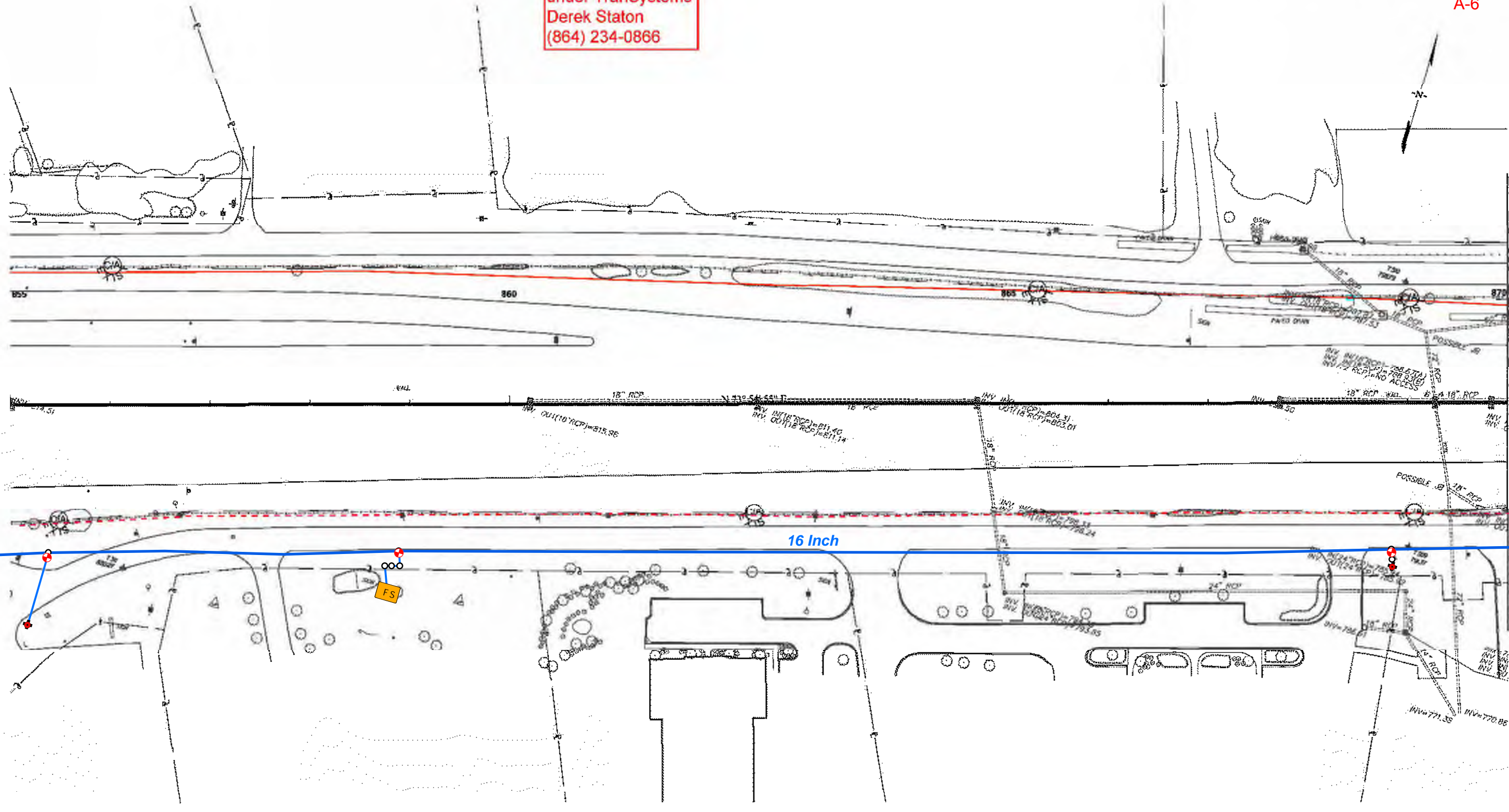
Kevin Smith, PE
Project Engineer

Spartanburg Water
175 N. Liberty Street
Spartanburg, SC 29306
Phone: (864) 580-5649
ksmith@spartanburgwater.org

DATE	BY	REVISION	PROJECT	SHEET
11/14/18	BC	ISSUED FOR PERMIT	Interstate 85	A-6

Utility Coordination
under TranSystems
Derek Staton
(864) 234-0866

A-6



MATCHLINE STA. 870+00 SEE SHEET NO. UT_A7

PRELIMINARY NOT FOR CONSTRUCTION	7			SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION INTERSTATE 85 UTILITY PLAN SHEET INTERSTATE 85 MILE MARKER 80-96 SEGMENT A
	6			
	6			
	4			
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11/14/18

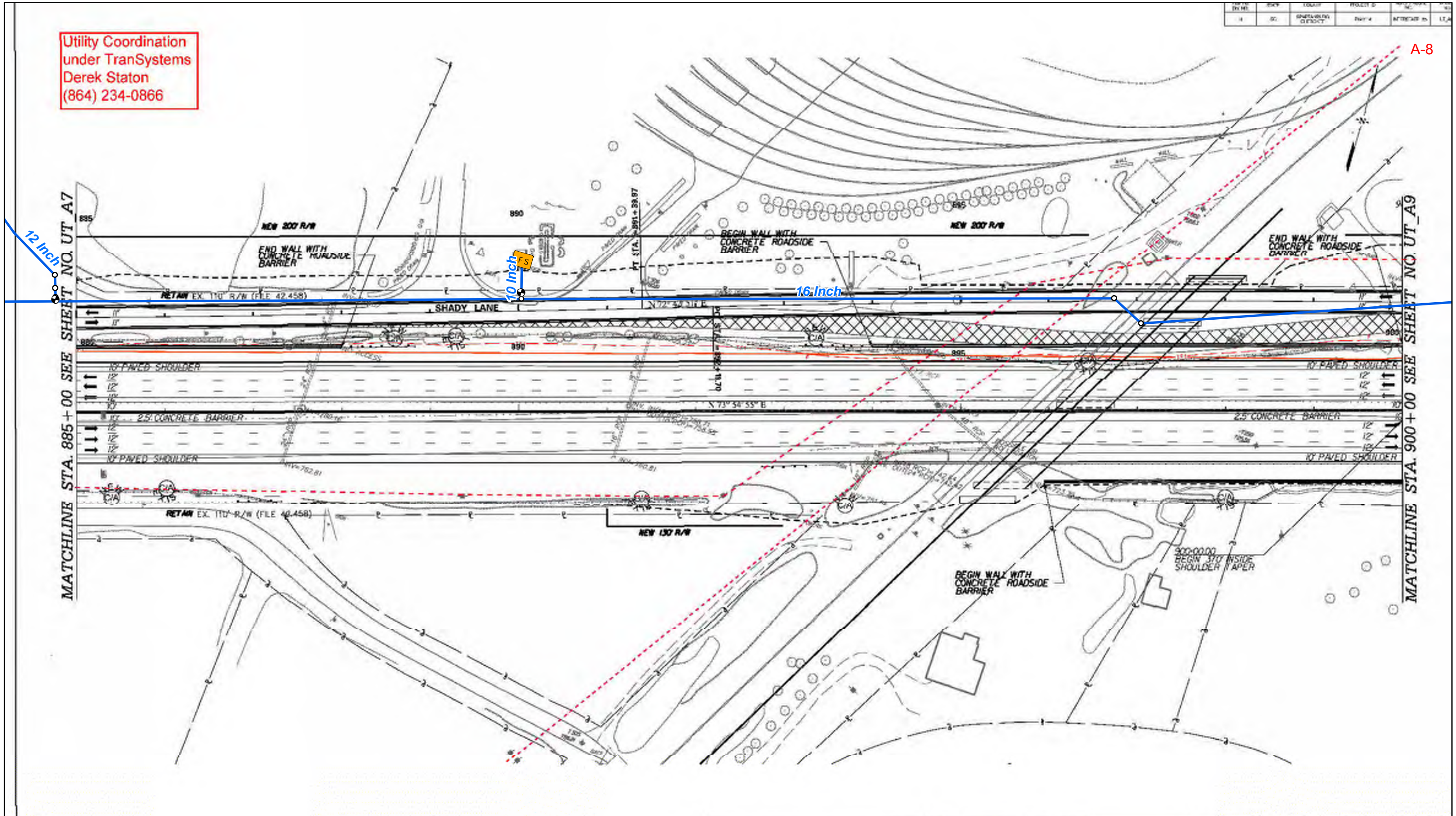
Utility Coordination
 under TranSystems
 Derek Staton
 (864) 234-0866

DATE	BY	GROUP	PROJECT	SCALE	NO.
11/14/11	DC	SAFETY/UTILITY	Inter 85	1/4" = 1'	11.4

A-8

MATCHLINE STA. 885 + 00 SEE SHEET NO. UT_A7

MATCHLINE STA. 900 + 00 SEE SHEET NO. UT_A9



PRELIMINARY NOT FOR CONSTRUCTION	7				SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION INTERSTATE 85 UTILITY PLAN SHEET INTERSTATE 85 MILE MARKER 80-96 SEGMENT A
	6				
	5				
	4				
	3				
	2				
	1				

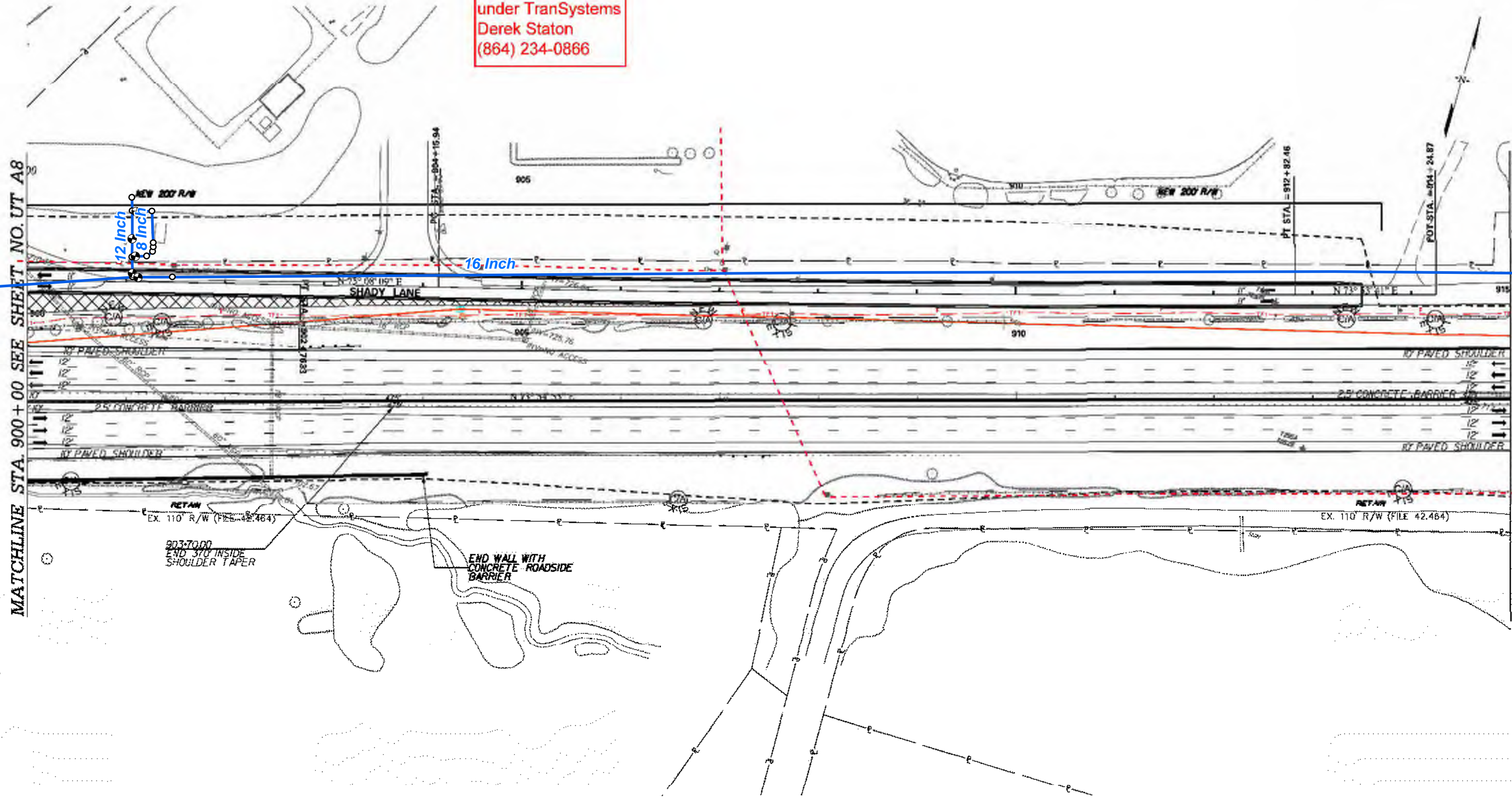
11/21/11

DATE	BY	SCALE	PROJECT	NO.
11/11/16	DC	AS SHOWN	INTERSTATE 85	UT_09

Utility Coordination
under TranSystems
Derek Staton
(864) 234-0866

MATCHLINE STA. 900+00 SEE SHEET NO. UT_A8

MATCHLINE STA. 915+00 SEE SHEET NO. UT_A10

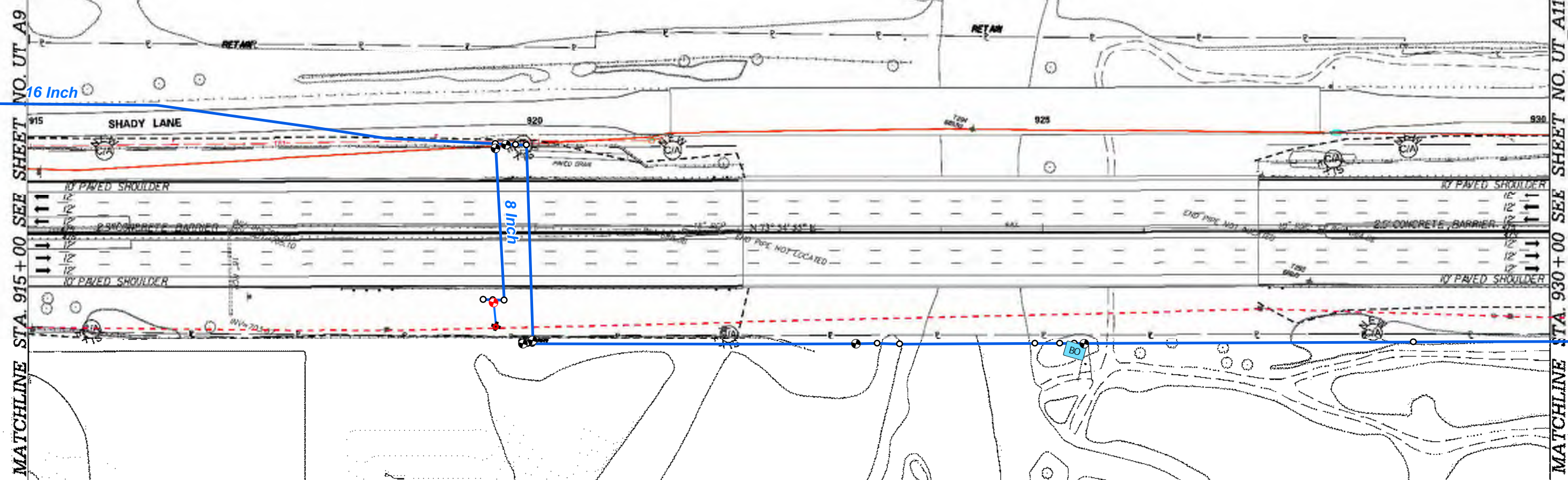


<p>PRELIMINARY NOT FOR CONSTRUCTION</p>	7				<p>SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION INTERSTATE 85</p>
	6				
	6				
	4				
	3				UTILITY PLAN SHEET
	2				<p>INTERSTATE 85 MILE MARKER 80-96 SEGMENT A</p>
	1				

DATE	BY	CHKD	LODGE	PROJECT	SHEET NO.	TOTAL SHEETS
11/15/16	DC			INTERSTATE 85	A-10	10

Utility Coordination
under TranSystems
Derek Staton
(864) 234-0866

Pacolet River



<p>PRELIMINARY NOT FOR CONSTRUCTION</p>	7				<p>SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION INTERSTATE 85</p> <p>UTILITY PLAN SHEET</p> <p>INTERSTATE 85 MILE MARKER 80-96 SEGMENT A</p>
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11/21/2016

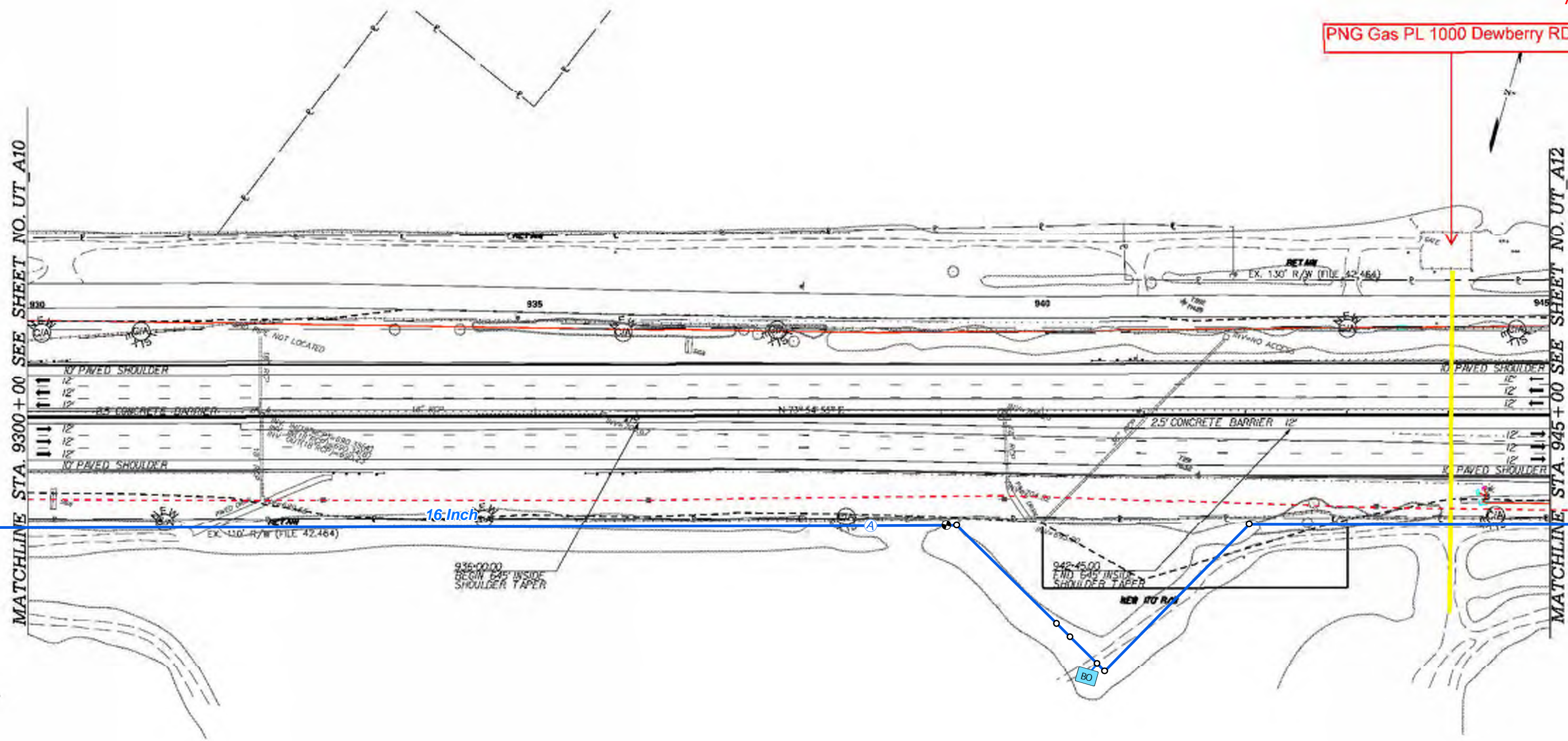
DATE	BY	SCALE	PROJECT	NO.	REV.
11/11/11

A-111

PNG Gas PL 1000 Dewberry RD

MATCHLINE STA. 9300 + 00 SEE SHEET NO. UT_A10

MATCHLINE STA. 945 + 00 SEE SHEET NO. UT_A12



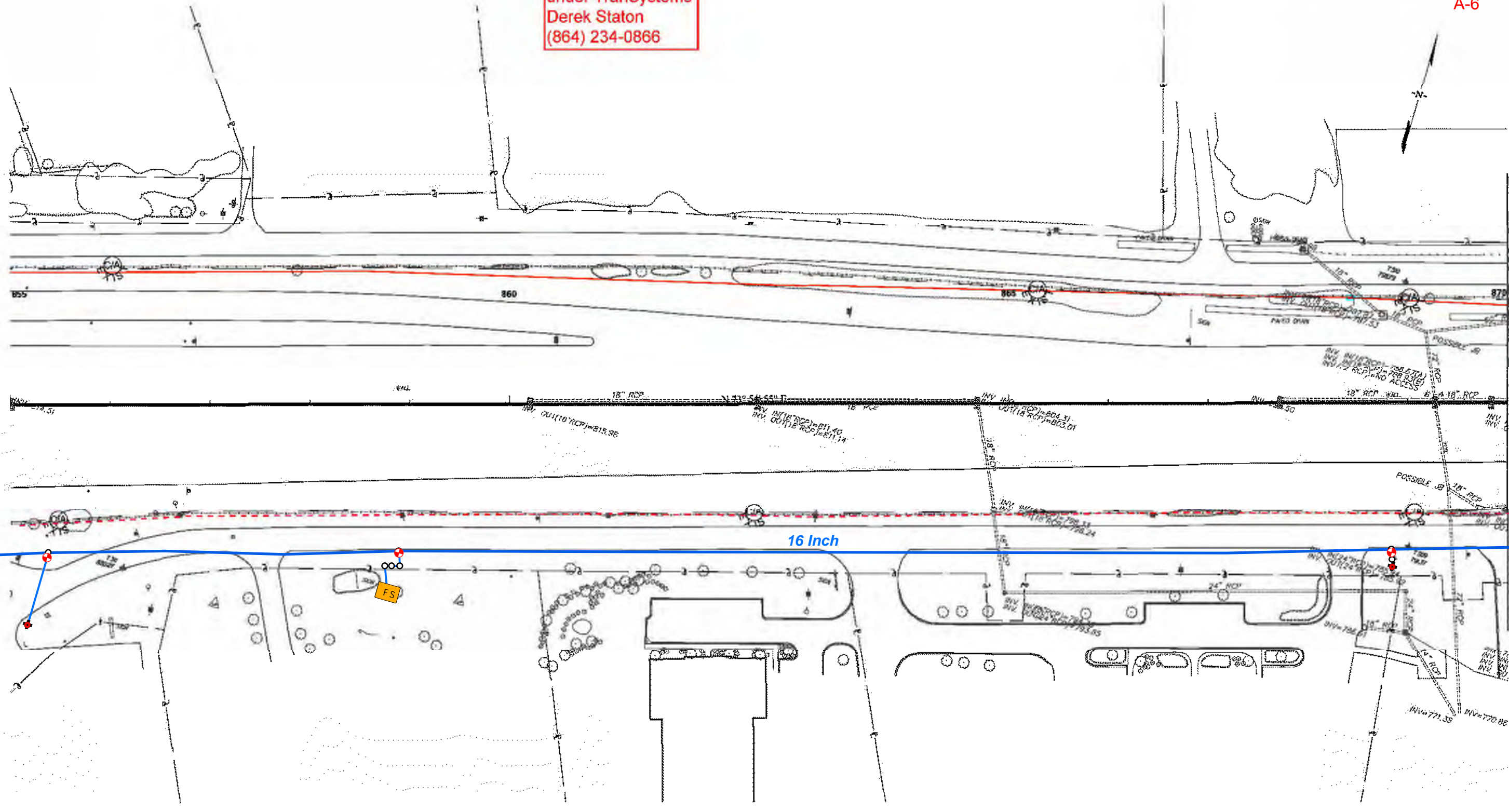
<p>PRELIMINARY NOT FOR CONSTRUCTION</p>	7				<p>SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION INTERSTATE 85</p> <p>UTILITY PLAN SHEET</p> <p>INTERSTATE 85 MILE MARKER 80-96 SEGMENT A</p>
	6				
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	1				

1/24/12

DATE	BY	REVISION	PROJECT	SHEET
11/14/18	BC	ISSUED FOR PERMIT	Interstate 85	A-6

Utility Coordination
under TranSystems
Derek Staton
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A-6



MATCHLINE STA. 870+00 SEE SHEET NO. UT_A7

PRELIMINARY NOT FOR CONSTRUCTION	7			SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION INTERSTATE 85 UTILITY PLAN SHEET INTERSTATE 85 MILE MARKER 80-96 SEGMENT A
	6			
	6			
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11/14/18

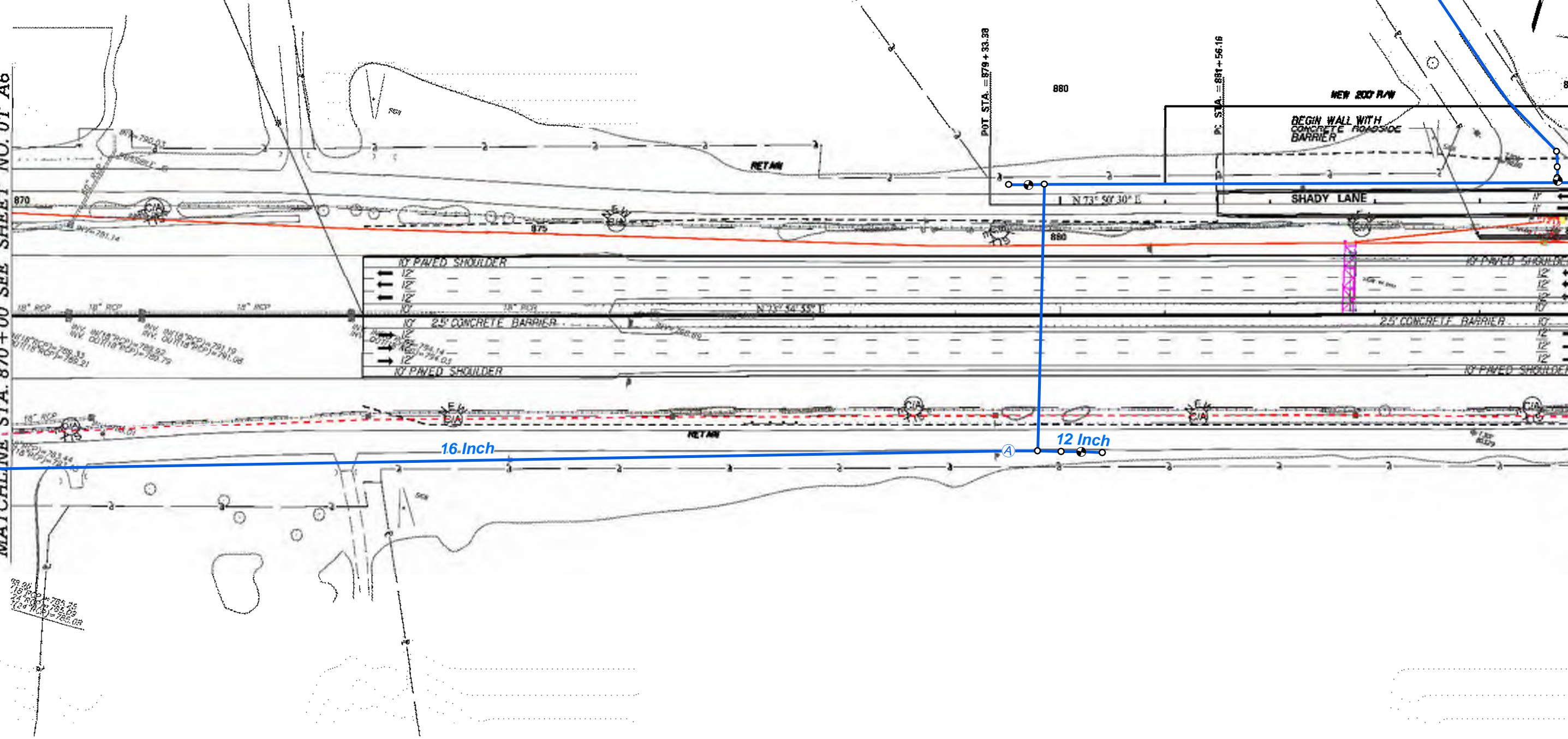
Utility Coordination
under TranSystems
Derek Staton
(864) 234-0866

DATE	BY	REVISION	DESCRIPTION

MATCHLINE STA. 870+00 SEE SHEET NO. UT_A6

MATCHLINE STA. 885+00 SEE SHEET NO. UT_A8

BEGIN CONSTRUCTION
STA. 873+55.00
I-85 SEGMENT A



PRELIMINARY
NOT FOR CONSTRUCTION

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SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION
INTERSTATE 85
UTILITY PLAN SHEET
INTERSTATE 85 MILE MARKER 80-96
SEGMENT A

872572015

Utility Coordination
 under TranSystems
 Derek Staton
 (864) 234-0866

DATE	BY	GROUP	PROJECT	SCALE
11/14/11	DC	ROADSIDE	Inter 85	1"=40'

A-8

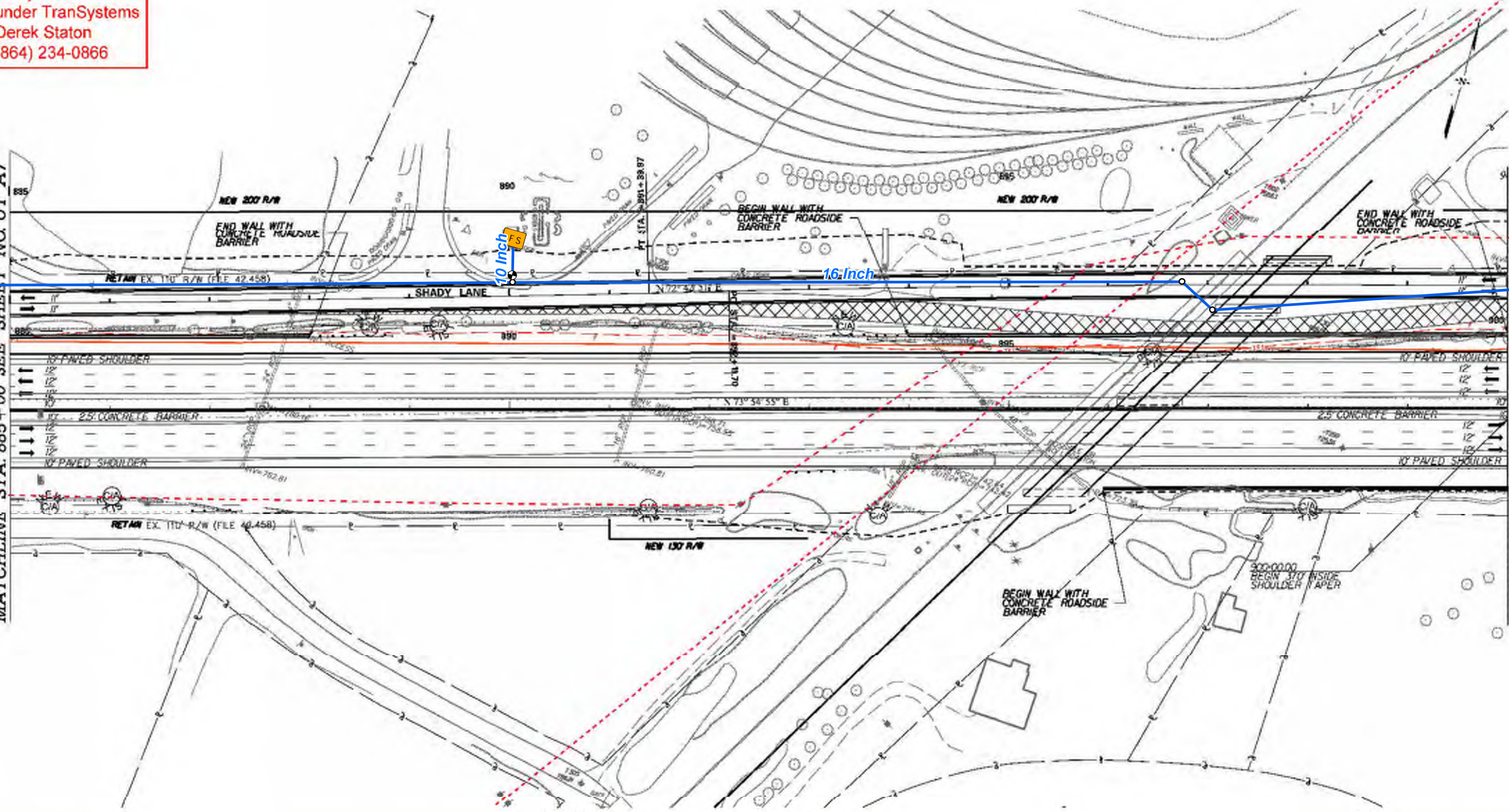
MATCHLINE STA. 885 + 00 SEE SHEET NO. UT_A7

MATCHLINE STA. 900 + 00 SEE SHEET NO. UT_A9

12 Inch

10 Inch

16 Inch



PRELIMINARY
 NOT FOR CONSTRUCTION

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4			
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SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION
 INTERSTATE 85
 UTILITY PLAN SHEET
 INTERSTATE 85 MILE MARKER 80-96
 SEGMENT A

11/21/2011

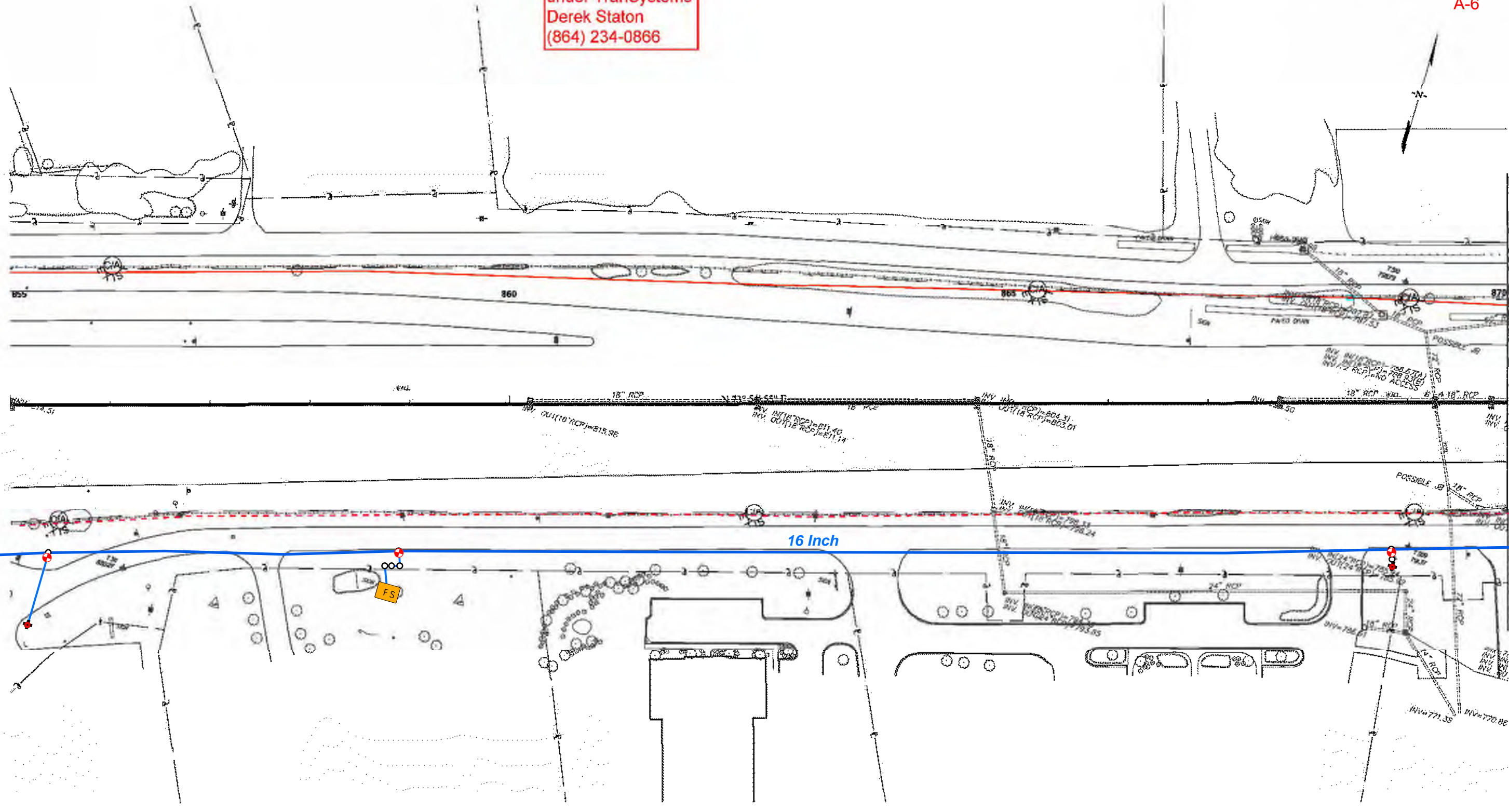
SCALE: 1" = 40'

REVISIONS

DATE	BY	REVISION	PROJECT	SHEET NO.
11/14/18	BC	ISSUED FOR PERMIT	Interstate 85	A-6

Utility Coordination
under TranSystems
Derek Staton
(864) 234-0866

A-6



MATCHLINE STA. 870+00 SEE SHEET NO. UT_A7

<p>PRELIMINARY NOT FOR CONSTRUCTION</p>	7				<p>SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION INTERSTATE 85</p> <p>UTILITY PLAN SHEET</p> <p>INTERSTATE 85 MILE MARKER 80-96 SEGMENT A</p>
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11/14/18

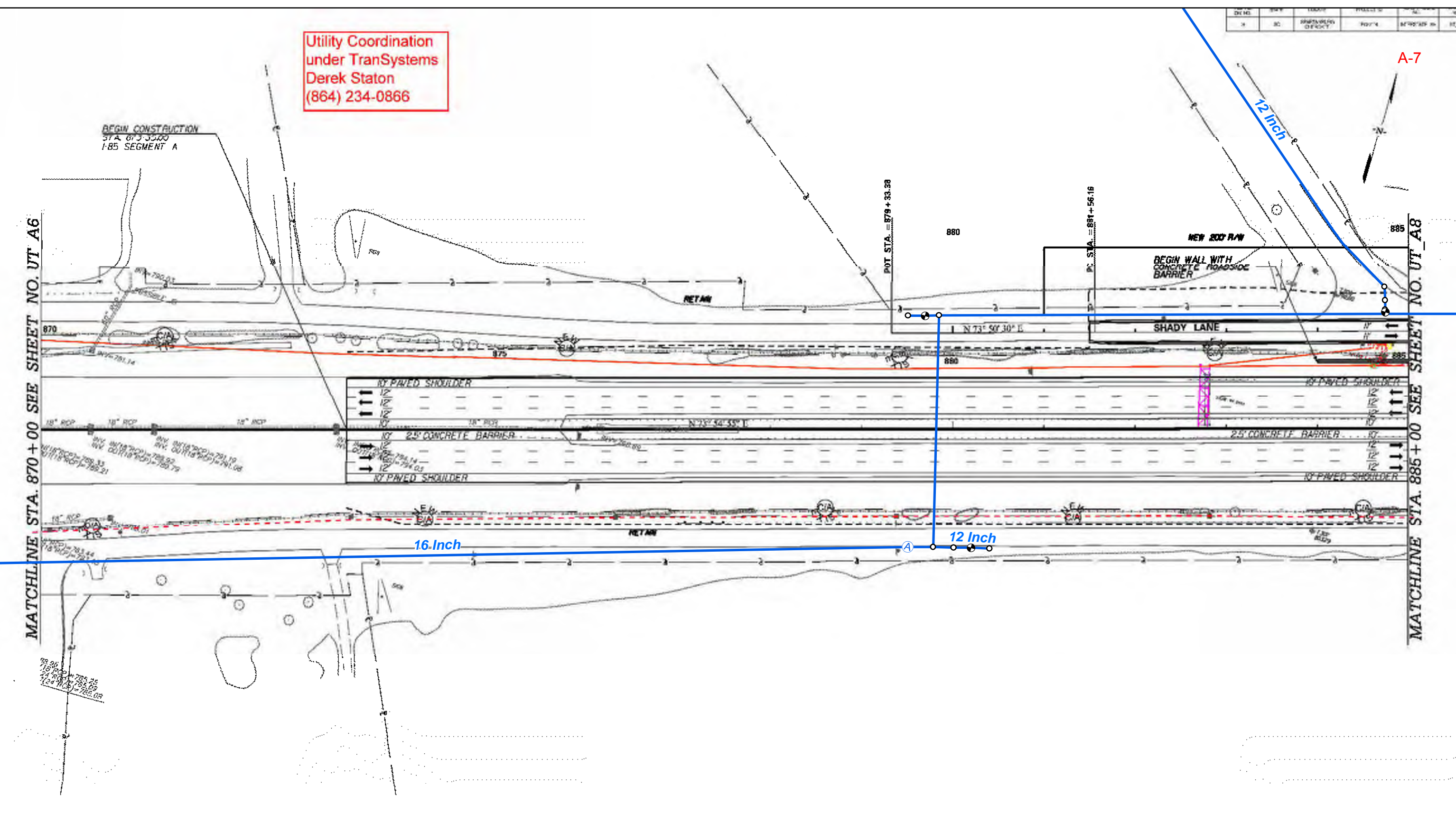
Utility Coordination
under TranSystems
Derek Staton
(864) 234-0866

DATE	BY	REVISION

MATCHLINE STA. 870+00 SEE SHEET NO. UT_A6

MATCHLINE STA. 885+00 SEE SHEET NO. UT_A8

BEGIN CONSTRUCTION
STA. 873+55.00
I-85 SEGMENT A



PRELIMINARY
NOT FOR CONSTRUCTION

7			
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SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION
INTERSTATE 85
UTILITY PLAN SHEET
INTERSTATE 85 MILE MARKER 80-96
SEGMENT A

172572015

Utility Coordination
 under TranSystems
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DATE	BY	GROUP	PROJECT	SCALE
11/14/11	DC	ROADSIDE	Inter 85	1"=40'

A-8

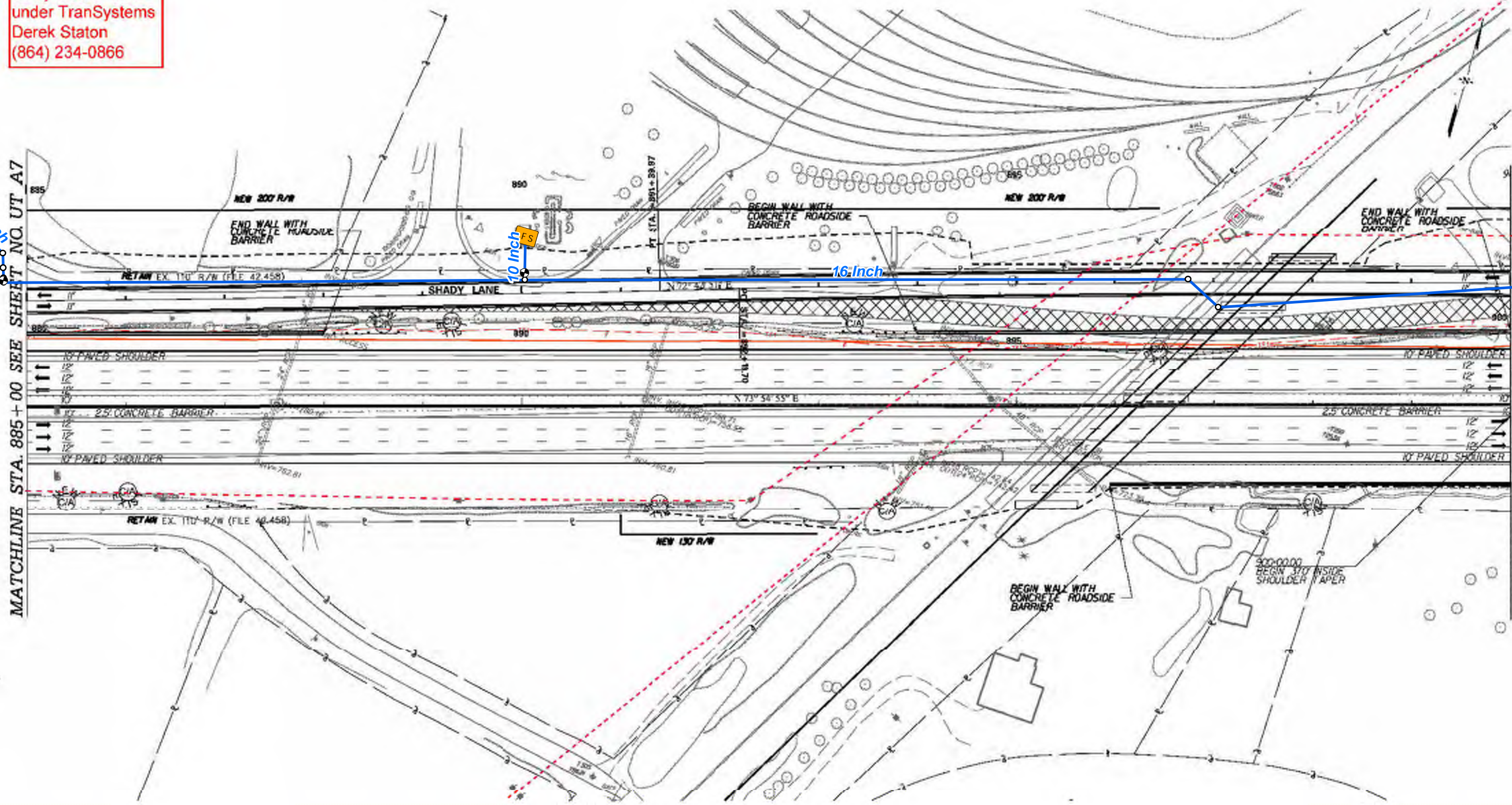
MATCHLINE STA. 885 + 00 SEE SHEET NO. UT_A7

MATCHLINE STA. 900 + 00 SEE SHEET NO. UT_A9

12 Inch

10 Inch

16 Inch



PRELIMINARY
 NOT FOR CONSTRUCTION

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SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION
 INTERSTATE 85
 UTILITY PLAN SHEET
 INTERSTATE 85 MILE MARKER 80-96
 SEGMENT A

11/21/11

SCALE: 1" = 40'

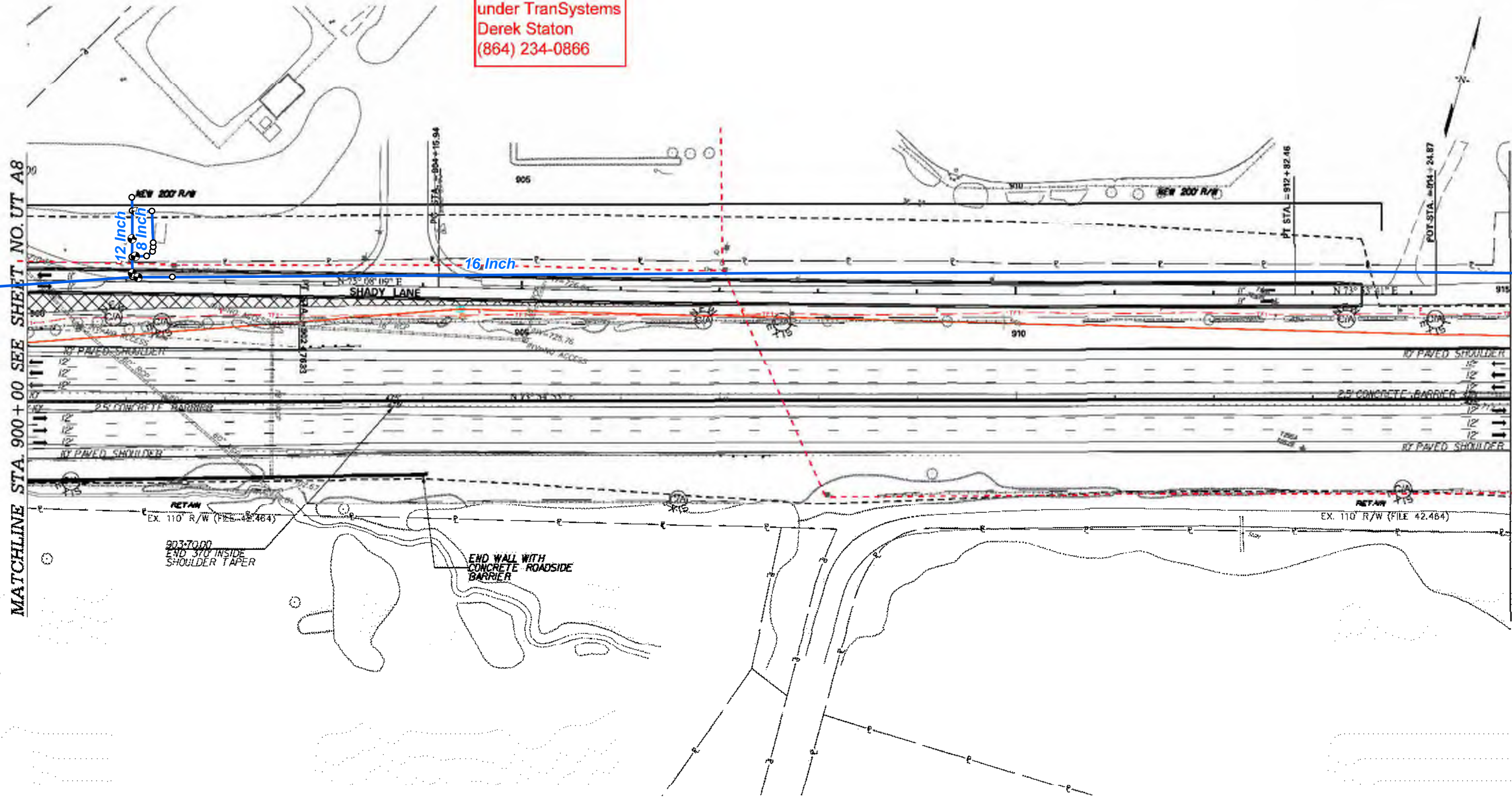
DATE	BY	SCALE	PROJECT	NO.
11	DC		INTERSTATE 85	UT_A9

A-9

Utility Coordination
under TranSystems
Derek Staton
(864) 234-0866

MATCHLINE STA. 900+00 SEE SHEET NO. UT_A8

MATCHLINE STA. 915+00 SEE SHEET NO. UT_A10



PRELIMINARY NOT FOR CONSTRUCTION	7				SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION INTERSTATE 85 UTILITY PLAN SHEET INTERSTATE 85 MILE MARKER 80-96 SEGMENT A
	6				
	6				
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11/24/2015

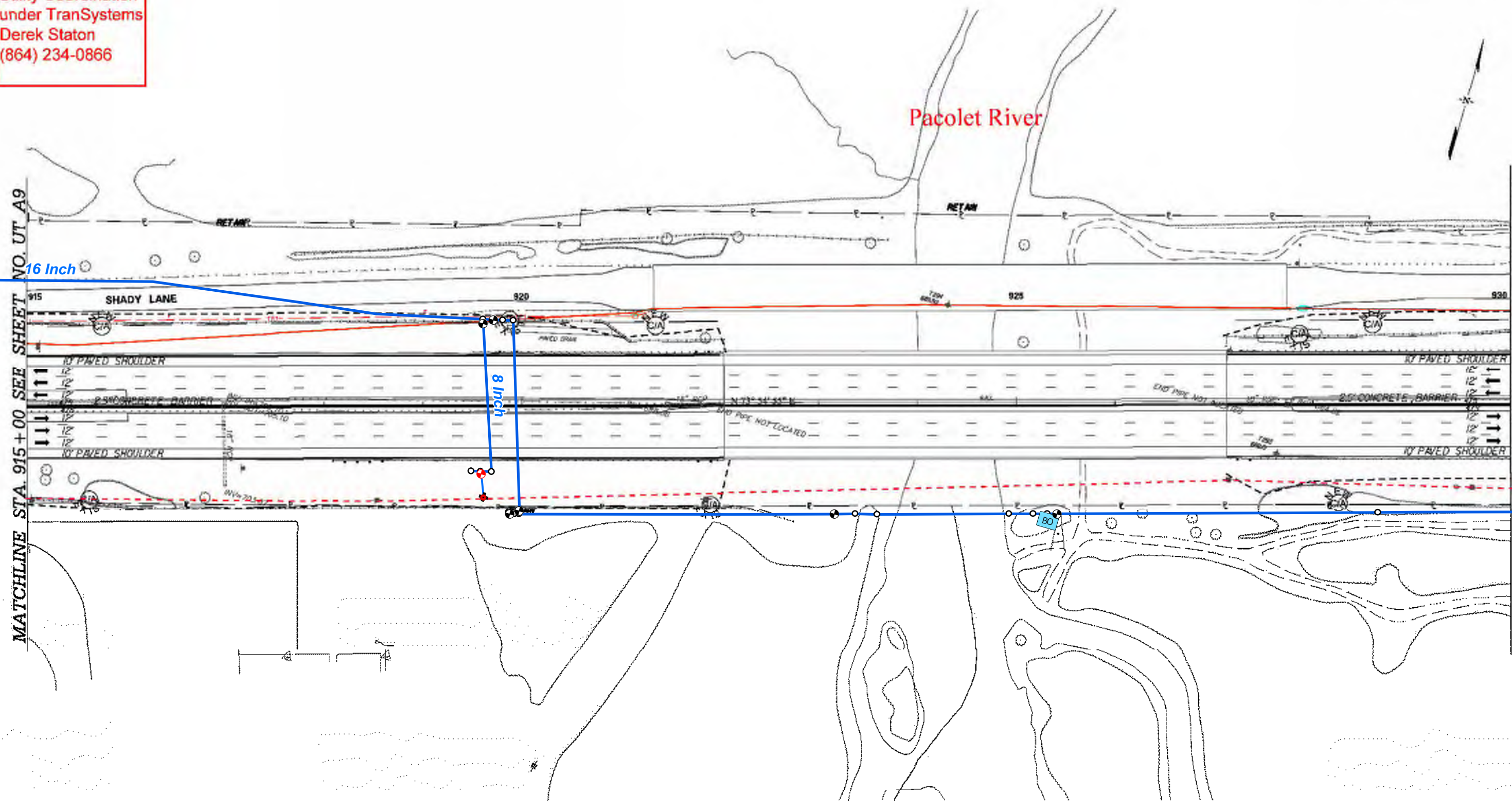
DATE	BY	CHKD	LODGE	PROJECT	SHEET NO.	TOTAL SHEETS
11/15/16	DC			INTERSTATE 85	A-10	10

Utility Coordination
under TranSystems
Derek Staton
(864) 234-0866

Pacolet River

MATCHLINE STA. 915 + 00 SEE SHEET NO. UT A9

MATCHLINE STA. 930 + 00 SEE SHEET NO. UT A11



<p>PRELIMINARY NOT FOR CONSTRUCTION</p>	7				<p>SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION INTERSTATE 85</p>
	6				
	6				
	4				
	3				UTILITY PLAN SHEET
	2				
	1				INTERSTATE 85 MILE MARKER 80-96 SEGMENT A

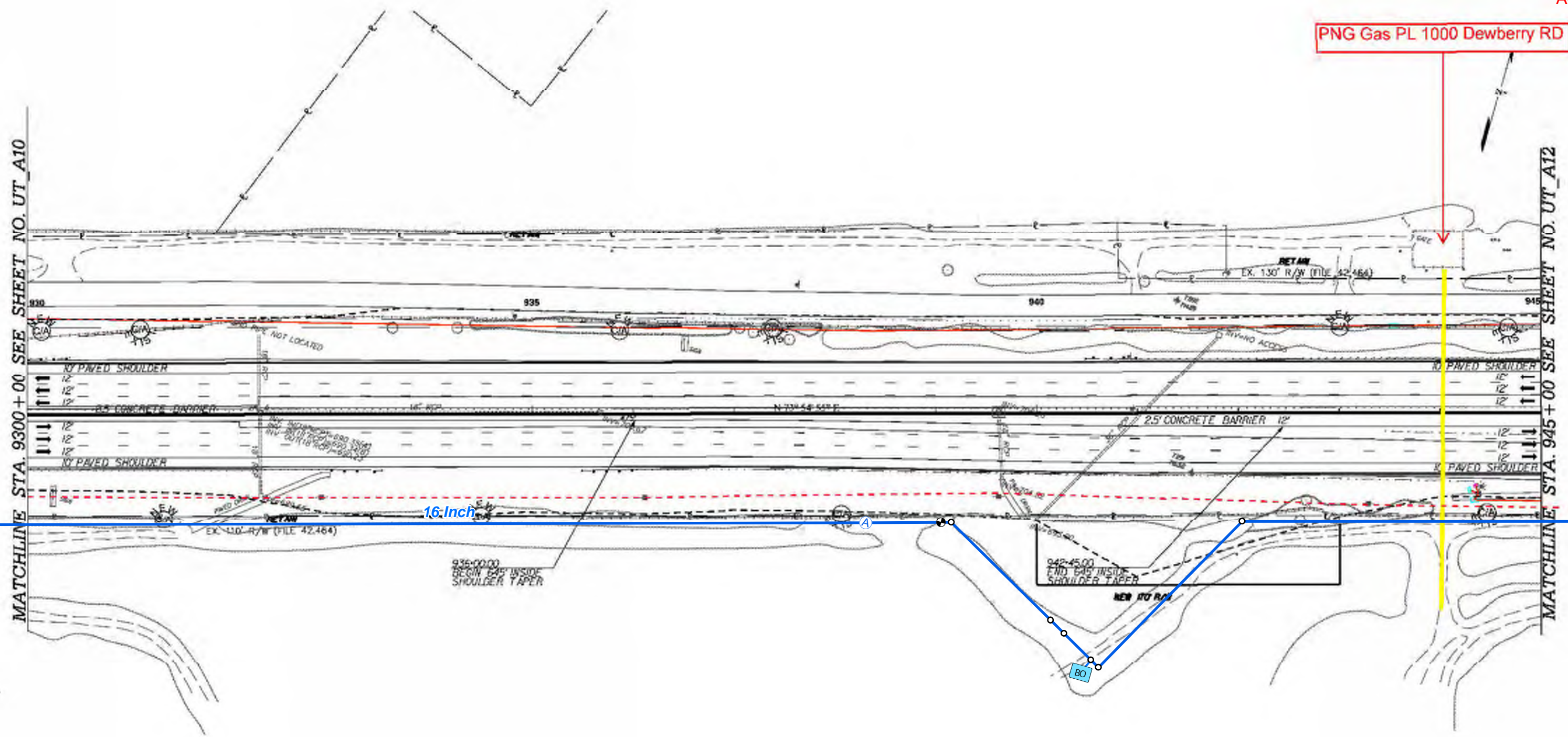
DATE	BY	SCALE	PROJECT	SHEET NO.	TOTAL SHEETS
11/11/11	DC		INTERSTATE 85	11	12

A-111

PNG Gas PL 1000 Dewberry RD

MATCHLINE STA. 9300 + 00 SEE SHEET NO. UT_A10

MATCHLINE STA. 945 + 00 SEE SHEET NO. UT_A12



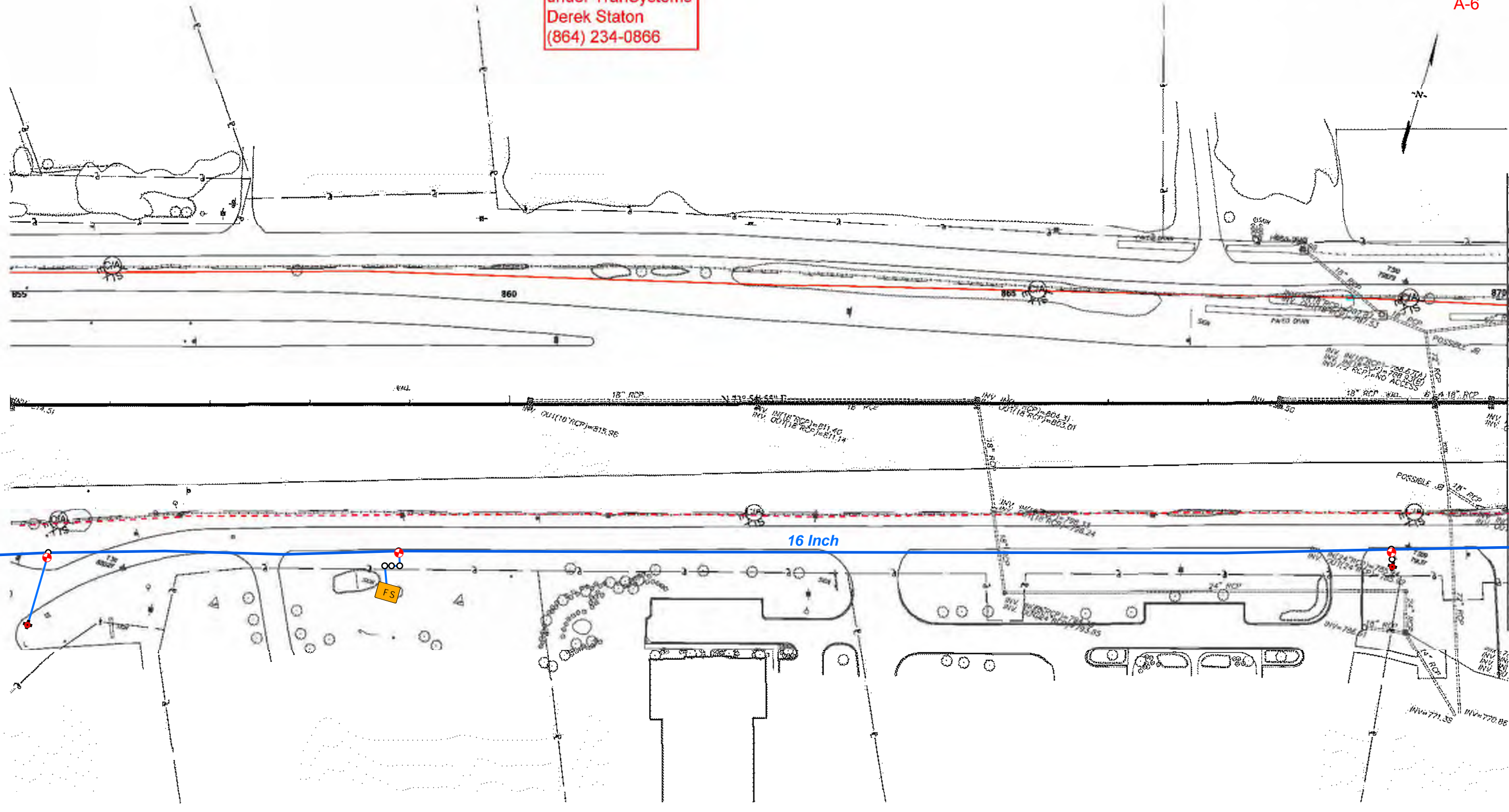
<p>PRELIMINARY NOT FOR CONSTRUCTION</p>	7				<p>SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION INTERSTATE 85</p>
	6				
	5				
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	2				UTILITY PLAN SHEET
	1				INTERSTATE 85 MILE MARKER 80-96 SEGMENT A

11/24/11

DATE	BY	REVISION	PROJECT	SHEET
11/14/18	BC	ISSUED FOR PERMIT	Interstate 85	A-6

Utility Coordination
under TranSystems
Derek Staton
(864) 234-0866

A-6



MATCHLINE STA. 870+00 SEE SHEET NO. UT_A7

PRELIMINARY NOT FOR CONSTRUCTION	7			SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION INTERSTATE 85 UTILITY PLAN SHEET INTERSTATE 85 MILE MARKER 80-96 SEGMENT A
	6			
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11/14/18

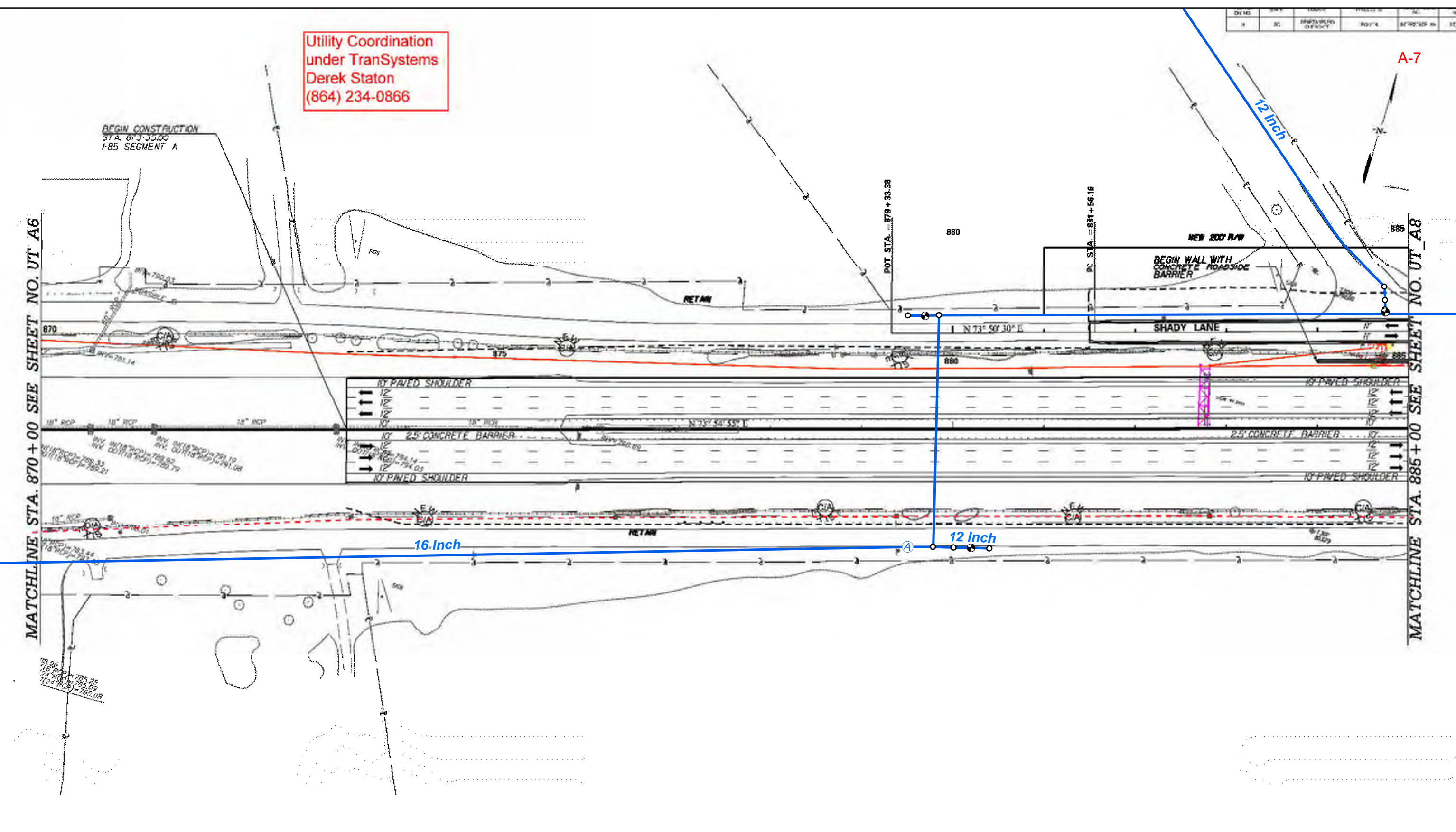
Utility Coordination
under TranSystems
Derek Staton
(864) 234-0866

DATE	BY	REVISION	DESCRIPTION

MATCHLINE STA. 870+00 SEE SHEET NO. UT_A6

MATCHLINE STA. 885+00 SEE SHEET NO. UT_A8

BEGIN CONSTRUCTION
STA. 873+55.00
I-85 SEGMENT A



PRELIMINARY
NOT FOR CONSTRUCTION

7			
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SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION
INTERSTATE 85

UTILITY PLAN SHEET

INTERSTATE 85 MILE MARKER 80-96
SEGMENT A

172572015

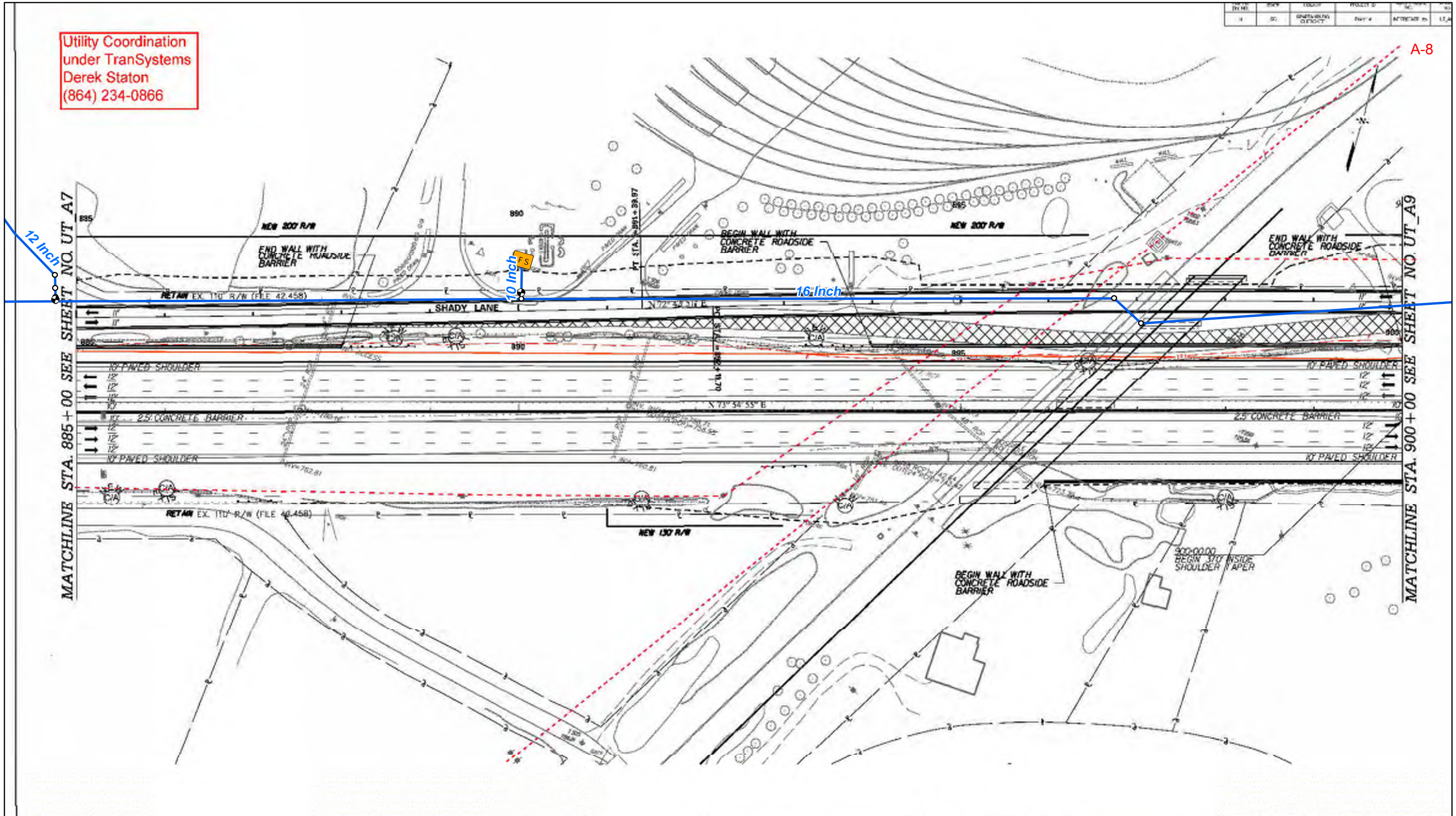
Utility Coordination
 under TranSystems
 Derek Staton
 (864) 234-0866

DATE	BY	GROUP	PROJECT	SCALE
11/14/11	DC	ROADSIDE	Inter 85	1" = 40'

A-8

MATCHLINE STA. 885 + 00 SEE SHEET NO. UT_A7

MATCHLINE STA. 900 + 00 SEE SHEET NO. UT_A9



PRELIMINARY NOT FOR CONSTRUCTION	7				SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION INTERSTATE 85 UTILITY PLAN SHEET INTERSTATE 85 MILE MARKER 80-96 SEGMENT A
	6				
	6				
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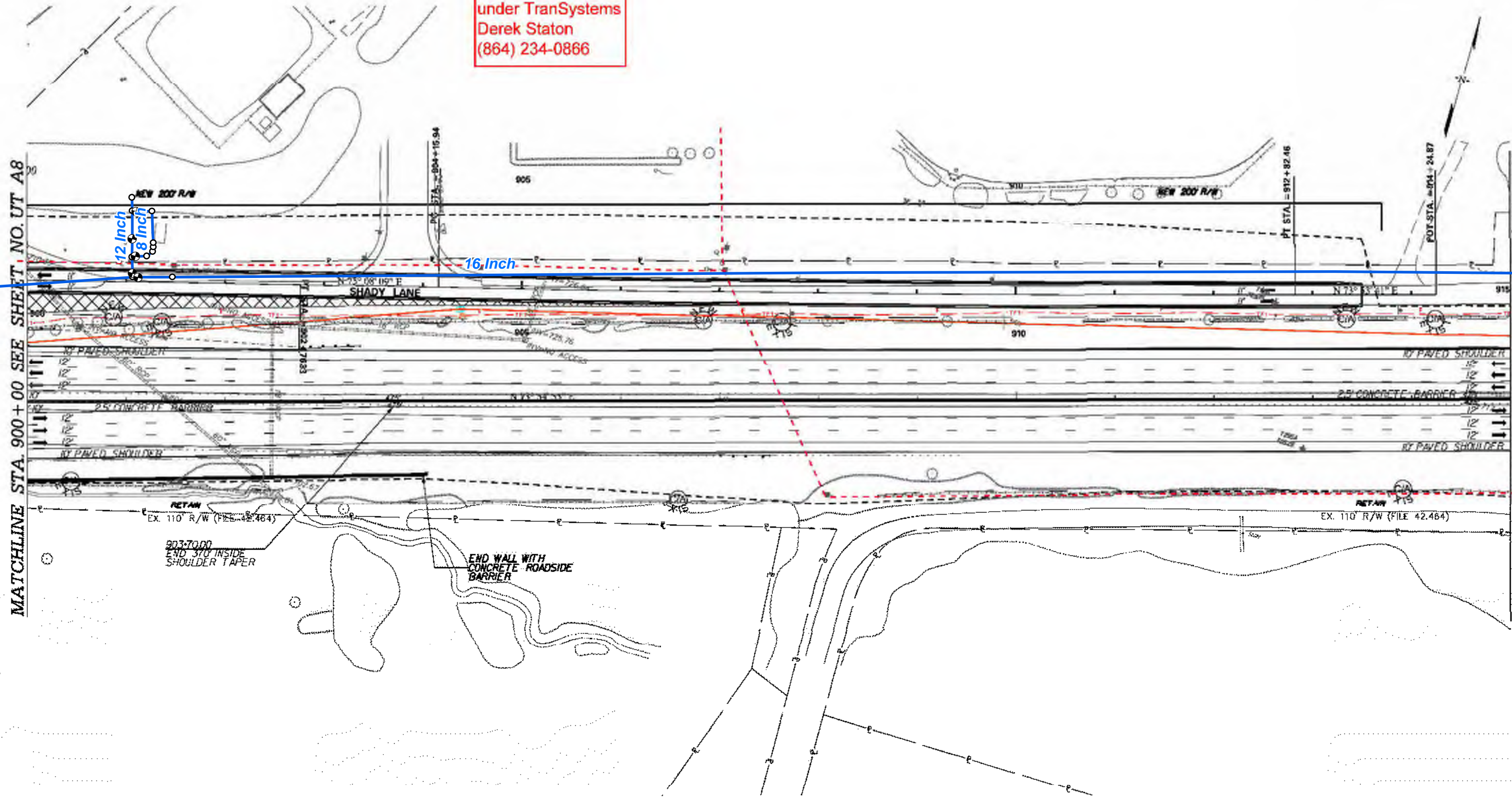
172-7201

DATE	BY	SCALE	PROJECT	NO.
1	DC			

Utility Coordination
under TranSystems
Derek Staton
(864) 234-0866

MATCHLINE STA. 900+00 SEE SHEET NO. UT_A8

MATCHLINE STA. 915+00 SEE SHEET NO. UT_A10

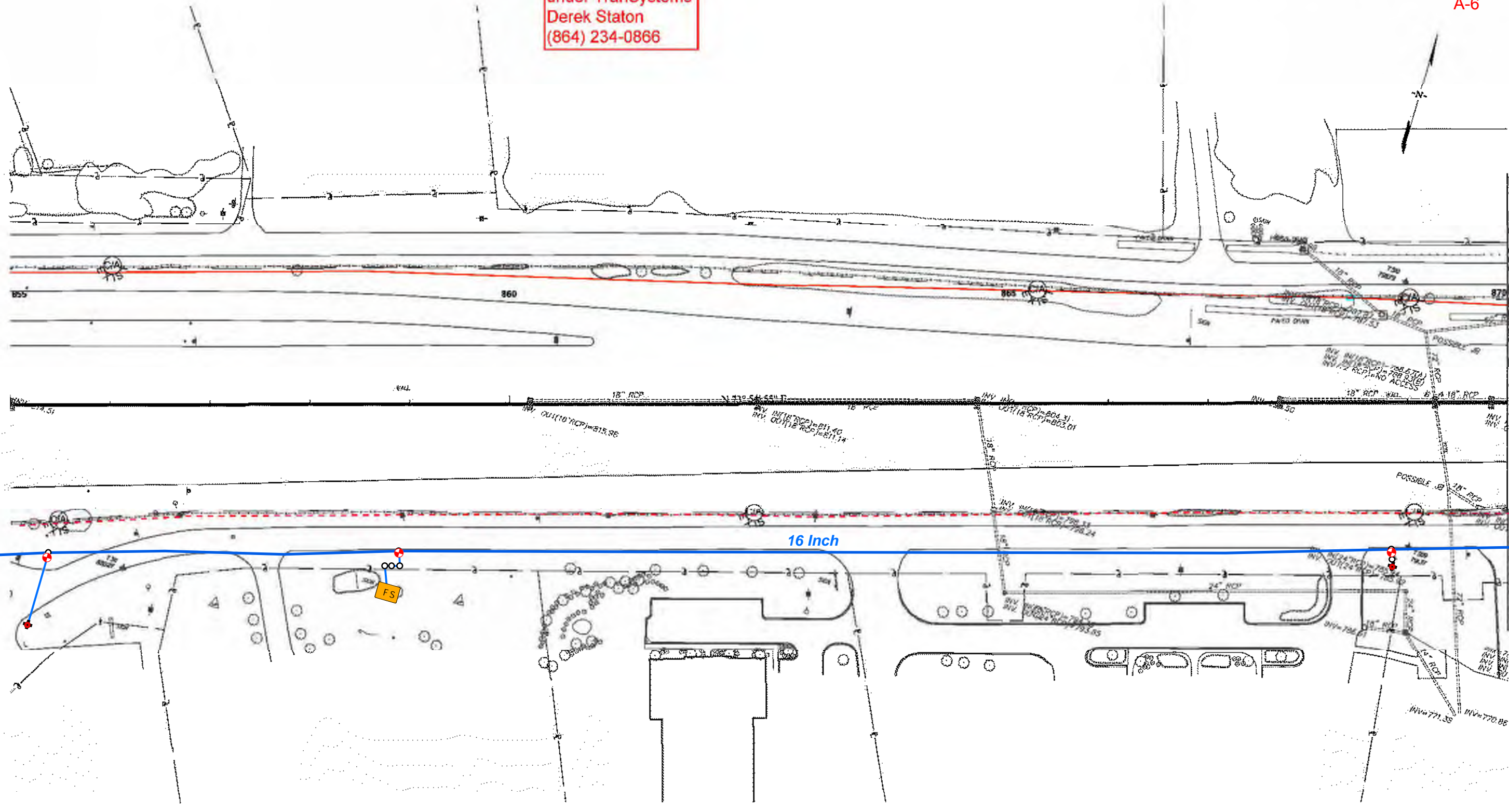


<p>PRELIMINARY NOT FOR CONSTRUCTION</p>	7				<p>SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION INTERSTATE 85</p> <p>UTILITY PLAN SHEET</p> <p>INTERSTATE 85 MILE MARKER 80-96 SEGMENT A</p>
	6				
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DATE	BY	SCALE	PROJECT	NO.
11/14/11	BC	AS SHOWN	85-96	101

Utility Coordination
under TranSystems
Derek Staton
(864) 234-0866

A-6



MATCHLINE STA. 870+00 SEE SHEET NO. UT_A7

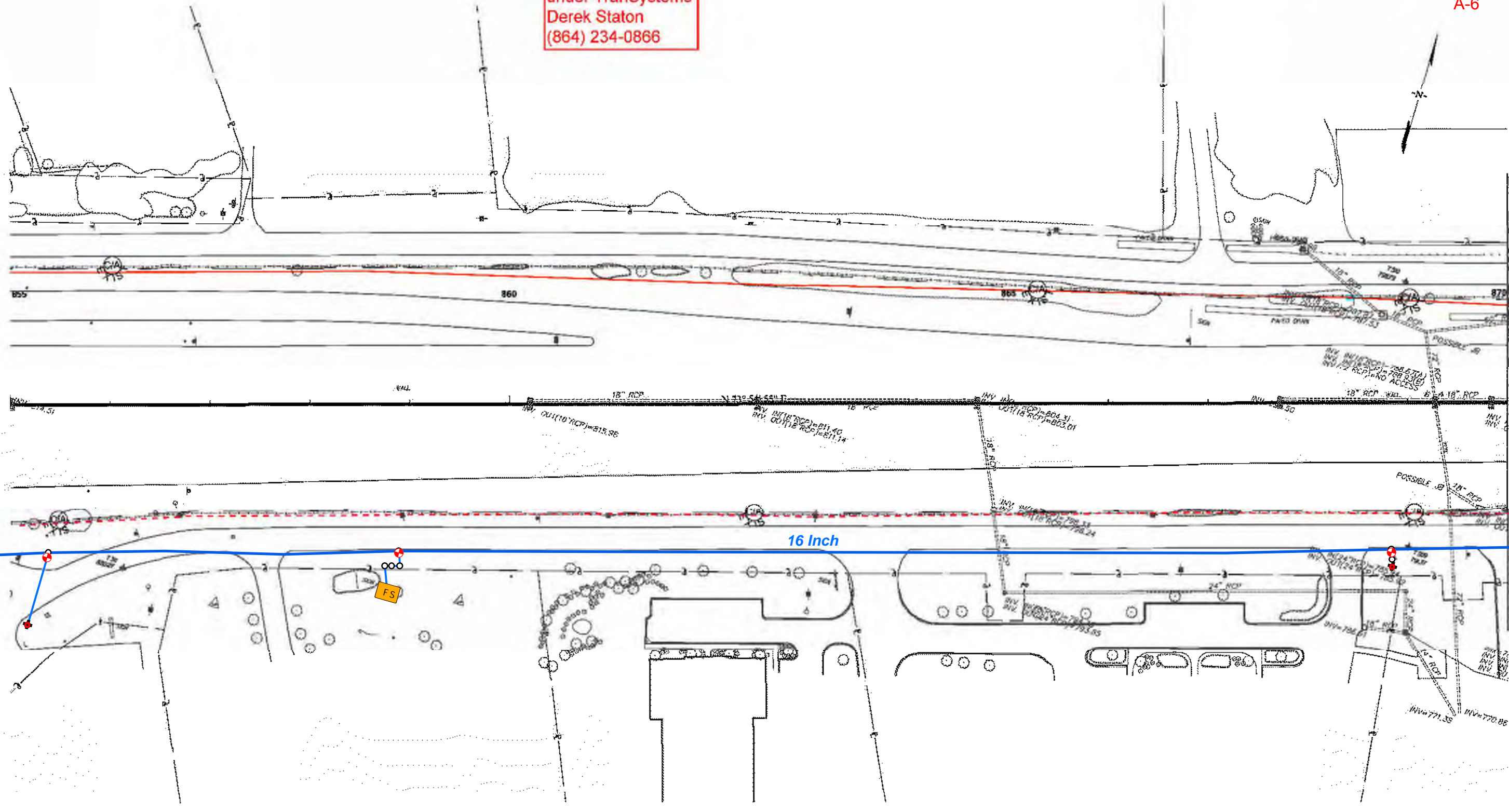
<p>PRELIMINARY NOT FOR CONSTRUCTION</p>	7				<p>SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION INTERSTATE 85</p>
	6				
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	3				UTILITY PLAN SHEET
	2				<p>INTERSTATE 85 MILE MARKER 80-96 SEGMENT A</p>
	1				
	0				

11/14/11

DATE	BY	SCALE	PROJECT	NO.
11/14/12	BC	AS SHOWN	85-96	101

Utility Coordination
under TranSystems
Derek Staton
(864) 234-0866

A-6



MATCHLINE STA. 870+00 SEE SHEET NO. UT_A7

<p>PRELIMINARY NOT FOR CONSTRUCTION</p>	7				<p>SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION INTERSTATE 85</p>
	6				
	5				
	4				
	3				UTILITY PLAN SHEET
	2				<p>INTERSTATE 85 MILE MARKER 80-96 SEGMENT A</p>
	1				
	0				

11/14/12

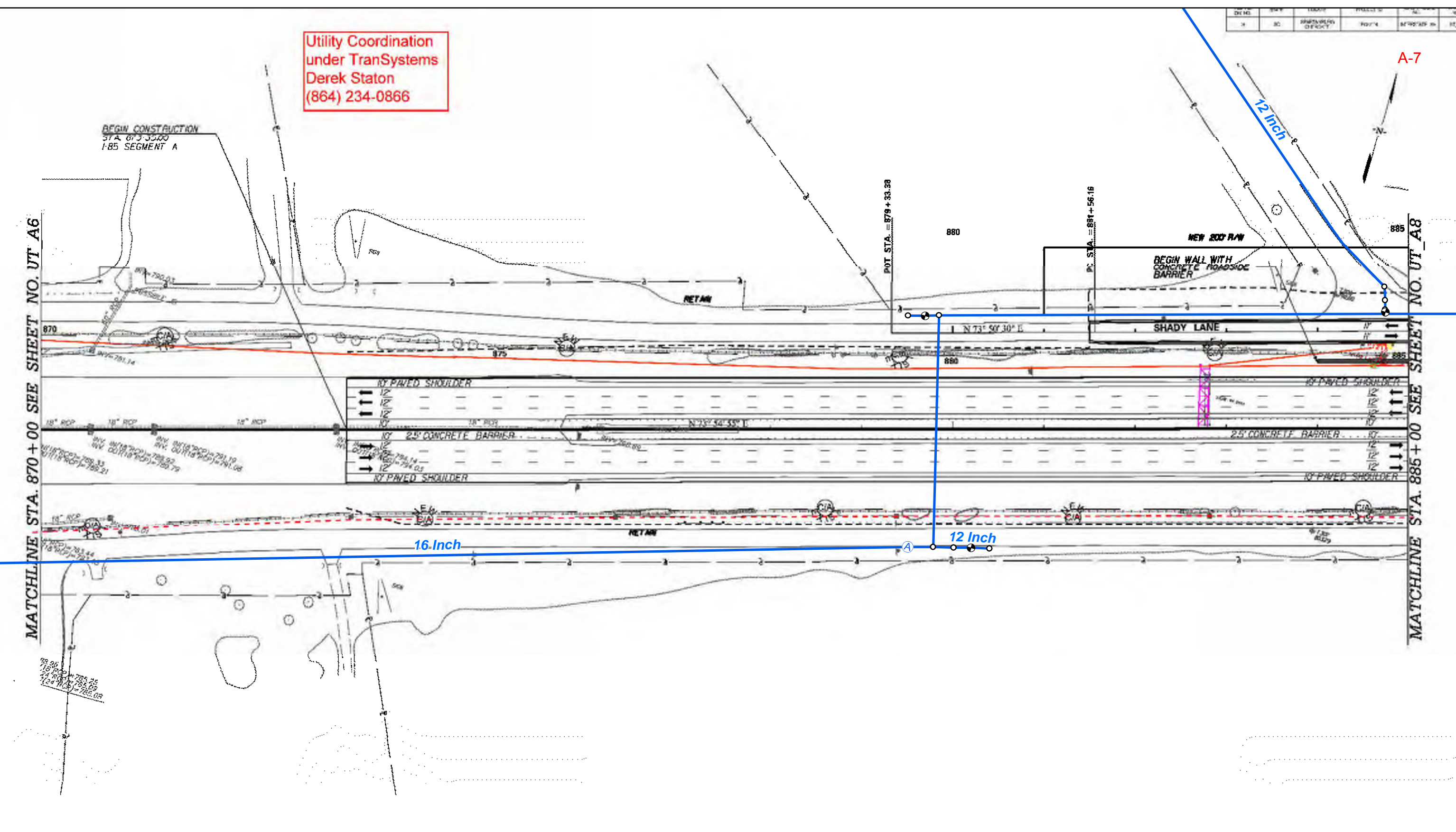
Utility Coordination
under TranSystems
Derek Staton
(864) 234-0866

DATE	BY	REVISION

MATCHLINE STA. 870+00 SEE SHEET NO. UT_A6

MATCHLINE STA. 885+00 SEE SHEET NO. UT_A8

BEGIN CONSTRUCTION
STA. 873+35.00
I-85 SEGMENT A



PRELIMINARY
NOT FOR CONSTRUCTION

7			
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SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION
INTERSTATE 85
UTILITY PLAN SHEET
INTERSTATE 85 MILE MARKER 80-96
SEGMENT A

172572015

Utility Coordination
 under TranSystems
 Derek Staton
 (864) 234-0866

DATE	BY	GROUP	PROJECT	SCALE	NO.
11/14/11	DC	SAFETY/UTILITY	Inter 85	1/4" = 1'	11.4

A-8

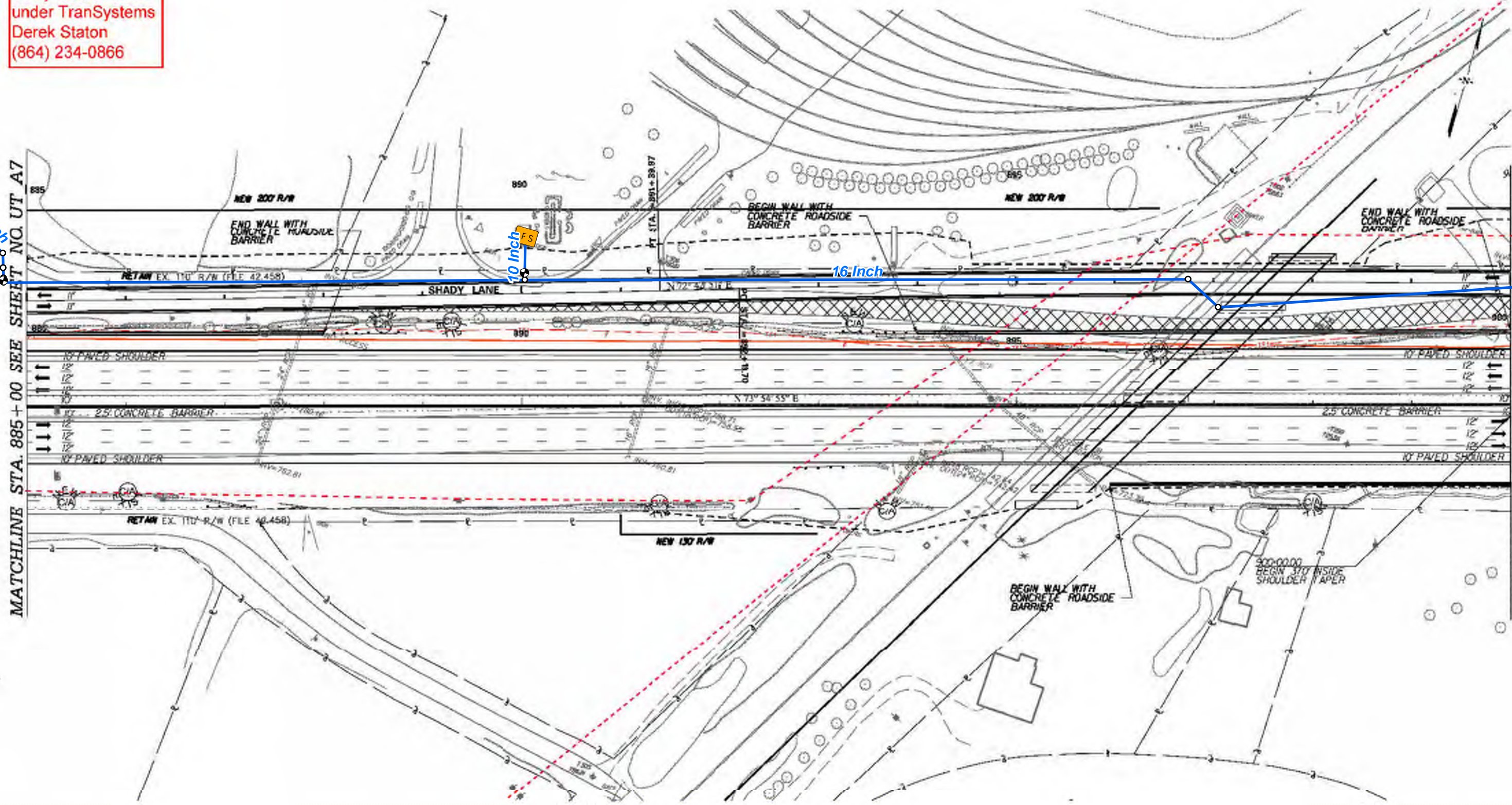
MATCHLINE STA. 885 + 00 SEE SHEET NO. UT_A7

MATCHLINE STA. 900 + 00 SEE SHEET NO. UT_A9

12 Inch

10 Inch

16 Inch



PRELIMINARY NOT FOR CONSTRUCTION	7				SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION INTERSTATE 85 UTILITY PLAN SHEET INTERSTATE 85 MILE MARKER 80-96 SEGMENT A
	6				
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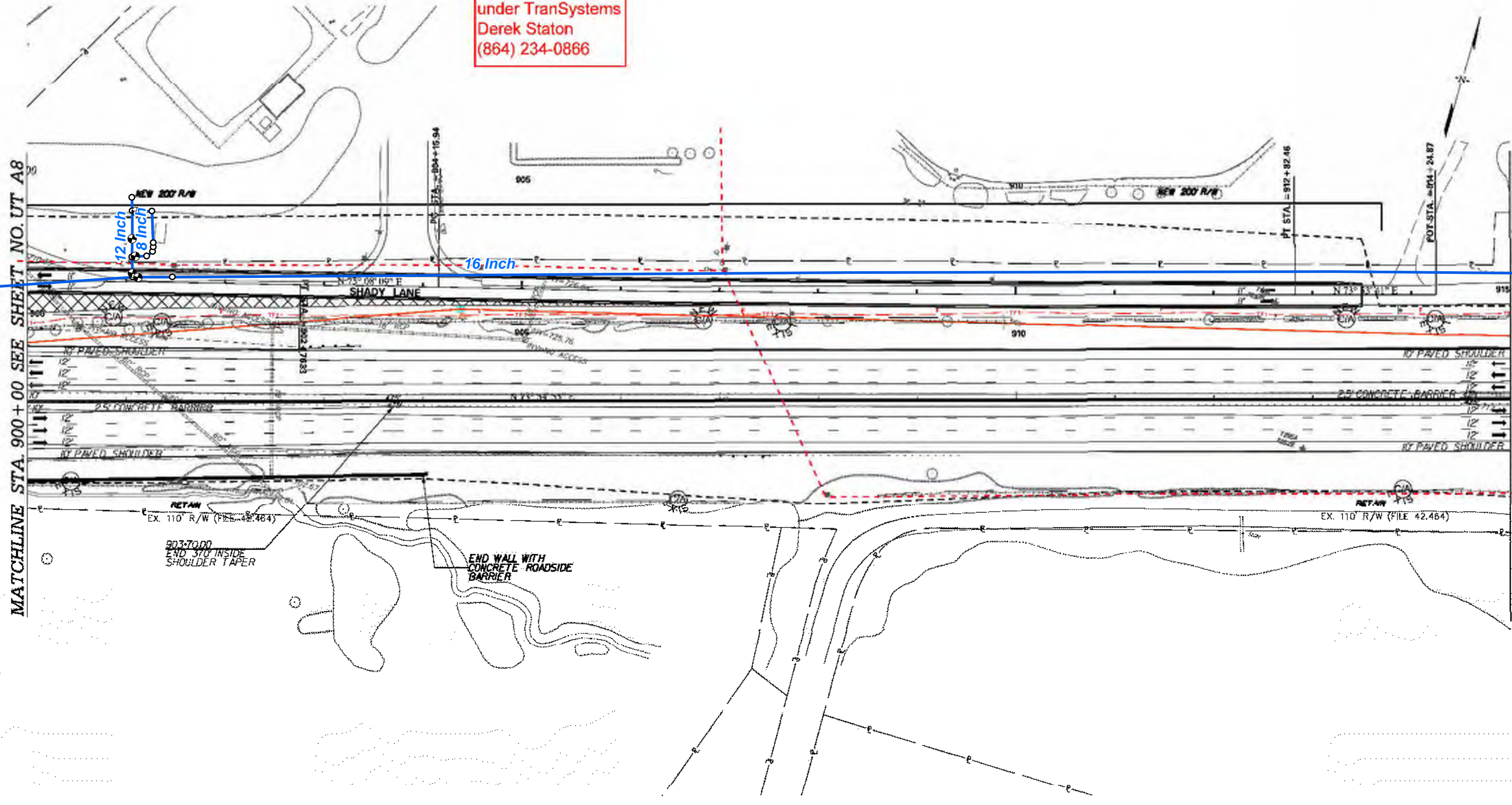
11/21/11

DATE	BY	SCALE	PROJECT	NO.
11/11/11	DC	AS SHOWN	INTERSTATE 85	UT_09

Utility Coordination
under TranSystems
Derek Staton
(864) 234-0866

MATCHLINE STA. 900+00 SEE SHEET NO. UT_A8

MATCHLINE STA. 915+00 SEE SHEET NO. UT_A10



PRELIMINARY
NOT FOR CONSTRUCTION

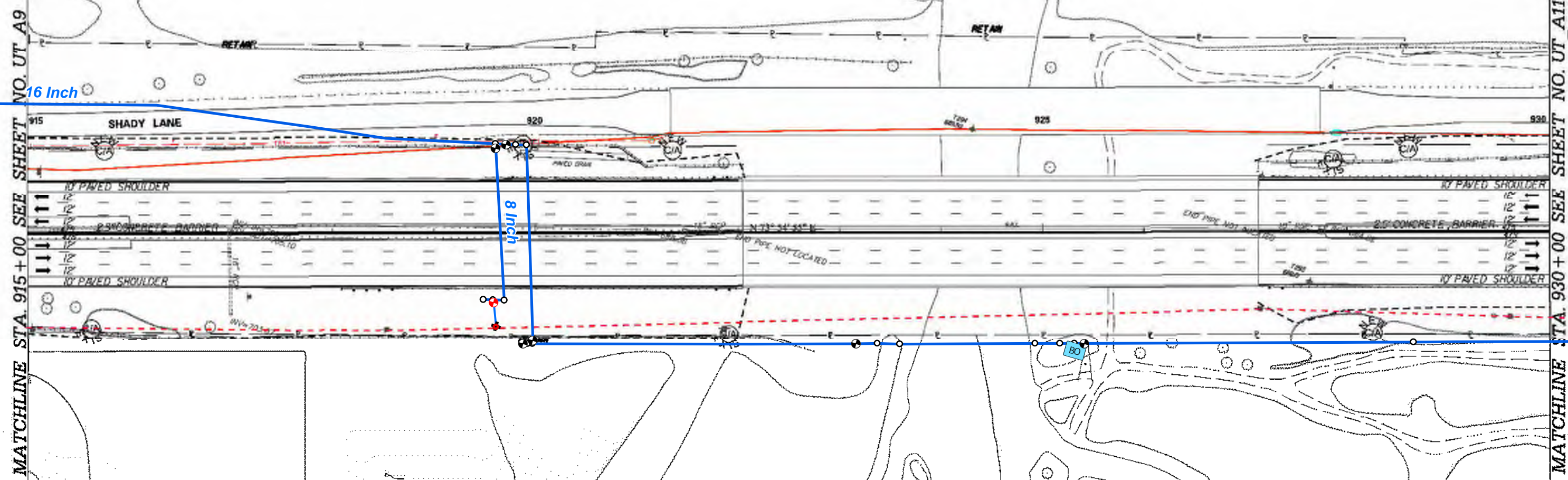
7			
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SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION
INTERSTATE 85
UTILITY PLAN SHEET
INTERSTATE 85 MILE MARKER 80-96
SEGMENT A

DATE	BY	CHKD	LODGE	PROJECT	SHEET NO.	TOTAL SHEETS
11/15/16	DC			INTERSTATE 85	A-10	10

Utility Coordination
under TranSystems
Derek Staton
(864) 234-0866

Pacolet River



<p>PRELIMINARY NOT FOR CONSTRUCTION</p>	7				<p>SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION INTERSTATE 85</p> <p>UTILITY PLAN SHEET</p> <p>INTERSTATE 85 MILE MARKER 80-96 SEGMENT A</p>
	6				
	6				
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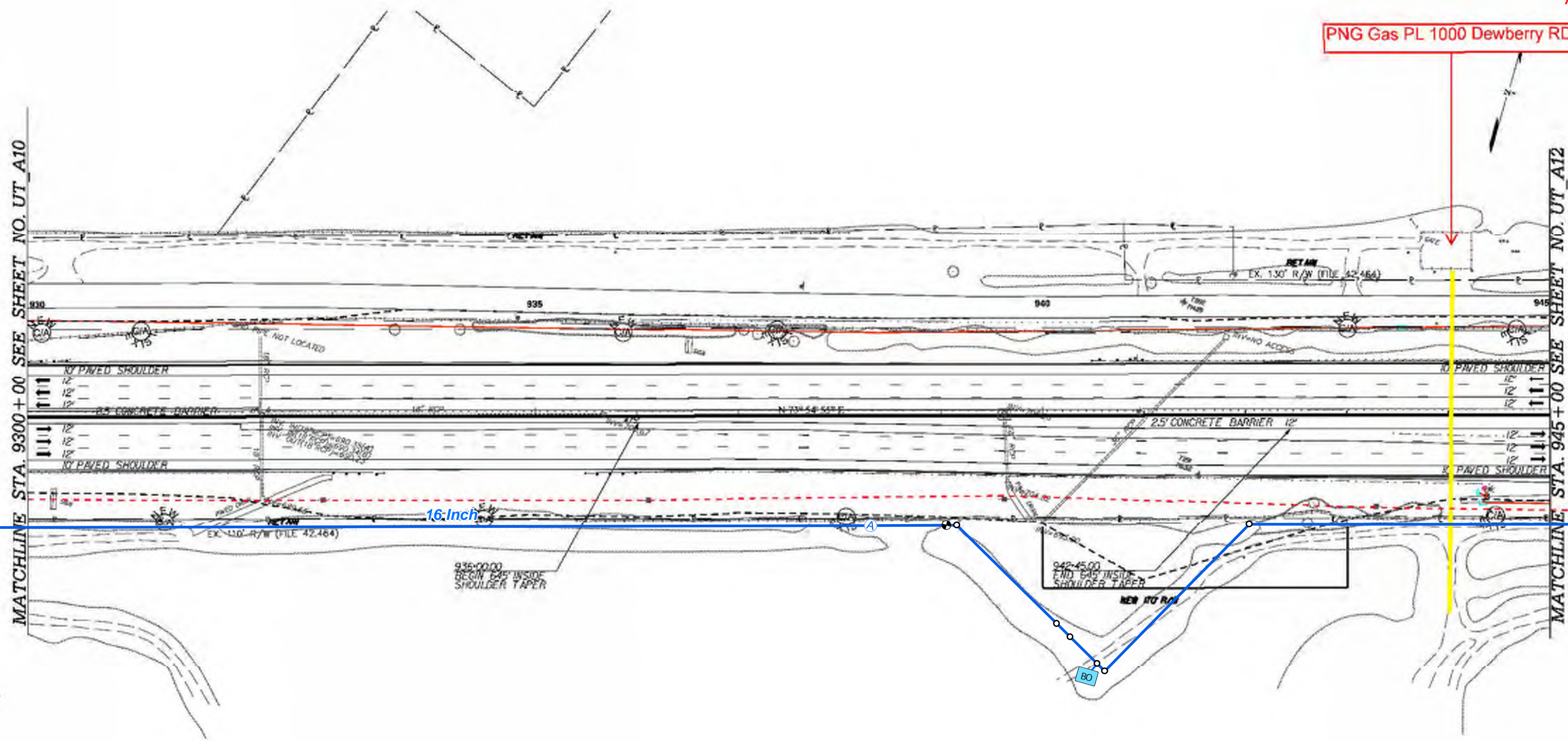
DATE	BY	SCALE	PROJECT	NO.	REV.
11/11/11

A-111

PNG Gas PL 1000 Dewberry RD

MATCHLINE STA. 9300 + 00 SEE SHEET NO. UT_A10

MATCHLINE STA. 945 + 00 SEE SHEET NO. UT_A12



PRELIMINARY
NOT FOR CONSTRUCTION

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4			
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1			

SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION
INTERSTATE 85

UTILITY PLAN SHEET

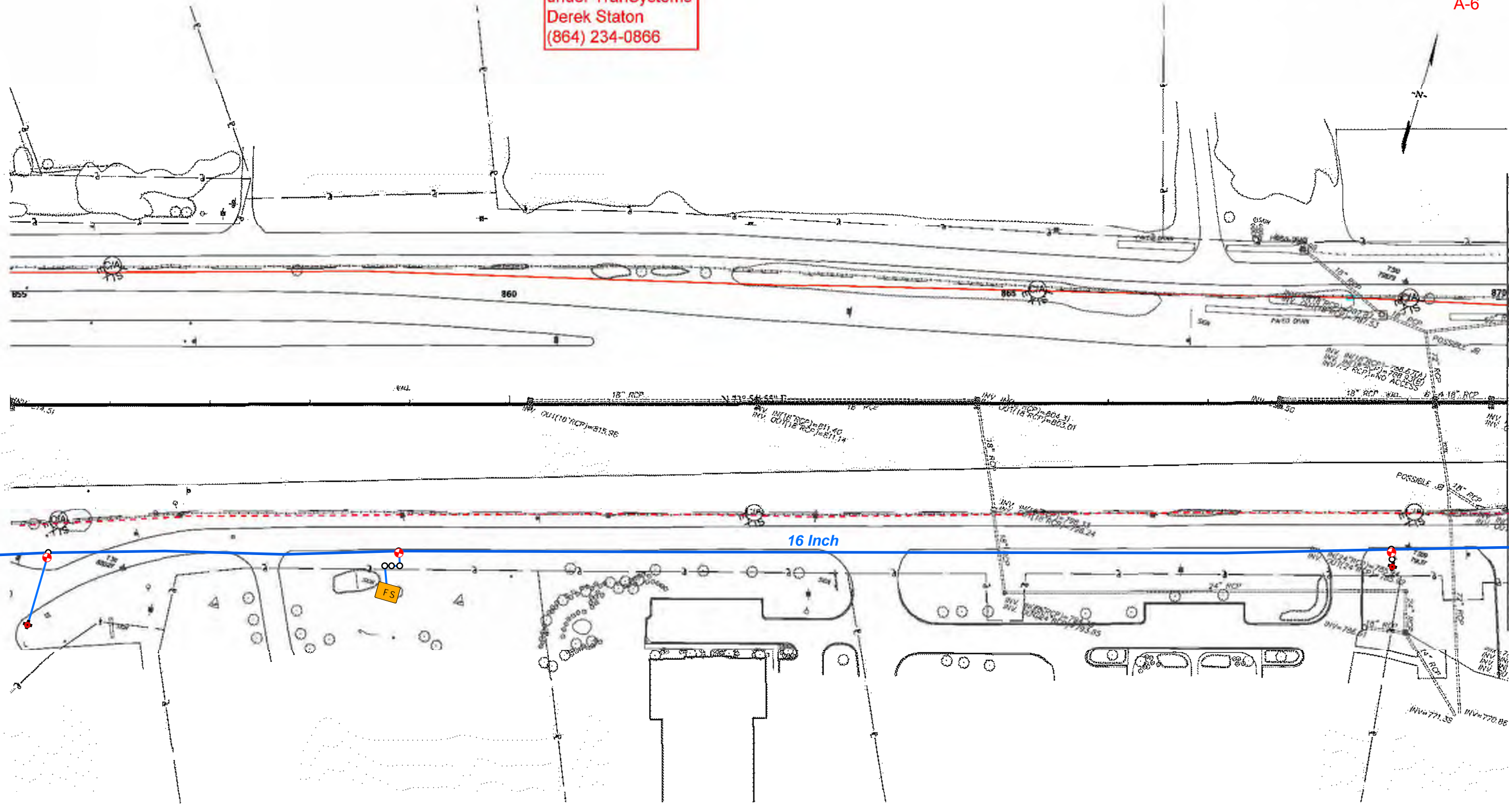
INTERSTATE 85 MILE MARKER 80-96
SEGMENT A

1/24/12

DATE	BY	REVISION	PROJECT	SHEET
11/14/18	BC	ISSUED FOR PERMIT	Interstate 85	A-6

Utility Coordination
under TranSystems
Derek Staton
(864) 234-0866

A-6



MATCHLINE STA. 870+00 SEE SHEET NO. UT_A7

PRELIMINARY NOT FOR CONSTRUCTION	7			SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION INTERSTATE 85 UTILITY PLAN SHEET INTERSTATE 85 MILE MARKER 80-96 SEGMENT A
	6			
	6			
	4			
	0			
2				
1				

11/14/18

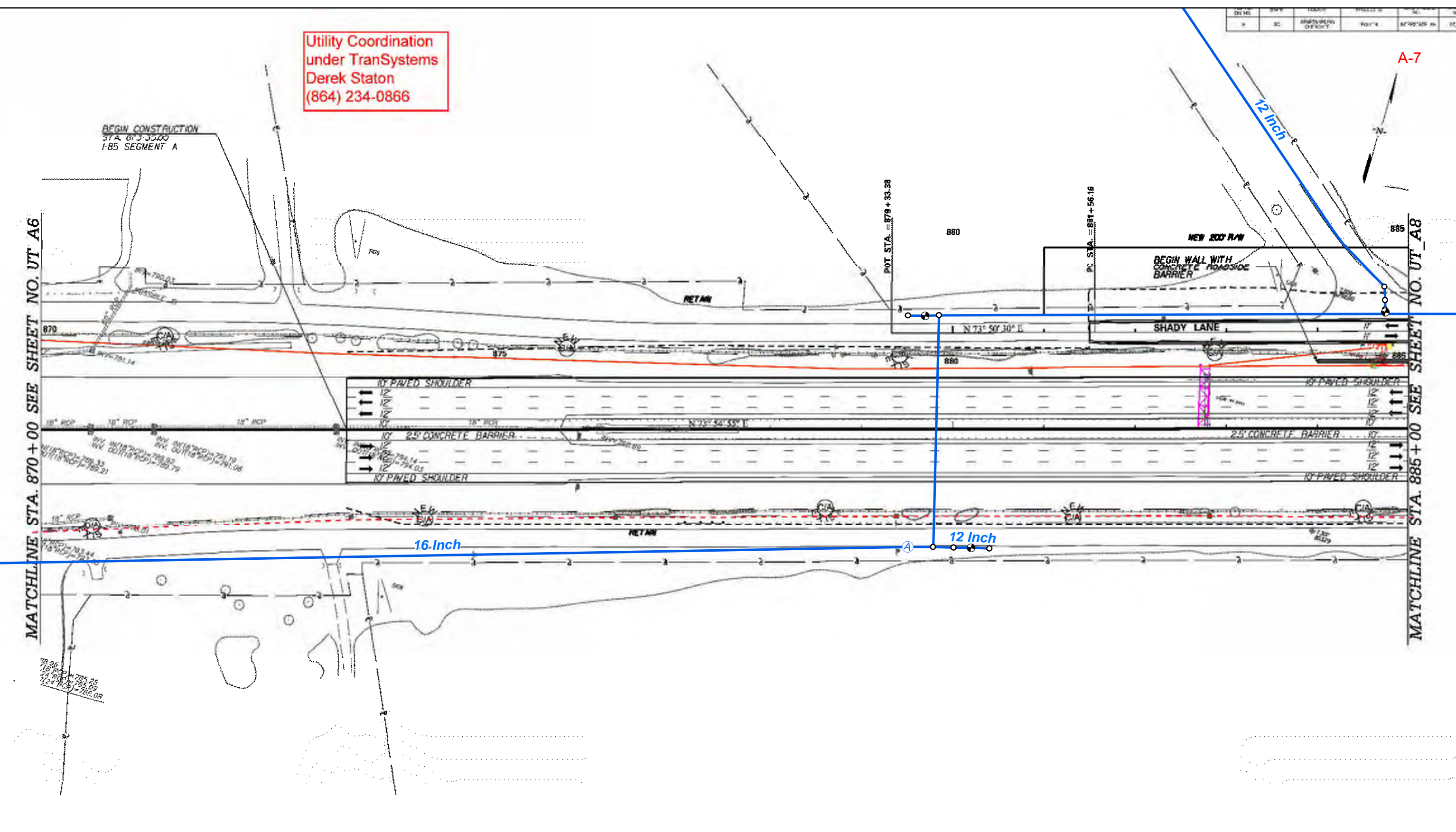
Utility Coordination
under TranSystems
Derek Staton
(864) 234-0866

DATE	BY	REVISION	DESCRIPTION

MATCHLINE STA. 870+00 SEE SHEET NO. UT_A6

MATCHLINE STA. 885+00 SEE SHEET NO. UT_A8

BEGIN CONSTRUCTION
STA. 873+55.00
I-85 SEGMENT A



PRELIMINARY
NOT FOR CONSTRUCTION

7			
6			
5			
4			
3			
2			
1			

SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION
INTERSTATE 85
UTILITY PLAN SHEET
INTERSTATE 85 MILE MARKER 80-96
SEGMENT A

172572015

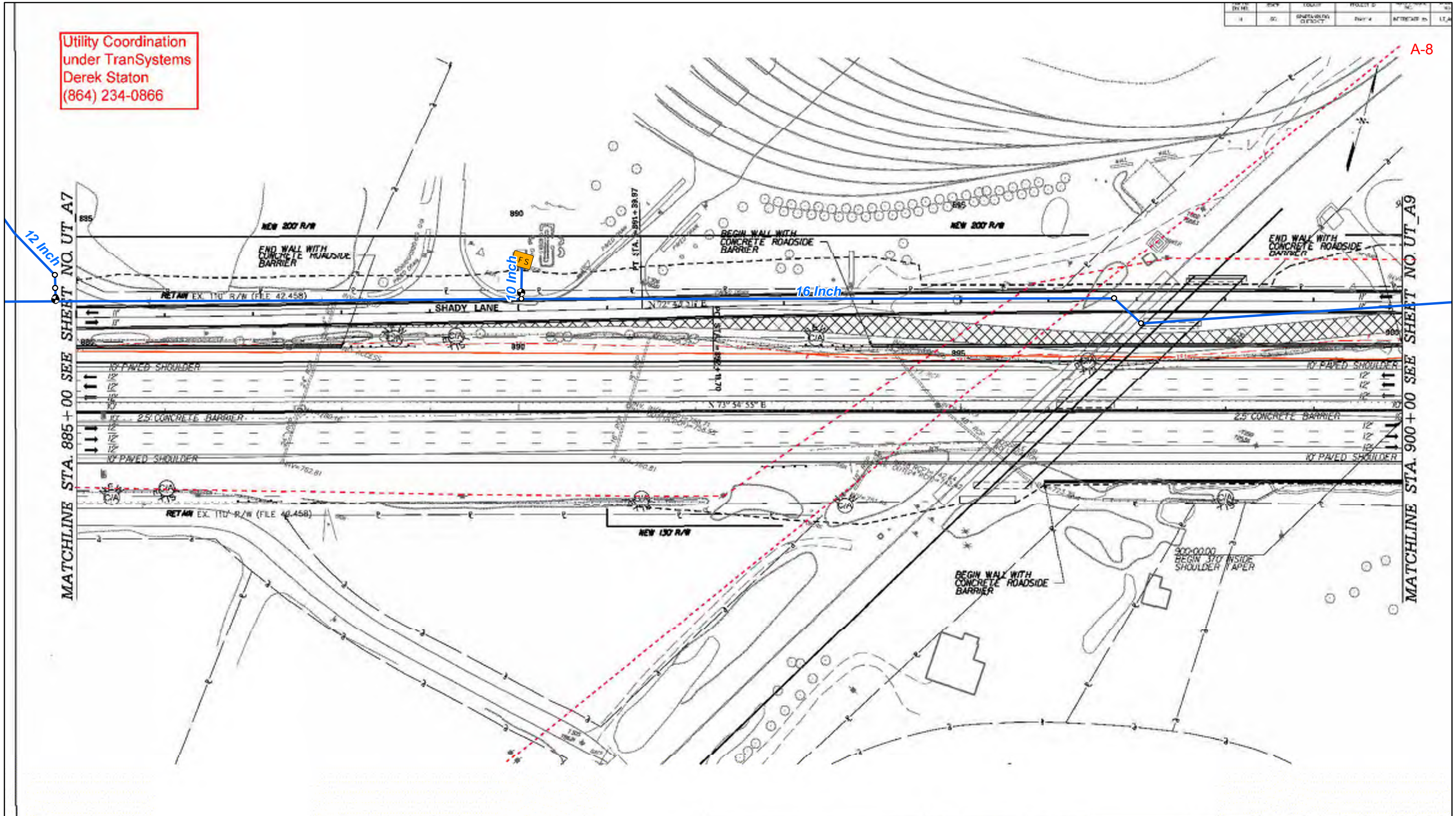
Utility Coordination
 under TranSystems
 Derek Staton
 (864) 234-0866

DATE	BY	GROUP	PROJECT	SCALE
11/14	DC	SAFETY/UTILITY	Inter 85	1"=40'

A-8

MATCHLINE STA. 885 + 00 SEE SHEET NO. UT_A7

MATCHLINE STA. 900 + 00 SEE SHEET NO. UT_A9



PRELIMINARY NOT FOR CONSTRUCTION	7				SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION INTERSTATE 85 UTILITY PLAN SHEET INTERSTATE 85 MILE MARKER 80-96 SEGMENT A
	6				
	5				
	4				
	3				
	2				
	1				

172-7201

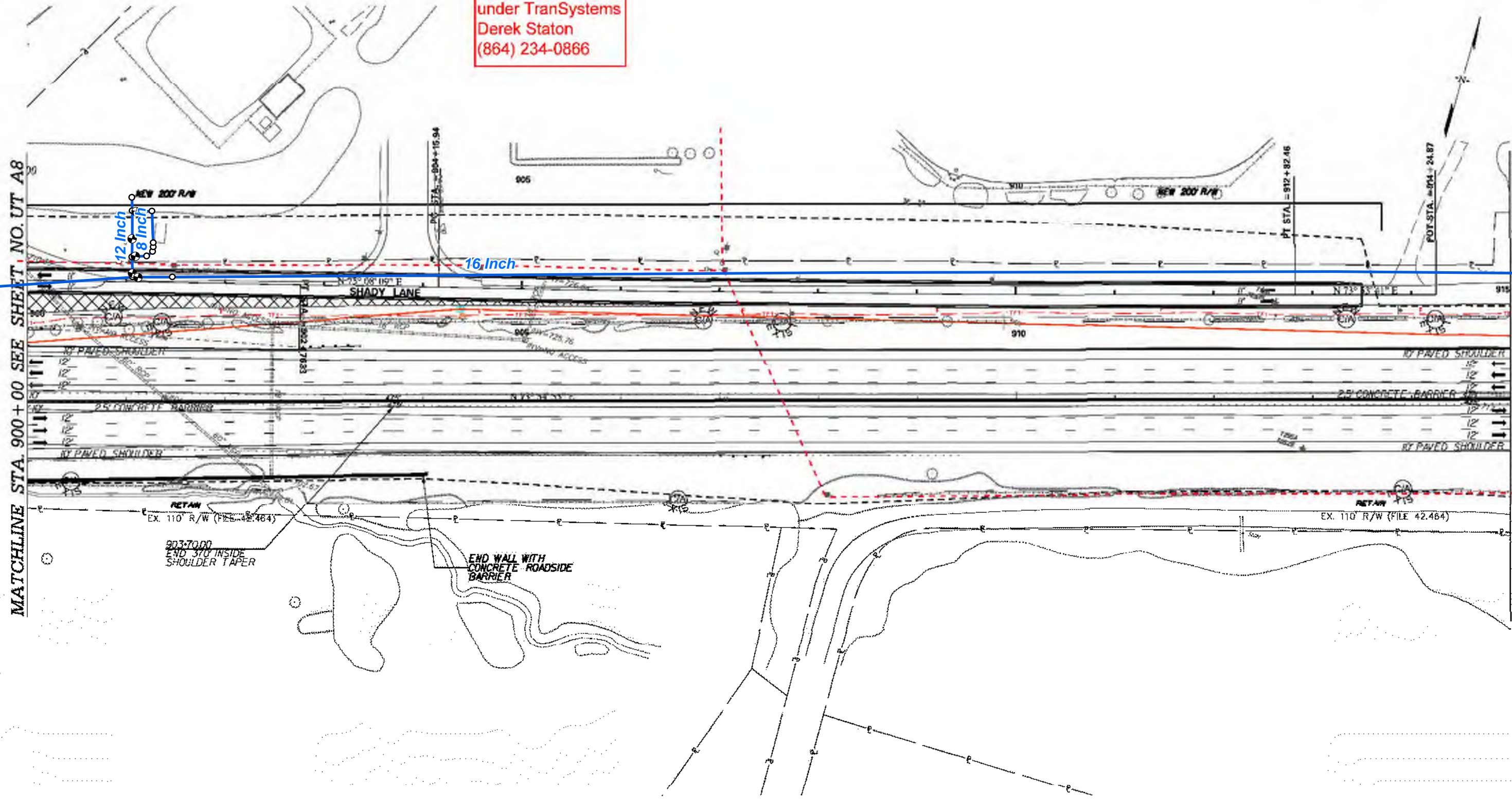
DATE	BY	SCALE	PROJECT	NO.
11	DC		INTERSTATE 85	UT_09

A-9

Utility Coordination
under TranSystems
Derek Staton
(864) 234-0866

MATCHLINE STA. 900+00 SEE SHEET NO. UT_A8

MATCHLINE STA. 915+00 SEE SHEET NO. UT_A10



PRELIMINARY NOT FOR CONSTRUCTION	7				SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION INTERSTATE 85 UTILITY PLAN SHEET INTERSTATE 85 MILE MARKER 80-96 SEGMENT A
	6				
	6				
	4				
	3				
2					
1					

11/24/2015

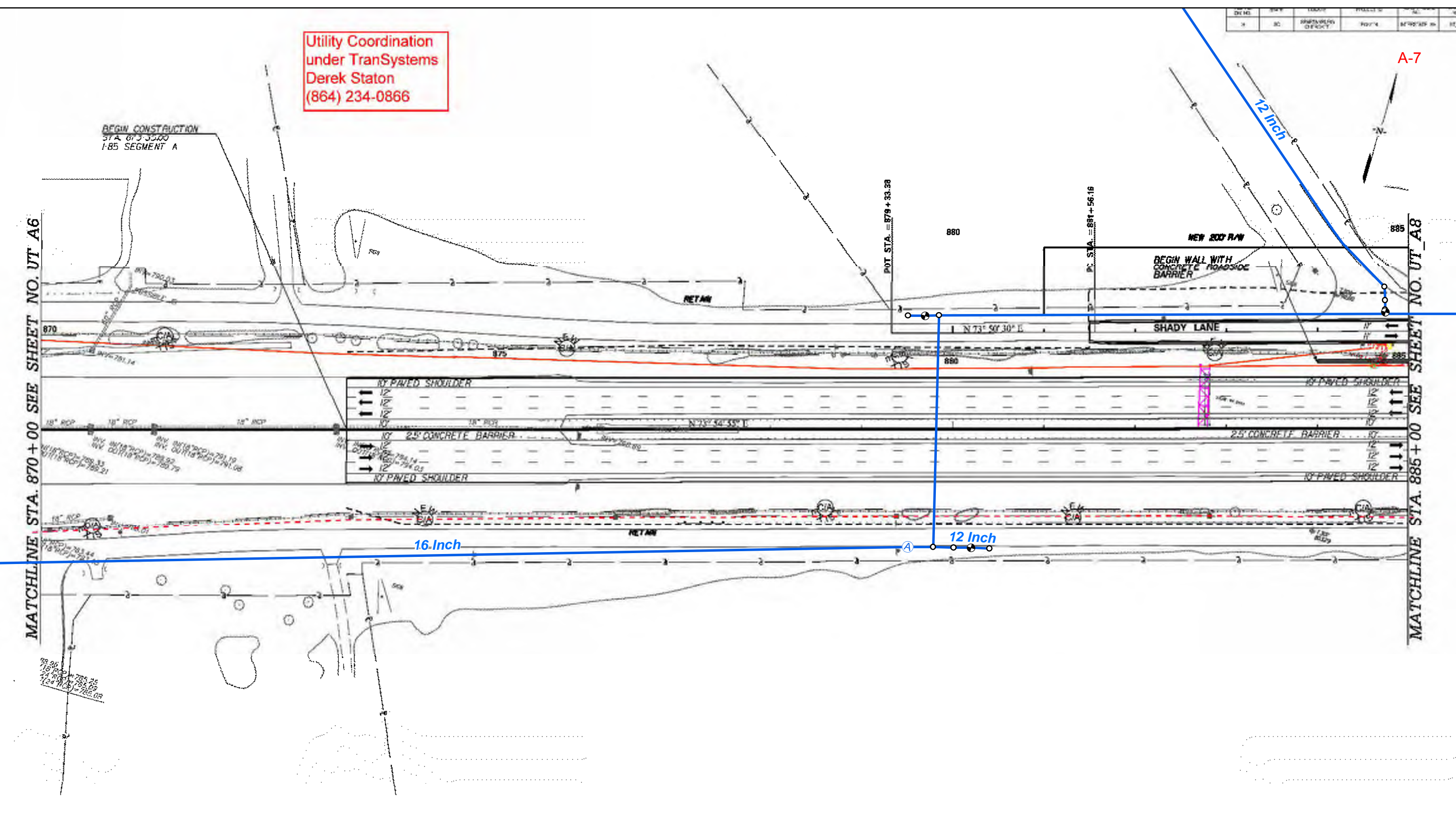
Utility Coordination
under TranSystems
Derek Staton
(864) 234-0866

DATE	BY	REVISION

MATCHLINE STA. 870+00 SEE SHEET NO. UT_A6

MATCHLINE STA. 885+00 SEE SHEET NO. UT_A8

BEGIN CONSTRUCTION
STA. 873+55.00
I-85 SEGMENT A



PRELIMINARY
NOT FOR CONSTRUCTION

7			
6			
5			
4			
3			
2			
1			

SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION
INTERSTATE 85
UTILITY PLAN SHEET
INTERSTATE 85 MILE MARKER 80-96
SEGMENT A

172572015

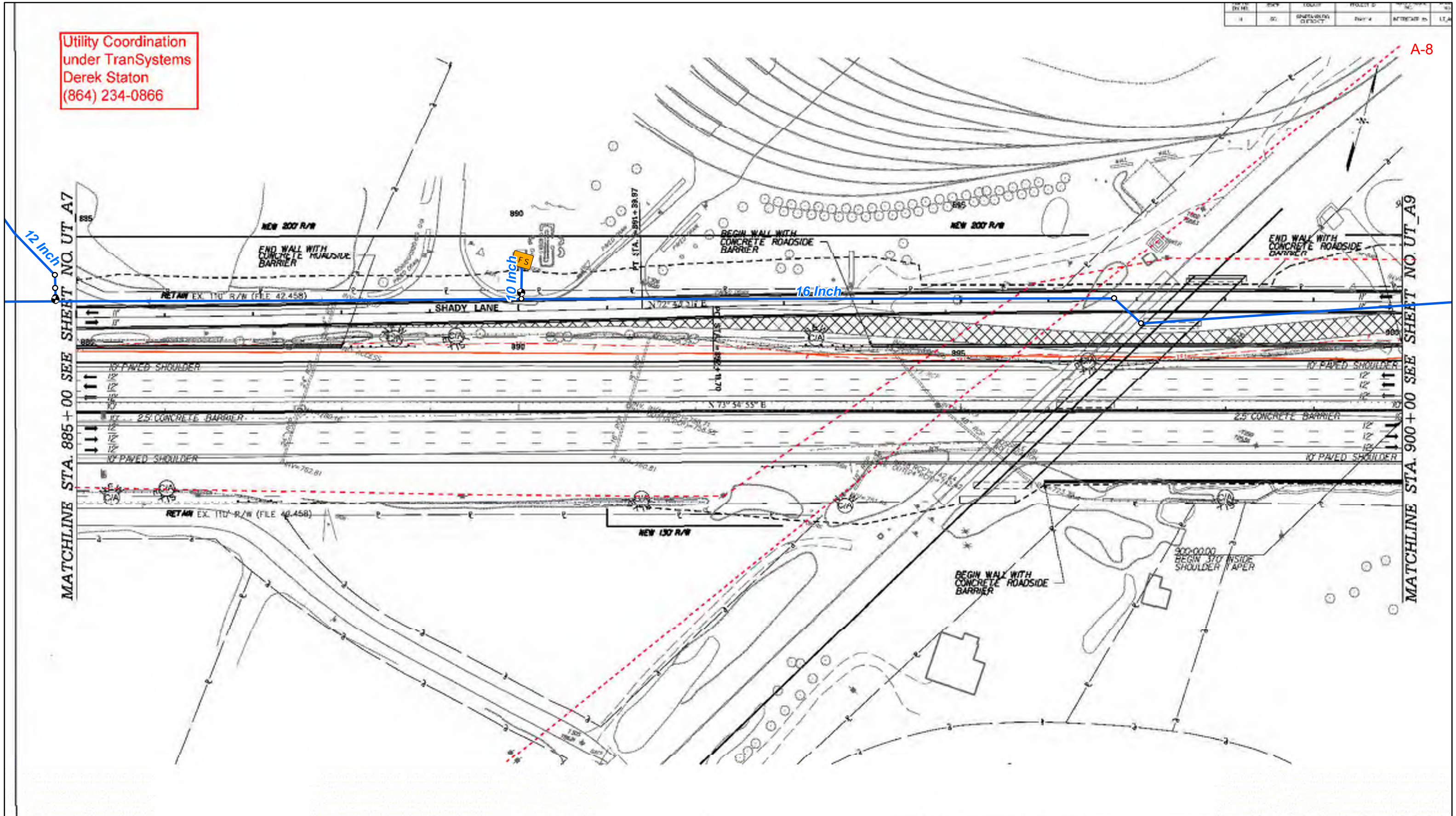
Utility Coordination
 under TranSystems
 Derek Staton
 (864) 234-0866

DATE	BY	GROUP	PROJECT	SCALE	NO.
11	DC	SAFETY/UTILITY	Inter 85	1:1	11.4

A-8

MATCHLINE STA. 885 + 00 SEE SHEET NO. UT_A7

MATCHLINE STA. 900 + 00 SEE SHEET NO. UT_A9



PRELIMINARY NOT FOR CONSTRUCTION	7				SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION INTERSTATE 85 UTILITY PLAN SHEET INTERSTATE 85 MILE MARKER 80-96 SEGMENT A
	6				
	5				
	4				
	3				
	2				
	1				

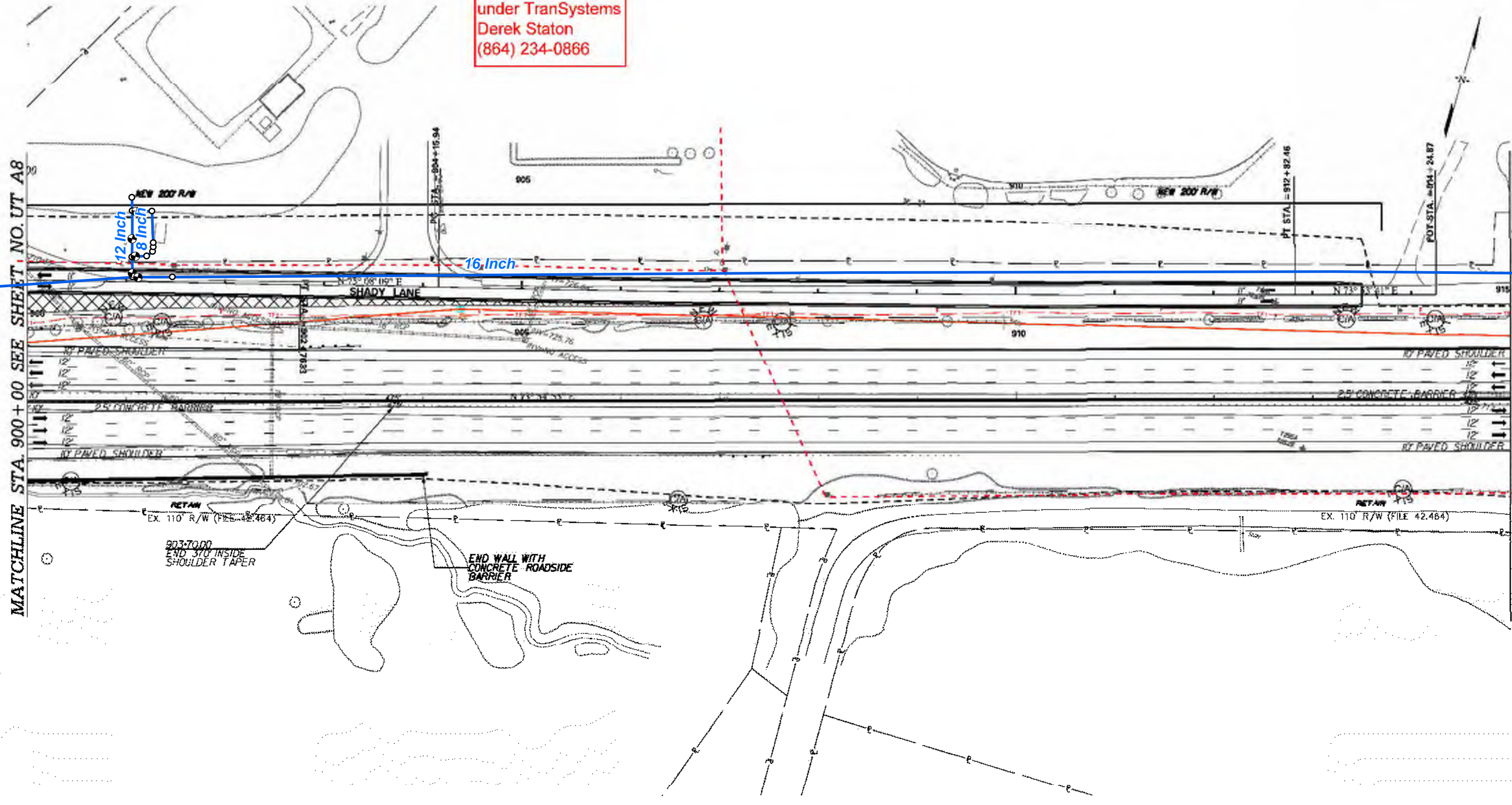
172-7201

DATE	BY	SCALE	PROJECT	NO.
11	DC		INTERSTATE 85	UT_A9

Utility Coordination
under TranSystems
Derek Staton
(864) 234-0866

MATCHLINE STA. 900+00 SEE SHEET NO. UT_A8

MATCHLINE STA. 915+00 SEE SHEET NO. UT_A10

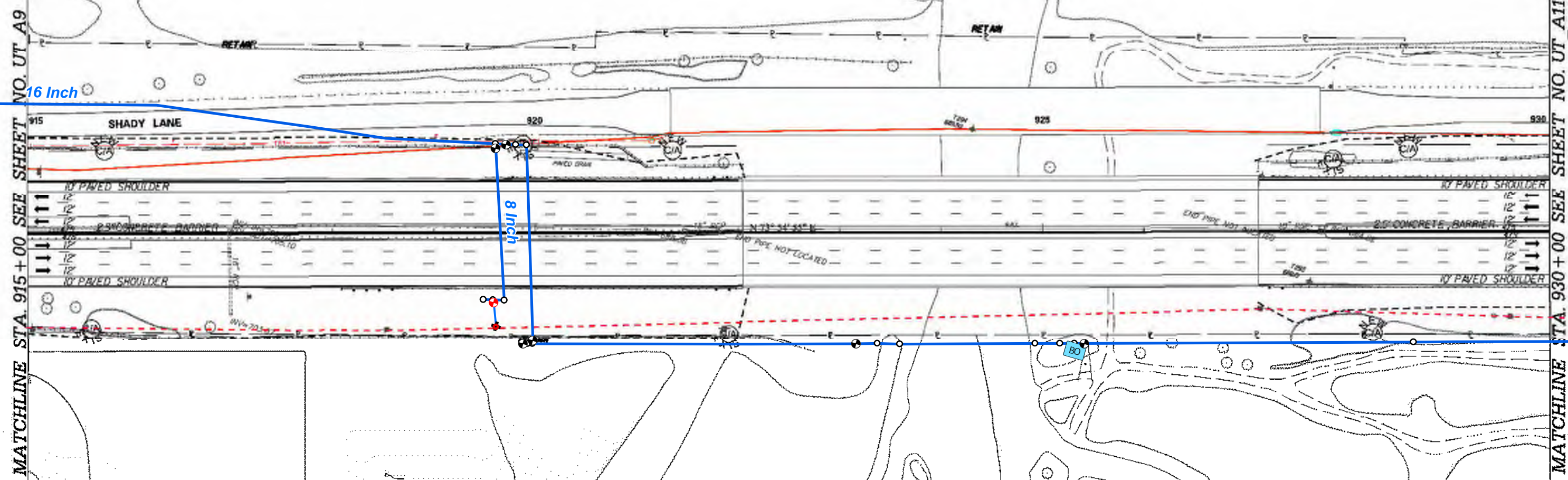


<p>PRELIMINARY NOT FOR CONSTRUCTION</p>	7				<p>SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION INTERSTATE 85</p> <p>UTILITY PLAN SHEET</p> <p>INTERSTATE 85 MILE MARKER 80-96 SEGMENT A</p>
	6				
	6				
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1					

DATE	BY	CHKD	LODGE	PROJECT	SHEET NO.	TOTAL SHEETS
11/15/16	DC			INTERSTATE 85	A-10	10

Utility Coordination
under TranSystems
Derek Staton
(864) 234-0866

Pacolet River



<p>PRELIMINARY NOT FOR CONSTRUCTION</p>	7				<p>SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION INTERSTATE 85</p> <p>UTILITY PLAN SHEET</p> <p>INTERSTATE 85 MILE MARKER 80-96 SEGMENT A</p>
	6				
	6				
	4				
	3				
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11/24/2016

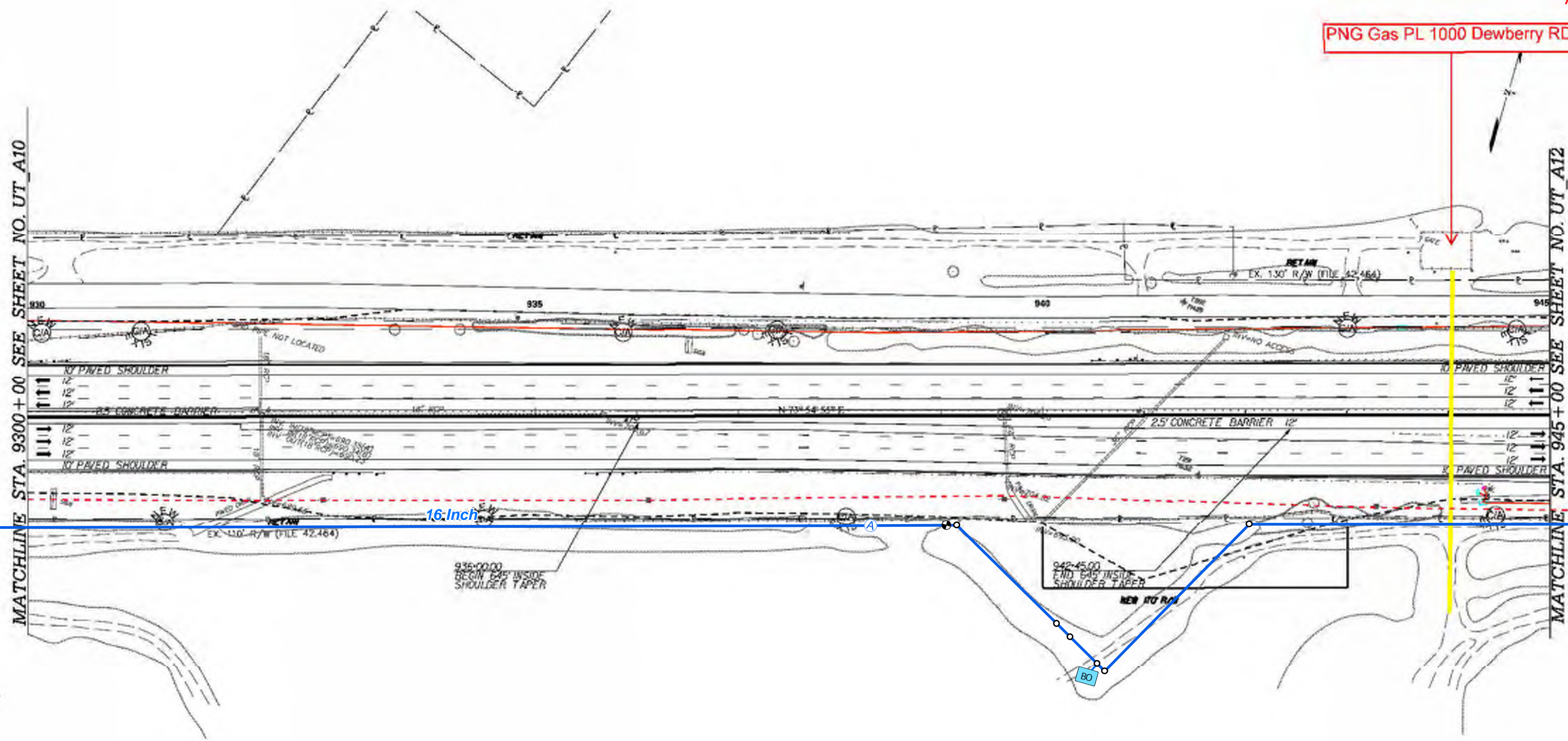
DATE	BY	SCALE	PROJECT	NO.	REV.
11/11/11

A-111

PNG Gas PL 1000 Dewberry RD

MATCHLINE STA. 9300 + 00 SEE SHEET NO. UT_A10

MATCHLINE STA. 945 + 00 SEE SHEET NO. UT_A12



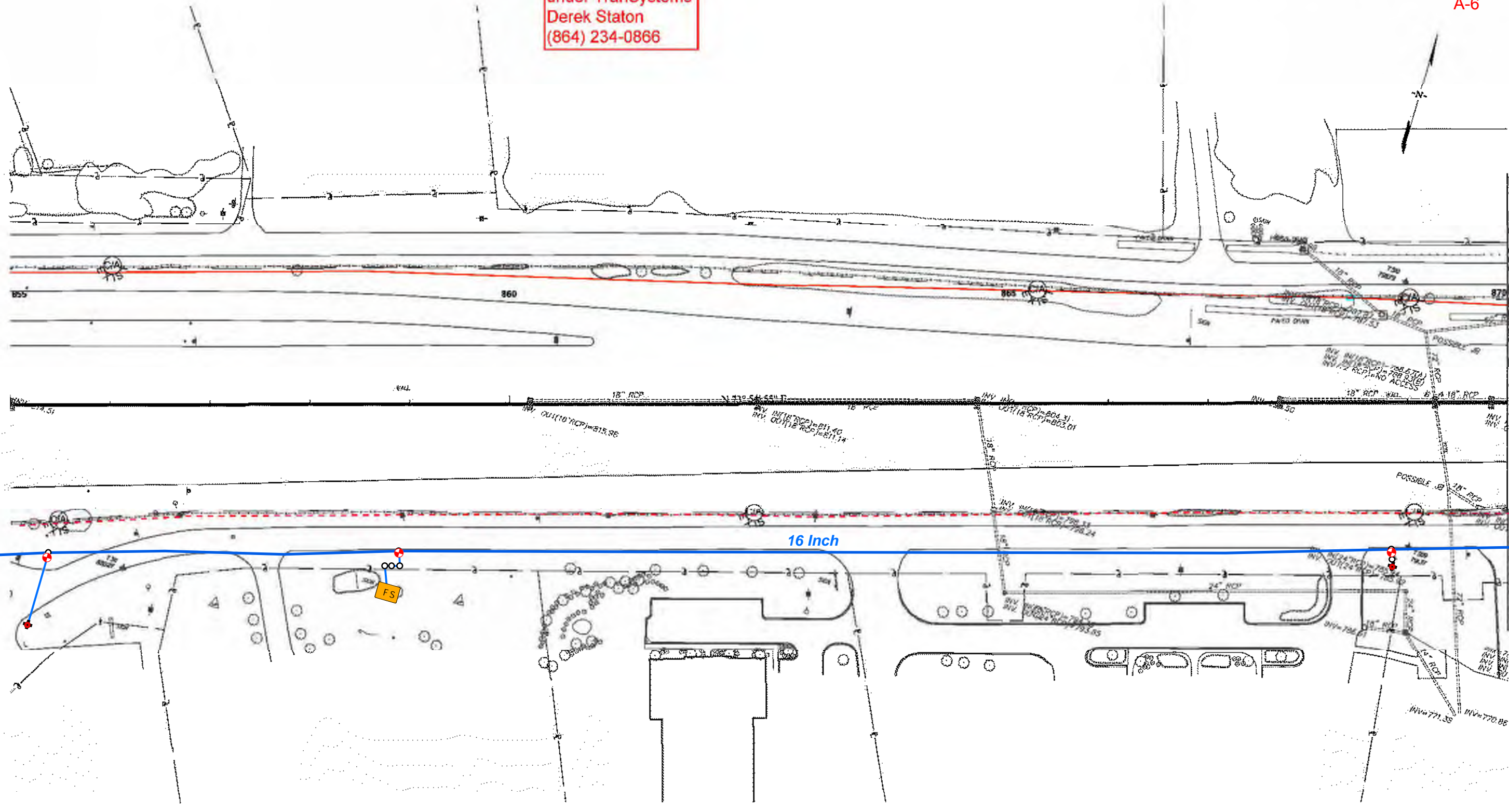
<p>PRELIMINARY NOT FOR CONSTRUCTION</p>	7				<p>SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION INTERSTATE 85</p>
	6				
	5				
	4				
	3				UTILITY PLAN SHEET
	2				INTERSTATE 85 MILE MARKER 80-96 SEGMENT A
	1				

11/24/11

DATE	BY	REVISION	PROJECT	SHEET
11/14/18	BC	ISSUED FOR PERMIT	Interstate 85	A-6

Utility Coordination
under TranSystems
Derek Staton
(864) 234-0866

A-6



MATCHLINE STA. 870+00 SEE SHEET NO. UT_A7

PRELIMINARY NOT FOR CONSTRUCTION	7			SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION INTERSTATE 85 UTILITY PLAN SHEET INTERSTATE 85 MILE MARKER 80-96 SEGMENT A
	6			
	6			
	4			
	0			
2				
1				

11/14/18

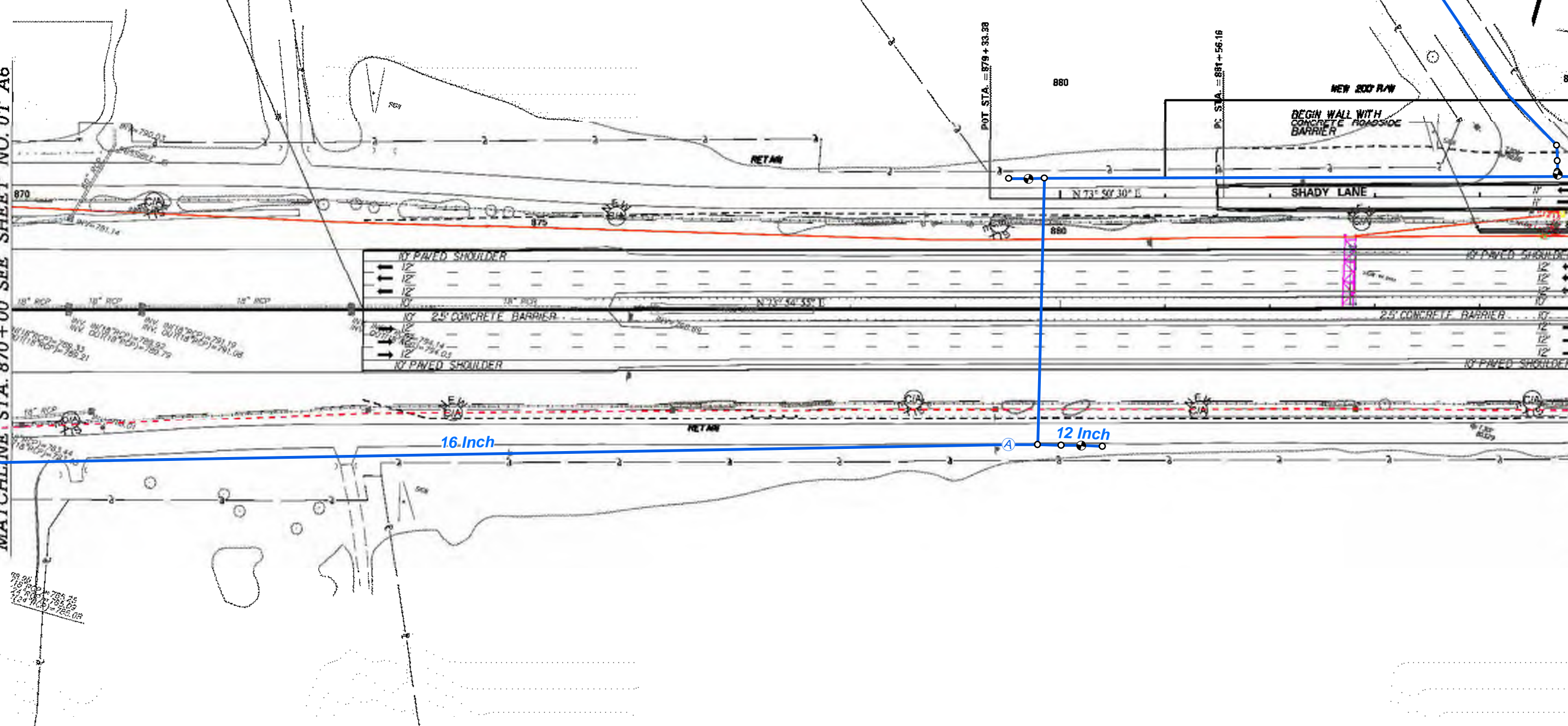
Utility Coordination
under TranSystems
Derek Staton
(864) 234-0866

DATE	BY	REVISION	DESCRIPTION

MATCHLINE STA. 870+00 SEE SHEET NO. UT_A6

MATCHLINE STA. 885+00 SEE SHEET NO. UT_A8

BEGIN CONSTRUCTION
STA. 873+55.00
I-85 SEGMENT A



PRELIMINARY
NOT FOR CONSTRUCTION

7			
6			
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3			
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1			

SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION
INTERSTATE 85
UTILITY PLAN SHEET
INTERSTATE 85 MILE MARKER 80-96
SEGMENT A

172572015

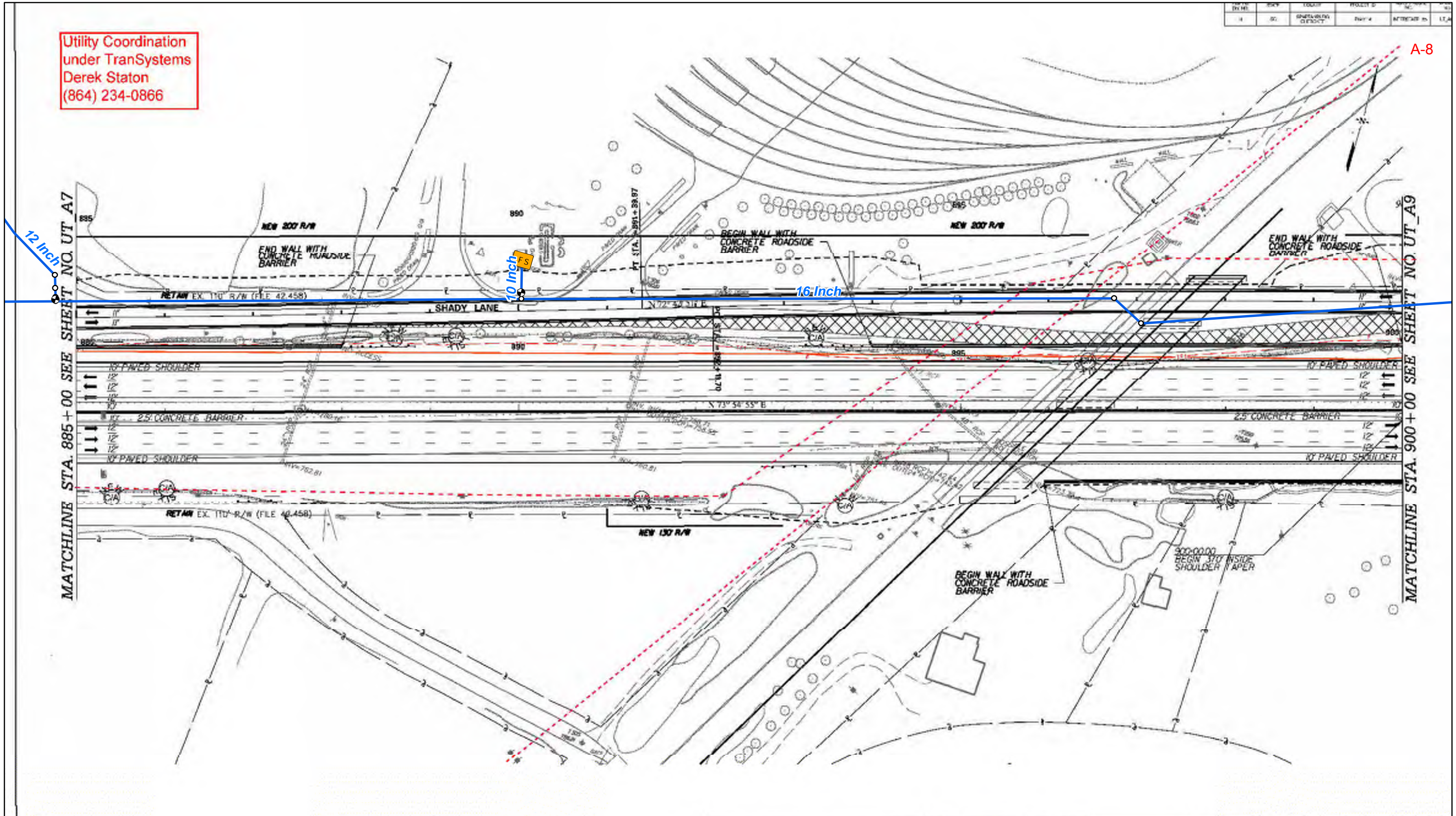
Utility Coordination
 under TranSystems
 Derek Staton
 (864) 234-0866

DATE	BY	GROUP	PROJECT	SCALE
11/14/11	DC	TRANSPORTATION	INTERSTATE 85	1"=40'

A-8

MATCHLINE STA. 885 + 00 SEE SHEET NO. UT_A7

MATCHLINE STA. 900 + 00 SEE SHEET NO. UT_A9



PRELIMINARY NOT FOR CONSTRUCTION	7				SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION INTERSTATE 85 UTILITY PLAN SHEET INTERSTATE 85 MILE MARKER 80-96 SEGMENT A
	6				
6					
4					
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1					

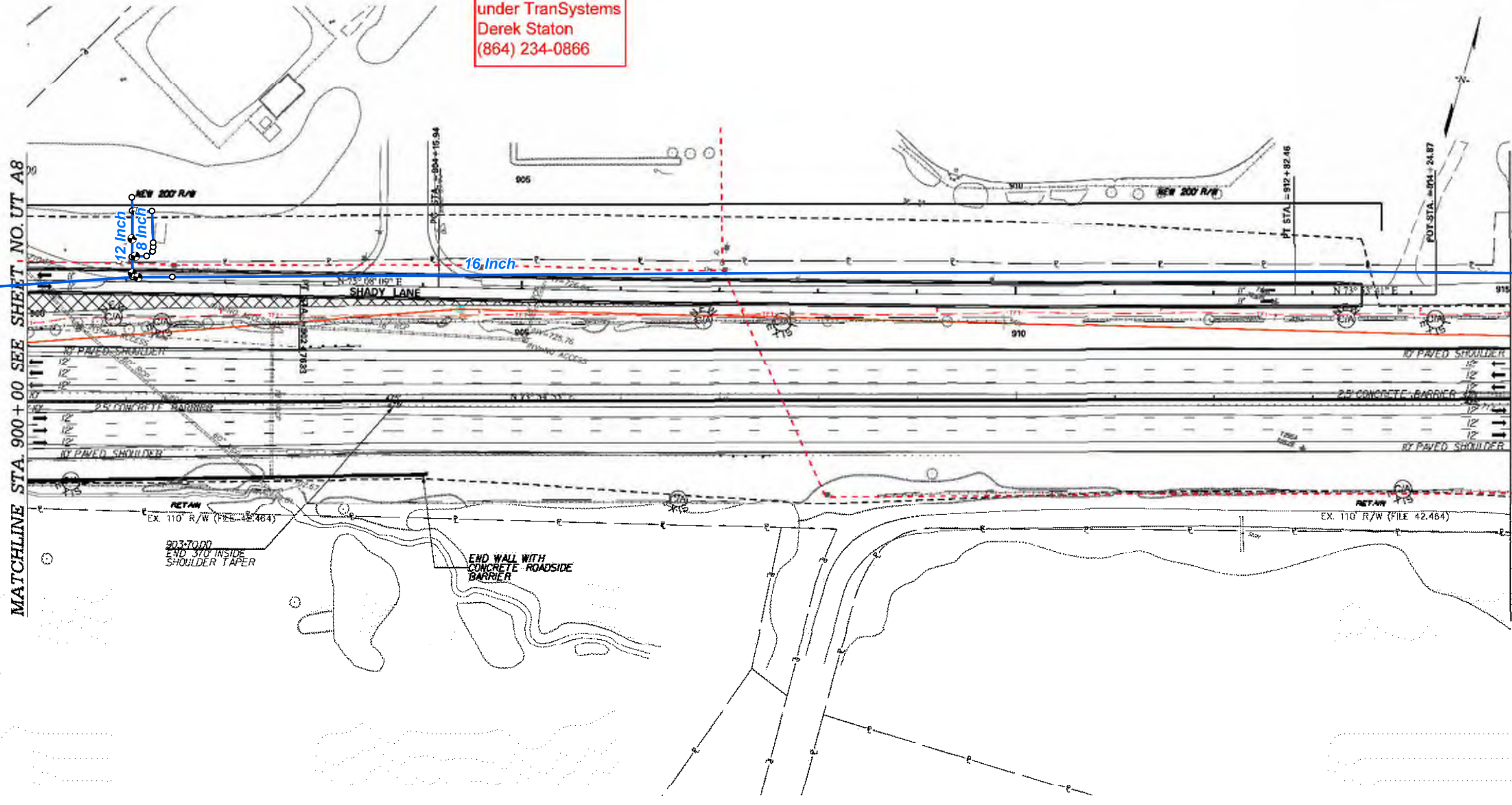
172-7201

DATE	BY	SCALE	PROJECT	NO.
11	DC		INTERSTATE 85	UT_09

Utility Coordination
under TranSystems
Derek Staton
(864) 234-0866

MATCHLINE STA. 900+00 SEE SHEET NO. UT_A8

MATCHLINE STA. 915+00 SEE SHEET NO. UT_A10



<p>PRELIMINARY NOT FOR CONSTRUCTION</p>	7				<p>SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION INTERSTATE 85</p> <p>UTILITY PLAN SHEET</p> <p>INTERSTATE 85 MILE MARKER 80-96 SEGMENT A</p>
	6				
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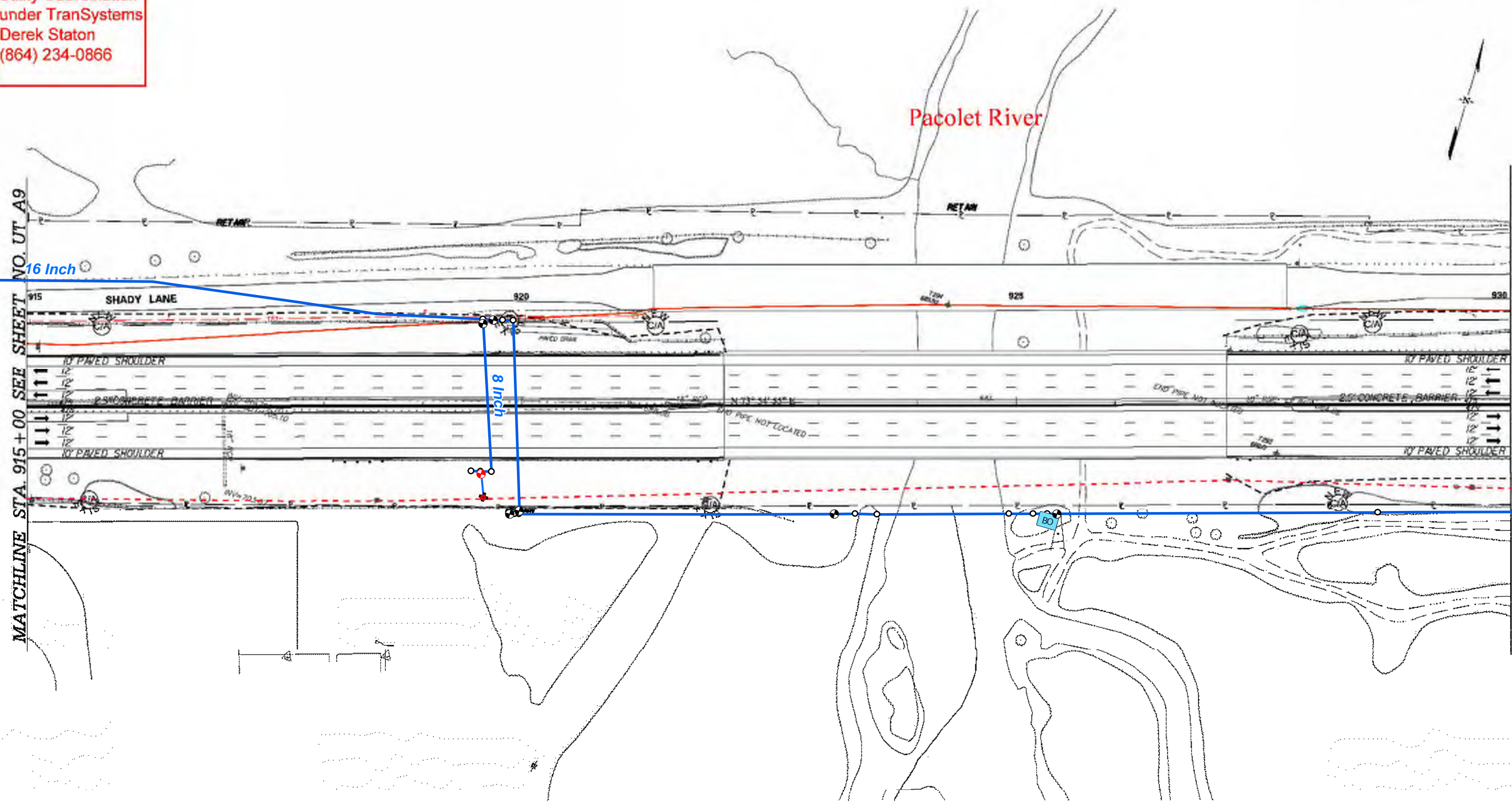
DATE	BY	CHKD	LODGE	PROJECT	SHEET NO.	TOTAL SHEETS
11/15/16	DC			INTERSTATE 85	A-10	10

Utility Coordination
under TranSystems
Derek Staton
(864) 234-0866

Pacolet River

MATCHLINE STA. 915 + 00 SEE SHEET NO. UT A9

MATCHLINE STA. 930 + 00 SEE SHEET NO. UT A11



<p>PRELIMINARY NOT FOR CONSTRUCTION</p>	7				<p>SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION INTERSTATE 85</p> <p>UTILITY PLAN SHEET</p> <p>INTERSTATE 85 MILE MARKER 80-96 SEGMENT A</p>
	6				
	6				
	4				
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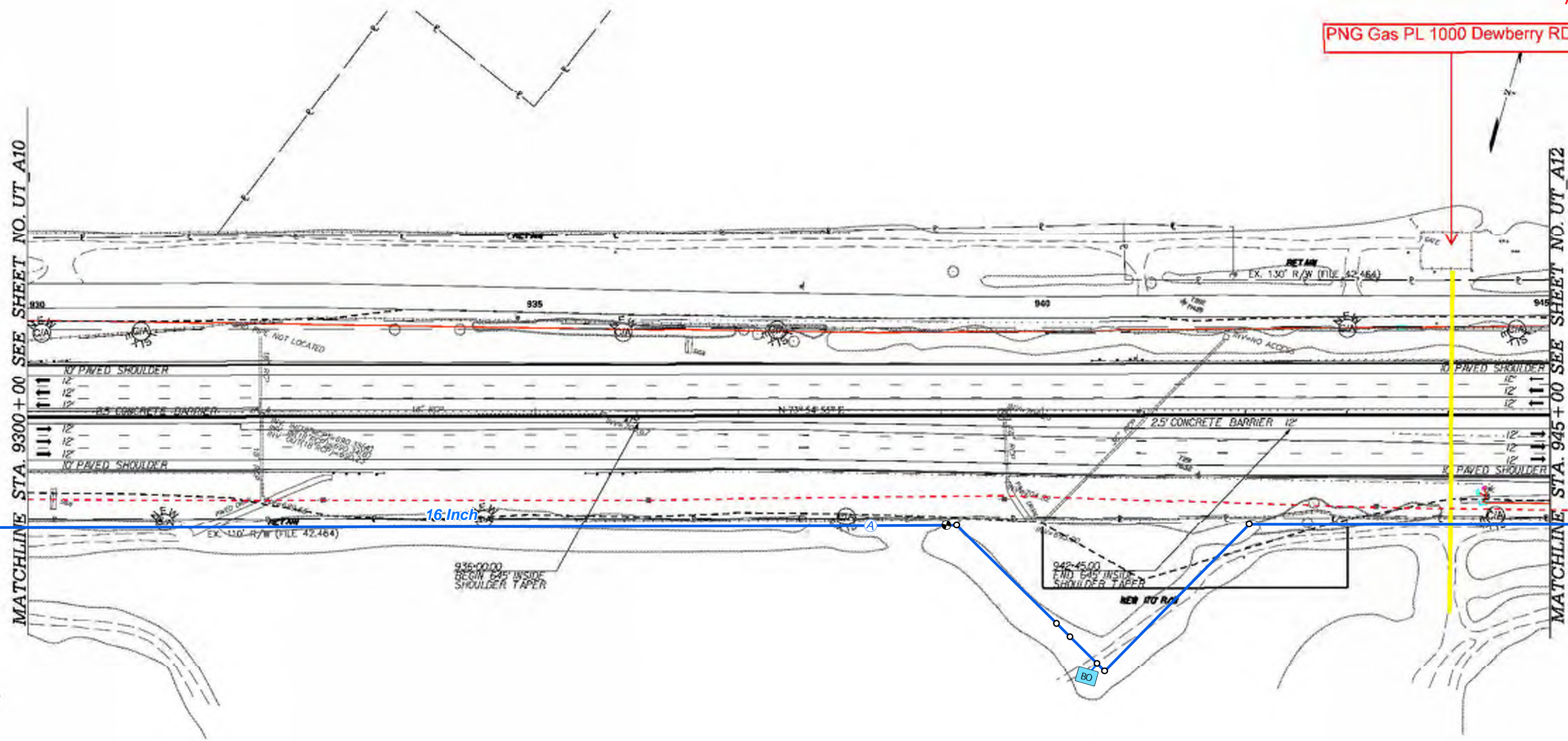
DATE	BY	SCALE	PROJECT	NO.	REV.
11/11/11

A-111

PNG Gas PL 1000 Dewberry RD

MATCHLINE STA. 9300 + 00 SEE SHEET NO. UT_A10

MATCHLINE STA. 945 + 00 SEE SHEET NO. UT_A12



<p>PRELIMINARY NOT FOR CONSTRUCTION</p>	7				<p>SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION INTERSTATE 85</p> <p>UTILITY PLAN SHEET</p> <p>INTERSTATE 85 MILE MARKER 80-96 SEGMENT A</p>
	6				
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	1				

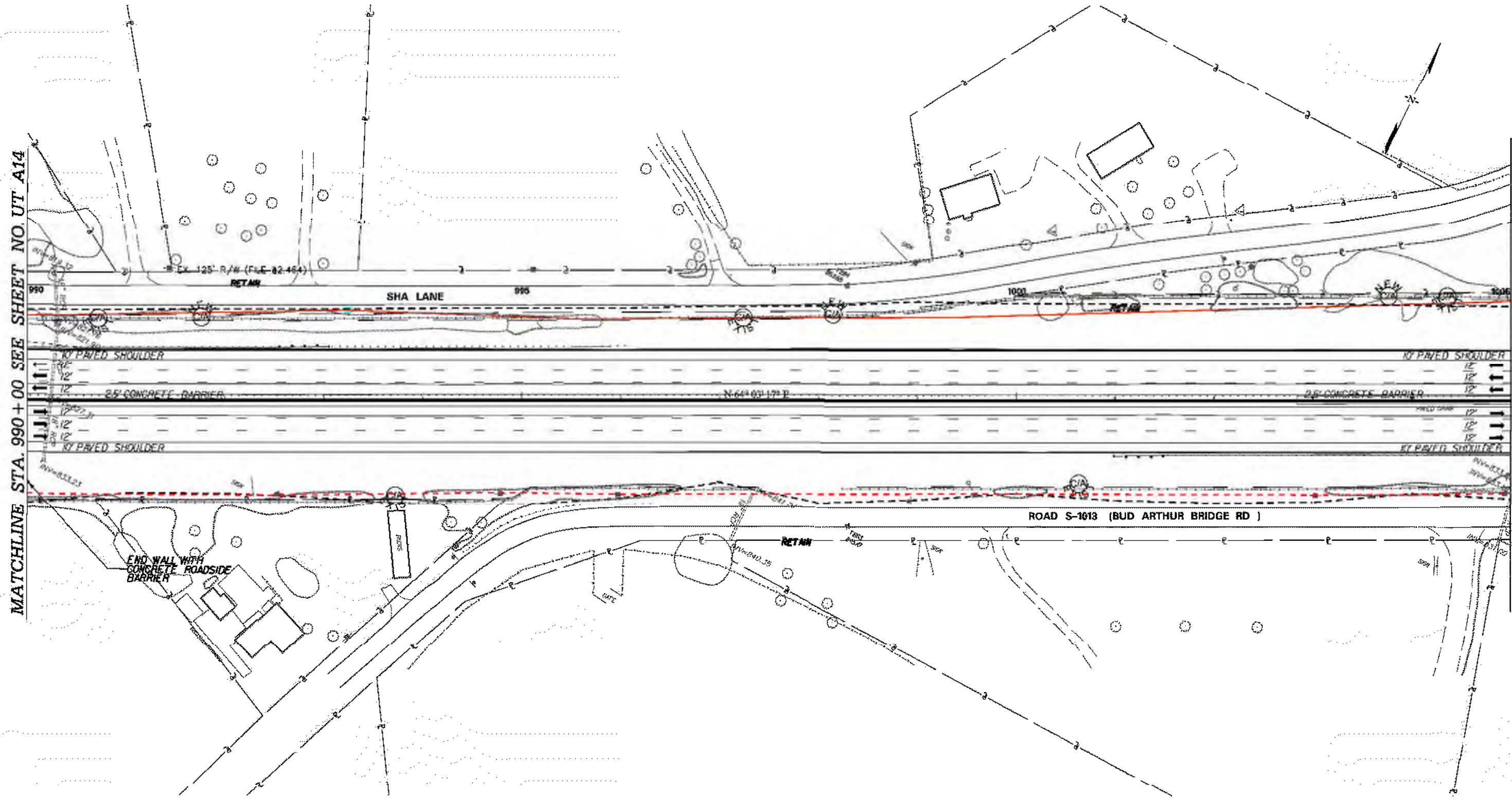
11/24/11

DATE	BY	SCALE	PROJECT	DATE	BY
11/11/11	SC	ASAP/AD/DA	PROJECT	11/11/11	SC

A-15

MATCHLINE STA. 990 + 00 SEE SHEET NO. UT A14

MATCHLINE STA. 1005 + 00 SEE SHEET NO. UT A16



END WALL WITH CONCRETE ROADSIDE BARRIER

<p>PRELIMINARY NOT FOR CONSTRUCTION</p>	7				<p>SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION INTERSTATE 85</p> <p>UTILITY PLAN SHEET</p> <p>INTERSTATE 85 MILE MARKER 80-96 SEGMENT A</p>
	6				
	5				
	4				
	3				
	2				
	1				

16 Inch

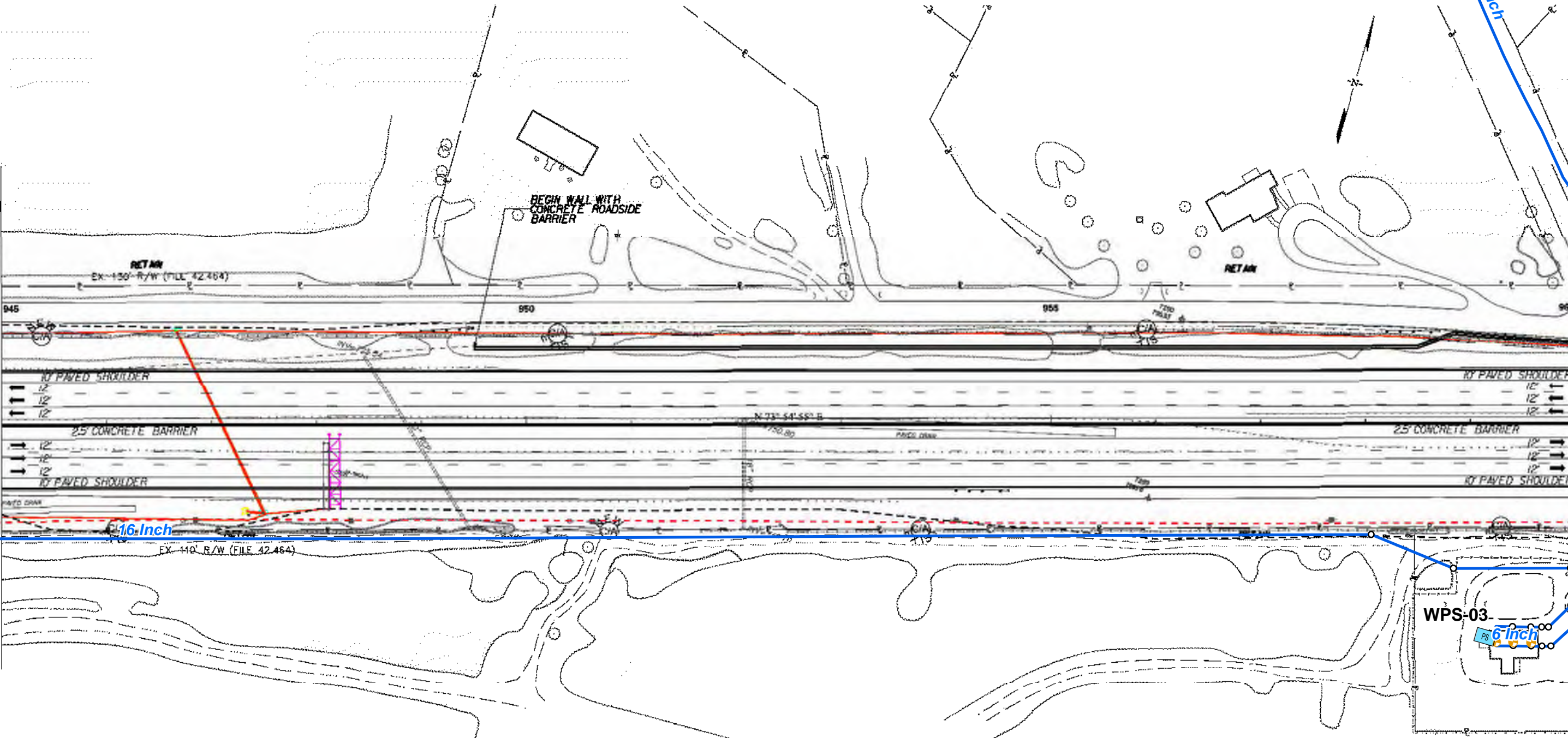
3/25/12

CDOT DIST. NO.	STATE	COUNTY	POLLING DISTRICT	PRECINCT	PRECINCT NO.	UTILITY
H	SC	SPRINGFIELD	1st	1st	1st	UT A1

A-12

MATCHLINE STA. 945+00 SEE SHEET NO. UT A11

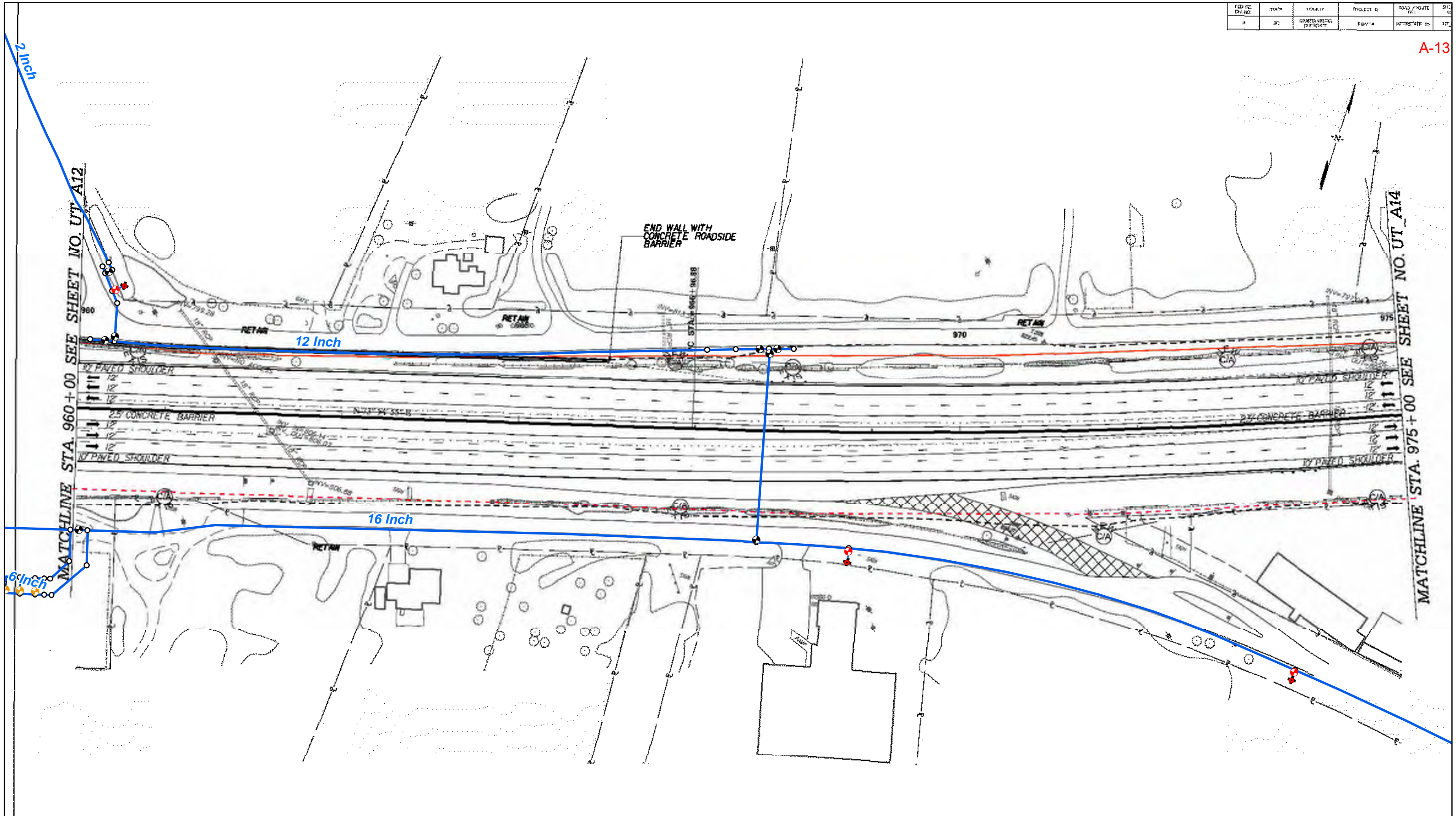
MATCHLINE STA. 960+00 SEE SHEET NO. UT A13



PRELIMINARY NOT FOR CONSTRUCTION	7				SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION INTERSTATE 85 UTILITY PLAN SHEET INTERSTATE 85 MILE MARKER 80-96 SEGMENT A
	6				
	6				
	4				
	3				
	2				
	1				

9/24/2005

FED. RD. DIST. NO.	STATE	TOWNSHIP	PROJECT NO.	ROAD ROUTE	SHEET NO.
8	SC	SPRENTAN W/CD	80-96	INTERSTATE 85	13

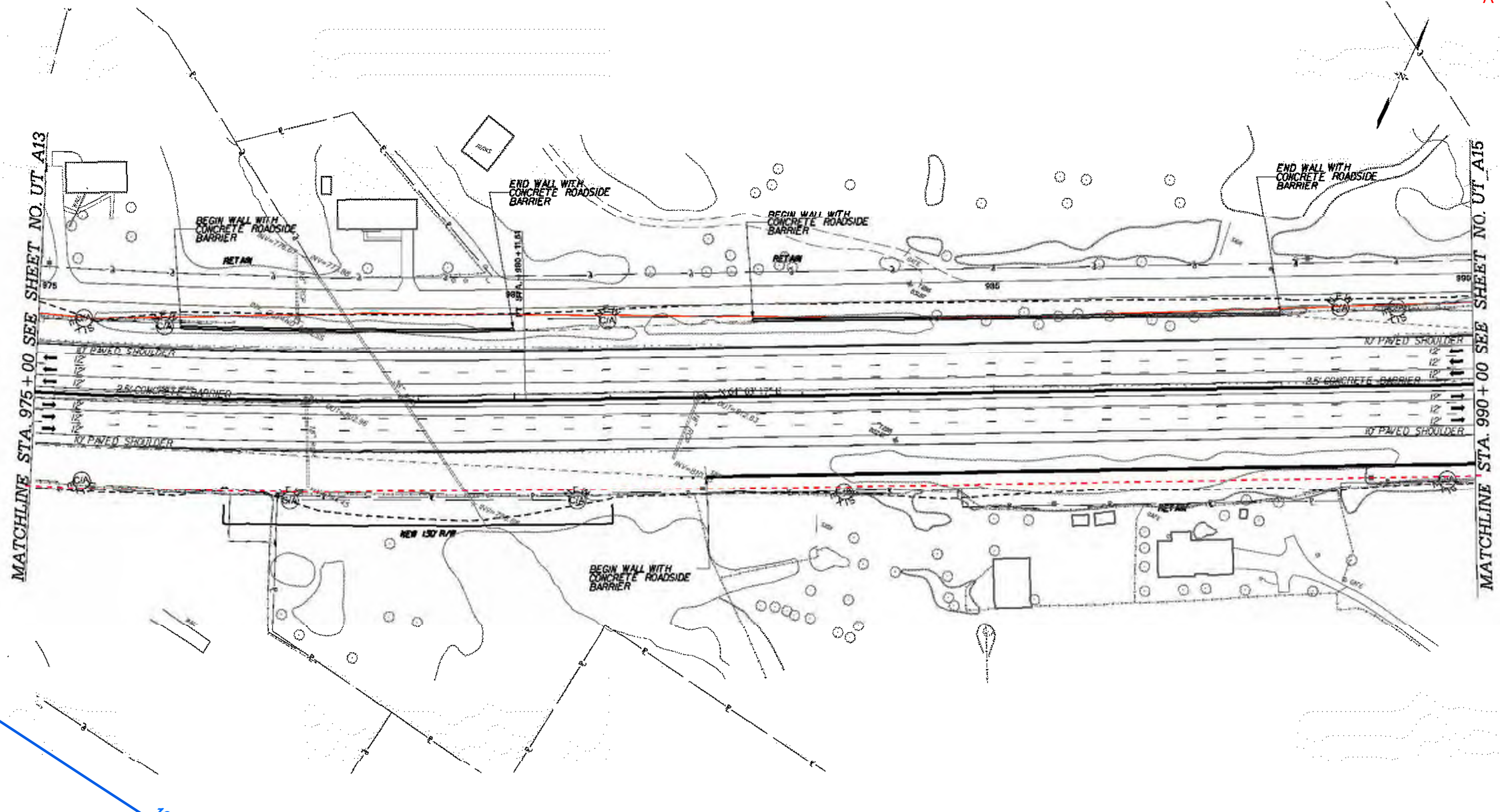


<p>PRELIMINARY NOT FOR CONSTRUCTION</p>	7				<p>SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION INTERSTATE 85</p> <p>UTILITY PLAN SHEET</p> <p>INTERSTATE 85 MILE MARKER 80-96 SEGMENT A</p>
	6				
	5				
	4				
	3				
2					
1					

3/27/21

BY NO.	DATE	REVISION	BY	DATE
1	03	ISSUED FOR PROJECT	RLC	11/24

A-14



16 Inch

<p>PRELIMINARY NOT FOR CONSTRUCTION</p>	7				SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION INTERSTATE 85 UTILITY PLAN SHEET INTERSTATE 85 MILE MARKER 80-96 SEGMENT A
	6				
	5				
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	0				

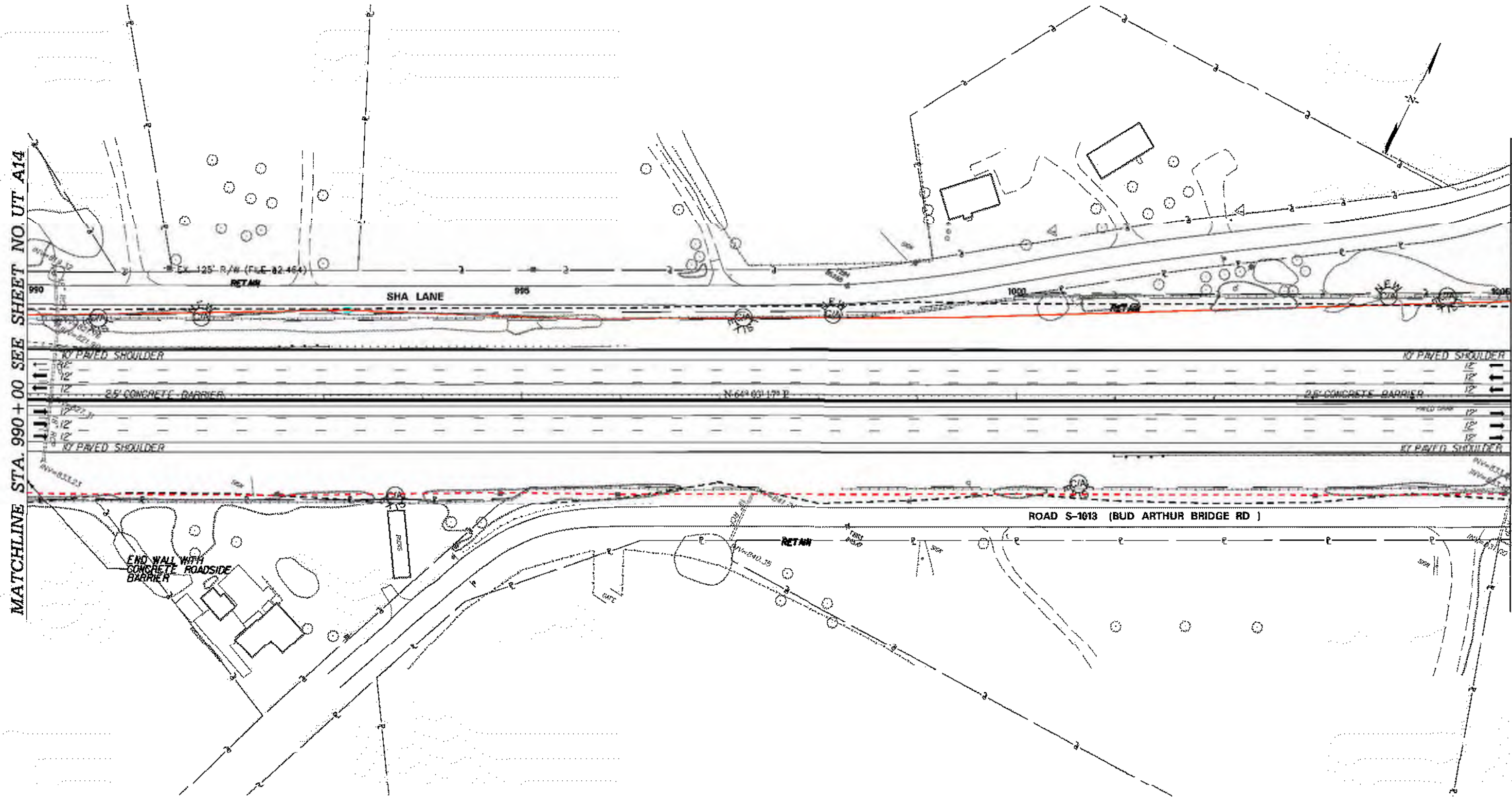
7247231E

DATE	BY	SCALE	PROJECT	DATE	BY
11/11/11	SC	AS SHOWN	INTERSTATE 85	11/11/11	SC

A-15

MATCHLINE STA. 990 + 00 SEE SHEET NO. UT A14

MATCHLINE STA. 1005 + 00 SEE SHEET NO. UT A16



END WALL WITH CONCRETE ROADSIDE BARRIER

<p>PRELIMINARY NOT FOR CONSTRUCTION</p>	7				<p>SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION INTERSTATE 85</p> <p>UTILITY PLAN SHEET</p> <p>INTERSTATE 85 MILE MARKER 80-96 SEGMENT A</p>
	6				
	5				
	4				
	3				
	2				
	1				

16 Inch

3/25/12

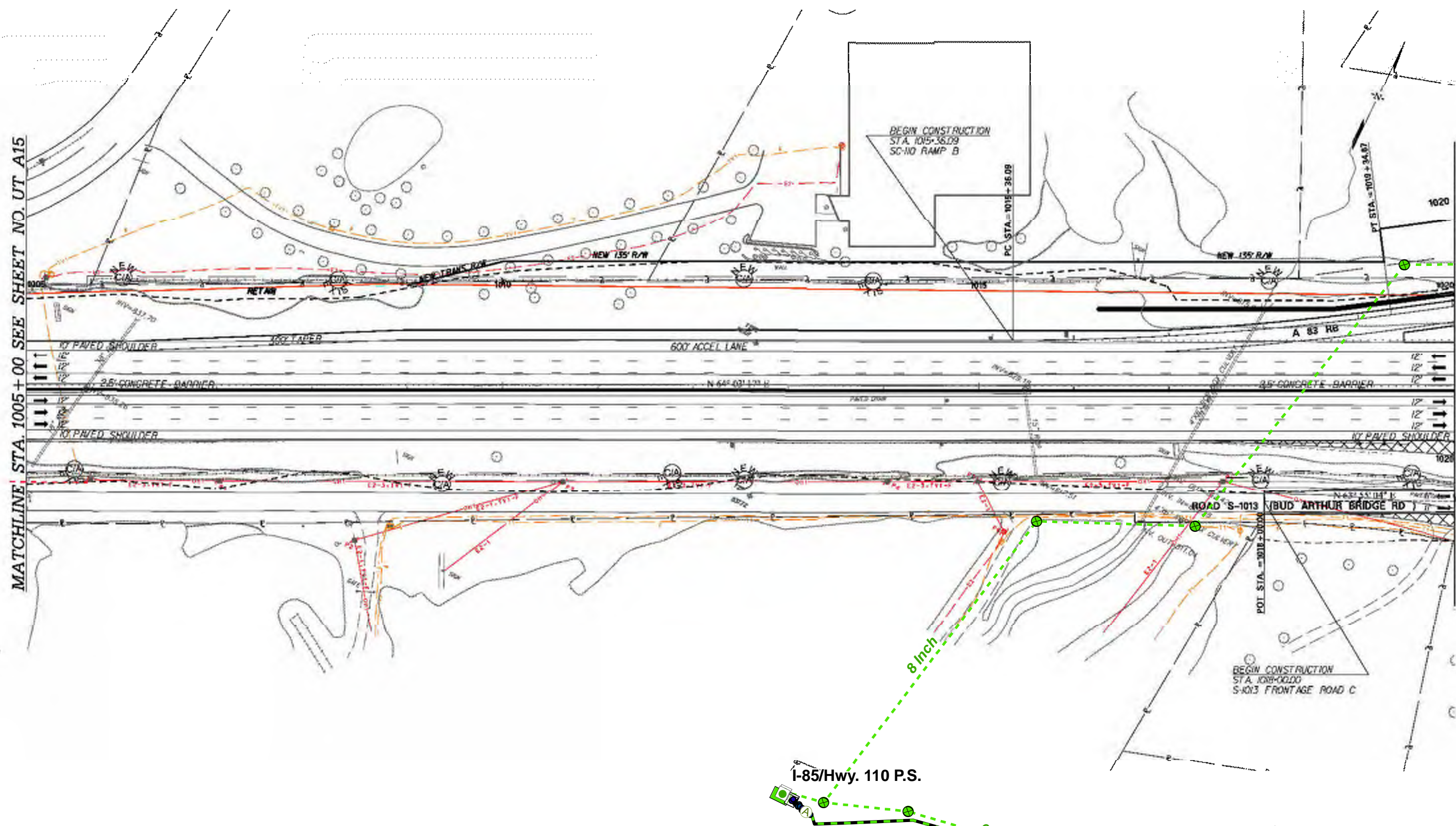
ROUTE	STATE	COUNTY	PROJECT	NO. / DATE	DATE
85	SC	SPARTANBURG	INTERSTATE 85	80-06	UT, A

SWSD Gravity Sewer for survey to pick up

A-16

MATCHLINE STA. 1005+00 SEE SHEET NO. UT_A15

MATCHLINE STA. 1020+00 SEE SHEET NO. UT_A17



<p>PRELIMINARY NOT FOR CONSTRUCTION</p>	7			<p>SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION INTERSTATE 85</p>
	6			
	5			
	4			
	3			<p>UTILITY PLAN SHEET</p>
	2			<p>INTERSTATE 85 MILE MARKER 80-06 SEGMENT A</p>
	1			

9/24/2003

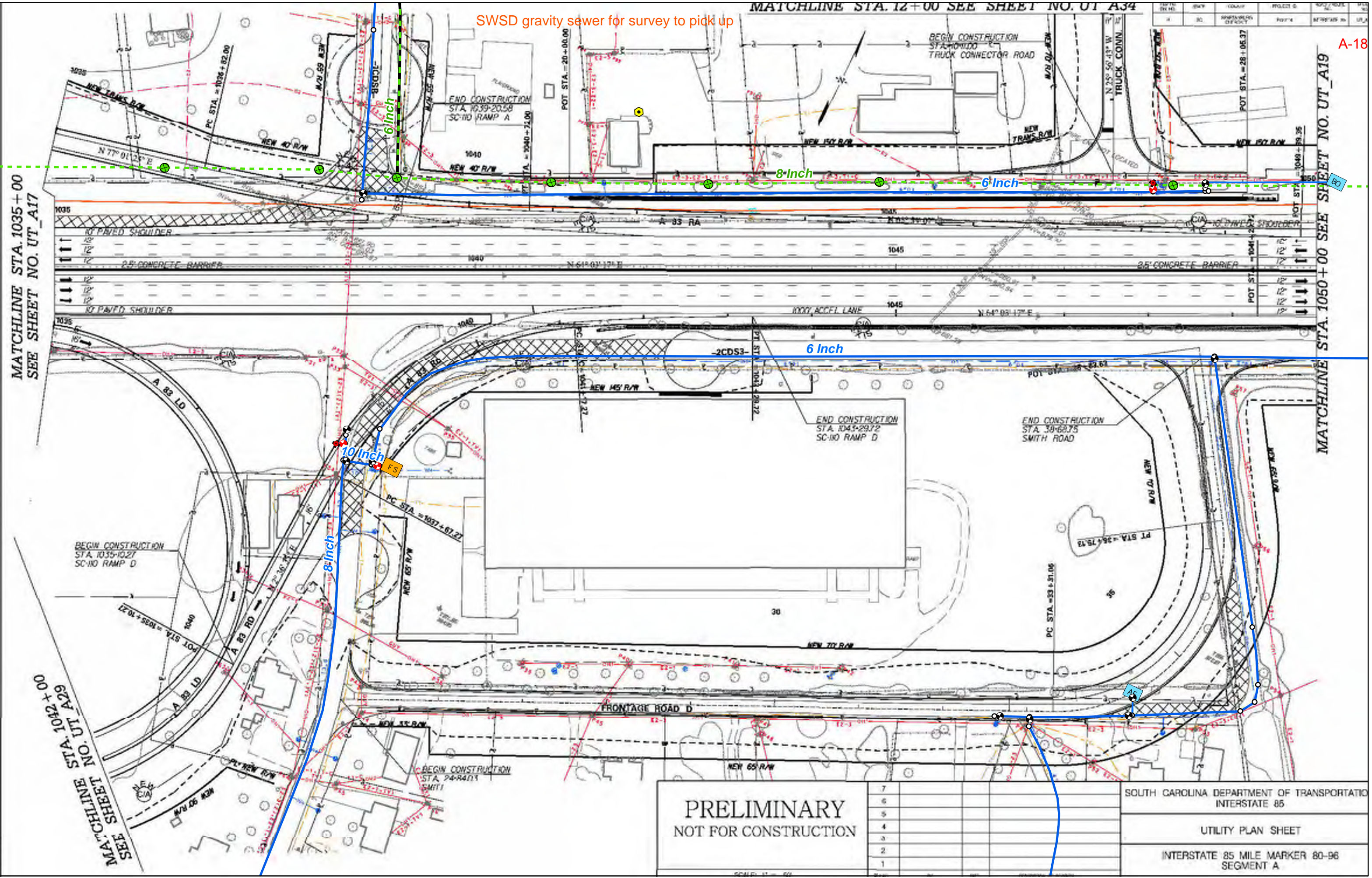
NO.	DATE	BY	REVISION
1			
2			
3			
4			
5			
6			
7			

A-18

SWSD gravity sewer for survey to pick up

MATCHLINE STA. 1035+00
SEE SHEET NO. UT_A17

MATCHLINE STA. 1050+00 SEE SHEET NO. UT_A19



PRELIMINARY
NOT FOR CONSTRUCTION

SCALE: 1" = 60'

7			
6			
5			
4			
3			
2			
1			

SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION
INTERSTATE 85

UTILITY PLAN SHEET

INTERSTATE 85 MILE MARKER 80-96
SEGMENT A

07/24/2023

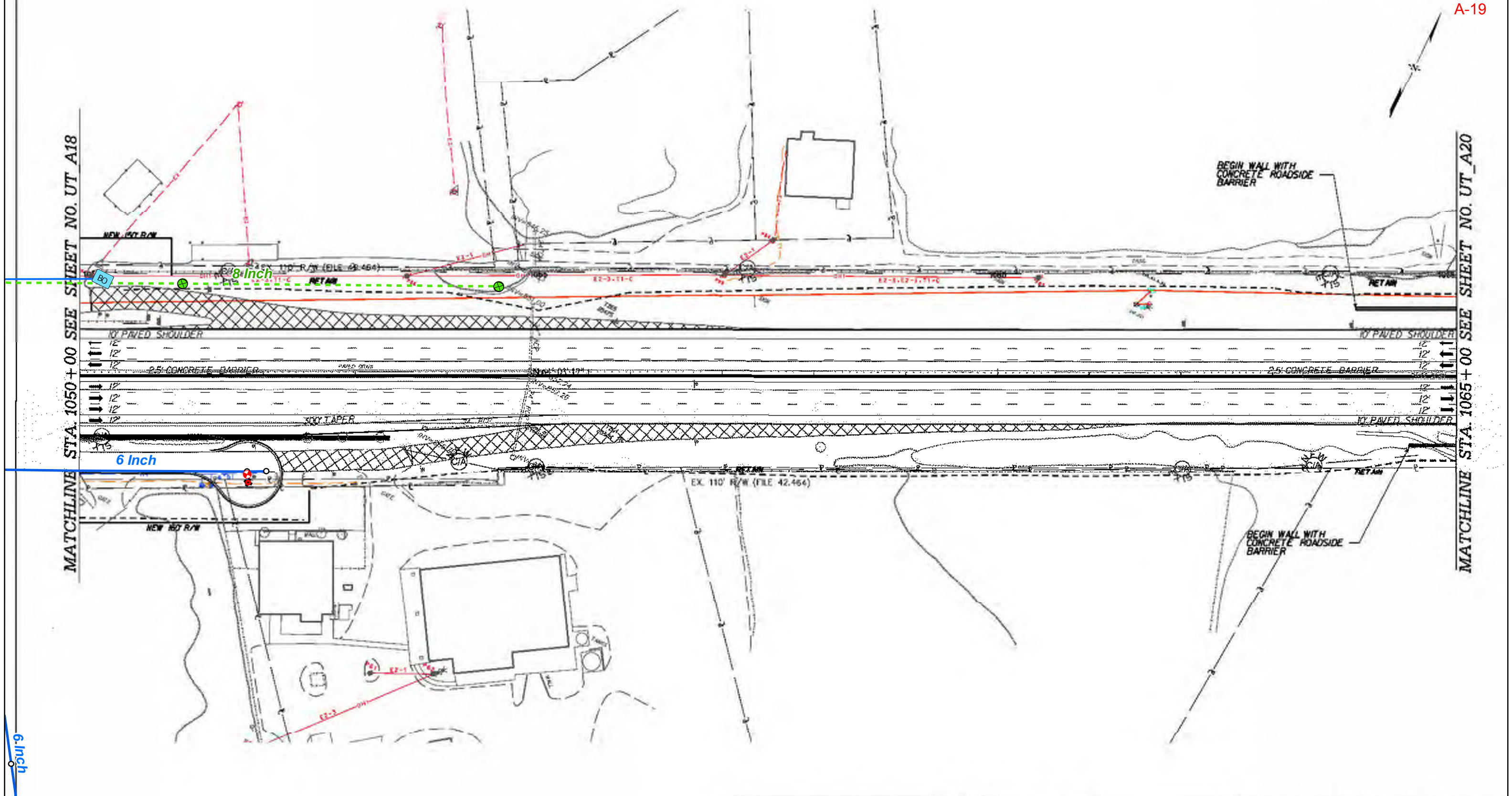
SWSD gravity sewer for survey to pick

DATE	BY	SCALE	PROJECT	NO.
11/14	SC	AS SHOWN	FILE 4	11/14

A-19

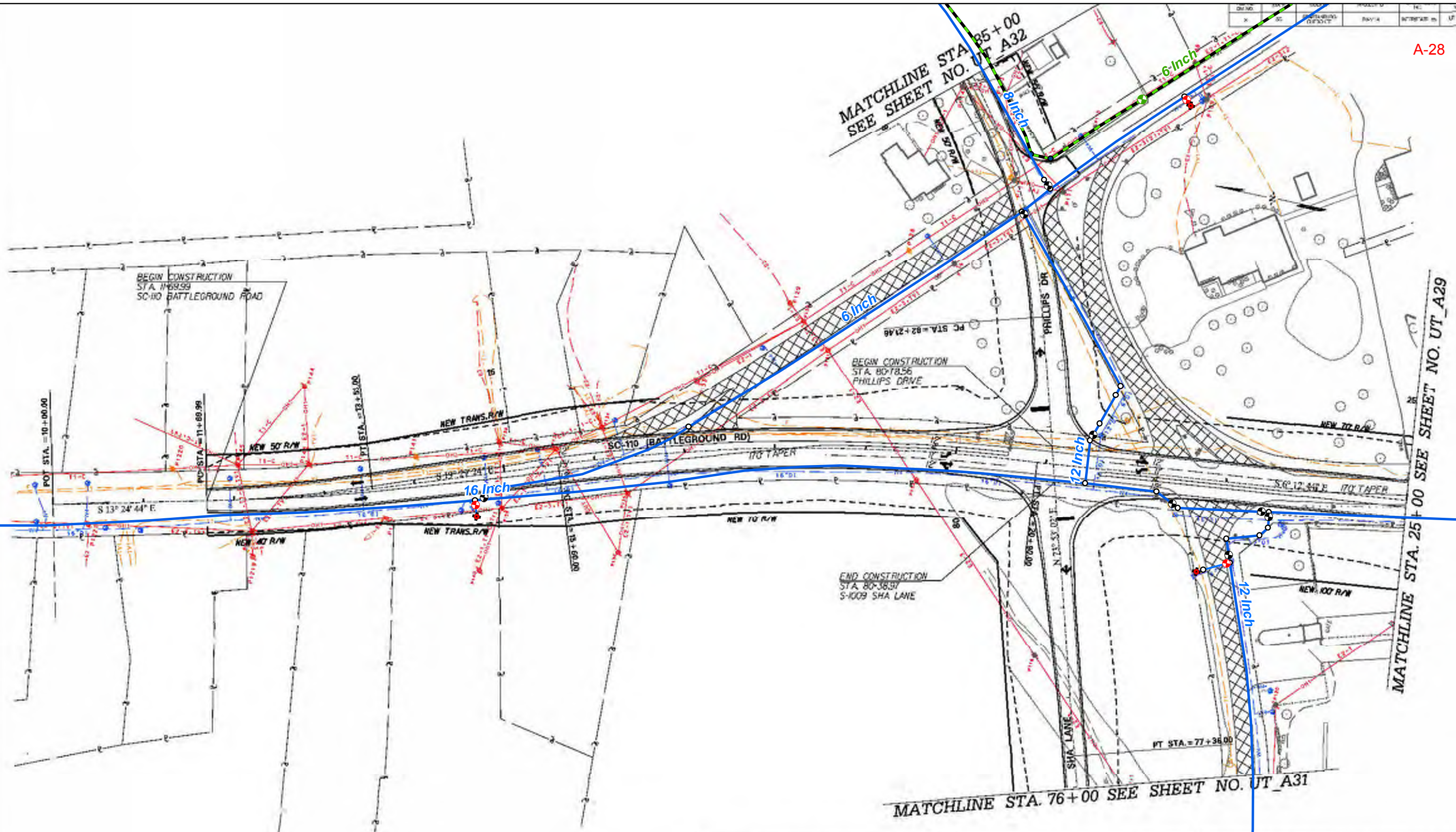
MATCHLINE STA. 1050 + 00 SEE SHEET NO. UT_A18

MATCHLINE STA. 1065 + 00 SEE SHEET NO. UT_A20



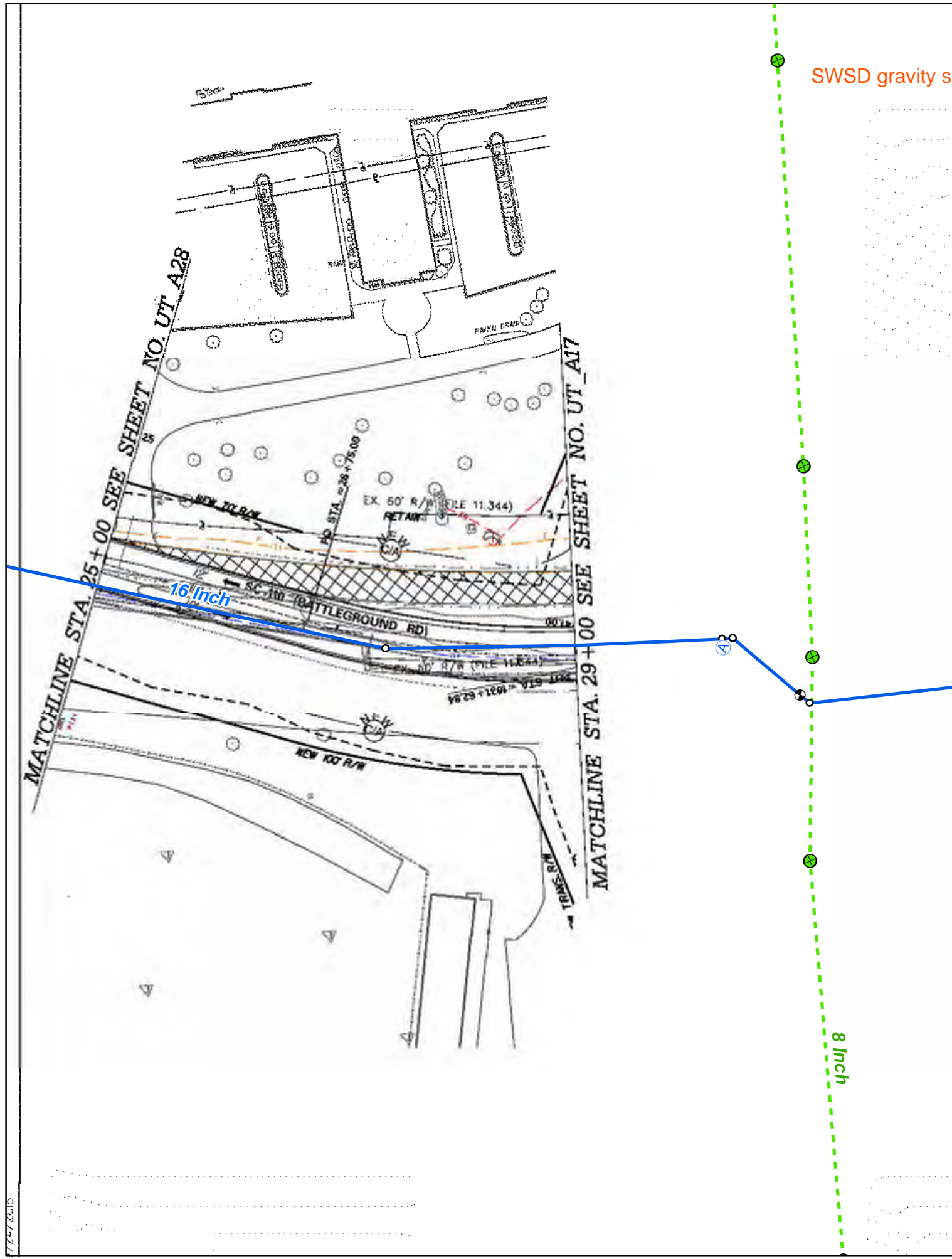
<p>PRELIMINARY NOT FOR CONSTRUCTION</p> <p>SCALE: 1" = 60'</p>	7				SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION INTERSTATE 85
	6				
	5				UTILITY PLAN SHEET
	4				INTERSTATE 85 MILE MARKER 80-96 SEGMENT A
	3				
	2				
	1				

6 inch

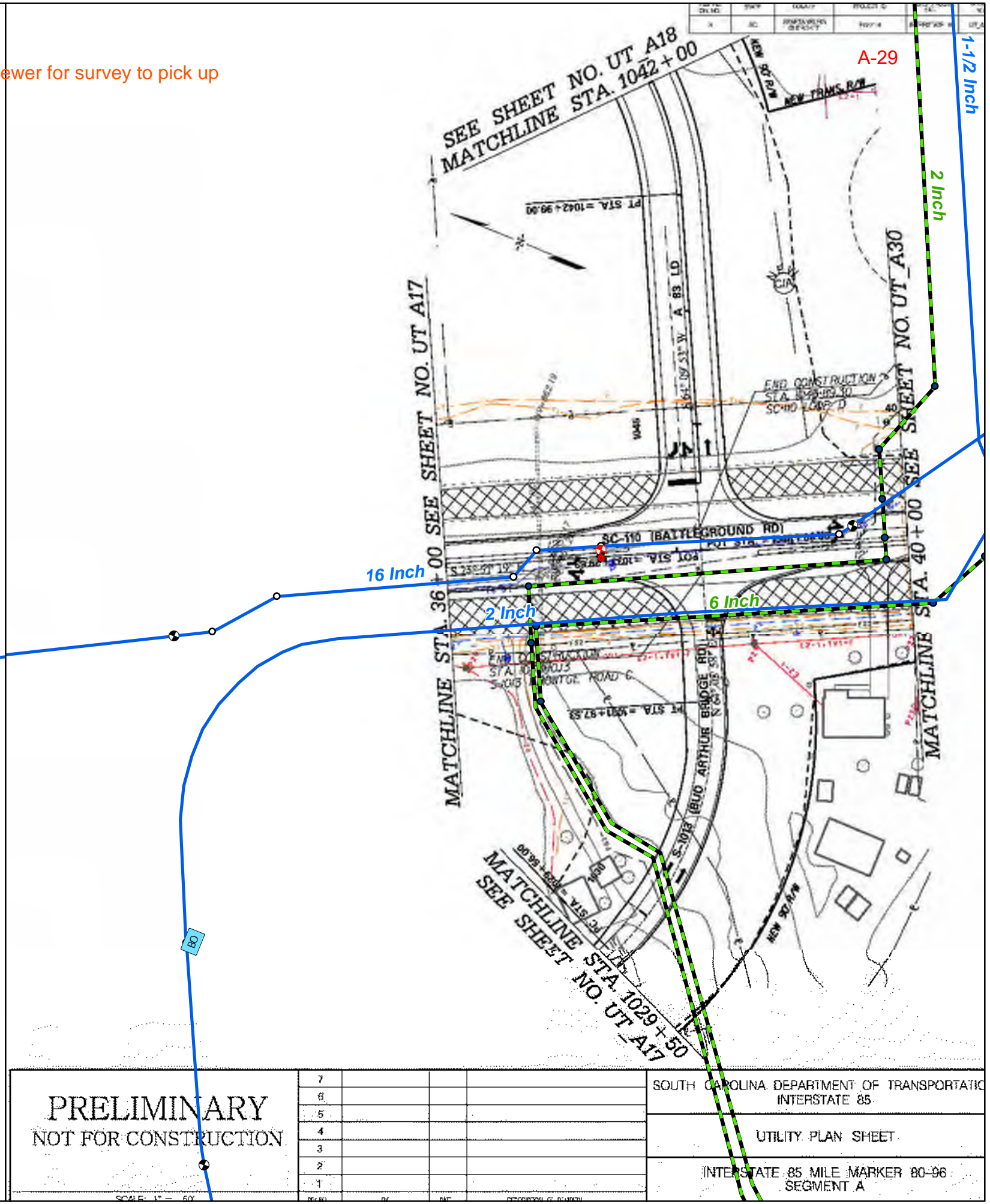


PRELIMINARY NOT FOR CONSTRUCTION	7				SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION INTERSTATE 85 UTILITY PLAN SHEET INTERSTATE 85 MILE MARKER 80-96 SEGMENT A
	6				
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	4				
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1					

72472315



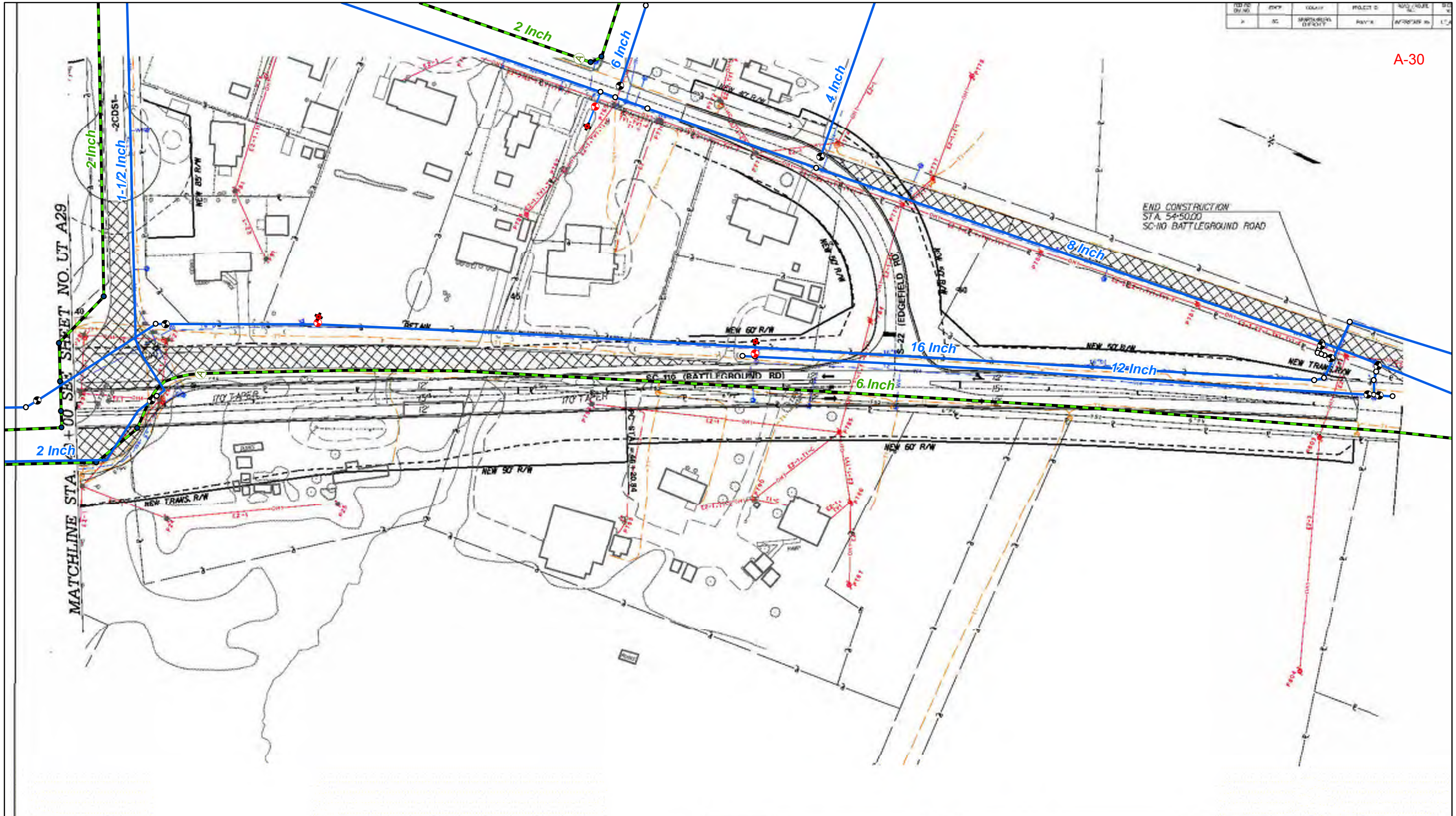
SWSD gravity sewer for survey to pick up



<p>PRELIMINARY NOT FOR CONSTRUCTION</p>	7				<p>SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION INTERSTATE 85</p>
	6				
	5				
	4				
	3				
	2				UTILITY PLAN SHEET
	1				INTERSTATE 85 MILE MARKER 80-96 SEGMENT A

NO.	DATE	BY	PROJECT	SCALE
1	SC	SPROCKERS	PROJ	AS SHOWN

A-30



<p>PRELIMINARY NOT FOR CONSTRUCTION</p>	7				<p>SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION INTERSTATE 85</p> <p>UTILITY PLAN SHEET</p> <p>INTERSTATE 85 MILE MARKER 80-96 SEGMENT A</p>
	6				
	5				
	4				
	3				
2					
1					

07/2/25



December 11, 2015

Ms. Theresa H. Hodge, P. E.
Director of Utilities
Civil Engineering Consulting Services, Inc.
2000 Park Street Suite 201
Columbia, SC 29201

Re: I-85 Widening Water Relocations
Spartanburg Water Project No: W150411
CSX Railroad Conflicts

Dear Ms. Hodge:

Please accept this letter as notification of Spartanburg Water's intent to relocate the existing 16" waterline under the CSX Railroad at the Auriga Polymer site, as shown on the attached sketch. The relocation at the proposed location is contingent upon the approval of the SCDOT, CSX, and other utilities in the area, as well as any available relocation options outside of the SCDOT right-of-way in this area. Spartanburg Water also intends to verify the location and depth of the 16" waterline by potholing, thereby allowing the actual location of the waterline in this area to be shown on the railroad bridge/I-85 widening plans.

Sincerely,

SPARTANBURG WATER

A handwritten signature in blue ink that reads "Kevin D. Smith".

Kevin D. Smith, P.E.
Project Engineer

Enclosures: As noted

NEW 200' R/W

SIGHT CLEARANCE TO SCI
(PLAT BOOK 52 PAGE 9

EX. 1203R/
(FILE 42.45

EXISTING 16" WATERLINE

PROPOSED
RELOCATION
OF 16" WATERLINE

WATER
VAULT

PRES. TRANSITION R/V
PROPERTY LINE PER PB 165

TOWER

T 302
758.63

S 30

1"=20'

895

ELEVATIONS
@ BOTTOM OF

751.77 751.85
751.82

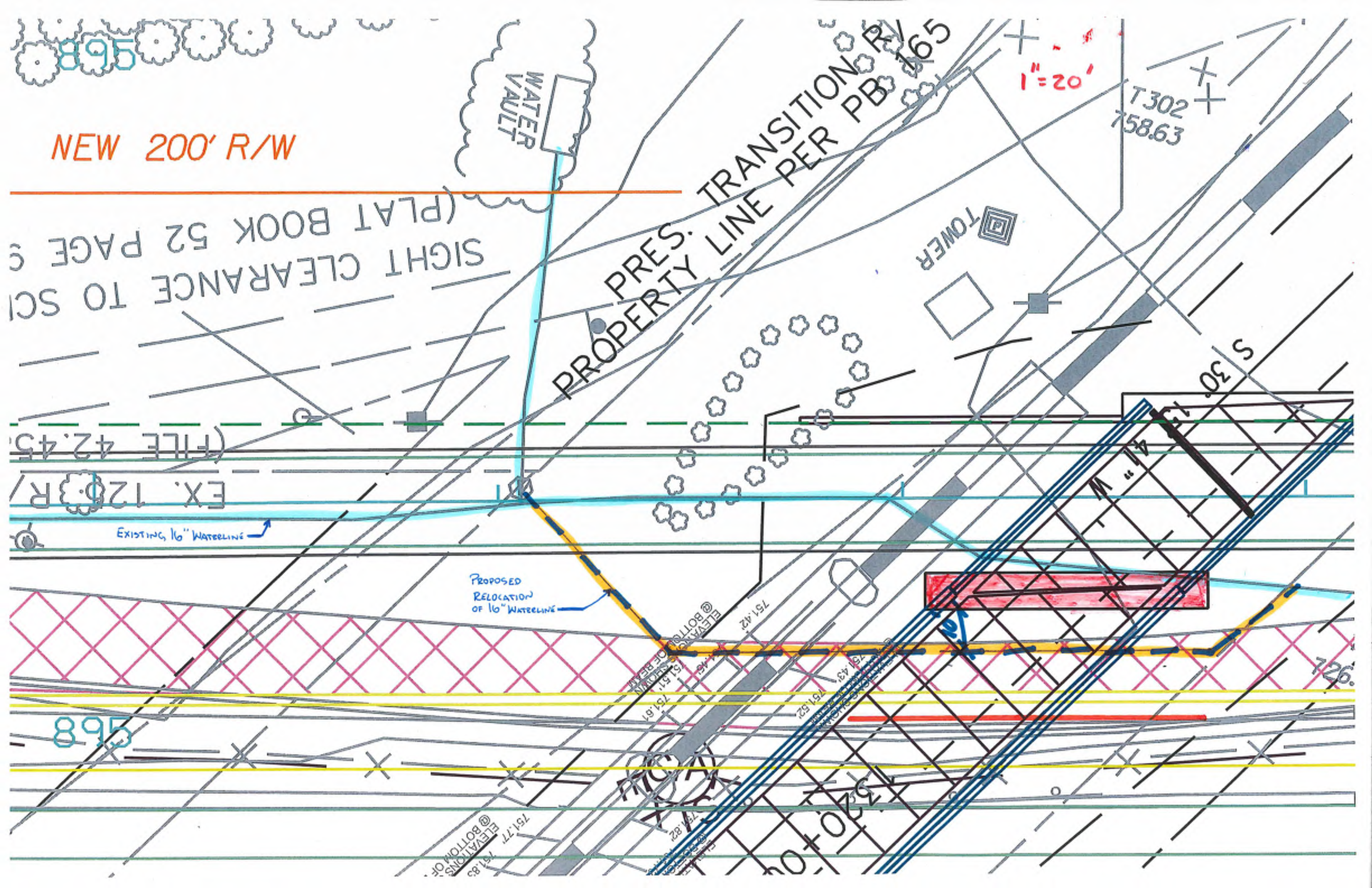
ELEVATIONS
@ BOTTOM OF

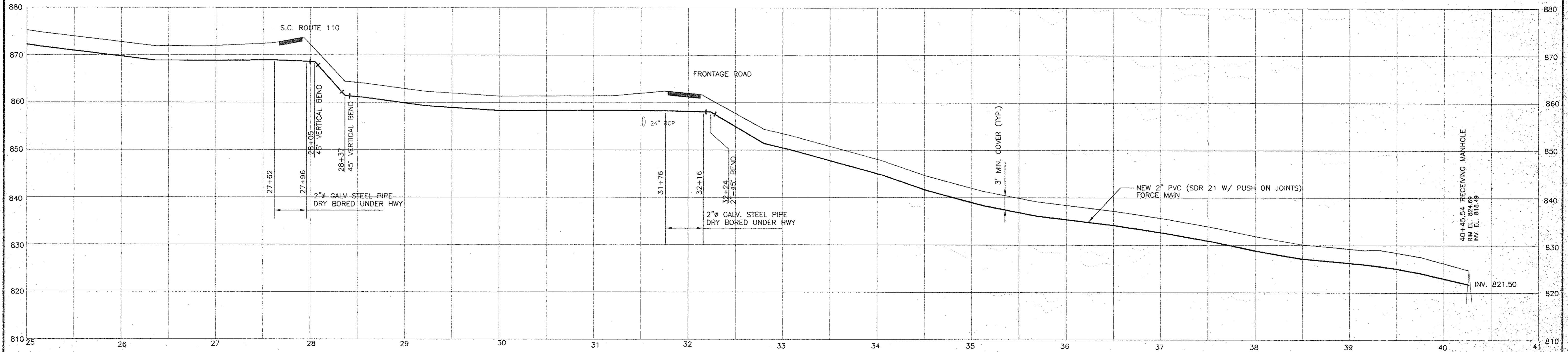
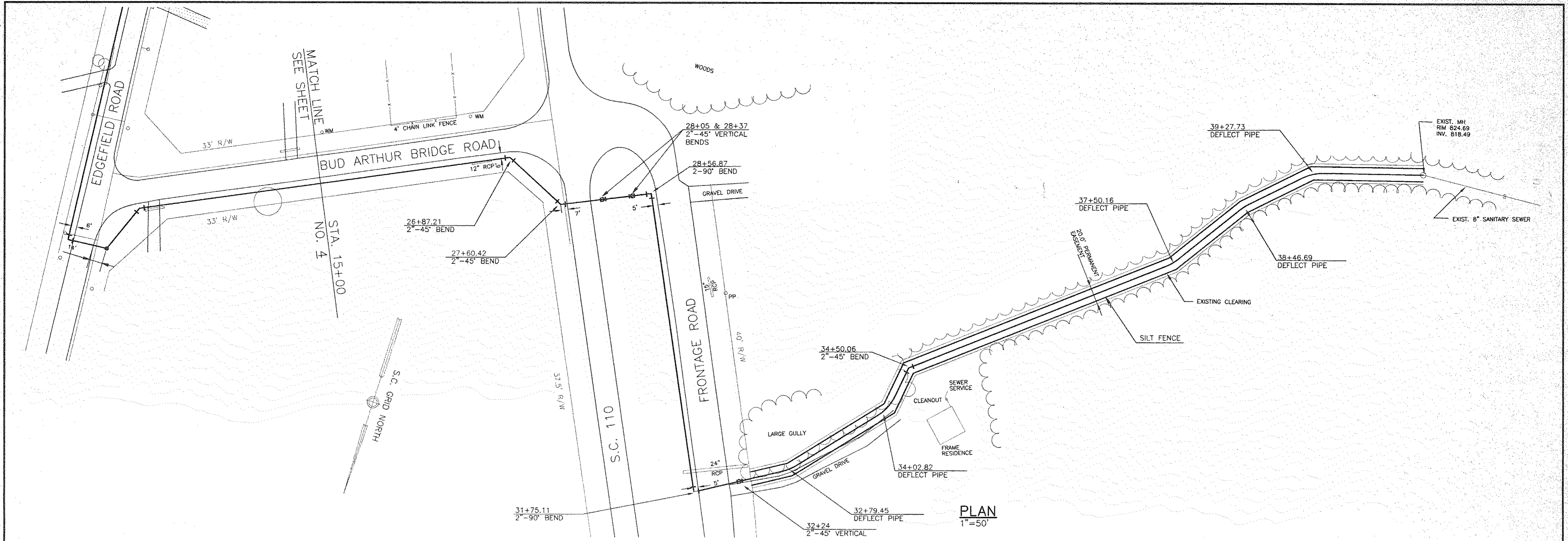
751.42

751.43 751.52

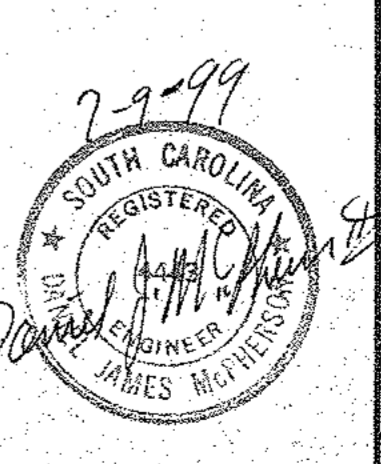
726

320+0





NOTE:
ALL EXISTING UTILITIES SHOWN IN PLAN & PROFILE ARE APPROXIMATE. CONTRACTOR SHALL LOCATE ALL EXISTING UTILITIES PRIOR TO ANY CONSTRUCTION AND NOTIFY THE ENGINEER OF ANY CONFLICTS.



SPARTANBURG SANITARY SEWER DISTRICT	
EDGEFIELD PUMP STATION 2" SEWER FORCE MAIN-PLAN & PROFILE	
PREPARED BY: HAYES, SEAY, MATTERN & MATTERN, INC.	SCALE: AS NOTED
DATE: JUNE 1999	APPROVED BY:
DATE CONSTRUCTED:	SHEET NO. 5 OF 9



MOUNT PLEASANT RD

COLOR DR

38

FRANK DR

WHITLOCK BLANK DR

OBINER DR

HOECHST DR

7146

COURTESY LAKE LN

DENZBERRY RD

VINTAGE DR

INTERSTATE 65

CONWAY BLACK RD

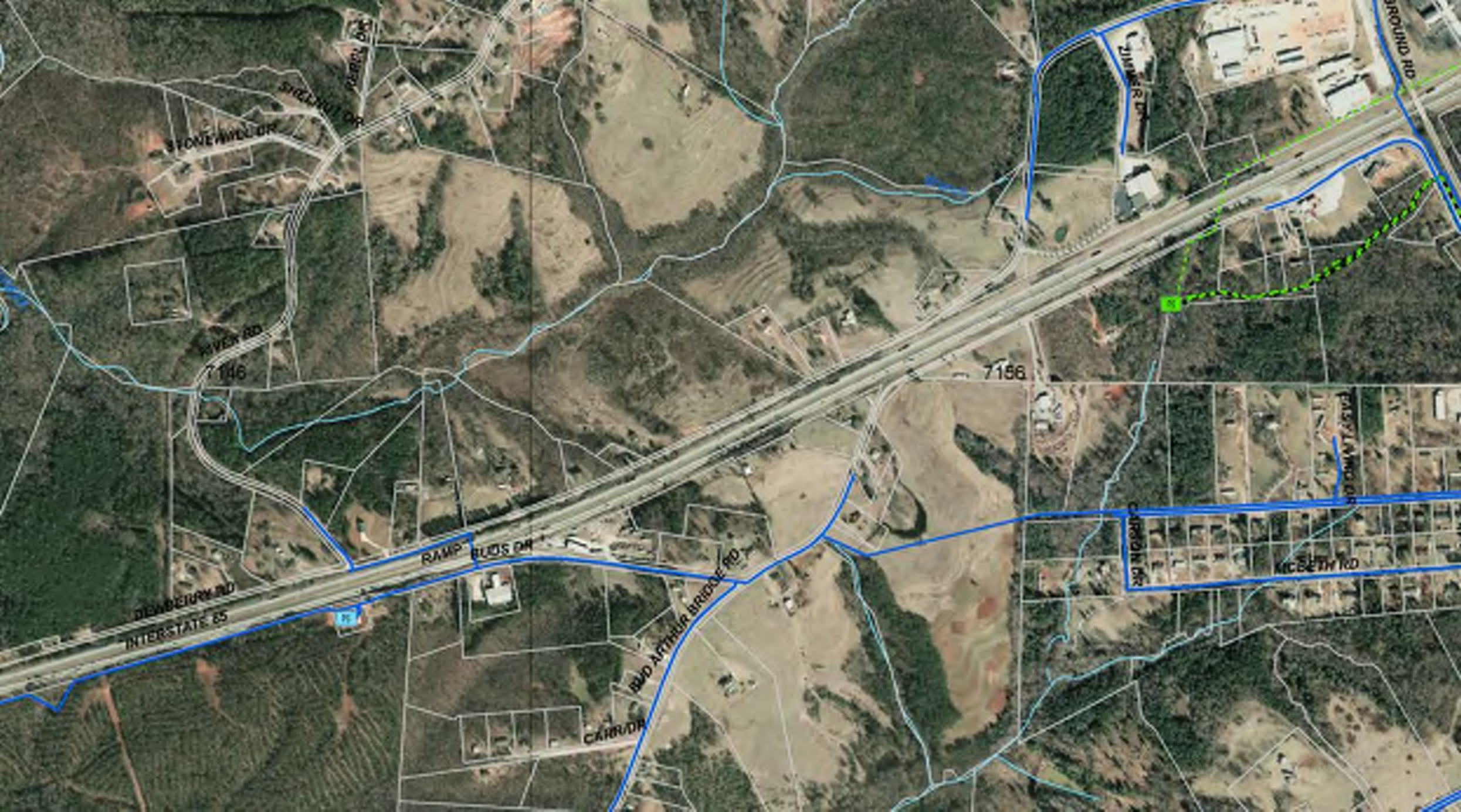
BRUCKNER RD

BLUE DR

RIVER VIEW DR

WOODLEY DR

RIVER RD



STONEWELL DR

SHELLNUT DR

PEPPY DR

RIVER RD
7186

7186

DISMAL DR
INTERSTATE 85

RAMP
BUDDS DR

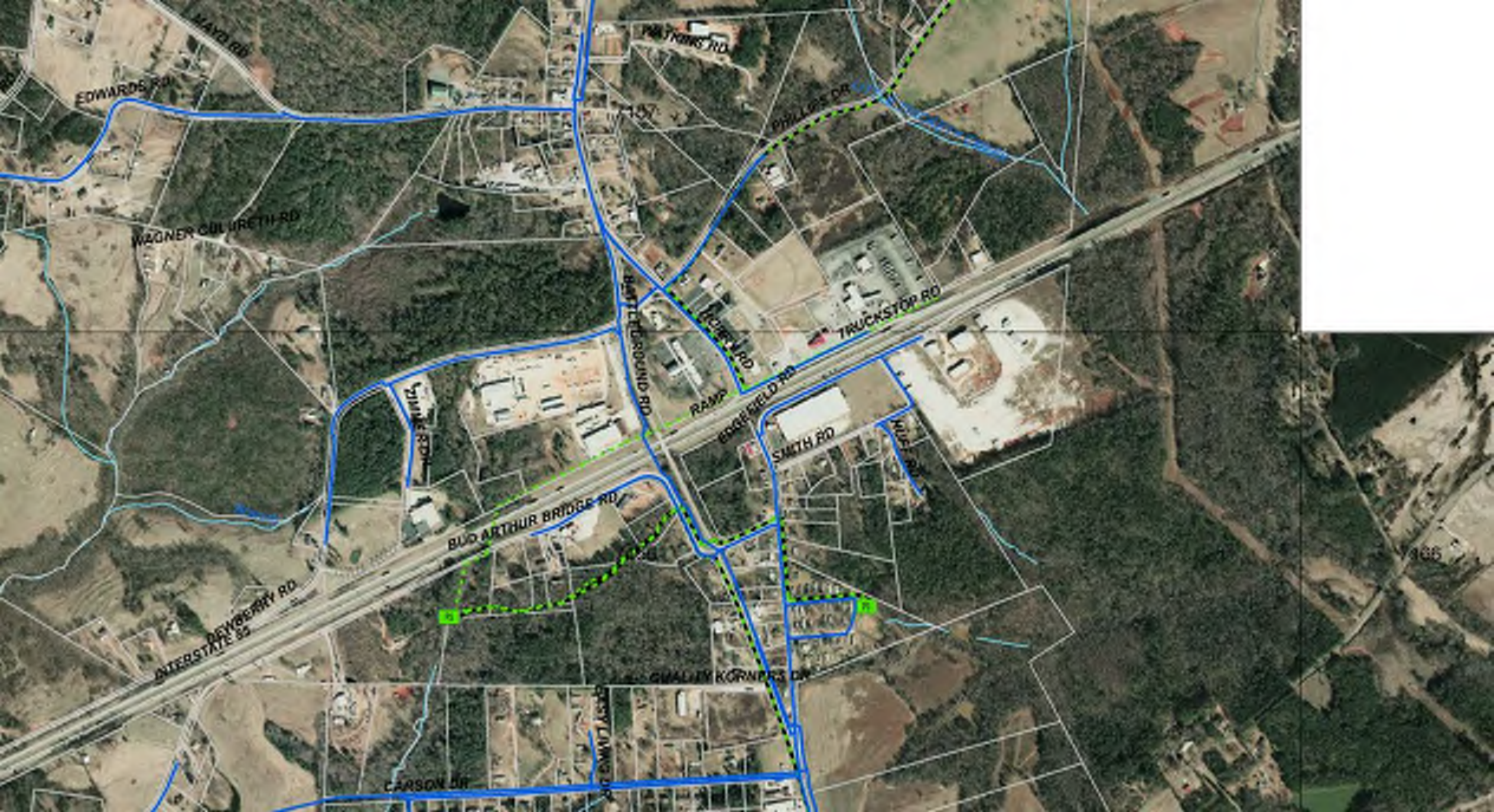
BUD ARTHUR BRIDGE RD

CARR DR

CAMPBELL DR

KICEBETH RD

ROUND RD



EDWARDS RD

MAYO RD

PATTONS RD

PHILLIPS DR

WAGNER CULURETH RD

TRUCKSTOP RD

BATTLEGROUND RD

RAMP

EDGEFIELD RD

SMITH RD

BUD ARTHUR BRIDGE RD

NEWBERRY RD
INTERSTATE 85

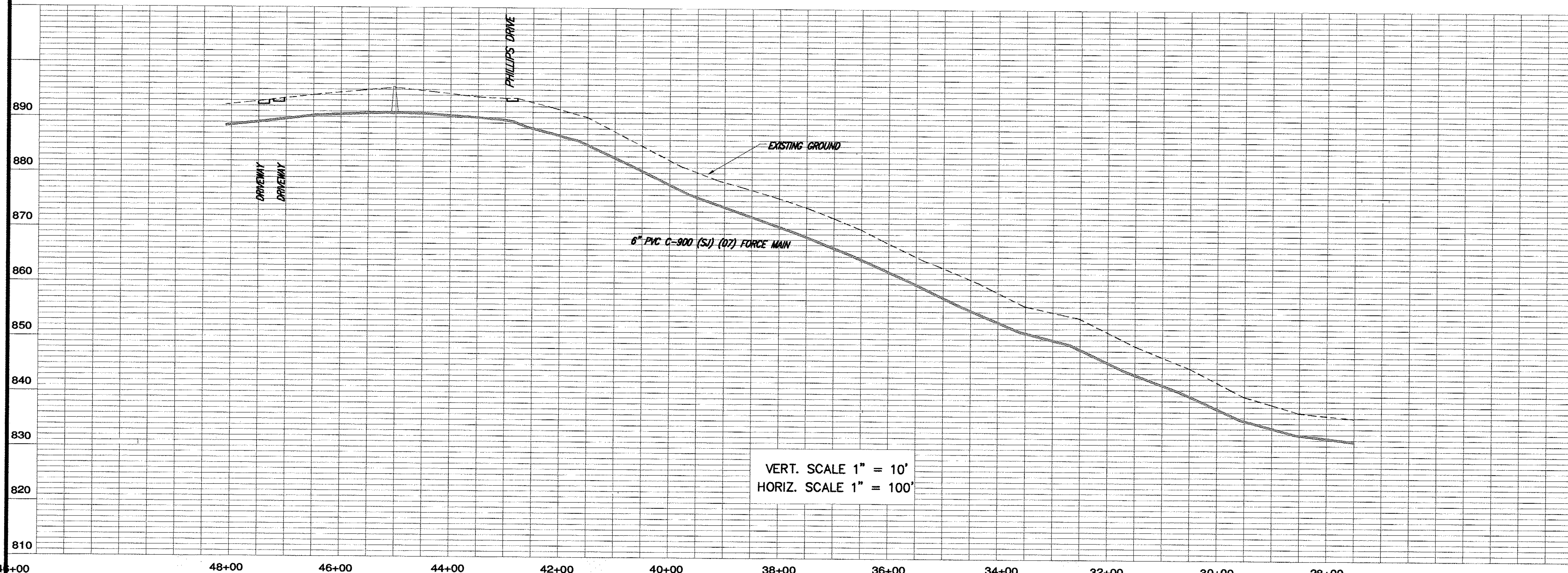
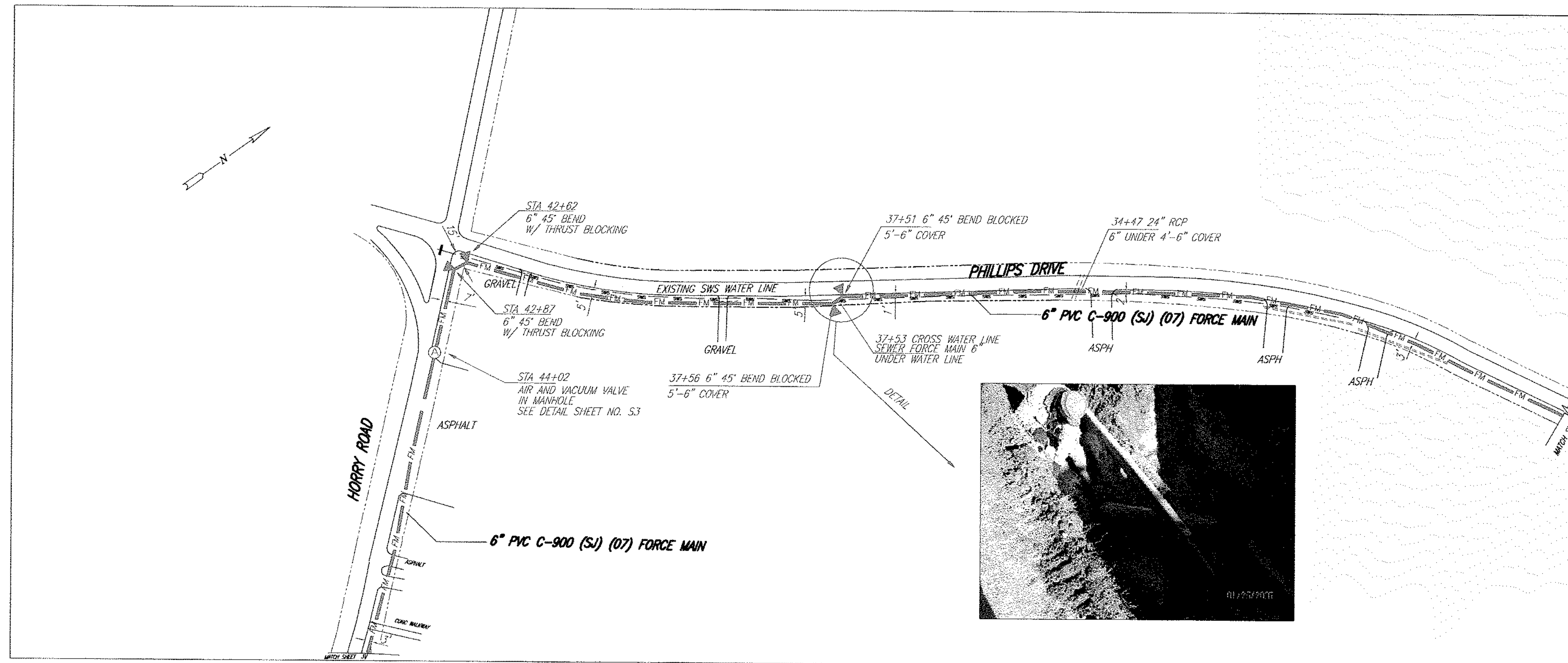
CARSON DR

QUALITY KORNER DR

136

**SPARTANBURG WATER SYSTEM
BATTLEGROUND PUMP STATION
281 BUDS DRIVE**

EMERGENCY TELEPHONE 864-585-8296



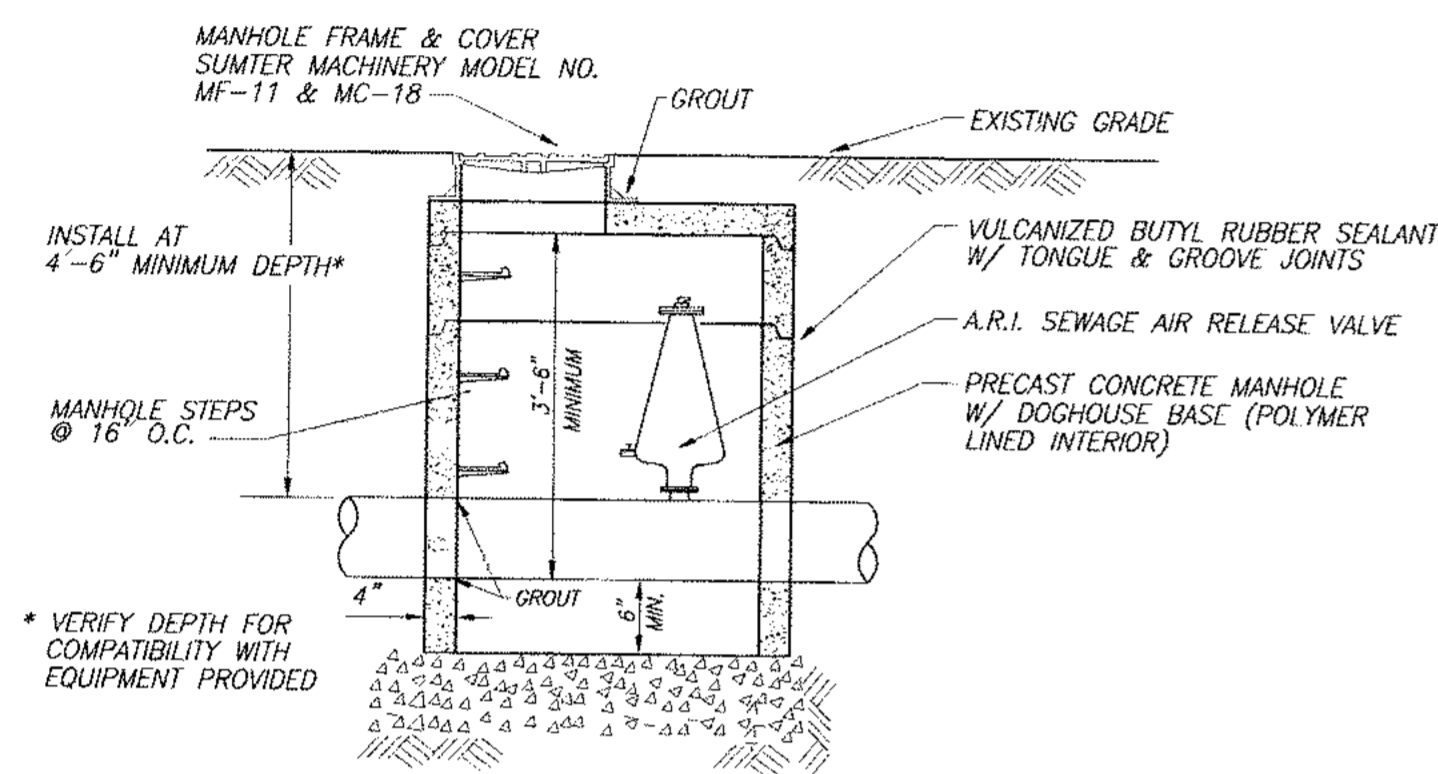
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NO.	REVISION	DATE	BY
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A	ISSUED FOR BID	10-1-06	JB

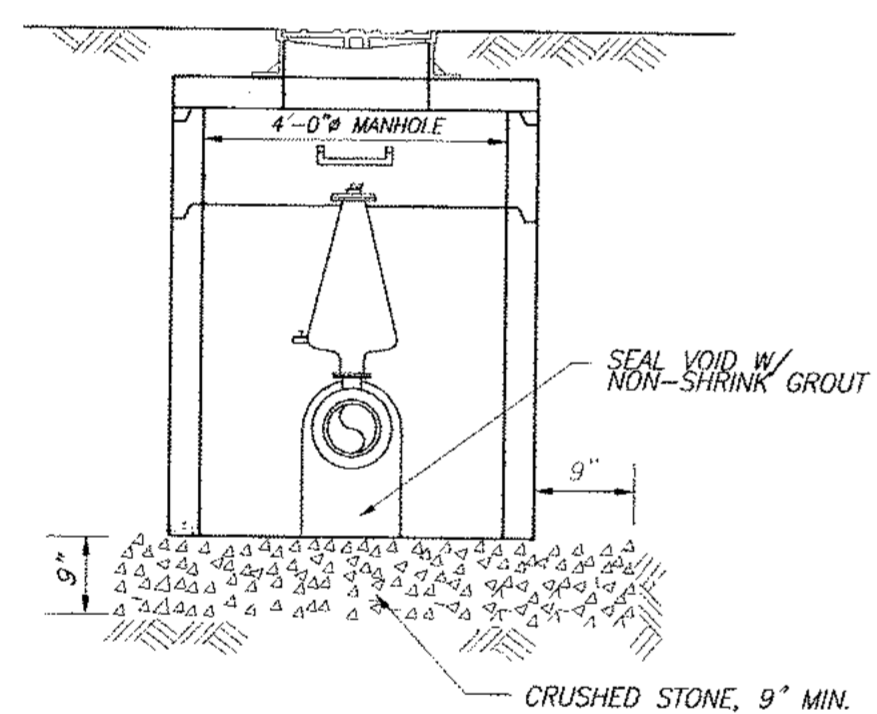
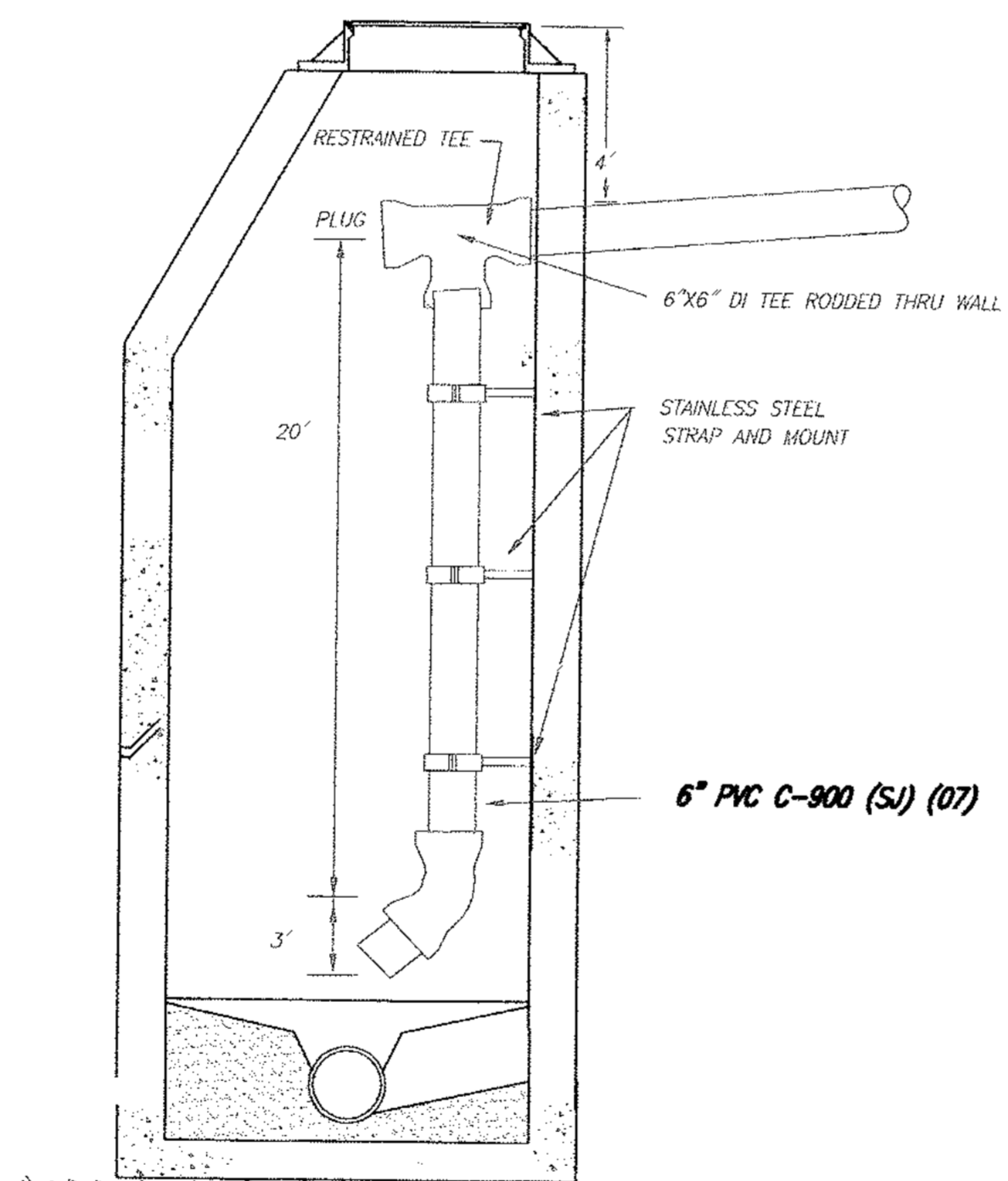
UPSTATE CORPORATE PARK
PUMP STATION & FORCE MAIN
COWPENS

SPARTANBURG SANITARY
SEWER DISTRICT

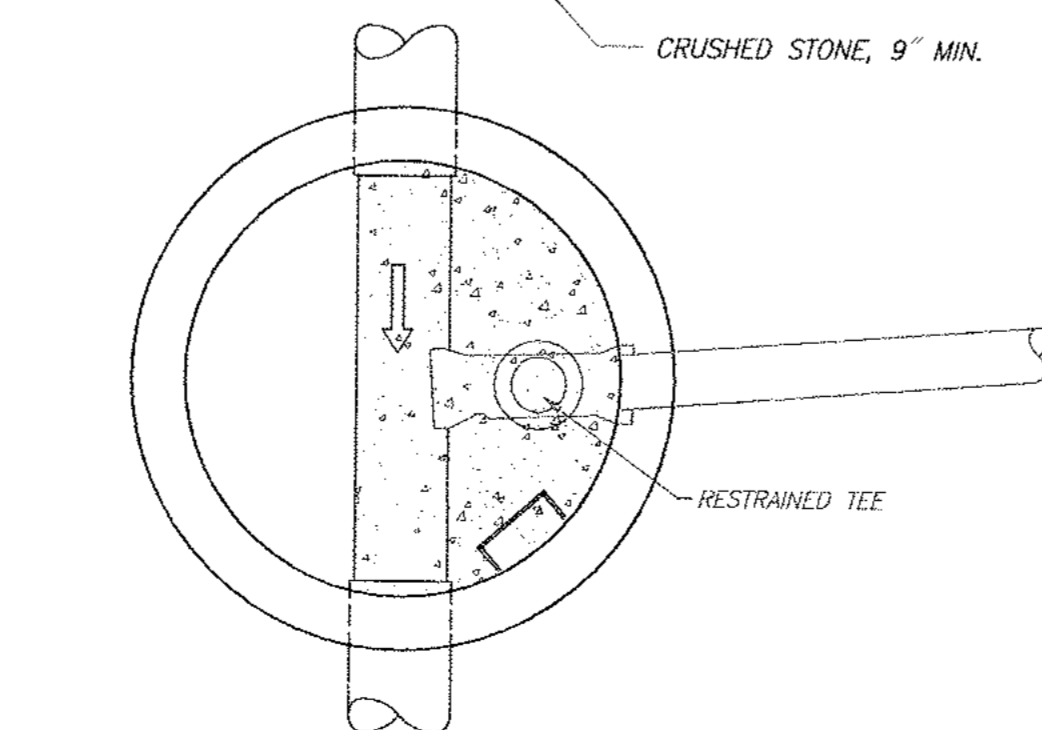
Date: _____ Approved By: _____
 Drawn By: J BARON Checked By: _____
 Job # S040603 File # S040603
 Sheet No: _____ Of: _____



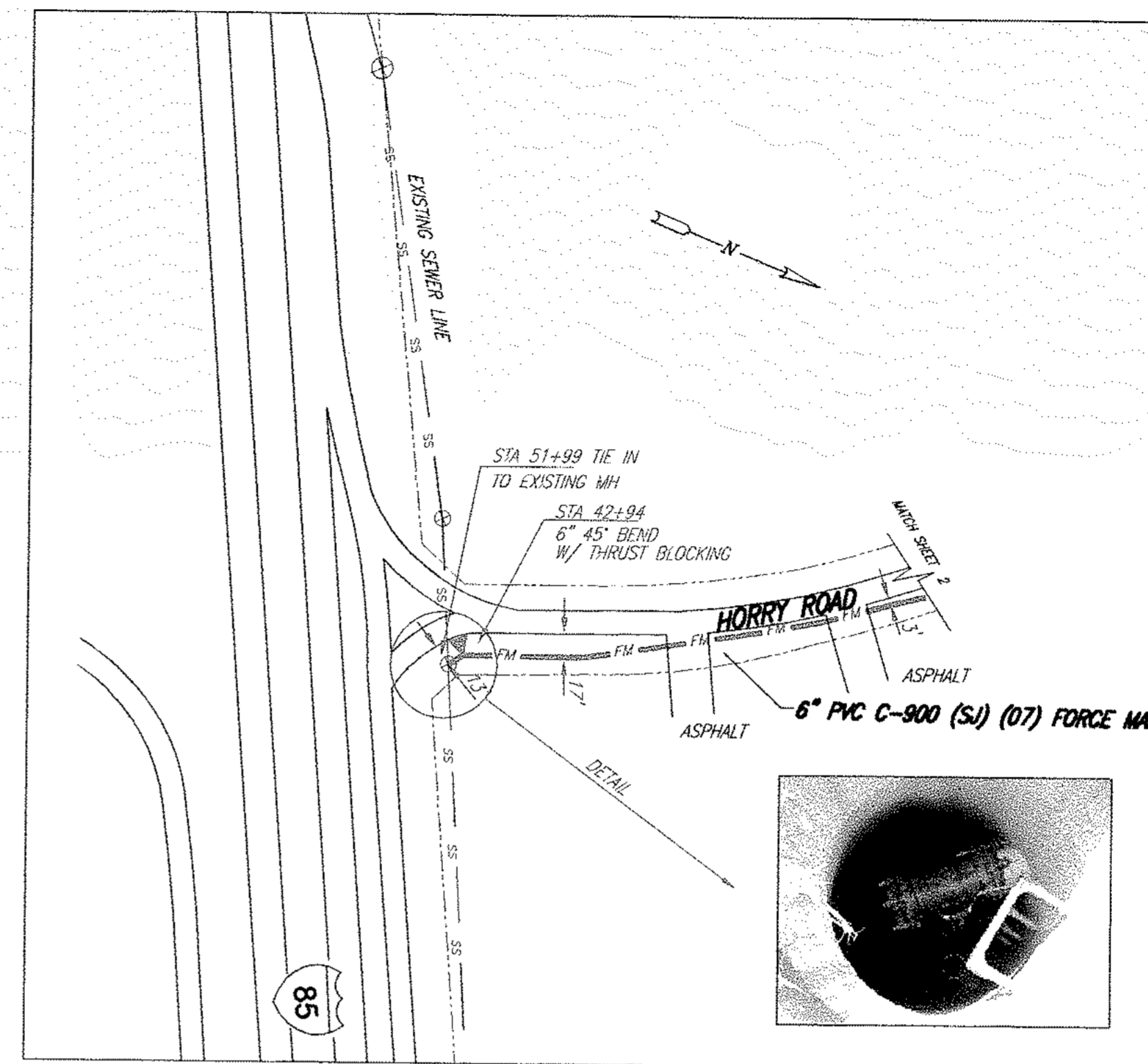
CASING PIPE INSTALLATION
N.T.S.



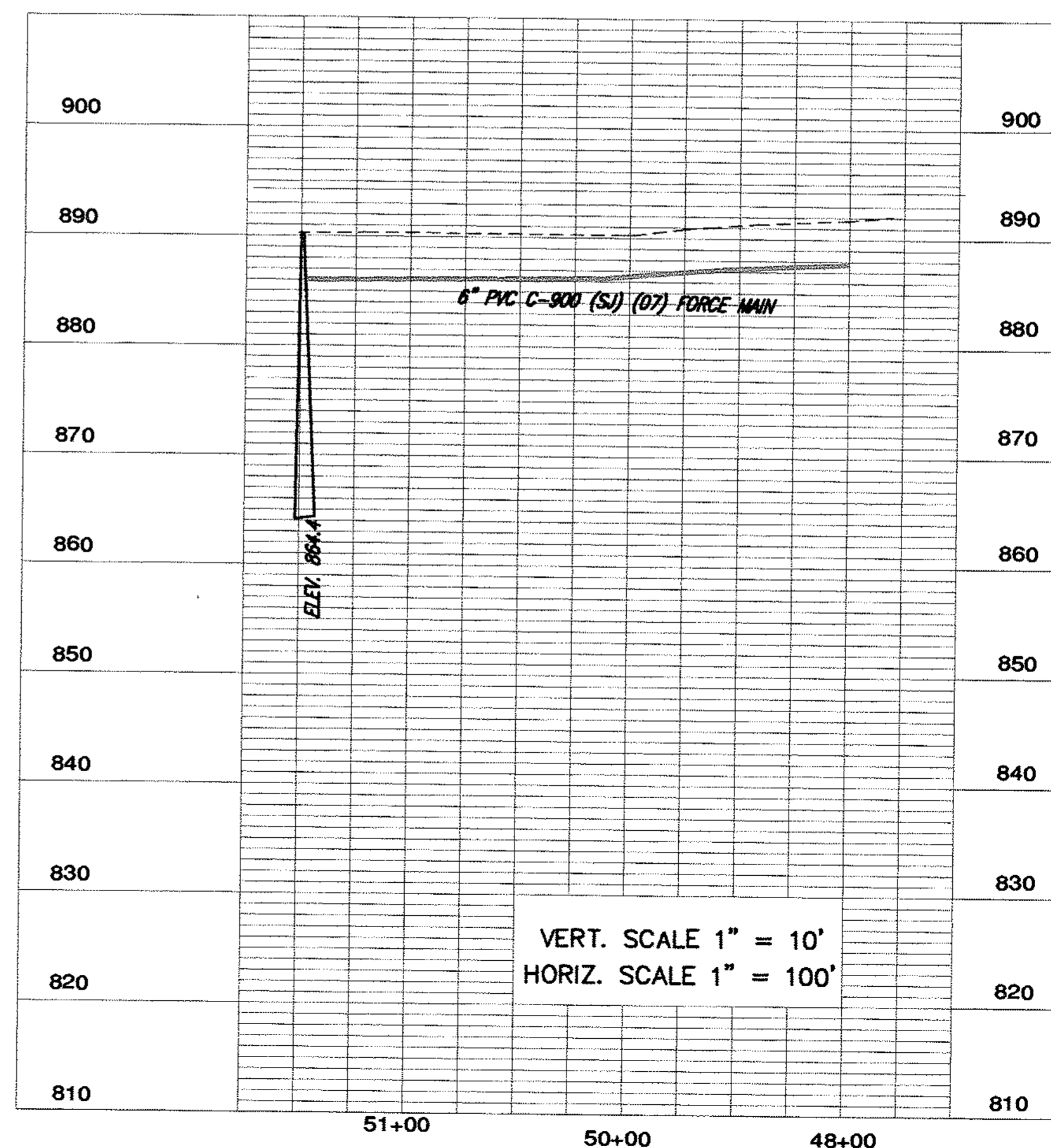
SEWER AIR RELEASE VALVE MANHOLE
N.T.S.



INSIDE DROP MANHOLE DETAIL STA 51+99
N.T.S.



GRID # 7156



Record Drawing

NO.	REVISION	DATE	BY
B	RECORD DRAWING	7-27-07	
B	CHANGED DROP MH LOCATION FROM ISLAND TO SHOULDER	10-13-06	JB
A	ISSUED FOR BID	10-1-06	JB

UPSTATE CORPORATE PARK
PUMP STATION & FORCE MAIN
COWPENS

SPARTANBURG SANITARY
SEWER DISTRICT

Date: _____ Approved By: _____
Drawn By: J BARON Checked By: _____
Job # S040603 File # S040603
Sheet No: _____ Of: _____

***TECHNICAL
SPECIFICATIONS
FOR
WATER DISTRIBUTION
SYSTEM IMPROVEMENTS***



**SPARTANBURG WATER SYSTEM
SPARTANBURG, SOUTH CAROLINA**

Approved by SCDHEC JULY 15, 2008

PREFACE

In an attempt to standardize the water distribution systems being deeded to or constructed for the Spartanburg Water System (SWS), we have developed the following specifications for items that shall be incorporated into the design and construction of all water distribution systems. The basis for these specifications is the SOUTH CAROLINA DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL R.61-58 State Primary Drinking Water Regulations. These specifications shall be followed. If they must be deviated from, you shall contact the Spartanburg Water Engineering Department, and discuss the reasons for the deviation. We are aware that not all items will work in all situations and must ask for your cooperation in working with SWS to resolve problem areas. If you have any comments concerning these specifications, please feel free to contact us at 864-585-9142.

These specifications will be updated periodically as deemed necessary. It is your responsibility to contact SWS to verify that the revision you are working with is the most recent. All standards cited in the text refer to the latest revision of that standard under the same specification number or to superseding specifications with a new number.

Please refer to the [Spartanburg Water Developers Manual](#) for a detailed explanation of procedures and requirements that a developer must follow in order to plan, construct, and have SWS accept, a water extension for operation and maintenance.

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SECTION 1
GENERAL PROVISIONS

1-01 INTENT AND SCOPE OF PLANS AND SPECIFICATIONS

It is the intent of the plans and specifications that one shall supplement the other, but not necessarily duplicate one another. Any work called for in one and omitted in the other shall be executed as if called for in both in order that the work be fully completed according to the complete design as determined by the Consulting Engineer (Engineer) and approved by the Spartanburg Water System (SWS) Project Manager. Should any discrepancy appear in or between the drawings and specifications, the specifications will govern. It is to be understood that the work described in the specifications and shown on the plans shall be complete in every detail whether every necessary item is particularly mentioned or not and the Contractor shall be held to provide all items of labor and materials necessary for the satisfactory completion of the indicated work. Any provisions contained in the specifications or shown on the standard drawings which are not applicable to the work pertaining to this project shall be disregarded. All testing shall be accomplished in accordance to these specifications and only at the discretion of the SWS shall any portions of the testing be waived.

- A. The Contractor shall check all dimensions, elevations, quantities and instructions shown on the plans or given in the specifications and shall notify the Engineer should any discrepancy of any kind be found in the plans, specifications or conditions at the site. He will not be allowed to take advantage of any discrepancy, error or omissions. If any discrepancy is discovered, the Engineer with Spartanburg Water System's approval will issue full instructions pertaining thereto and the Contractor shall carry out these instructions as if originally specified.
- B. The Specifications are divided into Sections for convenience of reference. The materials, work, etc., mentioned or specified in one part are not intended to be limited to that part only, but shall be applied with equal force to any other part or division of work where such materials, work, equipment, etc., are mentioned or required to properly provide for acceptable work according to the true intent of the drawings and specifications. Reference to standard specifications (ASTM, AWWA, ANSI, etc.), national codes, local or state codes and laws and ordinances shall mean the latest edition of said document in effect at the time of taking bids unless specifically stated otherwise.
- C. Drawings shall be followed in construction of the work and all dimensions and elevations shown on the Plans shall be accurately maintained. Scaled measurements will not be allowed and no work shall be performed when dimensions or elevations are not indicated until such dimensions or elevations are obtained from the Engineer.

1-02 MATERIALS AND WORKMANSHIP

It is the intent of these Specifications that the Contractor shall furnish first-class materials and do all work in a first-class manner so that the completed job shall be thoroughly satisfactory in every respect. To this end, the Contractor shall utilize all of his construction experience and

shall consult with the Engineer regarding items in the Plans and Specifications which may be altered to the benefit of the work.

- A. Materials, Services and Facilities: It is understood that except as otherwise specifically stated in the specifications, the Contractor shall provide and pay for all materials, labor, tools, equipment, water, light, power, transportation, superintendence, temporary construction of every nature, and all other services and facilities of every nature whatsoever necessary to execute, complete and deliver the work within the specified time.

Materials must be approved for use before being purchased by the Contractor. The Contractor shall submit to the Engineer a list of such materials or products, and the shop drawings, together with such samples as may be necessary for determination of their acceptability and obtain material/product approval. No request for payment will be approved until this list has been received and approved by the Spartanburg Water System Engineering Department. Delay caused by obtaining approvals for substitute materials will not be considered justifiable grounds for an extension of construction time.

- B. Shop Drawings: Shop Drawings are original drawings prepared by the Contractor, or a subcontractor or supplier, which illustrate some portion of the work and show fabrication, layout, and setting or erection details. Shop drawings shall also include manufacturer's catalog sheets, brochures, diagrams, schedules, performance charts, illustrations and other standard descriptive data, as required. Shop drawings shall be clearly marked to identify specific materials, finishes, products or models, and shall show all required dimensions and clearances, performance characteristics and capacities, wiring diagrams and controls.

- 1) The Contractor shall review and check all shop drawings for accuracy and conformance with the contract documents. The Contractor's review shall include verifying field measurements, field construction criteria, dimensions, catalog numbers and similar data. Prior to submission to the Engineer, all shop drawings shall be marked, stamped or otherwise certified as approved by the Contractor, dated and signed or initialed. Any shop drawings not so marked will be returned to the Contractor without the Engineer's review.
- 2) The Contractor shall schedule the submission of shop drawings to allow sufficient time for review by the Engineer and the Spartanburg Water System, corrections and resubmissions by the Contractor, and re-checking by the Engineer/Spartanburg Water System, as necessary. The Engineer will review shop drawings within two (2) weeks from date received.
- 3) A minimum of six (6) copies of each submittal indicating approval by the Engineer shall be submitted to the Spartanburg Water System.
- 4) Distribution of shop drawings shall be:
 - a.SWS project file – One Copy

- b.SWS M&C Department – Two Copies
- c.Contractor – Three Copies

- 5) The Contractor shall not begin fabrication or work which requires submittals until return of submittals with the full approval.

1-03 SOURCE OF SUPPLY AND QUALITY OF MATERIALS

The source of supply of all materials and equipment shall be submitted to the SWS Engineering Department for review before orders are placed. Suppliers of reinforcing steel, fabricated metal work, and metal castings may be required to submit guarantees of conformity with the Drawings and Specifications. If required, representative preliminary samples of the character and quality prescribed shall be submitted by the Contractor or producer for examination and tested in accordance with the methods specified below. Only materials conforming to the requirements of the specifications shall be used in the work. Any materials proposed to be used may be inspected or tested during their preparation and use. If, after inspecting and testing and/or trial, it is found that initial sources of supply do not furnish an acceptable product in conformity with the Specifications, the Contractor shall be required to furnish materials that comply with the specifications. No materials, which after approval have become unfit for use, shall be used in the work or remain on the jobsite.

1-04 SAMPLES AND TESTING OF MATERIALS

Testing and certification of materials may be required by the Engineer if the quality of such materials are in question. In the event the materials do not meet specifications, the Contractor shall pay for the testing and provide materials which meet the specifications. If the materials meet specifications, SWS will pay for the testing. Unless otherwise specified, materials tests shall be made in accordance with the standards of the American Society for Testing and Materials (ASTM), and by a commercial testing laboratory approved by the Engineer. Reports of tests shall promptly be furnished to the Engineer. Test shall be arranged by the Contractor as directed by the Engineer. The cost of all specified inspection and testing of materials shall be paid by the Contractor.

1-05 PRECONSTRUCTION CONFERENCE:

- A. Upon SCDHEC construction permit issuance, the Consulting Engineer shall contact the SWS Project Manager to schedule a preconstruction conference. The conference shall be scheduled no less than 72 hours in advance.
- B. The conference shall be attended by:
 - SWS Project Manager
 - SWS Engineering Field Technician
 - Representative of Consulting Engineer
 - Representative of the Contractor and/or the Contractor's Project Foreman (preferred)
 - Representative of any Subcontractors involved with project.

- C. At least two (2) days prior to the preconstruction conference, the Consulting Engineer shall provide the Spartanburg Water System Project Manager with four sets of plans and specifications stamped "Issued for Construction". Project cut sheets and applicable shop drawings shall be provided as soon as possible after the preconstruction conference and prior to starting construction.

1-06 INSPECTION

The Engineer shall provide for the inspection of all materials used and all work done under these specifications, by assistants and inspectors under his direction. Such inspection may extend to any or all parts of the work and to the preparation or manufacture of materials used, whether within the limits of the work or at any other place. The Contractor shall furnish the Engineer all information relating to the work and to the materials which the Engineer may deem necessary or pertinent and with such samples of materials as may be required. The Contractor shall, at his own expense, supply labor and assistance as may be necessary in handling material for proper inspection.

- A. The representatives of the Owner, Engineer and any State, Federal or other agency having jurisdiction over the work, shall have access to the work wherever it is in preparation or progress, and the Contractor shall provide proper facilities for such access and inspection.
- B. Spartanburg Water System Engineering Field Technician shall be authorized to inspect all work done and all materials furnished, including preparation, fabrication and manufacture of the materials to be used. The Engineering Field Technician shall not be authorized to alter or waive requirements of the Drawing and Specifications. The Engineering Field Technician shall call to the attention of the Contractor to failures of the work and/or materials to conform to the Drawings and Specifications. The Engineering Field Technician may reject materials or suspend work until questions at issue can be referred to, and decided by, the Spartanburg Water System Project Manager or designated representative. The presence of the Engineering Field Technician shall in no way lessen the responsibility of the Contractor.
- C. The Contractor shall furnish all necessary facilities and assistance to make any examination of the complete work if such examination is deemed advisable by the Engineer. If any of the work is found defective in any respect, the Contractor shall defray the expense of the examination and satisfactory reconstruction. If the work is found acceptable, the expense of the examination shall be added to the Contractor's final estimate.
- D. Work covered up without consent or approval of the Spartanburg Water System must, if required by the Engineering Field Technician, be uncovered for examination and properly restored at the Contractor's expense.
- E. If the Specifications, the Engineer's instructions, codes, laws, ordinances, or any public authority require any work to be specially tested or approved, the Contractor shall give the Engineer timely notice of its readiness for inspection; and, if the

inspection is by an authority other than the Engineer, of the date fixed for such inspection.

- F. Testing: During the course of the project, the Engineering Field Technician will perform and/or witness various testing which is required by SCDHEC or the Spartanburg Water System. The method of performing these tests is outlined in the following sections of this document. The Engineering Field Technician will provide the Contractor with the test results, and whether the results comply with the requirements. The following is a list the testing which is generally required on water main projects:

- 1) Soil Compaction Tests
- 2) Hydrostatic Pressure Tests
- 3) Bacteriological Tests

The installation of special fixtures or materials may require additional, specialized, testing or documentation, which shall be noted on the approved plans. In these cases, the Design Engineer will be responsible for conducting and witnessing the specialized testing.

- G. Final Inspection: Upon notice from the Contractor that work is complete, the Engineer and Spartanburg Water System will make a final inspection, and will notify the Contractor in writing of all defective, incomplete or otherwise unacceptable work revealed by the inspection. The Contractor shall immediately correct all such deficiencies to the satisfaction of the Engineer and Spartanburg Water System. Once all deficiencies have been corrected, and all required testing has passed, the Engineer will then certify the project in writing to SCDHEC, copying the Spartanburg Water System, and request a final regulatory agency inspection.

1-07 EXECUTION OF WORK

- A. VERIFICATION OF DIMENSIONS AND ELEVATIONS: Dimensions and elevations indicated on the drawings in reference to existing structures, location of utilities or other information on existing facilities, are the best available data obtainable but are not guaranteed by the Engineer. The Engineer will not be responsible for their accuracy. Before proceeding with any work dependent upon the data involved, the Contractor shall field check and verify all dimensions, grades, inverts, lines, elevations, or other conditions of limitations at the site of the work to avoid construction errors or damage to existing facilities. If any work is performed by the Contractor, or any subcontractors, prior to adequate verification of applicable data, any resultant extra cost for adjustment of work necessary to conform to existing conditions, or damage to existing facilities, shall be assumed by the Contractor without reimbursement or compensation by the Owner.
- B. If the Contractor, in the course of the work, finds any discrepancy between the drawings and the physical conditions of the location, or any errors or omissions in drawings or in the layout as given by survey points and instructions, he shall

immediately inform the Engineer, in writing. The Engineer will promptly investigate the reported conditions and, after Spartanburg Water System approval, shall issue such instructions as may be necessary for the proper execution of the work. Any work done after such discovery and prior to receipt of such instructions shall be at the risk of the Contractor.

- C. **CARE OF EXISTING FACILITIES:** In executing the work, the Contractor shall exert every effort not to damage any existing utilities or the Spartanburg Water System existing facilities. Any damage that is done thereto shall be promptly repaired by the Contractor or by the Owner, at the Owner's option, and at the Contractor's expense. Damage to SWS lines shall be repaired by the SWS personnel. The contractor shall not interrupt or interfere with the operation of existing utilities or facilities during construction except when absolutely necessary. When this is the case, he shall consult with the Engineer, Owner and the utility company as to procedure, and shall be governed by their decision. Any damage done shall be promptly reported to the affected utility for repair. Damage to SWS existing facilities shall be repaired promptly.
- D. The Engineer does not guarantee that all existing facilities such as buildings, fences, pipelines, electrical lines, conduit, telephone cable, service connections, or other facilities are shown on the plans. It shall be the Contractor's responsibility to locate and protect all such existing facilities prior to beginning construction.
- E. Contractor's Responsibilities. Contractor shall conduct his operations in a manner and sequence which will provide for the continued transportation of wastewater flows during construction of this project. Contractor shall take all actions required to prevent discharge of sewer flow from the system to the ground or any stream. Any construction actions that impede or interrupt flow shall be carefully executed and monitored to prevent surcharging and overflow.
- F. Any existing surface or subsurface improvements, such as pavement, curbs, sidewalks, pipe or utilities, footings, or structures (including portions thereof), trees and shrubbery, not indicated on the drawings or noted in the specifications as being removed or altered shall be protected from damage during construction of the project. Any such improvements damaged during construction of the project shall be restored to a condition equal to that existing at time of award of contract.
- G. Any such improvements damaged during construction of the project shall be restored to a condition equal to that existing at time of award of contract. All repairs to utility services shall be coordinated with the applicable utility company, and shall be made in strict accordance with their requirements.
- H. **CONNECTING TO EXISTING WORK:** It shall be the express responsibility of the Contractor to connect his work to each part of the existing work or work previously installed as required by the drawings and specifications to provide a complete installation. Connections to existing water lines, prior to completion, may be allowed by the SWS on a case by case basis where requested by the Contractor and approved by the Spartanburg Water System Project Manager; otherwise, connections to

existing water lines shall be made only after all inspections are completed and all punch list items have been adequately addressed. In certain cases, due to the type of pipe material, certain main transmission and other water mains in the Spartanburg Water system may only be tapped by SWS personnel. The special condition will be noted on the approved project drawings.

- I. **Contractor's Work Limits:** The Contractor is to perform his work in compliance with all State and Federal safety requirements within the specified public right-of-way or right-of-way as procured by the Spartanburg Water System. The Contractor may make his own arrangements for increased construction right-of-way at no additional cost to the Owner. Any damage caused by the Contractor inside or outside of the specified work limits will be the responsibility of the Contractor.
- J. **RECORD DRAWINGS:** To enable the SWS to prepare record drawings, the Contractor shall keep a complete set with accurate records of changes and/or deviations from the contract documents and shop drawings. It shall show the project as it was actually installed. The Contractor's record set of marked-up drawings, shop drawings and specifications shall be kept at the job site during construction and be available for inspection by the Owner. These marked-up drawings and specifications shall be included in the package of final documentation submittals before final payment is requested.
- K. **TRENCH BRACING:** The Contractor is required by State and Federal law to have on site a Competent Person to respond to the requirements for the safety of the job site to include trench bracing. Spartanburg Water System personnel will not enter any trench that does not meet with the regulations and, therefore, will not approve that portion of construction until the site in question meets with requirements. The Contractor is responsible to provide the necessary labor, equipment and material to comply with the regulations and work within the right-of-way provided by the Spartanburg Water System at no additional cost to the Owner.
- L. **ORDER AND SEQUENCE OF WORK:** The prosecution, or sequence of the work shall be as provided herein or as approved by the Engineer, which approval, however, shall in no way affect the responsibility of the Contractor. All taps and line draining for connecting lines will be coordinated with the SWS Engineering Department and may not be constructed until approved. The Contractor shall schedule with the SWS any construction work which requires interference with the waterworks operations.
- M. **HANDLING OF MATERIALS:** Proper and suitable tools and equipment for the safe and convenient handling of pipe and appurtenances are to be used. Special care shall be taken to prevent damage to all pipe, appurtenances and surrounding property while unloading, storing and stringing the pipe.
- N. **STRINGING OF PIPE:** Stringing of pipe along the route of work will be allowed to the extent of work which can be completed during a single work day. Unloading and

stringing pipe along the entire route is prohibited.

1-08 INSURANCE

The Contractor shall not start work under this contract until he has obtained all the insurance required under this paragraph and such insurance has been approved by the Owner. The Contractor shall not allow any subcontractor to start work on his subcontract until the insurance required of the subcontractor has been so obtained and approved.

- A. Compensation and Employer's Liability Insurance: The Contractor shall procure and maintain during the life of the contract the statutory Workmen's Compensation and Employer's Liability Insurance for all of his employees to be engaged in work on the project under the contract. The Contractor shall require all subcontractors to provide Workmen's Compensation and Employer's Liability Insurance of all their employees to be engaged in such work.
- B. General Public Liability and Property Damage Insurance: The Contractor shall procure and maintain during the life of the contract General Public Liability and Property Damage Insurance, including vehicle coverage, to protect him from all claims for destruction of or damage to property, arising out of or in connection with any operations under the contract, whether such operations be by himself or by any subcontractor under him, or anyone directly or indirectly employed by the Contractor or by a subcontractor under him. The amount of such insurance shall be not less than the following limits of liability.
- 1) \$500,000 for all damages arising out of bodily injury, including death, at any time resulting therefrom, sustained by any one person in any one accident; and \$500,000 aggregate for any such damages sustained by two or more persons in any one accident.
 - 2) \$200,000 for all property damage sustained by any one person in any one accident; and \$200,000 aggregate for any such damage sustained by two or more persons in any one accident.
- C. Special Hazards Insurance: Where special hazards are encountered in the work under this contract, such hazards shall be covered by a rider to the policy or policies required under subparagraph B in an amount not less than those stipulated under subparagraph B. The Contractor shall be responsible for procuring this insurance before performing any work involving special hazards.
- D. Flood Insurance: The Contractor shall procure and maintain during the life of the contract adequate flood insurance to cover all work on this project.
- E. Certificates of Insurance: Prior to starting any work, the Contractor shall furnish the Owner with certificates showing the type, amount, class of operations, effective dates and expiration dates of all insurance policies. Each certificate shall contain the following statement: **"The insurance covered by this certificate shall not be cancelled or materially altered, except after ten (10) days written notice has been**

received by the Owner."

F. Railroad Insurance:

- 1) The Contractor shall be able to furnish the Railway Company the following:
 - a) Certificate of Workmen's Compensation or Employer's liability insurance according to the laws of the State.
 - b) Certificate of the contractor's Public Liability Insurance, to protect the Contractor and Subcontractor:
 - 1) For loss of life or injury to any one person in an amount not less than \$150,000 for any one person and not less than \$300,000 for any one accident.
 - 2) For property loss or damage in an amount not less than \$150,000 for any one accident and not less than \$300,000 aggregate.
 - c) The original policy of Railroad Protective Liability Insurance naming the Railway Company as the insured.
 - 1) For loss of life or injury to any one person in the amount not less than \$150,000 for any one person and not less than \$300,000 for any one accident.
 - 2) For property loss or damage in an amount not less than \$150,000 for any one accident and not less than \$300,000 aggregate.

SECTION 2

RIGHTS-OF-WAY AND EASEMENTS

2-01 SCOPE:

This section covers the requirements and work pertaining to the rights-of-way and easements necessary for the construction of the project.

2-02 WORK ON RIGHTS-OF-WAY AND EASEMENTS:

- A. The Owner will obtain all land and rights-of-way necessary for all work under this contract, except for County, Town or City roads or streets. If all land and rights-of-way are not obtained before construction begins, the Contractor shall start work only upon such land and rights-of-way previously obtained by the Owner, and no claims for damages will be allowed because of such delay. If the Owner is unable, for any reason, to obtain the land and rights-of-way necessary for the work, the contract time will be extended as required to cover the time lost by such delay. The Contractor shall secure copies of all applicable right-of-way plats to be kept at the job site during construction.
- B. Contractor shall confine his construction operations to the immediate vicinity of the location shown on the plans and in no case shall he encroach beyond the limits of the Owner's property or rights-of-way. The exact location of the rights-of-way limits shall be shown on the rights-of-way plats which will be furnished to the Contractor. He shall place materials, equipment, supplies, etc., so as to cause the least possible damage to property and interference with traffic. His method of operation and placing of equipment shall be subject to the approval of the Engineer. Any damage done to property outside the rights-of-way limits shall be the financial responsibility of the Contractor. Any vehicular access to right-of-way which crosses private property shall be by written permission of the property owner with copy of same provided to District Engineering Field Technician.
- C. It shall be the duty of the Contractor to locate the limits of the rights-of-way, or property lines, prior to beginning construction. He shall be solely responsible for any damage to trees, crops or other property outside the boundaries of the rights-of-way and shall make satisfactory settlement for any damage directly with the property owner involved.
- D. Clearing and Grubbing. Contractor shall consult with the Spartanburg Water Engineering Department and Engineer prior to beginning clearing and a full understanding is to be reached as to procedure. Contractor shall then conduct clearing and grubbing operations in strict accordance with these agreements

- E. All operations shall be conducted with full consideration of all proper and legal rights of the Owner, adjacent property owners and the public, and with the least possible amount of inconvenience to them. Care shall be taken to protect adjacent property.
- F. Contractor shall perform all clearing and grubbing work required for the installation of the complete work. Clearing shall consist of the removal and disposal of all pavement, stumps, trees, brush, debris, or other such materials in the path of the work.
- G. No burying of cleared debris on the right-of-way will be allowed.
- H. Any vehicular access to the right-of-way which crosses private property shall be by written permission of the property owner with copy of same provided to the Engineering Field Technician.
- I. Erosion control measures as shown on the plans, and/or as required by SECTION 10: GRASSING AND EROSION CONTROL, shall be put in place during clearing and grubbing and before trench excavation.
- J. Clearing Along Right Of Way: Where trees, brush, stumps or exposed roots exist within rights-of-way, the full width of the right-of-way shall be completely cleared and grubbed. Stumps shall be removed and roots shall be grubbed at least two (2) feet below the ground surface.
- K. Burning Of Cleared Material shall be in strict accordance with all applicable local, state and federal regulations pertaining to open burning and smoke abatement. Prior to burning, approval and where applicable written permits, must be obtained from all applicable agencies;
- L. Minor Structures may exist on the right-of-way. The disposition of the structures shall be so noted as shown on the plans by either; (1) left in place in a condition equal to prior to construction; (2) removed and disposed of by the Contractor; (3) removed for construction and replaced in a condition equal to prior to construction; (4) relocated as shown on the plans. If the Contractor notes structures on the right-of-way that are not shown on the plans or the disposition is not noted on the plans, he shall contact the SWS Engineering Department as to which of the above methods shall be followed.
- M. Removal and Replacement of Fences: Fences shall be removed as required by construction and replaced to property owners' satisfaction with materials as good as that which was removed. Temporary fencing, as required, shall be installed to property owners' satisfaction until permanent fencing can be erected.
- N. Trees or Shrubbery along the highways, roadways, and streets shall not be disturbed

unless absolutely necessary. Approval must be obtained from the SWS Engineering Department prior to any such removal. Any such trees or shrubbery which may be necessary to be removed shall be heeled in and replanted. Heeling in and replanting shall be done under the direction of an experienced nurseryman. Trees or shrubbery that die within twelve (12) months of replacement shall be replaced by the Contractor at no expense to the Spartanburg Water System.

O. Construction Operations: All work along highways, streets and roadways shall be in accordance with the following sequence of construction operations, so as to least interfere with traffic.

- 1) Trenching, Laying and Backfilling: It is the intent of these specifications that there shall be minimum interruption to traffic and all traffic control shall be in accordance with the regulations and requirements of the South Carolina Department of Transportation, Spartanburg County and/or the local jurisdiction. By entering into the construction agreement, the Contractor agrees to hold the Spartanburg Water System harmless from and against any and all liabilities and claims of any nature whatsoever relating to or arising from traffic control. The trench shall not be opened any further ahead of pipe laying operations than is necessary for proper laying operations, and trenches shall be progressively backfilled and consolidated, and excess material removed immediately behind laying operations so as not to interfere with traffic.
- 2) Shaping: Immediately after backfilling operations are complete, any damaged cut and fill slopes, side ditches and ditch lines, shall be reshaped and returned to original level and condition. Topsoil, sod and any other materials removed from shoulders shall be replaced in accordance with the requirements of, and to the full and complete satisfaction of the South Carolina Department of Transportation, Spartanburg County, the local jurisdiction, and the Spartanburg Water System.
- 3) Grassing: See SECTION 10: GRASSING AND EROSION CONTROL.
- 4) Capability: When installing pipelines and appurtenances, sufficient personnel and equipment will be provided so as to simultaneously carry out all of the above operations.

2-03 WORK ON STATE AND COUNTY HIGHWAYS OR ROADS, TOWN OR CITY ROADS OR STREETS, RAILROAD AND OTHER UTILITY RIGHTS-OF-WAY:

- A. The Contractor shall not begin excavation, grading, fill, storm drainage, paving and any other construction or installations on any property or in any right-of-way of streets, highways, public carrier lines, utility lines (either aerial, surface or subsurface),

etc. until the necessary permits are secured. The Contractor shall conform to all requirements of the authorities having jurisdiction and to the applicable requirements of the specifications. Contractor shall make all necessary arrangements with the proper authorities, including approval of construction methods, etc., and shall pay all costs charged in connection with work. Contractor shall notify the South Carolina Department of Transportation at least 24 hours in advance of any work performed on State roads and shall notify Spartanburg County Roads and Bridges at least 24 hours in advance of any work performed on County roads.

- B. The Contractor shall provide full time flagmen, with appropriate red flags, at all times when work is in progress along highways. Suitable warning and descriptive signs shall be placed at each end of the working area while work is in progress along highways. These signs shall be well tended, and shall be placed at sufficient distances from the work so that ample warning is given to approaching traffic. Signs shall be adequately lighted at night. All traffic control devices and methods shall comply with the latest edition of the Manual on Uniform Traffic Control Devices.
- C. Where pipe is installed in open cut across a highway, the cut shall be immediately backfilled and all work of repairing the pavement completed within the same week that it is cut. The Contractor shall keep at least one full lane open for traffic at all times. Any subsequent settlement shall be immediately corrected and repaired. Refer to SECTION 9.03 for paving and surfacing specifications.
- D. Where a pipeline crossing under a highway is installed within encasement pipe, the encasement pipe shall be provided as specified in SECTION 8-02: BORING.
- E. Unless otherwise indicated, no excavated material shall be placed on the pavement side of the ditch along highways. The least possible amount of ditch shall be left open when work is not in progress, and equipment shall be removed from the pavement and shoulders during shutdown periods. Shoulders of roadways shall be left in good acceptable condition, and all disturbed topsoil and grass shall be replaced.
- F. The Contractor shall not begin work on any property of any Railroad until the Spartanburg Water System has secured necessary permits. Contractor shall conform to all requirements of the Railroad, or its authorized representatives, in the construction of this portion of the work. The Contractor shall also pay the cost of flagmen or other expenses of the railroad in protecting rail or vehicular traffic. He shall notify the railroad of the time that the work will be done and shall not begin work until authorized by Railroad officials.

2-04 RESTORATION OF RIGHTS-OF-WAY:

- A. During construction, the Contractor shall maintain the site and adjacent public and private property, including streets and highways, free from accumulations of waste debris, rubbish and dirt caused by his operations. Dry materials and rubbish shall be wet down as necessary to prevent blowing dust.
- B. Immediately after completion of the work, or any substantial unit or portion of it, the Contractor shall remove all unused material, refuse and dirt placed by him in the vicinity of the work and shall leave the premises in a neat and orderly condition, satisfactory to the Engineer.
- C. The right-of-way shall be restored to the original condition. Horizontal benches shall be provided to facilitate access to the site and shall be located where directed by the Engineer and the Spartanburg Water System. Fill material, where required, shall be free of grass, roots, rock and other objectionable material and shall be spread evenly and properly compacted. The entire right-of-way shall be graded, dressed off and cleaned up to the satisfaction of the Engineer, Spartanburg Water System, other agencies having jurisdiction, and property owner, where applicable.
 - 1) Where work is along streets or highways and dirt has been placed on the pavement, the pavement shall be swept clean of all dirt after backfill has been completed.
 - 2) Site: The Contractor shall clean up behind the work as much as is reasonably possible as the work progresses, but in no case shall the pipe laying operation be more than 1000 feet ahead of complete cleanup. Federal regulations require that temporary stabilization measures be implemented within 14 days of the time when construction activities have been completed in an area of a phased project.
 - 3) Upon completion of the work and before acceptance of the Final Payment for the project by the Owner, the Contractor shall remove all his surplus and discarded materials, excavated material and rubbish from the roadways, sidewalks, parking areas, lawns and all adjacent property; shall restore, in an acceptable manner, all property, both public and private, which has been disturbed or damaged during the prosecution of the work; and shall leave the whole site in a neat and presentable condition.
 - 4) Except where specifically directed otherwise by the property owner, the entire construction right-of-way shall be provided with a permanent grass cover within 30 days after backfilling. Topsoil shall be replaced and seed planted, fertilized and watered until a grass cover satisfactory to the Engineer and property owner is obtained. If necessary, a temporary grass cover shall be provided until a permanent cover can be established. Grassing shall be as

specified in SECTION 10. If required by the property owner, shrubbery shall be replaced to the satisfaction of the Engineer and the property owner.

SECTION 3

MATERIAL SPECIFICATIONS FOR PIPE AND FITTINGS

3-01 SCOPE

This section contains the current specifications for materials to be used in projects to be integrated into the Spartanburg Water System. The Spartanburg Water System has established specific manufacturers as the standard for various items within its system. Such standardization is for the express purpose of expediting maintenance procedures. All requests for approval of an "or equal" item must be submitted to the Spartanburg Water System in writing. All pipe, fittings, packing, joint materials, valves and fire hydrants shall conform to Section C of the AWWA Standards and SCDHEC R.61-58. All materials or products that contact potable water must be third party certified as meeting the requirements of ANSI/NSF61. Metallic pipe and fittings shall be lead free in accordance with R.61-58.4(F).

The following pipe materials are specifically prohibited from installation, as part of the Spartanburg Water System, for the purpose of distributing potable water:

- A. Asbestos Cement "AC" Pipe
- B. Thermoplastic Pipe in above-grade applications.

3-02 DESIGN CRITERIA:

Reference Standards of the American National Standards Institute (ANSI) and American Waterworks Association (AWWA)

A21.4/AWWA C104 Cement-Mortar Lining for Cast-Iron and Ductile-Iron Pipe and Fittings for Water

A21.5/AWWA C105 Polyethylene Encasement for Gray and Ductile Cast-Iron Piping for Water and Other Liquids.

A21.10/AWWA C110 Gray-Iron and Ductile-Iron fittings, 3" through 48" Inches for Water and Other Liquids.

A21.11/AWWA C111 Rubber Gasket Joints for Cast-Iron and Ductile-Iron Pressure Pipe and Fittings.

A21.15/AWWA C115 Flanged Cast-Iron and Ductile-Iron Pipe With Threaded Flanges.

A21.16/AWWA C116 Fusion-Bonded Epoxy Coatings.

A21.50/AWWA C150 Thickness Design of Ductile-Iron Pipe.

A21.51/AWWA C151 Ductile-Iron Pipe Centrifugally Cast, In Metal Molds or Sand-Lined Molds, for Water or Other Liquids.

A21.53/AWWA C153 Ductile-Iron Compact Fittings for 3" thru 48".

B16.1 Cast-Iron Pipe Flanges and Flanged Fittings, Class 25, 125, 250, and 800.

Reference Standards of the American Water Works Association (AWWA)

C200 Steel Water Pipe

C600 Installation of Ductile-Iron Water Mains and Appurtenances.

C651 Disinfecting Water Mains.

C900, C905 Polyvinyl Chloride (PVC) Pipe
C901-02, C906 High Density Polyethylene (HDPE) Pipe

3-03 DUCTILE IRON WATER PIPE (3-inch through 64-inch)

- A. Ductile Iron Pipe shall be centrifugally cast and conform to ANSI/AWWA A21.51/ C151, latest edition.

The pressure Class, net weight of pipe without lining, length of pipe and name of manufacturer shall be clearly marked on each length of pipe.

- B. Push-on, mechanical joint, and restrained joint pipe shall have a minimum rated working pressure of 150 psi. All buried pipe shall be (minimum) pressure class as follows:

- 1) 4" – 12" Pressure Class 350
- 2) 14" – 20" Pressure Class 250
- 3) 24" Pressure Class 200
- 4) 30" – 64" Pressure Class 150

- C. Flanged pipe shall be Thickness Class 53

- D. The pipe shall be lined in accordance with ANSI/AWWA C104/ A21.4, latest edition. The pipe shall have the standard thickness cement lining inside and bituminous coat outside in accordance with ANSI/AWWA C104/A21.4. The inside cement lining shall be treated with a seal coat of asphaltic material in accordance with ANSI/AWWA C104/A21.4. The seal coat shall have no deleterious effect upon the quality, color, taste or odor of potable water and shall be approved by National Sanitation Foundation (NSF). Approved pipe manufacturers are as follows:

- 1) Griffin Pipe
- 2) American Pipe
- 3) U.S. Pipe
- 4) McWane Group (includes Atlantic States and Clow Products)

NOTE: All ductile iron pipe installed in the Spartanburg Water System shall be of domestic manufacture which is defined as physically manufactured within the limits of the continental United States of America.

- E. Push-on and Mechanical Joints shall conform to ANSI A21.11/AWWA C111. The pipe is to be supplied in minimum 18 foot lengths with either push-on joints or mechanical joints.

- 1) Push-On Joints as supplied by the following manufacturers are approved.
 - a. Griffin Pipe Product: "Super Bell-Tite" joints;
 - b. American Pipe Product: "Fastite" joint;
 - c. U.S. Pipe Product "Tyton" joint;

- d. McWane Group (includes Atlantic States and Clow Products) “Tyton” joint 4” – 24” , “Fastite” joint 30” – 36”
- 2) Mechanical Joints in accordance with ANSI A21.11/AWWA C111
- F. Restrained Joint Pipe shall conform to ANSI A21.11/AWWA C111.
 - 1) American Pipe Product: Flex Ring.
 - 2) U.S. Pipe Product: TR FLEX.
 - 3) Griffin Pipe Product: SNAP-LOK.
 - 4) McWane Group (includes Atlantic States and Clow Products)

G. Push-on Joint Restraint rubber gaskets shall conform to ANSI A21.11/AWWA C111 with stainless steel locking segments vulcanized into gasket, and shall be have an operating pressure of 250 psi or greater. The joints shall be capable of being disassembled and are approved for use only on ductile iron pipe, 4” through 12” diameter inclusive.

Manufacturers:

- 1) U.S. Pipe Product: Field-Lok Gasket.
- 2) American Product: Fast Grip

H. External Restraint of DIP Bell and Spigot Joints

DIP bell and spigot joints may be restrained by the use of the following external restraint fixtures only if specifically approved by the Spartanburg Water Maintenance and Construction (M&C) or Engineering Departments. In all cases, the installation of these fixtures shall be performed as specified by the manufacturer, shall be shown on the approved plans, and shall be specifically called out on the Record Drawings.

TABLE 3-1: DIP External Restraint Fixtures

Manufacturer	Model #	Notes
EBA Iron Sales, Inc.	MEGALUG Series 1700 Restraint Harness	DIP Only
Ford	Uni-Flange Series 1300 or 1390	DIP Only
Sigma Corporation	One-Lok SLDH Restraint Harness	DIP Only

- I. Except as specifically listed above, no other unique, proprietary, or other pipe or joint restraint method shall be approved as an “equal” prior to being submitted for review by the Spartanburg Water Engineering Department.
- J. Flanged Joints shall conform to ANSI A21.11/AWWA C115. Bolts and nuts shall conform to ANSI A21.11/AWWA C111.
- K. Lead Ban

- 1) Any pipe, solder, or flux which is used in the installation or repair of any public water system shall be lead free.
 - 2) Any pipe, solder, or flux which is used in any plumbing in a residential or nonresidential facility which provides water, through connection to a public water system, for human consumption shall be lead free.
 - 3) Lead free shall be defined, when used with respect to solders and flux, as those containing not more than 0.2 percent lead.
 - 4) Lead free shall be defined, when used with respect to pipes and pipe fittings, as those containing not more than 8.0 percent lead.
 - 5) Leaded joints necessary for the repair of cast iron pipes shall be exempt from the lead free requirement.
- L. Natural rubber or other material which will support microbiological growth may not be used for any gaskets, O-rings, and other products used for jointing pipes, valves, or other appurtenances which will expose the material to the water. All gaskets shall be AWWA approved.
- M. Asbestos Cement Pipe
- 1) No asbestos cement pipe will be allowed to be installed.
 - 2) If asbestos cement pipe is encountered during any work in the Spartanburg Water system, use whatever methods needed to prevent damage to the pipe and follow all applicable SCDHEC regulations.

3-04 PVC PIPE

A. GENERAL

PVC pipe shall be 4-inch through 12-inch nominal diameter in accordance with AWWA C900, ASTM D2241 and ANSI/NSF 61. PVC pipe in diameters larger than 12-inch is not approved for use anywhere in the Spartanburg Water System.

- 1) All PVC pipe shall be designed and manufactured in accordance with AWWA C900, latest revision, from virgin polyvinyl chloride resin meeting cell Class 12454-A or 12454-B as defined in ASTM D1784. All compounds shall qualify for a rating of 4000 psi for water at 73.4 degrees Fahrenheit per the requirements of PPI TR3.
 - a. PVC (as described and specified above) is the only type of “thermoplastic” pipe approved for use in the Spartanburg Water System;

- b. Thermoplastic PVC pipe is not approved for use in any above-grade application, and all installations of PVC must be installed with the depth of cover specified in SECTION 4-04 (F) of these specifications.
- 2) PVC pipe shall be pressure class 200 (DR14) furnished in ductile iron pipe equivalent outside diameters in 20-foot lengths and shall be approved by the National Sanitation Foundation (NSF) Standard 14.
- 3) Each length of PVC pipe shall bear markings indicating the following information at intervals not to exceed five (5') feet: (1) manufacturer's name or trademark, (2) nominal pipe size and OD base, (3) AWWA material code designation, (4) dimension ratio, (5) AWWA pressure class, (6) AWWA C900 designation, and (7) product record code.
- 4) All PVC pipe shall be elastomeric-gasket bell-end pipe. One gasket shall be furnished with each length of PVC pipe.
- 5) The installation of solvent-weld PVC pipe and fittings, of any size, is prohibited in the water distribution system which is owned and operated by Spartanburg Water.
- 6) Gaskets and lubricants to be used with PVC pipe shall be made from materials that are compatible with PVC and with each other, but that will not support the growth of bacteria or adversely affect, in any way, the quality of the potable water to be transported.
- 7) Fittings used in the laying of PVC pipe shall be iron fittings as described below. Fabricated or molded PVC fittings will not be acceptable in any application.

B. PVC PIPE INSPECTION

- 1) Each pipe shipment shall be inspected with care by the Contractor and the SWS Engineering Field Technician. Any pipe which is warped, cracked, discolored, abraded, misshapen, or otherwise damaged shall be considered unsuitable and shall not be used. Any unsuitable material discovered during the inspection or at any other time shall be removed from the job site.
- 2) If the load shifted during transport, has broken packaging, or shows rough treatment, each pipe length shall be carefully inspected for damage.
- 3) It is assumed that all handling and storage of the PVC pipe by all persons who handle, transport, and/or store, these PVC pipe materials prior to their delivery to the job site is in accordance with the requirements of the Uni-Bell PVC Pipe Association. Any damage resulting from improper

handling, transportation, or storage prior to or during the time the pipe material is on the work site shall cause the piping materials to be rejected.

C. SHIPPING, RECEIVING, UNLOADING PVC PIPE

- 1) Shipping: All pipe material shall be shipped in a manner to ensure that the pipe is not damaged.
- 2) Receiving: When receiving the PVC pipe shipment at the job site, the Contractor shall exercise established precautions.
- 3) Unloading: Preferred unloading is in package units using mechanical equipment; however, the pipe can be unloaded individually by hand. Mechanical equipment shall be operated so that it does not strike adjacent pipe and that pipe being moved does not strike anything.
 - a. Unloading unpackaged PVC Pipe: PVC pipe may be unloaded and moved individually by hand if not packaged or if mechanical equipment is not available.
 - b. Unloading Package Units: When unloading package units, the following instructions shall be carefully followed:
 - i. Remove restraints from the top unit loads;
 - ii. If there are boards across the top and down the sides of the load which are not part of pipe packaging, remove them;
 - iii. Use a fork lift with thin chisel forks, extend forks (or front end loader equipped with forks) to remove each top unit (one at a time) from the truck. Remove back units first. Do not run the forks too far under units as fork ends striking adjacent units may cause damage. Insure forks are fully engaged;
 - iv. If a fork lift is not available, a spreader bar with fabric straps which are capable of handling the load (with straps spaced approximately 8 feet apart and looped under the load) may be used. Cables may also be used if cushioned with rubber hose sleeves or other material to prevent abrasion of the pipe
 - v. During the removal and handling, be sure that the units do not strike anything. Severe impact could cause damage, particularly during cold weather;
 - vi. Do not handle units with individual chains or single cables, even if padded;

- vii. Do not attach cables to unit frames or banding for lifting;
- viii. Pipe package units shall be placed and stored on level ground;
- ix. Package units shall not be stacked more than eight feet high. Units shall be protected by dunnage;
- x. To unload lower units, repeat the above unloading process;
- xi. If unloading equipment is not available, pipe may be unloaded by removing individual pieces by hand. However, care shall be taken to insure that pipe is not dropped or damaged.

D. STORAGE REQUIREMENTS FOR PVC PIPE:

- 1) PVC pipe shall be stored, if possible, at the job site in the unit packages provided by the manufacturer. Caution shall be exercised to avoid compression, damage or deformation to the bell ends of the pipe. Pipe shall be stored on level ground.
- 2) If stored as individual pieces, pipe shall be arranged and supported so that there can be no compression, damage or deformation to the bell ends.
- 3) When unit packages of PVC pipe are stacked, insure that the weight of the upper units does not cause deformation to the pipe in lower units.
- 4) PVC pipe unit packages shall be supported by racks or dunnage to prevent damage to the bottom during storage. Supports shall be spaced to prevent pipe bending.
- 5) When exposure to direct sunlight for an extended period is unavoidable, PVC pipe shall be covered with opaque material while permitting adequate air circulation above and around the pipe as required to prevent excessive heat accumulation.
- 6) PVC pipe shall not be stored close to heat sources or hot objects such as heaters, boilers, steam lines, engine exhaust, etc.
- 7) When unit packages of PVC pipe are stacked, insure that the height of the stack does not result in instability which could cause stack collapse, pipe damage or personnel injury.
- 8) The interior as well as all sealing surfaces of pipe, fittings and other accessories shall be kept free from dirt and foreign matter.

- 9) Gaskets shall be protected from exposure to heat, direct sunlight, ozone, oil, and grease.

E. HANDLING REQUIREMENTS FOR PVC PIPE:

- i. When using fork lifts or other handling equipment, prevent damage to PVC pipe.
- ii. When handling PVC pipe, avoid impact blows, abrasion damage, and gouging or cutting by metal surfaces or rocks. Avoid stressing bell joints and damage of bevel ends.
- iii. Pipe shall be lowered, not dropped, from trucks and into trenches.
- iv. In preparation for pipe installation, placement of pipe (stringing) shall be as close to the trench as practical and on the opposite side from the excavated earth. Bell ends shall point in the direction of work progress.
- v. Pipe stringing shall not extend further than 100 feet beyond the installation.
- vi. In subfreezing temperatures, extra caution is required in handling PVC pipe to prevent impact damage.

1. EXTERNAL RESTRAINT OF PVC BELL AND SPIGOT JOINTS

PVC bell and spigot joints may be restrained by the use of the following external restraint harnesses only if specifically approved by the Spartanburg Water Maintenance and Construction (M&C) or Engineering Departments. In all cases, the installation of these fixtures shall be performed as specified by the manufacturer, and shall be shown on the approved plans

TABLE 3-2: PVC Pipe External Restraint Harness

Manufacturer	Model #	Notes
EBAA Iron Sales, Inc.	Series 1500 Bell Restraint Harness	C-900 PVC
Ford	Uni-Flange Series 1390	DR-14 PVC Only
Sigma Corporation	Series PVP PV-Lok	PVC Only

3-05 HIGH DENSITY POLYETHYLENE (HDPE) PIPE

A. HDPE PIPE MANUFACTURE

All HDPE pipe shall be designed in accordance with AWWA C901, latest edition, for sizes 1-1/4" thru 3" IPS diameters and to the requirements of ASTM D3035. Pipe 4"IPS and DIPS sizes 4" and above shall be manufactured to the requirements of ASTM F714 and AWWA C906, latest edition. Black PE materials used for the manufacture of polyethylene pipe and fittings shall be PE 3408 high density polyethylene meeting ASTM

D3350 cell classification 345464C.

- 1) HDPE pipe shall be Pressure Class 200 (DR-9) or greater wall thickness.
- 2) The pipe is to be supplied in minimum 20 foot lengths with thermal butt fusion joints in accordance with ASTM D3261.

B. INSPECTION

Pipe and fittings shall be carefully examined by the Contractor and the SWS Engineering Field Technician for cracks and other defects immediately before installation, with special attention to pipe ends. All defective pipe and fittings discovered during the inspection or at any other time shall be removed from the job site.

3-06 STEEL PIPE

The existing Spartanburg Water distribution system includes several welded steel main transmission water lines. In general, no new steel water lines shall be installed in the SWS system. However, if the installation of a new steel water main has a clear benefit to the SWS system, the design should be submitted to the SWS Engineering Department for consideration. All steel pipe must be in accordance with AWWA C200 or ASTM A53 or ASTM A120.

3-07 FITTINGS

- A. Fittings shall be ductile iron fittings manufactured in accordance with ANSI/AWWA C153/A21.53, latest revision. Where compact fittings are not available, fittings shall be full size iron fittings manufactured in accordance with ANSI/AWWA C110/A21.10 and ANSI/AWWA C111/A21.11, latest revisions. The working pressure rating shall be 350 psi.
- B. Only MJ x MJ (for buried service) or Flange x Flange (for above-ground service) are approved. Push-on or other socket-type joints are not approved in any application, and proprietary restraining methods are not approved except as noted below.
- C. Ductile iron shall be in accordance with ASTM A-536, latest revision, with minimum physical qualities of 70,000 psi tensile strength, 50,000 psi yield strength and 5% elongation.
- D. Restraint of joints at MJ fittings shall be achieved through the installation of an approved restrainer gland with "auto-torque" twist-off heads. See below:

TABLE 3-3: Approved Restrainer Glands for DIP and PVC with Ductile Iron Fittings

Manufacturer	Model #	Notes
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EBAA Iron Sales, Inc.	MEGALUG Series 1100	DIP Only
EBAA Iron Sales, Inc.	MEGALUG Series 2000PV	PVC Only
Ford	Uni-Flange Series 1400	DIP Only
Ford	Uni-Flange Series 1500	PVC Only
Sigma Corporation	Series SLD One-Lok	DIP Only
Sigma Corporation	Series SLC One-Lok	PVC Only

NOTE: The use of a restrained joint at a fitting in no way insures the restraint of the pipe/fitting as a system. The Design Engineer shall be responsible for designing the piping system with proper consideration for all issues related to piping restraint, and the installation must be per the approved design.

- E. Coatings shall be as follows (use of either option is approved):
- 1) Cement-mortar lining shall be in accordance with ANSI/AWWA C104/A21.4, latest edition. The fitting shall have the standard thickness cement lining inside and bituminous coat outside in accordance with ANSI/AWWA C104/A21.4. The inside cement lining shall be treated with a seal coat of asphaltic material in accordance with ANSI/AWWA C104/A21.4. The seal coat shall have no deleterious effect upon the quality, color, taste or odor of potable water and shall be approved by National Sanitation Foundation (NSF).
 - 2) Fusion bonded epoxy coating shall be coated with in accordance with AWWA C-116 and shall be mechanical joint in accordance with ANSI/AWWA C111/A21.11.

3-08 STEEL COUPLINGS AND BELL JOINT CLAMPS

- A. Leaks at bell joints are normally repaired by cutting out the leaking joint, and installing a spool piece with the correct Dresser coupling or solid ductile iron MJ sleeve. If specifically approved by the Spartanburg Water Maintenance and Construction (M&C) or Engineering Departments, the repair of leaking bell joints in cast iron pipes may be accomplished with bell joint clamps using Dresser Style 60 or 60S bell joint clamps. **Bell-joint clamps are not approved for use on ductile iron or PVC pipe.**
- B. Steel couplings used for joining cast iron, ductile iron or steel water mains of all sizes shall be Dresser Style 38 or Style 138. The use of Dresser couplings is only approved for the repair of leaks as noted above, not as a substitute for gasketed bell and spigot joints used in normal pipe laying operations.

SECTION 4

WATER MAIN INSTALLATION AND TESTING

4-01 SCOPE

This section contains the current specifications for the installation of pipe, fittings, and all related appurtenances in projects to be integrated into the Spartanburg Water System. All pipe, fittings, packing, joint materials and appurtenances shall conform to and shall be installed in accordance with Section C of the AWWA Standards and SCDHEC R.61-58. All materials or products that contact potable water must be third party certified as meeting the requirements of ANSI/NSF61.

4-02 DESIGN CRITERIA:

Reference Standards of the American Water Works Association (AWWA) Latest Revisions
B300 AWWA Standard for Hypochlorites
C111 Rubber-gasket Joints for Ductile Iron Pressure Pipe and Fittings
C200 Steel Water Pipe
C600 Installation of Ductile-Iron Water Mains and Appurtenances.
C651 Disinfecting Water Mains.
C900, C905 Polyvinyl Chloride (PVC) Pipe
C901-02, C906 High Density Polyethylene (HDPE) Pipe

4-03 EXISTING UTILITIES AND STRUCTURES

- A. SCOPE: This Section pertains to the coordination with other utilities at the construction site and instructions to prevent damage to other utilities.
- B. GENERAL: It is the intent of these specifications that care shall be taken to prevent damage to other utilities and structures. Any repairs shall be made at Contractor's expense and in accordance with the particular utilities' requirements.
- C. Existing Utilities: Utilities have been located based on information provided to the Engineer by the utility companies. The Spartanburg Water System cannot guarantee the accuracy of this information. At least 72 hours prior to installation, Contractor shall contact Palmetto Utility Protection Service (PUPS) in Columbia, SC (1-800-922-0983) and any other utility that may be in the area.
- 1) When interruptions of existing utilities occur, temporary service shall be provided as approved by the Engineer and owner of the utility.
 - 2) Underground Utilities and Other Structures: Necessary excavations to

determine the location and elevation of existing underground utilities and other structures shall be made prior to the opening of trenches. Contractor shall contact the utility and a representative of the utility shall be present when excavating to locate utilities. When a conflicting utility has been located in the field by the utility's personnel, or when there is direct knowledge of the presence of one of these utilities in an area which will conflict with the construction efforts, then the exact location of the conflicting utility shall be verified by hand digging before any additional construction takes place. If the utility's line is not uncovered in the staked position, then additional hand digging shall be performed until either the utility's line is uncovered or until it can safely be determined that it does not interfere with the proposed construction and is not subject to damage during construction. Only after it is confirmed that the conflicting utility will not be damaged shall the pipeline construction efforts proceed.

3) Separations of Water Mains and Sewers:

The separation of water mains and sanitary sewers shall be in accordance with Section R61-58.4.D(12) of the State Primary Drinking Water Regulations as outlined herein.

- a. Parallel installation - Water mains shall be laid at least 10 feet horizontally from any existing or proposed sewer. The distance shall be measured edge to edge. The water main may be allowed to be installed closer to a sewer, provided that the water main is laid in a separate trench or on an undisturbed earth shelf located on one side of the sewer at such an elevation that the bottom of the water main is at least 18 inches above the top of the sewer. However, any deviations to the 10 feet horizontal distance must be approved by the Engineering Department and DHEC.
- b. Crossings - Water mains crossing sewers shall be laid to provide a minimum vertical distance of 18 inches between the invert of the water main and the top of the sewer. Where a water line crosses under a sewer line, both the water and sewer line must be ductile iron. At crossing, one full length of water pipe shall be located so both joints will be as far from the sewer as possible. Special structural support for the water and sewer pipes may be required. Refer to CONSTRUCTION DETAIL NO. 1
- c. Force mains - There shall be at least a 10 foot horizontal separation between water mains and sanitary sewer force mains. There shall be an 18 inch vertical separation at crossing as required in Part 1) and 2) above.
- d. Sewer manholes - No water pipe shall pass through or come in

contact with any part of a sewer manhole.

- e. Water lines may come in contact with storm water piping or catch basins if there is no other practical alternative, provided that ductile iron is used, no joints of the water line are within the storm water piping or catch basin and the joints are located as far as possible from the storm piping or catch basin.
- f. No water line shall be installed within 25 feet horizontally from any portion of a wastewater tile/spray field. Also no water line shall be installed within a contaminated area.
- g. Special Conditions: When it is impossible to obtain the distances specified in (a) and (b) above, the Contractor shall contact the SWS Engineer. Any alternative design must first be approved by the SWS Engineer and the South Carolina Department of Health and Environmental Control. Any alternative design shall:
 - (i) maximize the distances between the water main and the sewer line and the joints of each;
 - (ii) use approved water main piping materials for the sewer line; and,
 - (iii) allow enough distance to make repairs to one of the lines without damaging the other.

- D. Structures: Adequate temporary support and adequate protection and maintenance of all underground and surface structures, drains, sewers, curbs, and other obstructions encountered in the progress of the work shall be provided. The structures which have been disturbed by the construction operations shall be restored to the satisfaction of the utility involved upon completion of the work. ANY DAMAGES to existing underground utilities shall immediately be reported to the Engineer and to the appropriate utility.

4-04 TRENCH EXCAVATION GENERAL

- A. SCOPE: Work consists of all necessary site grading, trench excavation and backfill, and related work as shown on the plans and as specified herein.
- B. GENERAL: All excavation and grading shall be confined to the right-of-way or easement area as shown on the plans, and shall be done in an approved manner with proper equipment. Excavation, filling and grading work shall be suspended during rain and inclement weather, or when unsatisfactory field conditions are encountered, unless otherwise directed by the SWS Engineering Department. At all times during construction, Contractor shall maintain proper drainage in the construction area, and

shall take all measures necessary for erosion and sediment control as required in the SECTION 10: GRASSING AND EROSION CONTROL.

- C. Classification of Earthwork: Excavation shall be classified as either "common excavation" or "rock excavation." "Rock excavation" shall be such materials which cannot be removed by means other than by blasting or with a pneumatic or hydraulic hammer. "Common excavation" shall include all types of materials that do not fall into the category of "rock excavation" as defined above. Classification of excavation shall be determined by the Engineer. It shall be the Contractor's responsibility to notify the Engineer when rock excavation is encountered. The Contractor will not be credited for any rock quantities excavated before such notice is given.
- D. Excavation and Preparation: Trenches shall be excavated true to line and grade so that the pipe can be installed to the alignment and depth required. The trench shall not be opened any further ahead of pipe laying operations than is necessary for proper laying and backfilling operations and as approved by the SWS Engineering Department. Trenches shall be progressively backfilled within 100 feet of the pipe laying and installation operations unless otherwise approved by the Engineering Field Technician. No trenches may be left open overnight without the approval of the SWS Engineering Department. When approved, proper traffic protection, lighting and signs in accordance with requirements of South Carolina Department of Transportation shall be provided by Contractor.
- E. Width: The width of the trench shall be ample to permit the pipe to be laid and jointed properly. Allowable widths of trenches are as follows:

<u>PIPE SIZE</u>	<u>TRENCH WIDTH (min/max)</u>		<u>PIPE SIZE</u>	<u>TRENCH WIDTH (min/max)</u>
3" or Under	6"/12"		20"	40"/44"
4"	18"/24"		24"	44"/48"
6"	24"/30"		30"	50"/54"
8"	24"/30"		36"	56"/60"
10"	24"/36"		42"	62"/66"
12"	24"/36"		48"	68"/72"
16"	30"/40"			

Trenches shall be of such extra width, when required, to permit the placing of timber supports, sheeting and bracing.

- F. Depth of Cover: All pipe shall have a minimum cover of 48 inches. If 48 inches of cover cannot be obtained (i. e. bridge crossings) ductile iron pipe shall be required and

adequate insulation shall be provided to prevent freezing.

- G. Excavation to Grade: The trench shall be excavated to the depth required so as to provide a UNIFORM AND CONTINUOUS ditch bottom between the bell holes. Ledge rock, boulders and large stones must be removed to provide not less than 6 inches of soil cushion on all sides of the pipe and appurtenances. Any part of the bottom of the trench excavated below the specified grade shall be corrected by adding approved material and compacted to not less than 95% of the maximum dry density as determined by a Standard Proctor Test (ASTM D698). The finished subgrade shall be prepared accurately by means of hand tools.
- H. Bell Holes: Bell holes shall be provided at each pipe joint to permit the jointing to be properly made. Bell holes shall be excavated to sufficient depth and width, approximately one (1") inch, to allow the pipe to rest uniformly on the bedding material and to allow the joint to be properly made. The pipe bell shall not be used to support the pipe.
- I. Excavation in Soil: Where the bottom of the trench at subgrade is found to be unstable or to include ashes, cinders, refuse, vegetable, or other organic material which, in the opinion of the Engineering Field Technician should be removed, then the material shall be removed to the width and depth required. Before the pipe is laid, the subgrade shall be prepared by backfilling with an approved material in three (3") inch uncompacted layers. Each layer shall then be thoroughly compacted, as specified below in order to provide a uniform and continuous firm bearing and support for the pipe at every point between bell holes.
- J. Crushed Stone Stabilization: Wherever, in the opinion of the Engineering Field Technician, the subgrade is by nature too soft or mucky for the proper installation of the pipe, the trench shall be excavated as directed by the Engineer, and backfilled with No. 67 Stone (3/4" and less) and brought to the grade required and compacted.
- K. Excavated Material: All surface materials which are suitable for reuse in restoring the surface shall be kept separate from the general excavated materials.
 - 1) Storage of Excavated Material: All excavated material shall be stored in a manner that will not endanger the work and which will avoid obstructing sidewalks, driveways, or traffic. Fire hydrants under pressure, valve pit covers, valve boxes, curb stop boxes, fire and police call boxes or other utility controls shall be left unobstructed and accessible until the work is completed. Gutters shall be kept clear or other satisfactory provisions made for street drainage, and natural water courses shall not be obstructed. Rural mail boxes shall be left unobstructed and accessible when possible.
- L. Trench Bracing: The Contractor is responsible for the safety of the site. This is to include complying with all safety regulations concerning trench bracing to State and Federal requirements.

- M. Dewatering: An adequate dewatering system shall be provided, if required by the Engineering Field Technician. If a well-point system is used, the Contractor shall submit plans to the SWS Engineering Department for approval. The system shall be capable of removing any water that accumulates in the excavation and maintaining the excavation in a dry condition while construction is in progress. Dirt placed on the surface of the ground shall be sloped away from the excavation. If necessary, piping shall be provided to prevent surface water from entering the excavation. Disposal of water from the dewatering operation shall be done in a manner that does not interfere with normal drainage, and does not cause damage to any portion of the work or adjacent property. All drains, culverts, storm sewers and inlets subject to the dewatering operation shall be kept clean and open for normal surface drainage. The dewatering system shall be maintained until backfilling is complete or as otherwise directed by the Engineering Field Technician. All damage resulting from the dewatering operation shall be repaired by the Contractor to the satisfaction of the Engineering Field Technician and at no cost to the Spartanburg Water System.
- N. Trench Earth Dams: Where pipe bedding is angular material, earth dams, consisting of a minimum ten (10) foot trench length of select compacted backfill to replace angular bedding, shall be installed every 200 feet of pipe to prevent groundwater movement in angular bedding material. Compacted backfill 95% proctor shall replace angular bedding.
- O. Backfilling Trenches – General (See also specific requirements in the applicable sections for specific pipe materials)
- 1) All trenches shall be backfilled immediately after the pipe is laid in the trench and bedding is complete, unless otherwise directed by the SWS Engineering Field Technician. All opened trench shall be properly backfilled before the end of the working day unless the SWS Engineering Department specifically approves leaving the trench open.
 - 2) Initial backfill material shall be placed to a satisfactory height over the top of the pipe (minimum 12-inches) for impact protection during the installation of the remaining backfill. No mechanical tamps shall be used until this depth has been achieved.
 - 3) Bedding and backfill up to 12 inches over the top of the pipe shall be placed as required above. Backfilling shall be carried up evenly on both sides of the pipe. The remaining backfill may be placed in layers of up to 12-inches for mechanical tamps, (18-inches if a mobile tamp is used) and each layer shall be compacted to 95% standard proctor by using one of the approved tamping devices listed in Paragraph 4) below. The tamping equipment shall make no less than four (4) passes. One compaction run up the trench and back down the trench is considered one pass.

- 4) Tamping Equipment: Mechanical tamps (gasoline driven), pneumatic tamps (air tamp), and sheepsfoot trench rollers are acceptable. "Mobile tamps" and/or "sheepsfoot trench rollers" such as "Rammax P-24EC" or approved equal, are permitted.
 - 5) Compaction Test: All backfill for water lines shall be subject to a compaction test by Spartanburg Water System personnel or an independent laboratory approved by the Spartanburg Water System. If compaction meets test requirements, the Owner will pay for the cost of the test. If compaction fails the test, the Contractor shall remove and replace backfill to the satisfaction of the Spartanburg Water System, and shall also pay for the cost of the test and any subsequent test required.
 - 6) Contractor shall be responsible for final subsidence of all trenches, and shall leave trenches flush with the original ground after all settlement has taken place. Any settlement of backfill below finish grade shall be promptly corrected. Trenches shall be protected against scour due to surface drainage. Refer to CONSTRUCTION DETAIL NO. 2.
- P. Underground Utilities: The Contractor is responsible for locating and protecting all existing underground utilities as required in Section 4-03, EXISTING UTILITIES AND STRUCTURES.
- Q. Sequence of Work: Excavation, cleaning, laying, jointing, and backfilling shall be kept up as closely as is possible so as to progress in a uniform, workmanlike manner. In no case shall pipe be left in the trench overnight, without completing the joint. The completed pipeline shall not be left exposed in the trench unnecessarily. The trench shall be backfilled and compacted as soon as possible after laying and jointing is completed. If necessary, exposed ends of pipe shall be properly plugged during laying to prevent dirt and other materials entering the line. Each day at the close of work, and at all times when laying is not in progress the exposed end of the pipeline in the trench shall be closed by the use of an approved temporary water tight plug. If, at any time, it becomes necessary to cover the ends of the uncompleted line with backfill, the end of such pipeline shall be plugged with a water tight plug.
- R. Flushing - The design shall provide for a readily accessible means of flushing all water lines at a minimum velocity of 2.5 feet per second. This does not apply to service lines.
- 1) Where dead-end lines occur they shall be provided with a fire hydrant if flow and pressure are sufficient and if justified by line size and fire protection requirements. Otherwise, a readily accessible blow-off valve shall be provided for flushing purposes, except for the following cases:
 - a. Lines one and one half (1-1/2) inches in diameter and smaller will not require blow-offs.

- b. Two inch lines shorter than two hundred (200) feet will not require a blow-off. However, a service connection shall be installed at the end of the line or another acceptable means of bleeding chlorine through the lines must be provided.
- c. Blow-offs shall be sized to provide a minimum velocity of 2.5 feet per second in the line and maintain a residual pressure of twenty-five (25) pounds per square inch.
- d. Lines ten (10) inches and larger require flows in excess of five hundred (500) gallons per minute to achieve a two and a half (2.5) feet per second scouring velocity. This would require a standard fire hydrant or other approved blow-off, for flushing which must be designed to provide at least five hundred (500) gallons per minute in excess of peak hourly flow and a minimum residual pressure of twenty (20) pounds per square inch.
- e. No flushing device shall be directly connected to any sanitary sewer. Refer to CONSTRUCTION DETAIL NO. 3

4-05 INSTALLATION OF DUCTILE IRON PIPE AND FITTINGS

- A. GENERAL: All pipe and fittings shall be assembled and joined in accordance with the instructions in this Section and shall accurately conform to the lines and grades established by the plans.
 - 1) Handling: Proper and suitable tools and equipment for the safe and convenient handling and laying of pipe shall be used. Care shall be taken to prevent the pipe or fittings coating from being damaged, particularly the cement lining on the interior of the iron pipe. All pipe and fittings shall be carefully examined for cracks, broken lining or other defects. No pipe or fitting shall be laid which is known to be defective. If any pipe or fitting is discovered to be cracked, broken or defective, after being laid, it shall be removed and replaced with acceptable new pipe or fittings at no additional cost. All pipe and fittings shall be thoroughly cleaned before being laid and shall be kept clean until accepted in the completed work.
 - 2) Cleaning Pipe and Fittings: All lumps, blisters and excess tar coating shall be removed from the bell and spigot, and the inside of the bells shall be wire brushed and wiped clean and dry and free from oil and grease or other foreign material before the pipe is laid. If the interior of the pipe is not clean, the entire length of pipe shall be SWABBED clean by the use of a circular cloth swab having a diameter equal to the inside diameter of the pipe.

- 3) Placing in Ditch: Every precaution shall be taken to prevent foreign material from entering the pipe while it is being placed in the trench. If the pipe laying crew cannot place the pipe into the trench and in place without getting earth into it, a heavy tightly woven canvas bag of suitable size shall be placed over each end before lowering the pipe into the trench and left in place until the connection is to be made. During laying operations, no debris, tools, clothing or other material shall be placed in the pipe.
- 4) Whenever pipe laying is stopped, the open end of the line shall be closed with a tight-fitting, inflatable, plug to keep out sand, earth, and water. An MJ cap (with restrainer gland) may be used as an alternate if the pipe terminates in a plain end. Any standing water shall be removed from the trench before the plug or cap is removed. The plug should be tied off to prevent movement under the influence of standing water in the ditch which may be present after a heavy rain. Any dirt or foreign matter found in the pipe shall be thoroughly removed before joining occurs.
- 5) In the event that the cap or plug fails to prevent the entry of standing water and/or debris into the pipe, the pipe laying operation shall not commence until the interior of the pipe has been cleaned to the satisfaction of the Engineering Field Tech.
- 6) Permissible Deflection: Whenever it is necessary to deflect the pipe from a straight line, either in the horizontal or vertical plane the maximum amount of deflection allowed shall not exceed that listed in the table below. Joints shall be pushed home straight before deflecting. For mechanical joint pipe, the bolts shall be partially tightened before the length of pipe is deflected.

TABLE 4-1

MAXIMUM PIPE DEFLECTION AND TORQUE

<u>Size</u> nominal	<u>Push-on Joint*</u>		<u>Mechanical Joint*</u>		<u>Torque</u>
	degrees	inches	degrees	inches	ft-lbs
3 inch	4.0	15.0	4.5	17.0	60
4 inch	4.0	15.0	4.5	17.0	90
6 inch	4.0	15.0	4.5	17.0	90
8 inch	4.0	15.0	4.5	17.0	90
10 inch	4.0	15.0	4.5	17.0	90
12 inch	4.0	15.0	4.5	17.0	90
14 inch	2.0	7.5	3.0	11.0	90
16 inch	2.0	7.5	3.0	11.0	90
20 inch	2.0	7.5	2.0	7.5	90
24 inch	2.0	7.5	2.0	7.5	90
30 inch	1.5	5.5	2.0	7.5	120
36 inch	1.5	5.5	2.0	7.5	120
42 inch	1.5	5.5	1.5	5.5	150
48 inch	1.5	5.5	1.5	5.5	150

*18-foot joints

7) Cutting Pipe:

- a. The cutting of pipe for installing valves, fittings or nipple pieces shall be done in a neat and workmanlike manner without damage to the pipe or lining and so as to leave a smooth end at right angles to the axis of the pipe. Prior to cutting, the exact location of the cut shall be carefully marked by chalk or some other means around the entire circumference of the pipe. The cut shall be made following this mark. The edge of the cut spigot shall be beveled a minimum of 1/4-inch when "push-on" joints are involved.
- b. A pipe saw shall be used for cutting all pipe. Any other method must be approved by the SWS Engineering Department prior to

construction.

- c. The flame cutting of any pipe by any means will not be allowed.
- d. The minimum nipple length allowed without approval from the SWS Engineering Field Technician is two feet (2’).

- B. Push-On Joints ("Super Belltite", "Tyton", Fastite"): Jointing of compression ("Push-on") joint pipe shall be made by experienced workers. Sockets, spigots, and gaskets shall be thoroughly cleaned in accordance with AWWA C111 before the gasket is inserted into the socket recess. At a minimum, the sockets and spigots shall be cleaned with a wire brush. If the gaskets and spigots require additional cleaning and lubrication, this shall be provided via an NSF approved soapy water solution or an approved lubricant. However the lubricant cannot be vegetable shortening nor can it support microbiological growth. Any lubrication shall be in accordance with manufacturer's recommendation. The gasket shall be carefully placed into the socket recess by hand, and evenly seated. A thin film of lubricant supplied by the pipe supplier shall be applied to the inside of the gasket and outside of the spigot end of the pipe to permit easy entry of the pipe into the socket. The spigot ends of cut pipe shall be dressed and tapered with a coarse file or approved beveling device in a manner that will protect the gasket from damage, permit the proper centering of pipe in the bell, provide uniform compression of the gasket, and easy entry of spigot into socket. The spigot end of the pipe shall be pushed "HOME" by the use of a large bar ratchet type assembly tool, or jack, or other approved methods. Care must be taken in the use and storage of the joint lubricant provided. Lubricant contaminated by dirt or other material shall be discarded. During assembly of the next joint of pipe in the ditch, the joint being installed must be kept straight and in line with the previous joint installed. Pipe may be deflected if necessary but only after the assembly is completed.
- C. Mechanical Joints: Joints for mechanical joint pipe shall be made by experienced workers. Gaskets, sockets and spigots shall be cleaned and lubricated as stated in paragraph "B" above. The spigot shall be pushed into position and seated evenly in the socket. The gland shall be pushed into position for compressing the gasket. All bolts and nuts shall be tightened to a uniform permanent tightness to the required torque as shown in Table 4-1. Bolts shall be tightened beginning with the bottom bolt, then the bolt directly opposite and proceeding around the joint using this alternating procedure to provide uniform tightness around the pipe. Care shall be taken to keep the gland square with the socket. The glands and bolts shall be kept clean and sockets, spigots, and gaskets shall be kept clean until such joint has been completed. Any joint which leaks shall be reassembled.
- D. Restrained Joint Pipe: Where restrained joint pipe is called for on the plans, or is otherwise required and approved by the Engineer, it shall be assembled and installed in accordance with the manufacturers published instructions and recommendations.
- E. Threaded Jointing: The threads of the coupling and pipe shall be inspected for defects

and, if satisfactory, all threads shall be thoroughly cleaned with a wire brush before the joint is made. If the coupling is furnished "hand-tight", it shall be removed and all threads cleaned with a wire brush before being reassembled and properly tightened. The threaded end of the next joint to be assembled shall be squared with the coupling and hand-tightened. Final uniform tightening of the pipe length and coupling shall be accomplished by competent workers using the proper wrenches which shall not damage the pipe coating. Teflon tape and Teflon pipe dope shall be used as lubricant for all threaded joints.

F. Water Crossings: For all surface water crossings (above the water level) the pipe shall be adequately supported and anchored as shown on the construction drawings in order to protect the pipe from damage and freezing as well as to make the pipe accessible for repair or replacement. For all underwater crossings, a minimum of two (2) feet of cover shall be provided. For water crossings of 15 feet wide or greater, the following shall be provided:

- 1) The pipe material and joints shall be designed appropriately;
- 2) Valves shall be located so that the section can be isolated for testing or repair; the valves shall be easily accessible, and not subject to flooding; and,
- 3) A blow-off shall be provided on the side opposite the supply service, sized in accordance with R.61-58.4(D)(7). Blow-offs shall not be directed toward creeks or other water bodies without proper precaution taken to dechlorinate prior to discharge.

Refer to SECTION 8: BORING AND AERIAL CROSSINGS.

G. All plugs, caps, tees, bends, and hydrants, and other items as may be indicated on the plans, shall be provided with reaction blocking, tie rods, or other approved restraining methods or as shown on the drawings for lines 2-inches in diameter and larger. This includes fire hydrants on lines 6-inches in diameter and larger.

- 1) Concrete Blocking and Rodding:
 - a. Concrete used for blocking, collars and "Deadman" type thrust blocks shall have a compressive strength of 3,000 psi at 28 days. High early strength concrete shall be used.
 - b. Concrete shall be poured to the dimensions shown on the plans and formed when directed by the Engineering Field Technician. The large side (backs) of the blocking shall bear against undisturbed, hard, solid earth. Blocking shall be poured to bear against the pipe or fitting and allow sufficient area for repair and the easy removal of nuts and bolts. The pipe or fitting shall be wrapped with 8 mil polyethylene (according to AWWA C-105) for a suitable distance either side of the

thrust block to prevent the concrete from bonding to the pipe, fitting, or fasteners. Refer to CONSTRUCTION DETAIL NO. 4.

- c. Backfilling on poured concrete will not be permitted on concrete for 24 hours after pouring, and no water will be permitted in mains for at least 24 hours after concrete blocking is poured.
- d. Metal Straps and rods shall be made of steel having a tensile strength of 95,000 psi. If required by the Engineer, the Contractor shall supply acceptable certification of tensile strength. All steel components, including rods, straps, nuts, bolts, couplings and clamps shall be coated with 17.5 mils of Thick and Quick Mastic, or equal. Contractor shall supply coating and coat all the tie rods, clamps and miscellaneous steel used for anchoring purposes.
- e. Concrete Collars poured on the last joint of pipe in a dead end run, shall be poured around a thrust collar which shall be installed according to the manufacturer's recommendations (unless welded on, which must be done at the factory). This collar shall be installed on the pipe midway between the MJ bell and the spigot. Pipe manufacturer's shop drawings must be submitted for each size collar to be used indicating that the collar is designed to, at a minimum, restrain the force created by a 250 psi line pressure as listed in the table below. Field welding thrust collars will not be allowed. Refer to CONSTRUCTION DETAIL NO. 5 and SECTION 3-03 Paragraph I of these Specifications.

Pipe Size Nominal Inch	Test Pressure (PSI)	Thrust (LBS)
4	250	3,140
6	250	7,065
8	250	12,560
10	250	19,625
12	250	28,260
14	250	38,465
16	250	50,240
18	250	63,585
20	250	78,500
24	250	113,040
28	250	153,860
30	250	176,625
32	250	200,960
36	250	254,340
40	250	314,000
44	250	379,940
48	250	452,160

- f. Certain applications require special thrust restraint procedures and designs which should be submitted to the Spartanburg Water Engineering Department for review.

H. Restrained Joint Pipe:

Restrained joint piping materials shall meet the requirements stated in Section 3-03G, PIPE MATERIALS, and Section 3-06 FITTINGS, and shall be as those shown on the shop drawings submitted by the Contractor and approved by the Engineer.

I. Pipe Bedding:

- 1) Pipe Bedding: All ductile iron pipe 3-inch through 20-inch diameter shall be bedded on a flat trench bottom or on select material as described in B.(1) below. All ductile iron pipe 24-inch through 42-inch diameter shall be bedded on a 4-inch thick bed of angular material as described in B.(2) below. All pipe bedding shall be continuous and uniform, have adequate support, and no stones within six (6) inches of the pipe.
- 2) Bedding Materials: Materials for pipe bedding shall be as indicated on the typical trench section (CONSTRUCTION DETAIL NO. 2), or as specified herein
- 3) Select material shall be used from the angular material to the top of trench. It shall be suitable material from the excavation free of large stones, hard lumps of debris and other objectionable materials. If select material is not available from the excavation, it shall be hauled to the site.

- 4) Angular material shall be crushed stone conforming to ASTM C33, Size No. 67 with a size not larger than 3/4-inch. Size No. 57 stone, which is frequently more-readily available, may be used as a substitute.
- 5) Trench Earth Dams: Where pipe bedding is angular material, earth dams, consisting of a minimum ten (10) foot trench length of select compacted backfill to replace angular bedding, shall be installed every 200 feet of pipe to prevent groundwater movement in angular bedding material. Compacted backfill 95% proctor shall replace angular bedding.

J. BACKFILLING TRENCHES:

- 1) All trenches shall be backfilled immediately after pipes are laid in the trench, unless otherwise directed by the Engineering Field Technician. All opened trenches shall be properly backfilled before the end of the working day.
- 2) Backfilling: The backfilling of pipe trenches shall be as stated below according to the pipe diameter.
- 3) Ductile iron pipe 4-inch to 12-inch diameter: The trench shall have a lightly consolidated backfill (80% Standard Proctor) placed around the barrel of the pipe, with fine material, free of large stones, hard lumps of debris and other objectionable material, up to the top of pipe. Backfilling shall be carried up evenly on both sides of the pipe. The remaining backfill may be placed in layers of up to 12-inches for mechanical tamps, (18-inches if a mobile tamp is used) and each layer shall be compacted to 95% standard proctor by using one of the approved tamping devices listed in paragraph 5) below. The tamping equipment shall make no less than four (4) passes. One compaction run up the trench and back down the trench is considered one pass.
- 4) Ductile iron pipe 14-inch to 42-inch diameter: The trench shall be backfilled to the top of the pipe with select material compacted to 95% standard proctor by a narrow footed air tamp or narrow footed mechanical tamp. Remaining backfill may be placed in layers of up to 12 inches. From the top of the pipe to the top of ditch the backfill shall be compacted by using one of the approved tamping devices listed in paragraph C below. All backfill shall be compacted to 95% maximum Standard Proctor (ASTM D698). The tamping equipment shall make no less than four (4) passes; more if necessary to obtain the required compaction. One compaction run up the trench and back down the trench is considered one pass. Compaction shall be such as to prevent future settlement. The entire cross-section of the trench (from side to side of trench and entire length) shall be compacted. No space in the trench shall be left uncompacted.
- 5) Tamping Equipment: Mechanical tamps (gasoline driven), pneumatic tamps (air tamp), and sheepsfoot trench rollers are acceptable. "Mobile tamps"

and/or "sheepsfoot trench rollers" such as "Rammax P-24EC" or approved equal, are permitted.

- 6) Compaction Test: All backfill for water lines shall be subject to a compaction test by Spartanburg Water System personnel or an independent laboratory approved by the Spartanburg Water System. If compaction meets test requirements, the Owner will pay for the cost of the test. If compaction fails the test, the Contractor shall remove and replace backfill to the satisfaction of the Spartanburg Water System, and shall also pay for the cost of the test and any subsequent test required.

K. TEMPORARY SURFACING:

- 1) Temporary Surfacing of Trenches: Where trenches are in streets or across roadways or driveways open to vehicular traffic, the remaining 6 inches of backfill up to the traveled surface shall be made with compacted crushed stone, ASTM C33 Gradation 67 with sufficient fines for compaction. Such surface maintenance of trenches shall continue until permanent replacement of street paving is completed.
- 2) Under Pavement, the top of the trench shall be filled with base for pavement as specified in SECTION 9: PAVEMENT AND SURFACING. In unpaved roads and shoulders, the top 6 inches of the trench shall be filled with compacted topsoil.
- 3) Contractor shall be responsible for final subsidence of all trenches, and shall leave trenches flush with the original ground after all settlement has taken place. Any settlement of backfill below finish grade shall be promptly corrected. Trenches shall be protected against scour due to surface drainage.

L. CONCRETE ENCASEMENT OF PIPE:

Where shown, and where otherwise directed, pipe shall be completely encased with concrete as specified in SECTION 4-05, Paragraph H. The trench shall first be excavated not less than six inches (6") below the bell of the pipe and the pipe laid to line and grade on concrete blocking. Concrete shall then be placed to the full width of the trench, but in no case less than six inches (6") from the pipe bell on either side of the trench, and to a height of not less than six inches (6") above the top of the pipe bell. No backfill material shall be placed in the trench for a period of at least twenty four (24) hours after the concrete encasement has been placed. The water main shall be tested before encasing in concrete.

M. CREEK OR RIVER CROSSINGS

- 1) Above-water crossings - The pipe shall be adequately supported and anchored, protected from damage and freezing, and accessible for repair or

replacement. (Refer to SECTION 8 of these Specifications)

- 2) Underwater crossings - A minimum cover of two (2) feet shall be provided over the pipe. When crossing water courses which are greater than fifteen (15) feet in width, the following shall be provided:
 - a. The pipe material and joints shall be designed appropriately. There are a number of proprietary flexible joint configurations which are available, and shall be submitted to the SWS Engineering Department for review.
 - b. Valves shall be located so that the section can be isolated for testing or repair; the valves shall be easily accessible, and not subject to flooding; and,
 - c. A blow-off shall be provided on the side opposite the supply service, sized in accordance with SCDHEC R.61-58.4(D)(7).
 - d. Blow-offs shall not be directed toward creeks or other water bodies without proper precaution being taken to dechlorinate prior to discharge

4-06 INSTALLATION OF PVC PIPE

- A. **GENERAL:** All pipe and fittings shall be assembled and jointed in accordance with the manufacturer's instructions and with this section. When gaskets are color coded, refer to the PVC pipe manufacturer's literature for significance. All work shall accurately conform to the lines and grades established on the plans.
- B. **Handling:** Proper and suitable tools and equipment for the safe and convenient handling and laying of PVC pipe shall be used. Care shall be taken to prevent the pipe or fittings from being damaged, particularly the lining on the interior of the iron fittings. All pipe and fittings shall be carefully examined for cracks, broken lining or other defects. No pipe or fitting shall be laid which is known to be defective. If any pipe or fitting is discovered to be cracked, broken or defective, after being laid, it shall be removed and replaced with acceptable new pipe or fittings. All pipe and fittings shall be thoroughly cleaned before being laid and shall be kept clean until accepted in the completed work.
- C. **Cleaning Pipe and Fittings:** In all cases, clean the gasket, the bell or coupling interior, especially the groove area (except when the gasket is permanently installed) and the spigot area with a rag, brush or paper towel to remove any dirt or foreign material before assembling. If, in the opinion of the Engineering Field Technician, the interior of the pipe is not clean, the entire length of pipe shall be SWABBED clean by the use of a circular cloth swab having a diameter equal to the inside diameter of the pipe.

- D. Inspection of Pipe: Inspect the gasket, pipe spigot bevel, gasket groove and sealing surfaces for damage or deformation. When gaskets are not permanently installed in the pipe, use only gaskets which are designed for and supplied with the pipe. Insert them as recommended by the pipe manufacturer.
- E. Placing in Ditch:
- 1) Proper tools and equipment shall be used for careful placement of PVC pipe in the trench to prevent damage. Under no circumstances shall pipe or accessories be dropped into the ditch.
 - 2) Every precaution shall be taken to prevent foreign material from entering the pipe while it is being placed in the trench. If the pipe laying crew cannot place the pipe into the trench without getting earth into it, a heavy, tightly woven canvas bag of suitable size shall be placed over each end before lowering the pipe into the trench and left in place until the connection is to be made. During laying operations, no debris, tools, clothing or other material shall be placed in the pipe. When pipe laying is not in progress, open ends of installed pipe shall be plugged with SWS approved plugs to prevent the entrance of trench water, dirt, or other foreign matter. Any dirt or foreign matter which is found in the pipe shall be removed before joining occurs.
 - 3) Lubrication: Lubricant shall be applied as specified by the pipe manufacturer. Bacterial growth, damage to the gaskets or the pipe may be caused by use of non-approved lubricants. Use only lubricant supplied by the pipe manufacturer for use with the pipe provided and in potable water systems. Lubricants which will support microbiological growth shall not be used for slip-on joints. Care must be taken in the use and storage of the joint lubricant provided. Lubricant contaminated by dirt or other material shall be discarded. Any lubricant must be ANSI/NSF approved.
 - 4) The socket (except when gasket is permanently installed), gasket, and spigot shall be thoroughly cleaned with a rag, brush, or paper towel before the gasket is inserted into the socket recess. Insert gasket as recommended by manufacturer.
 - 5) Good alignment of the pipe is essential for ease of assembly. Align the spigot to the bell and insert the spigot into the bell until it contacts the gasket uniformly. Apply firm steady pressure either by hand or by use of a bar and block assembly, until the spigot easily slips through the gasket.
 - 6) Do not suspend the pipe and swing it into the bell. The use of a backhoe to push the pipe will not be allowed. The use of other construction machinery will be allowed only if recommended by the pipe manufacturer and approved in advance by the SWS Engineer.

- 7) The spigot end of the PVC pipe is marked by the pipe manufacturer to indicate the proper depth of insertion. Care shall be taken to insure that the spigot end is inserted to this mark. PIPE SHALL NOT BE OVER-INSERTED.
- 8) Care must be taken to assure that previously assembled pipe joints are not disturbed or over-inserted as a result of force applied to subsequent joints.
- 9) When pipe installation is performed in cold weather gasket materials should be kept warm until jointing is to occur to aid in the ease of assembly.
- 10) If undue resistance to insertion of the pipe end is encountered or if the reference mark does not position properly, the joint shall be disassembled and the position of the gasket checked. If the gasket is twisted or out of place, the components shall be inspected and damaged items repaired or replaced. Components shall then be cleaned and reassembled making sure both pipe lengths are in concentric alignment. If the gasket is not out of position, verify proper location of the reference mark. The SWS Engineering Field Technician may relocate the reference mark if it is out of position.
- 11) During assembly of the next joint of pipe in the ditch, the joint being installed must be kept straight and in line with the previous joint installed.

F. Permissible Joint Deflection and Longitudinal Bending: Pipe may be deflected if necessary but only after the assembly is completed and only if the manufacturer's literature states that this is allowable. Whenever it is necessary to deflect the pipe from a straight line, either in the horizontal or vertical plane to avoid obstructions, or to properly locate valve stems, or where long radius curves are required; this may be accomplished by longitudinal bending only if the pipe is designed to allow this. If so, the manufacturer's recommendations for shall be followed and not exceeded.

G. Cutting Pipe:

- 1) The field cutting of pipe for installing valves, fittings, or nipple pieces shall be done in a neat and workmanlike manner without damage to the pipe and so as to leave a smooth end at right angles to the axis of the pipe. Prior to cutting, the exact location of the cut shall be carefully marked around the entire circumference of the pipe. The cut shall be made following this mark. A square cut is essential for proper assembly.
- 2) A hacksaw, handsaw or a power handsaw with a steel blade or abrasive disc shall be used for cutting PVC pipe.
- 3) A factory-finished beveled end shall be used as a guide to ensure proper bevel angle and depth and proper insertion reference mark when assembling to PVC

pipe bells. For installation of PVC pipe in iron fittings, all but 1/4-inch of the factory bevel on the spigot end shall be removed.

- 4) The end may be beveled by using wood rasp or a pipe beveling tool which will cut the correct taper. A portable sander or abrasive disc may also be used. All sharp edges on the bevel shall be rounded off with a knife or a file.
 - 5) The minimum nipple length allowed without the approval of the SWS Engineering Field Technician is 2' – 0".
- a. Sequence of Work: Excavation, cleaning, laying, jointing, and backfilling shall be kept up as closely as is possible so as to progress in a uniform, workmanlike manner. In no case shall pipe be left in the trench overnight, without completing the joint. The completed pipeline shall not be left exposed in the trench unnecessarily. The trench shall be backfilled and compacted as soon as possible after laying and jointing is completed. If necessary, exposed ends of pipe shall be properly plugged during laying to prevent dirt and other materials entering the line.
- i. Whenever pipe laying is stopped, the open end of the line shall be closed with a tight-fitting, inflatable, plug to keep out sand, earth, and water. An MJ cap (with restrainer gland) may be used as an alternate if the pipe terminates in a plain end. Any standing water shall be removed from the trench before the plug or cap is removed. The plug should be tied off to prevent movement under the influence of standing water in the ditch which may be present after a heavy rain. Any dirt or foreign matter found in the pipe shall be thoroughly removed before joining occurs.
 - ii. In the event that the cap or plug fails to prevent the entry of standing water and/or debris into the pipe, the pipe laying operation shall not commence until the interior of the pipe has been cleaned to the satisfaction of the Engineering Field Tech.
- b. Mechanical Joint Fittings: Joints with mechanical joint fittings shall be made by experienced workers.
- i. All but 1/4-inch of the factory bevel on the spigot end of a length of PVC pipe shall be removed before installation of this spigot end into an iron fitting. This shall be removed following the procedures in paragraph G of this Section.
 - ii. Gaskets, sockets and spigots shall be thoroughly cleaned with a rag, brush, or paper towel before slipping the gland and gasket over the spigot end of the pipe.
 - iii. The spigot shall be pushed into position and seated evenly in the socket. The gland shall be pushed into position for compressing the gasket. All bolts and nuts shall be tightened to a uniform permanent tightness given in Table 4-1.

Bolts shall be tightened beginning with the bottom bolt, then the bolt directly opposite and proceeding around the joint using this alternating procedure to provide uniform tightness around the pipe. Care shall be taken to keep the gland square with the socket.

- iv. The glands and bolts shall be kept clean and sockets, spigots, and gaskets shall be kept clean until such joint has been completed. Any joint which leaks shall be reassembled.
- H. Thrust restraint shall be installed as shown on the approved plans and as required in the applicable section of these SPECIFICATIONS.
- 1) For external restraint of bell and spigot joints refer to SECTION 3-04, Paragraph F.
 - 2) For restraint of iron fittings refer to SECTION 3-06, Paragraph D.
- I. Dead-end Lines: Where a line is to terminate in a plug, the last joint of pipe shall be one full length of mechanical joint ductile iron pipe (AWWA C151) with a restrained joint plug (AWWA C153). The pipeline shall be restrained as required in SECTION 3-05 H. THRUST RESTRAINT FOR DUCTILE IRON PIPE.
- J. All plugs, caps, tees, bends, reducers, valves, hydrants and other items as may be indicated on the plans or directed by the SWS Engineering Field Technician shall be restrained or braced as shown on the detail drawings. The weight of fittings, valves, hydrants, and other appurtenances shall not be carried by the PVC piping. Blocking and/or concrete support cradles shall be poured so as to support the full weight of the fitting or appurtenance.
1. Concrete used for thrust blocking, collars, "Deadman" type thrust blocks, and concrete support cradles shall have a compressive strength of 3,000 psi at 28 days. High early strength concrete shall be used. Mixed concrete shall be furnished by a concrete supplier and a mix furnished, if required by the Engineer, to indicate a design mix of 3,000 psi.
 2. Concrete support cradles used for carrying the weight of fittings, valves, hydrants, and other appurtenances shall be poured on and bear against undisturbed, hard, solid, firm earth. They shall be poured to bear against the appurtenance and allow sufficient area for repair and the easy removal of nuts and bolts.
 3. Concrete Blocking and Rodding:
 - a. Concrete shall be poured to the dimensions shown on the detail drawings and formed when directed by the SWS Engineering Field Technician at no additional cost. The large

side (backs) of the blocking shall bear against undisturbed, hard, solid, firm earth. Blocking shall be poured to bear against the fitting and allow sufficient area for repair and the easy removal of nuts and bolts. All fittings and fasteners, upon which concrete is to be poured, shall be wrapped with 8 mil polyethylene to facilitate future removal.

- b. Backfilling on poured concrete will not be permitted for 24 hours after pouring, and no water will be permitted in mains for at least 24 hours after concrete blocking is poured.
- c. Metal Straps and rods shall be made of steel having a tensile strength of 95,000 psi. If required by the Engineer, the Contractor shall supply acceptable certification of tensile strength. All steel components, including rods, straps, nuts, bolts, couplings and clamps shall be coated with 17.5 mils of Thick and Quick Mastic or equal. Contractor shall supply coating and coat all the tie rods, clamps and miscellaneous steel used for anchoring purposes.
- d. Concrete Collars poured on the last joint of pipe in a dead end run, shall be poured around a thrust collar which shall be installed according to the information provided in CONSTRUCTION DETAIL NO. 5. This collar shall be installed on the pipe midway between the MJ bell and the spigot. Pipe manufacturer's shop drawings must be submitted for each size collar to be used indicating that the collar is designed to, at a minimum, restrain the force created by a 250 psi line pressure as listed in the table below. Field welding thrust collars will not be allowed.

<u>PIPE SIZE</u>	<u>MINIMUM THRUST RATING</u>
4	4,500 lbs.
6	9,300 lbs.
8	16,000 lbs.
12	34,000 lbs.

K. BEDDING OF PVC PIPE

- 1) Trench Bottom: Before the pipe is laid, the trench bottom shall be

constructed to provide a firm, stable, and uniform longitudinal support for the full length of the pipe.

- 2) Pipe Bedding: PVC Pipe shall be installed with proper bedding providing uniform longitudinal support under the pipe.
- 3) Bedding material shall be worked under the sides of the pipe to provide satisfactory haunching from the trench bottom to the spring-line of the pipe. This material shall be selected and placed carefully, avoiding stones, frozen lumps and debris and shall be compacted to 95% Standard Proctor.
- 4) Bedding Materials: Materials for pipe bedding shall be as indicated on the typical trench section detail, or as specified herein.
- 5) Select material shall be suitable material from the excavation free of large stones, hard lumps of debris and other objectionable materials. If select material is not available from the excavation, it shall be hauled to the site.
- 6) Angular material shall be crushed stone conforming to ASTM C33, Size No. 67 with a size not larger than 3/4-inch.
- 7) Trench Earth Dams: Where pipe bedding is angular material, earth dams, consisting of a minimum ten (10) foot trench length of select compacted backfill to replace angular bedding, shall be installed every 200 feet of pipe to prevent groundwater movement in angular bedding material. Compacted backfill 95% proctor shall replace angular bedding.

L. BACKFILLING TRENCHES:

- 1) All trenches shall be backfilled immediately after the pipe is laid in the trench and bedding is complete, unless otherwise directed by the SWS Engineering Field Technician. All opened trench shall be properly backfilled before the end of the working day unless the SWS Engineering Department specifically approves leaving the trench open.
- 2) Initial backfill material shall be placed to a satisfactory height over the top of the pipe (minimum 12-inches) for impact protection during the initial backfill. No mechanical tamps shall be used until this depth has been achieved.
- 3) Bedding and backfill up to 12 inches over the top of the pipe shall be placed as required above. Backfilling shall be carried up evenly on both sides of the pipe. The remaining backfill may be placed in layers of up to 12-inches for mechanical tamps, (18-inches if a mobile tamp is used) and each layer shall be compacted to 95% standard proctor by using one of the approved tampering devices listed in Paragraph 4) below. The tamping equipment shall make no less than four (4) passes. One compaction run up the trench and back down

the trench is considered one pass. Refer to CONSTRUCTION DETAIL NO. 2.

- M. Tamping Equipment: Mechanical tamps (gasoline driven), pneumatic tamps (air tamp), and sheepsfoot trench rollers are acceptable. "Mobile tamps" and/or "sheepsfoot trench rollers" such as "Rammax P-24EC" or approved equal, are permitted.
- N. Compaction Test: All backfill for water lines shall be subject to a compaction test by Spartanburg Water System personnel or an independent laboratory approved by the Spartanburg Water System. If compaction meets test requirements, the Owner will pay for the cost of the test. If compaction fails the test, the Contractor shall remove and replace backfill to the satisfaction of the Spartanburg Water System, and shall also pay for the cost of the test and any subsequent test required.
- O. Where trenches are in or along existing streets or roadways, PVC pipe shall not be installed. Ductile iron pipe shall be used in this application and Section 2 of these specifications shall apply.
- P. Contractor shall be responsible for final subsidence of all trenches, and shall leave trenches flush with the original ground after all settlement has taken place. Any settlement of backfill below finish grade shall be promptly corrected. Trenches shall be protected against scour due to surface drainage.

4-07 INSTALLATION OF HDPE PIPE

- A. Pipe shall be protected from lateral displacement by pipe embedment in trench material installed as specified in SECTION 4-07, Paragraph K. Pipe shall not be laid in water or under unsuitable weather or trench conditions and shall be protected against entry of foreign matter. If the pipe laying crew cannot place the pipe into the trench and in place without getting earth into it, a heavy, tightly woven canvas bag of suitable size shall be placed over each end before lowering the pipe into the trench and left in place until the connection is to be made.
 - 1) During freezing weather, particular care shall be taken in handling and laying pipe to prevent damage by impact.
 - 2) Whenever pipe laying is stopped, the open end of the line shall be closed with a tight-fitting, inflatable, plug to keep out sand, earth, and water. An MJ cap (with restrainer gland) may be used as an alternate if the pipe terminates in a plain end. Any standing water shall be removed from the trench before the plug or cap is removed. The plug should be tied off to prevent movement under the influence of standing water in the ditch which may be present after a heavy rain. Any dirt or foreign matter found in the pipe shall be thoroughly removed before joining occurs.

- 3) In the event that the cap or plug fails to prevent the entry of standing water and/or debris into the pipe, the pipe laying operation shall not commence until the interior of the pipe has been cleaned to the satisfaction of the Engineering Field Tech.
 - 4) Pipe shall be protected from exposure to sunlight, shall be kept as cool as possible during installation, and shall be covered with backfill immediately after installation.
- B. **Cleaning.** The interior of all pipe and fittings shall be thoroughly cleaned before installation and shall be kept clean until the work has been accepted.
- C. **Alignment.** Piping shall be laid to the lines and grades indicated on the drawings. Pipelines or runs intended to be straight shall be laid straight. Deflections from a straight line or grade shall not exceed the maximum deflection specified by the manufacturer.
- D. Unless otherwise specified or indicated in the drawings either shorter pipe sections or fittings shall installed as required to maintain the indicated pipeline alignment or grade.
- E. **Cutting Pipe.** Cutting shall be in accordance with the pipe manufacturer's recommendations. Cuts shall be smooth, straight, and at right angles to the pipe axis. After cutting, the end of the pipe shall be dressed to remove all roughness and sharp corners and shall be beveled in accordance with the manufacturer's instructions.
- F. **Butt-fusion.** Jointing shall be done in accordance with the instructions and recommendations of the pipe manufacturer.
- 1) Joints between plain end pipes and fittings shall be made by thermal butt fusion method in accordance with the pipe manufacturer's recommendations. Socket fusion and extrusion welding or hot gas welding will not be acceptable.
 - 2) The equipment used to prepare and complete the butt fusion shall include a datalogger which will record the fusion conditions. These conditions shall be, as a minimum, the elapsed time, the temperature, and the pressure exerted during the fusion operation.
 - 3) The butt fusion operation shall not occur unless the fusing machine and all pipe which is in the process of being fused are completely free of any moisture which would effect the integrity of the fusion.
- G. Polyethylene pipe and fittings may be joined together or to other materials by means of flanged connections, mechanical couplings designed for joining polyethylene pipe or for joining polyethylene pipe to another material, mechanical joint adapters, or

electrofusion. When joining by other means, the installation instructions of the joining device manufacturer shall be observed. The Engineer who is responsible for the design of projects which involved transitions from HDPE to other materials must be experienced and knowledgeable of the specific issues related to this type of installation. Refer to CONSTRUCTION DETAIL NO. 6 which shows the type of thrust restraint which may be required.

H. Connections between new work and existing piping shall be made using suitable fittings. Each connection with an existing pipe shall be made at a time and under conditions which will least interfere with service to customers, and as authorized by SWS. Facilities shall be provided for proper dewatering and for disposal of all water removed from the dewatered lines and excavations without damage to adjacent property.

I. **THRUST RESTRAINT FOR HDPE PIPE**

All plugs, caps, tees, bends, reducers, valves, hydrants and other items as may be indicated on the plans or directed by the SWS Engineering Field Technician shall be restrained or braced against movement. The method of restraint used shall be designed by a Registered Engineer, and comply with all manufacturer's recommendations. The weight of fittings, valves, hydrants, and other appurtenances shall not be carried by the HDPE piping. Blocking and/or concrete support cradles shall be poured so as to support the full weight of the fitting or appurtenance.

- 1) Concrete used for thrust blocking, collars, "Deadman" type thrust blocks, and concrete support cradles shall have a compressive strength of 3,000 psi at 28 days. High early strength concrete shall be used. Mixed concrete shall be furnished by a concrete supplier and a mix furnished, if required by the Engineer, to indicate a design mix of 3,000 psi.
- 2) Concrete support cradles used for carrying the weight of fittings, valves, hydrants, and other appurtenances shall be poured on and bear against undisturbed, hard, solid, firm earth. They shall be poured to bear against the appurtenance and allow sufficient area for repair and the easy removal of nuts and bolts.
- 3) Concrete Blocking and Rodding:
 - a. Concrete blocks shall be poured to the dimensions shown on the detail drawings and formed when directed by the SWS Engineering Field Technician at no additional cost. The large side (backs) of the blocking shall bear against undisturbed, hard, solid, firm earth. Blocking shall be poured to bear against the fitting and allow sufficient area for repair and the easy removal of nuts and bolts.
 - b. Backfilling on poured concrete will not be permitted for 24 hours after pouring, and no water will be permitted in mains for at least 24 hours

after concrete blocking is poured.

- J. Metal Straps and rods shall be made of steel having a tensile strength of 95,000 psi. If required by the Engineer, the Contractor shall supply acceptable certification of tensile strength. All steel components, including rods, straps, nuts, bolts, couplings and clamps shall be coated with 17.5 mils of Thick and Quick Mastic or equal. Contractor shall supply coating and coat all the tie rods, clamps and miscellaneous steel used for anchoring purposes.

K. **BEDDING OF HDPE PIPE**

- 1) Trench Bottom: Before the pipe is laid, the trench bottom shall be constructed to provide a firm, stable, and uniform longitudinal support for the full length of the pipe.
- 2) Pipe Bedding: HDPE Pipe shall be installed with proper bedding providing uniform longitudinal support under the pipe.
- 3) Bedding material shall be worked under the sides of the pipe to provide satisfactory haunching from the trench bottom to the spring-line of the pipe. This material shall be selected and placed carefully, avoiding stones, frozen lumps and debris and shall be compacted to 95% Standard Proctor.
- 4) Bedding Materials: Materials for pipe bedding shall be as indicated on the typical trench section detail, or as specified herein.
- 5) Select material shall be suitable material from the excavation free of large stones, hard lumps of debris and other objectionable materials. If select material is not available from the excavation, it shall be hauled to the site.
- 6) Angular material shall be crushed stone conforming to ASTM C33, Size No. 67 with a size not larger than 3/4-inch.
- 7) Trench Earth Dams: Where pipe bedding is angular material, earth dams, consisting of a minimum ten (10) foot trench length of select compacted backfill to replace angular bedding, shall be installed every 200 feet of pipe to prevent groundwater movement in angular bedding material. Compacted backfill 95% proctor shall replace angular bedding.

L. **BACKFILLING TRENCHES:**

- 1) All trenches shall be backfilled immediately after the pipe is laid in the trench and bedding is complete, unless otherwise directed by the SWS Engineering Field Technician. All opened trench shall be property backfilled before the end of the working day unless the SWS Engineering Department specifically approves leaving the trench open.

- 2) Initial backfill material shall be placed to a satisfactory height over the top of the pipe (minimum 12-inches) for impact protection during the final backfill. No mechanical tamps shall be used until this depth has been achieved.
- 3) Bedding and backfill up to 12 inches over the top of the pipe shall be placed as required above. Backfilling shall be carried up evenly on both sides of the pipe. The remaining backfill may be placed in layers of up to 12-inches for mechanical tamps, (18-inches if a mobile tamp is used) and each layer shall be compacted to 95% standard proctor by using one of the approved tamping devices listed in Paragraph 4) below. The tamping equipment shall make no less than four (4) passes. One compaction run up the trench and back down the trench is considered one pass. Refer to CONSTRUCTION DETAIL NO. 2.
- 4) Tamping Equipment: Mechanical tamps (gasoline driven), pneumatic tamps (air tamp), and sheepsfoot trench rollers are acceptable. "Mobile tamps" and/or "sheepsfoot trench rollers" such as "Rammax P-24EC" or approved equal, are permitted.
- 5) Compaction Test: All backfill for water lines shall be subject to a compaction test by Spartanburg Water System personnel or an independent laboratory approved by the Spartanburg Water System. If compaction meets test requirements, the Owner will pay for the cost of the test. If compaction fails the test, the Contractor shall remove and replace backfill to the satisfaction of the Spartanburg Water System, and shall also pay for the cost of the test and any subsequent test required.
- 6) Contractor shall be responsible for final subsidence of all trenches, and shall leave trenches flush with the original ground after all settlement has taken place. Any settlement of backfill below finish grade shall be promptly corrected. Trenches shall be protected against scour due to surface drainage.

4-08 CROSS-CONNECTION CONTROL (BACKFLOW PREVENTION DEVICES)

- A. There shall be no connection between the distribution system and any pipes, pumps, hydrants, or tanks whereby unsafe water or other contamination materials may be discharged or drawn into the system.
- B. No by-passes shall be allowed, unless the bypass is also equipped with an equal, approved back-flow prevention device.
- C. High hazard category cross-connections shall require an air gap or an approved reduced pressure backflow preventer.

- D. Reduced pressure principal backflow prevention assemblies shall not be installed in any area location subject to possible flooding. This includes pits or vaults which are not provided with a gravity drain to the ground's surface that is capable of exceeding the discharge rate of the relief valve. Generally, if installed in a pit, the drain line shall be 2 times the size of the line entering the backflow prevention device. The drain cannot empty into any type of ditch, storm drain, or sewer, which could flood water back into the pit.
- E. All piping up to the inlet of the backflow prevention device must be suitable for potable water. The pipe must be AWWA or NSF approved for potable water use. Black steel pipe cannot be used on the inlet side of the device. NOTE: Steel pipe is not approved for installation in the Spartanburg Water system.
- F. Fire line sprinkler systems and dedicated fire lines, except those in the high hazard category, shall be protected by an approved double check valve assembly. High hazard category fire sprinkler systems shall include, but not be limited to: antifreeze systems, foam systems, systems charged from or tied into ponds, lakes, streams, or any water source other than the approved public water supply. High hazard category fire sprinkler systems shall comply with the requirements of Paragraphs C and D above.

4-09 INSTALLATION OF TRACER WIRE AND WARNING TAPE

Wherever PVC or HDPE pipe is installed, tracer wire and warning tape shall be installed to facilitate future locating of the pipe line.

A. MATERIALS:

- 1) Tracer wire shall be 14 gauge solid copper wire. Wire shall be continuous.
- 2) Warning tape shall be color colored in accordance with APWA Uniform Color Code.
- 3) Test boxes shall be the Glenn 4 Test Station (4-inch diameter, 18-inch length) with a locking cover and 4-terminal terminal board as manufactured by C. P. Test Services, Inc., or equal. Test box shall be 4-inch ID plastic with cast iron cover and collar. The cover shall be painted blue.

B. INSTALLATION:

- 1) Tracer wire shall be taped to the top of the pipe (“12-o’clock position”) using strips of duct tape or other suitable adhesive tape spaced a minimum of every 5 feet along the entire length of the pipe.
- 2) Tracer wire shall be looped up into valve boxes on in-line valves. The tracer

wire shall pass through the gap between the upper and lower sections of a standard valve box. A loop shall be made in the wire to prevent it from falling down around the valve operating nut. Refer to CONSTRUCTION DETAIL NO. 7

- 3) Tracer wires shall begin and terminate in the test boxes. Test boxes shall be installed at each location as shown on the plans, spaced at intervals not to exceed 500 feet. Test boxes shall not be installed in streets or driveways.
- 4) Tracer wire between boxes shall be continuous, unbroken lengths. The tracer wire shall not be installed in tension, but neither shall there be "coils" in the wire. The ends of the tracer wires shall be installed in the test boxes. The length of each tracer wire in each box shall be long enough to extend no less than one foot and no greater than two feet above ground level and shall be attached to the terminal board.
- 5) Breaks shall be repaired by splicing with a split-bolt clamp or pre-approved equal. Repairs by "twisting" the two ends together will not be accepted.
- 6) Warning tape shall be buried in the backfill approximately one foot below grade, directly over the top of the PVC or HDPE pipeline. Tape shall be laid in continuous lengths. Any breaks or tears shall be repaired before proceeding with the backfilling operations. Refer to CONSTRUCTION DETAIL NO. 2.

- C. TESTING: After construction and backfilling is complete, but before final inspection, the SWS Engineering Field Technician will test the tracer wire with standard SWS locating equipment. If the Engineering Field Technician determines that the tracer is not operating properly, the Contractor shall locate and correct the problem. The pipelines will not be accepted and placed in operation until the tracer system is acceptable

4-10 TESTING, DISINFECTION, CLEAN-UP AND PLACING IN SERVICE

- A. HYDROSTATIC PRESSURE AND LEAKAGE TESTING: The hydrostatic pressure test shall be performed in conjunction with the leakage test and shall be in accordance with the requirements of the Spartanburg Water System, and AWWA C600, and the South Carolina Department of Health and Environmental Control R.61-58. All equipment, procedures, and sequences for each test shall be as required by the Spartanburg Water System. Water for testing shall be provided by Spartanburg Water System at no cost to the Contractor.

NOTE: The test procedures for High Density Polyethylene Pipe (HDPE) are different from those used with other pressure pipe. In testing HDPE pipe, the manufacturer's specific procedures shall be used. Prior to scheduling testing with the Spartanburg Water Engineering Field Technician, the test procedure shall be submitted to the

Engineering Department for review.

- 1) Taps: If taps are not available at high points in the pipeline, taps for air release shall be installed. The Contractor shall excavate tap holes, make the taps, and backfill when testing is complete. After the tests have been completed, plugs shall be installed on the taps by the Contractor at his expense. Post hydrants are not allowed.
- 2) Testing shall be conducted in the following steps:
 - a. The SWS Engineering Field Technician with the assistance of the Contractor shall fill each of the sections of pipe slowly with water and expel all air through air valves or taps. Engineering Field Technicians shall operate all valves in the existing water system. Contractor to operate all blow-offs.
 - b. Before testing, the newly constructed water main shall be thoroughly flushed to remove all dirt and foreign matter. Water shall be flowed in a manner which will create a scouring velocity of not less than 2.5 feet per second in the main being flushed for all ductile iron pipe installations. For all PVC pipe installations, the scouring velocity shall not be less than 3.0 feet per second. Flushing of all lines shall be coordinated by and shall be done at the direction of the SWS Engineering Field Technician after the trench has been backfilled. Flushing will be coordinated by the Engineering Field Technician based upon system operating conditions at the time.
 - c. Employ Best Management Practices (BMPs) to prevent erosion from discharge of water during any construction activities including flushing and disinfection in accordance with an approved Storm Water Pollution Prevention Plan (SWPPP)
 - d. Extreme care shall be taken during the flushing operation to ensure that damage from the discharged water is not caused to adjacent property, that the operation is performed in the safest manner possible, and that the nearby system pressure is not adversely affected. If necessary, a pressure gauge shall be installed on a fire hydrant so that the system pressure can be monitored during flushing. Care shall be exercised to prevent the water from entering the trench and/or wetting the backfill material. The Contractor shall be responsible for any damage caused by flushing.
 - e. The Contractor shall provide an approved test pump and a method of measuring water pumped into the pipeline which is acceptable to the Engineering Field Technician

- f. The SWS Engineering Field Technician shall connect the Pressure Test Recording Device to an appropriate pressure tap on the water main, shall operate the device, and shall be present during the entire test.
- g. The test pressure shall be 1.5 times the working pressure of the line or 150 psi, whichever is greater, as measured at the lowest point in the section of the line being tested, and no less than 1.25 times the working pressure as measured at the highest point in the section.
- h. The pressure in the line shall be pumped up to the test pressure and be constantly maintained for 96 minutes and recorded on Pressure Recorders furnished by the Spartanburg Water System. During testing, the pressure must be maintained to within ± 5 psi of the test pressure.

3) Leakage is the quantity of water that must be supplied to the newly laid pipe or any closed-valved section to maintain the pressure within the limits stated above.

4) The allowable leakage (for DIP and PVC) is defined by the following AWWA formulas:

Ductile Iron Pipe

PVC Pipe

$$L = \frac{SD/P}{133200}$$

$$L = \frac{ND/P}{7,400}$$

where

where

L = Allowable leakage in gallons per hour

L = Allowable leakage (gallons per hour)

S = Length of pipe in feet

N = # of joints in the length of pipe being tested

D = Diameter of the pipe in inches
D = Nominal diameter of pipe (inches)

P = Average test pressure in psi
P = Average test pressure during the leakage test (psi)

5) NOTE: The formulas above do not apply to pressure testing of HDPE pipe. HDPE pipe shall be hydrostatically tested by following the manufacturer's procedures. Only hydrostatic (water pressure) testing is approved by SWS; air pressure testing shall not be performed.

- 6) If the amount of leakage exceeds the allowable limit, the Contractor shall locate and repair the leaks and shall retest the line using the same test procedures. All visible leaks shall be repaired regardless of the amount of leakage.
- 7) Examination: All exposed pipe, valves, fittings, fire hydrants, etc., shall be carefully examined during the tests. When any visible leakage is detected, joints that are found to be leaking shall immediately be properly adjusted to stop the leakage. Any pipe, valves, fittings, fire hydrants, or other items discovered to be defective during the tests shall be removed and replaced and tests repeated until the results are satisfactory to the SWS Engineering Department.
- 8) Upon successful completion of the pressure and leakage tests, each section of the new main will be isolated by closing appropriate valves and each segment will be checked for evidence of excessive leakage. This inspection shall consist of connecting a pressure gauge to a blow off or other appropriate point, closing the next main line valve and watching for a rapid drop in pressure in the segment being tested. A full pressure test shall be required on questionable segments.

B. DISINFECTION: All water for disinfection shall be furnished at no cost by the Spartanburg Water System. Chemical hoses, pumps and all equipment shall be supplied by the Contractor. Disinfection shall be in accordance with AWWA C651 (latest version), including Section 4.8. In order to schedule laboratory testing, disinfection must be done on Monday through Thursday and must be scheduled so that the samples can be collected by laboratory personnel of the Spartanburg Water System before 12:00 noon on Friday. All chemicals or products added to the public water supply must be third party certified as meeting the specifications of ANSI/NSF Standard 60.

- 1) Equipment: All disinfection equipment shall be suitable and approved by the Engineering Department.
- 2) Acceptable Disinfectants
 - a. Sodium hypochlorite [NaOCl] conforming to AWWA B300 Standard for Hypochlorites.
 - b. Calcium hypochlorite [Ca(OCl)₂] granules and tablets conforming to AWWA B300 Standard for Hypochlorites. Calcium hypochlorite intended for use in swimming pools is not permitted.
 - c. Disinfection with pure chlorine gas is not permitted.
- 3) Disinfection Procedure: Before being placed in service, all new mains and repaired portions of, (or repaired existing mains) must be thoroughly flushed and then chlorinated with not less than fifty (50) ppm of available chlorine

throughout the length of the water main being disinfected. Water from the existing distribution system should be controlled so as to flow slowly into the newly constructed pipeline during the application of chlorine. The solution shall remain in the main for a minimum period of twenty-four (24) hours. The pressure of the injected chlorination solution in the main must not exceed a pressure of 5 psi less than the static pressure of the supply main. At the end of this 24-hour period, the treated water in all portions of the main must have a residual of not less than ten (10) ppm free chlorine.

- 4) Flushing After: Immediately after the requirements of the above paragraph have been met, the water main shall then be thoroughly flushed with potable water using the same taps and materials as utilized in the previous flushing procedures. No flushing device or drain shall be directly connected to any type of sewer. Chambers for valves, blow-offs, meters, air release valves are not allowed to be connected directly to storm drains or sewer systems. No cross connections between water lines and any pipes, pumps, hydrants, or tanks will be allowed. No cross connections between the distribution system and unsafe water or contaminations are allowed.
- 5) Chlorinated water used for disinfection shall be dechlorinated with an approved dechlorination agent. If discharge is not to a watercourse (e.g., flat ground), then total chlorine concentration shall be reduced to less than 1 ppm (part per million). Do not dose neutralizing chemical beyond the minimum required to neutralize the chlorine actually present in discharge. Allowable residual chlorine will vary depending on discharge avenue (watercourse or flat land).
- 6) Acceptable Dechlorination (Neutralizing) Agents
 - a. Sodium thiosulfate (technical grade, prismatic rice) is acceptable for all discharges, except to an active watercourse.
 - b. Vitamin C salt (sodium ascorbate, Vita-D-Chlor brand or equal) must be used when discharging to an active watercourse.
 - c. Sulfur dioxide gas is not permitted.
- 7) Sampling: Riser pipes for sampling shall be the same size as the tap and shall be made with a minimum of one foot of metal piping material at the end and supplied by and installed by the Contractor. Hydrants shall not be used for sampling.
 - a. After water mains have been tested, disinfected, and flushed, the Engineering Field Technician shall then notify the appropriate Spartanburg Water Laboratory that the main is ready for bacteriological sampling. Contractor shall give the Engineering Field Technician sufficient notice to allow twenty-four (24) hours notice to the Laboratory.

- b. The number and location of sampling sites depends on the amount of new construction. As a minimum, the sampling sites:
 - i. Must include all dead-end lines
 - ii. Must be representative of the water in the newly constructed mains.
 - iii. Shall be collected a minimum of every 1,200 linear feet
- c. Prior to sampling, the chlorine residual must be reduced to normal system residual levels. In the Spartanburg Water System, compliance with this requirement shall be confirmed by measuring the chlorine residual in the “backup” sample, which is taken from a nearby source of supply from the existing system, and comparing this value with the sampling sites on the new main.
- d. At each site, a minimum of two (2) satisfactory bacteriological samples taken at least 24 hours apart shall be obtained. Also, at each site, chlorine residual at time of sampling must be measured and reported. If the non-coliform growth is greater than eighty (80) colonies per one hundred (100) milliliters, the sample result is invalid and must be repeated.
- e. If the membrane filter method of coliform analysis is used, non-coliform growth must also be reported. All samples shall be analyzed by a Spartanburg Water System laboratory which is State Certified. If the bacteriological tests are satisfactory, the laboratory will so inform the SWS Engineering Department and the SWS Maintenance and Construction Department that the sampled water main may then be put into operation. However, if the samples indicate that contamination is still present, the Contractor shall then re-disinfect the water main according to the above procedure until satisfactory samples are obtained from all sampling sites. Water used for re-disinfection shall be paid for by the Contractor, at the rate charged for irrigation water. The volume of water used for re-disinfection shall be estimated by the SWS Engineering Field Technician.
- f. NOTE: The bacteriological sampling results are only valid for 30 days; If the new line has not been accepted by Spartanburg Water and placed in operation within 30 days, flushing and sampling must be repeated at the Developer’s expense.

C. PLACING IN SERVICE: Placing the new water main in service is conditional upon the following:

- 1) Installation: The completed installation fully complying with all of the Spartanburg Water System's current requirements, standards and criteria.
- 2) Hydrostatic Leakage Test: The successful completion of the required Hydrostatic Leakage Test.

- 3) Disinfection: The meeting of the Water System's standard water quality and bacteriological tests.
- 4) Discharge of Chlorinated Water: All chlorinated water which is to be discharged, shall be discharged in a manner which protects fish, wildlife, and vegetation from damage. All State, Federal, and local requirements governing the discharge of chlorine into the environment shall be adhered to.
- 5) Valve Operation: The Engineering Field Technician is the only person authorized to operate Spartanburg Water valves. The Engineering Field Technician will verify that all valves within the project are in the "open" position, unless specific instructions to leave a valve "closed" are shown on the plans or ordered by the Engineering Department.
- 6) Pavement Patches: All pavement patches shall be made in full accordance with approved standard details or as directed by the Engineering Department, if special conditions are made a portion of any permit.

SECTION 5

VALVES AND TAPS: MATERIALS AND INSTALLATION

5-01 SCOPE

This section contains the current specifications for materials to be used in projects to be integrated into the Spartanburg Water System. The Spartanburg Water System has established specific manufacturers as the standard for various items within its system. Such standardization is for the express purpose of expediting maintenance procedures. All requests for approval of an "or equal" item must be submitted to the Spartanburg Water System in writing. All valves and miscellaneous appurtenances shall conform to Section C of the AWWA Standards. All materials or products that contact potable water must be third party certified as meeting the requirements of ANSI/NSF61.

5-02 DESIGN CRITERIA

Valves and appurtenances shall be of the type and size shown on the plans. Underground valves shall have standard mechanical joint ends. Valves above ground or installed within structures shall have flanged ends. Flanges shall be Class 125 except where Class 250 is specifically noted. Valves shall be at least the same class as the pipe with which they are used. All valves which will be exposed to the weather shall be shop primed. Valves shall conform to the requirements of AWWA C-504, C-509 or C-515 and ANSI/NSF 61. All horizontal valves shall be set so that the operating nut is vertical.

Reference Standards of the American National Standards Institute

A21.11 Rubber Gasket Joints for Cast-Iron and Ductile Iron Pressure Pipe and Fittings

B16.1 Cast-Iron Pipe Flanges and Flanged Fittings, Class 25, 125, 250, 800

Reference Standards of the American Water Works Association (AWWA)

AWWA C111 Rubber Gasket Joints for Cast-Iron and Ductile-Iron Pressure Pipe and Fittings.

C504 Rubber-Seated Butterfly Valves

C509 Resilient Seated Gate Valves

C515 Reduced-Wall, Resilient Seated Gate Valves

C512 Air-Release, Air/Vacuum and Combination Air Valves for Waterworks Service

C540 Power-Actuating Devices for Valves and Slide Gates

C550 Protective Interior Coating for Valves and Hydrants

C600 Installation of Ductile-Iron Water Mains and Their Appurtenances.

5-03 GATE VALVES:

- A. Gate valves 2-inch and smaller shall be Ford Ball Valves. The valve is to open left.

- B. Gate valves for water service, 3-inch through 12-inch, shall have a cast iron or ductile iron body, bonnet and gate. The valve shall close to a drop tight shut off by way of resilient seating. Double disc and wedge are not acceptable. The valve stem shall be non-rising construction and supplied with a 2-inch operator unless otherwise specified on the drawings. The stem and stem nut shall be made of bronze. The stem shall have a minimum of two o-rings, one above and one below the stem thrust collar. The valve shall conform to all requirements of AWWA C-509 or AWWA C-515, latest edition, designed for a minimum operating pressure of 200 psi. The valve shall open counter clockwise (open left). Acceptable valve manufacturers are: **Mueller, Kennedy and American-Darling Valve (American Flow Control)**.
- C. Gate valves for water service 14-inch and larger shall be cast iron or ductile iron body, bronze mounted double disc and wedge, parallel seat type. The valve stem shall be non-rising with a bevel gear or spur gear (as specified by the Design Engineer), weather tight gear case and grease case tracks. The stem is to be sealed with a minimum of two o-rings, where available. The valves for water service shall conform to all requirements of AWWA C-509 latest edition. Acceptable valve manufacturers are: Mueller, Kennedy and American-Darling Valve (American Flow Control).
- D. All gate valves will be furnished with Mechanical Joint and all necessary bolts, nuts, gaskets, glands and other necessary appurtenances. All external valve body bolts shall meet the requirements of ASTM-A307 and shall be hot-dip zinc coated. The bolts and nuts are to have hexagonal heads. The nuts shall be bronze. Natural rubber or other material which will support microbiological growth may not be used for any gaskets, O-rings, and other products used for jointing pipes, valves, or other appurtenances which will expose the material to the water. All gaskets shall be AWWA approved.
- E. All valves to be coated in accordance with AWWA C-509 or C-515 latest edition.
- F. Valve stem sizes must meet the minimum standard set by AWWA C-509 or C-515.
- G. Valves 16-inches and larger shall have the number of turns to open stamped on the valve. The minimum number of turns to open shall be as specified in AWWA C-509 or C-515 for all valves.
- H. All valves shall be given an operational test, seal test and a hydrostatic test in accordance to AWWA C-509 or C-515. Certified test results shall be available on request.

5-04 BUTTERFLY VALVES

All valves shall comply with AWWA C504, as amended to date, for tight closing rubber-seated, Class 150B valves, and shall meet the following requirements:

- A. General: Butterfly valves shall be the buried service type. Valves shall be bubble tight at rated pressures and shall be satisfactory for applications involving throttling service and/or frequent operation and for applications involving valve operation after long periods of inactivity. Valve discs shall rotate 90 degrees from full open position to the tight shut position. Wafer type valves are not acceptable.

- B. Valve Body: Valve bodies shall be either of cast iron conforming to ASTM A126, Class B, or ASTM A48, Class 40, or ductile iron conforming to ASTM A536, Grade 65-45-12, as amended to date. Drilled and tapped holes are permitted where required at the body bearing trunnions. The body shall be designed to withstand the internal forces acting directly and the forces resulting from the thrust of the operating mechanism. Trunnion bosses shall be located at diametrically opposite points in the valve body which shall be accurately bored to accept permanently self-lubricated shaft bearing bushings. The trunnion box at the operator end shall be furnished with an integral packing box and the other trunnion shall include a factory set two-way bronze thrust bearing and a cast iron thrust bearing cover.

- C. Valve Shafts: Valve shafts shall be turned, ground and polished. Valve shafts shall be constructed of 18-8 Type 304 Stainless Steel conforming to ASTM A276, as amended to date. Shaft diameters shall meet requirements established by AWWA C504, as amended to date. Valve shafts shall be securely attached to the valve disc by means of stainless steel taper pins. Taper pins shall be mechanically secured.

- D. Valve Disc: Valve discs shall be constructed of ductile iron ASTM A536, Class 65-45-12, or ASTM A48, Class 40, or cast iron ASTM A48. The valve discs shall be designed to withstand bending and bearing loads resulting from the pressure load and operating forces. The faces of the discs shall be smooth and free of external projections. All retaining or pinning hardware in contact with water shall be monel or 316 stainless steel. The disc shall provide 360 degree uninterrupted seating.

- E. Valve Seats: Valve seats shall be Buna-N rubber designed for tight shutoff in both directions. Retaining ring cap screws shall pass through the rubber seat and be self-locking. Mating seat surfaces for resilient seats shall be 18-8 stainless steel. Seats shall provide full 360 degree seating without interruption. Valve seats shall be designed to permit removal and replacement in the field for valves 30-inch in size and larger.

- F. Valve Bearings: The valve shall be fitted with sleeve type bearings. Bearings shall be corrosion resistant and self-lubricating. Bearing load shall not exceed 1/5 of the compressible strength of the bearing or shaft material.
- G. Valve Actuators and Accessories: Valve actuators shall conform to AWWA C504, as amended to date. Operator shall be designed for buried service and employ a traveling nut design and be self-locking without the need for unidirectional sustained force from the valve. Stop-limiting devices shall be provided; the closed position stop will be adjustable externally. All 12" through 24" valve manual operators shall be capable of withstanding 450 foot pounds of input torque either in the open or closed position. The operator nut shall be 2-inches square. Operators shall hold valve disc in any intermediate position between fully open and fully closed without creeping or fluttering.
- H. Coating. All valves are to be coated in accordance with AWWA C-550, latest edition.
- I. Valve Testing: Performance, leakage and hydrostatic tests shall be conducted in strict accordance with AWWA C504, as amended to date. Leakage test shall be performed on each valve after the actuator has been mounted on the valve. The manufacturer shall, upon completion of manufacture, provide the Owner with an "Affidavit of Compliance" as per AWWA C504, as amended to date.
- J. All valves shall be open left (counterclockwise, viewed from the operating nut end of the stem).
- K. End connections shall be mechanical joint and shall be furnished with all necessary bolts, nuts, gaskets and appurtenances.
- L. Butterfly valves furnished shall be the Groundhog as manufactured by Henry Pratt; the Lineseal III as manufactured by Mueller; or the American-Darling Class 150 Butterfly Valve as manufactured by Valmatic.

5-05 AIR AND VACUUM VALVES

- A. Air relief valves - Air relief valves shall be provided in accordance with sound engineering practice at high points in water mains as required. Automatic air relief valves shall not be used in situations where flooding of the manhole or chamber may occur.
- B. Air and vacuum valves shall be designed for a minimum working pressure of 150 psi. Valve shall be of the type to vent air when the pipelines are being filled, to close once the line is filled, to remain closed until the line is drained, and then open to allow air to re-enter the line to prevent a vacuum from developing. All air and vacuum valves shall comply with AWWA C-512 latest edition.

- C. Valves shall be A.R.I. Model D-040-C, Combination Air Valves as a combination of an air and vacuum unit and a pressure unit. Valve sizes shall be as specified by the Design Engineer and shall be subject to approval by the Spartanburg Water Engineering Department.
- D. Where called for on the construction drawings air relief and vacuum valves shall be installed in 5-foot diameter manholes. Air relief valves shall be provided at high points in the water main. The open end of the vent pipe valve shall be extended to the top of the manhole with a screened downward facing elbow. Refer to CONSTRUCTION DETAIL NO. 8.
- E. Chambers, pits or manholes containing valves, blow-offs, meters, air release valves or other such appurtenances shall not be directly connected to any storm drain or sanitary sewer, and shall not be subject to flooding.
- F. If the location of the water main is such that installation of the air release valve directly on the water main may not be desirable or possible, SWS may consider an alternate design based on the following criteria:
 - 1) The air release valve is remotely mounted in a location which provides adequate security and protection from damage and flooding;
 - 2) The air release valve is connected to the water main with appropriately-sized piping which includes the necessary isolation valves, and the vent piping is not subject to flooding;
 - 3) The entire arrangement is designed by a licensed engineer, complies with SCDHEC R.61-58, and is submitted to SWS for approval.

5-06 MANHOLES

Manholes shall be used for all air valves, and as an alternative to valve vaults where specified on the plans. Shop drawings and related data for manhole material, frames, covers and steps shall be submitted to the Engineer for review.

- A. Manhole material shall be precast concrete unless otherwise approved by the Engineer and the Spartanburg Water System. The minimum diameter of all manholes shall be five (5) feet. The minimum wall thickness shall be five (5) inches.
- B. Precast Concrete Manholes shall conform to ASTM C478, and shall consist of precast reinforced concrete riser sections, a monolithic base section, and an eccentric, concentric or flat slab top section as required, all in accordance with the details shown on the plans.

- 1) Minimum compressive strength of concrete for all sections shall be 4000 psi. Maximum allowable absorption of concrete shall be 8 percent of the dry mass. Manhole interior walls, tables and inverts shall be a smooth surface free of voids, depressions, chips, rough edges and high spots. Pipe openings shall be provided in base sections as required. Lifting holes may be provided in each section for ease of handling. Concentric cones may be used for manholes less than five feet in depth.
- 2) Joint sealant shall be butyl rubber ring joint, 1-inch diameter, conforming to Federal Specifications SS-S-00210, Type I. Cement mortar joints will not be acceptable, except that each joint shall be wiped inside the manhole with cement mortar after assembly.
- 3) When depth will not allow cone-shaped tops, a precast cover designed to withstand traffic loads shall be installed.
- 4) Manhole frame and cover shall be MH-RCR-2001, weight 310 lbs by Dewey Brothers, Inc., of Goldsboro, North Carolina.

5-07 BALL VALVES - SWING CHECK VALVES

Ball valves and swing check valves are typically not allowed to be installed within the SWS, except as part of a back-flow preventer and in a fire service (REFER TO SECTION 6). However, where allowed, these valves shall conform to AWWA C507 and C508.

5-08 TAPPING SADDLES AND SLEEVES

In an effort to maintain the integrity and durability of the distribution system, Spartanburg Water reserves the right to specify any one (or a combination) of the following alternative methods of installing branches:

- A. Installation of a "wet tap" using a full-body, stainless steel, tapping sleeve (on pipe 12" OD and smaller and on other than "size on size" taps):
- B. Installation of a "wet tap" using a ductile (or cast) iron tapping sleeve or a full-body, stainless steel, tapping sleeve (on pipe larger than 12" OD and all "size on size" taps);
- C. Cutting in a new tee fitting with up to three (3) valves, depending on the area affected. Unless the procedure described below is used, this option will require that a water outage is scheduled and coordinated with the Spartanburg Water Maintenance and Construction (M&C) or Engineering Departments.
- D. TAPPING SLEEVES: Tapping sleeves for main line taps on pipe 12" OD and smaller (except for "size on size" taps) shall be as specified in the list below:

Tapping Sleeves for Wet Taps on Ductile Iron, PVC and Cast Iron Pipe

MANUFACTURER	STYLE	SIZE (O.D.)
Ford	Stainless Steel Wrap Around	4 – 12 (except size on size)
Romac	Stainless Steel Wrap Around	4 – 12 (except size on size)
Cascade	Stainless Steel Wrap Around	4 – 12 (except size on size)

- E. On main line taps on pipe larger than 12” OD, and for all size on size taps, the Contractor shall submit to the Spartanburg Water Engineering Department the proposed tapping fixture for approval. The approval of a given tapping fixture, or the requirement of an alternate method of constructing a branch, will be made based on the best interests of the Spartanburg Water system.

5-09 LINE STOPS AND VALVE INSERTIONS

Spartanburg Water System reserves the right to require specialized techniques to reduce the number of customers affected by a water outage which may be required to install a valve, a branch, or to extend a main line. This may include the installation of a Hydra-Stop (line stop) or EZ-Valve valve insertion, or other method. Any method used must comply with all current SCDHEC regulations, AWWA Standards, and NSF requirements.

- A. Prior to the installation of a new tee and branch valve, or an extension of an existing main, the installation of a line stop or an EZ-Valve may be required.
- B. Planned line stops and valve insertions shall always be submitted to the Spartanburg Water Engineering and Maintenance and Construction Departments for approval and scheduling.
- C. Preliminary installation of thrust blocks, dead men, or thrust collars may be required prior to the line stop or valve insertion.
- D. All costs associated with the installation of line stops or EZ-Valves, including dead men, thrust blocks, jumpers, or other appurtenances, whether performed by Spartanburg Water System or a subcontractor, will be paid by the Developer.

5-10 SERVICE SADDLES AND CORPORATION STOPS

- A. All pipe saddles and corporation stops for air relief, flushing and testing and disinfection shall be as specified in the list below. Tapping saddles will be required when the tapping machine is not capable of making a direct tap.

SADDLES FOR DUCTILE IRON PIPE

	3/4"CC Single Strap	1"CC Single Strap	1-1/4"CC Double Strap	1-1/2"CC Double Strap	2"CC Double Strap
Mueller	H-10400 Series	H-10400 Series	H-10500 Series	H-10500 Series	H-10500 Series
Smith/Blair	311	311	313	313	313
Ford	F101	F101	F202	F202	F202
Romac	101	101	202	202	202

SADDLES FOR C-900 PVC

	3/4"CC	1"CC	1-1/4"CC	1-1/2"CC	1-1/2"CC
Ford	FS202	FS202	FS202	FS202	FS202
Romac	101S	101S	101S	101S	101S

Note: CC Denotes Type Thread

CORPORATION STOPS

	3/4"	1"	1-1/2"	2"
Ford *	F-600	F-600	FB-600	FB-600
Mueller *	H-15000	H-15000	B-25000	B-25000
Ford **	*****	*****	*****	FB-400

* CC Thread Inlet & Flare Copper Outlet

**CC Thread Inlet & Male Iron Pipe Outlet

- B. Certain areas within the Spartanburg Water may operate at system pressures which are normally higher than in the other pressure zones. In these areas, SWS may specify alternate materials which are more appropriate for the higher operating pressures. Spartanburg Water reserves the right to specify alternative materials as needed, but in all cases, these materials shall comply with SCDHEC R.61.58.

C. TAPPING MACHINES

Type	Tap	Size
E-5	Saddle	3/4" - 1"
D-5	Saddle	3/4" - 2"
B100, B101	Direct	3/4" - 1"
A-3	Direct	1" - 2"
Tap Mate 2	Saddle	3/4" - 2"

5-11 VALVE INSTALLATION

- A. **GENERAL:** Gate valves, in general, shall be installed and jointed as specified in Section 3, WATER MAIN MATERIALS AND INSTALLATION
- B. Valve markers shall be manufactured of 3,000 psi concrete and provided as required by the Engineering Field Technician, and carefully set to assure the markers are plumb. The letters on the markers shall face the valves. Valve markers shall be marked with revised letters, MV for valves, AV for air or air/vacuum valves or BO for blow-offs.
- C. Valve boxes shall be furnished by the contractor for all underground valves and shall be cast iron, three-piece stack type with covers and bases. All boxes shall be gray cast iron in accordance with ASTM #A-48, Class 20. Boxes shall be Opelika part no. 5562-S or as manufactured for the SWS by Opelika Foundry Co.
- D. A valve box shall be installed on each underground valve. They shall be carefully set, entered exactly over the operating nut and plumbed true. The base shall be set as shown in CONSTRUCTION DETAIL NO. 7, arranged so that the weight of the valve box and superimposed loads will bear on the base and not on the valve or pipe. Extension stems shall be installed to assure the operating nut is no more than four feet beneath finished grade. A concrete valve collar shall be used for valves not located in asphalt.
- E. Non-gearred Valves: A cast iron valve box shall be provided for each vertical valve which has no gearing mechanism. The valve box shall not transmit shock or stress to the valve and shall be centered and plumb over the operating nut of the valve with the box cover flush with the surface of the finished grade.
- F. Geared Valves: A valve vault or manhole shall be provided for each valve which has a geared operating mechanism for all valves 16-inch and larger. The operating nut shall be easily accessible for operation through the opening in the manhole, which shall be set flush with the surface of the finished pavement or such other level as may

be directed by the SWS Engineering Department. Valve vaults shall be constructed as to permit minor valve repairs and afford protection to the valves and pipe from impact where they pass through the vault walls.

- G. Valves shall be installed so the operating stem is vertical and plumb. Horizontal valves shall be installed so that the operating nut is vertical and plumb.
- H. Precast concrete valve collars shall be installed around the tops of all valve boxes which are not otherwise installed in pavement. Refer to CONSTRUCTION DETAIL NO. 7.

SECTION 6

FIRE HYDRANTS AND FIRE SERVICES: MATERIALS AND INSTALLATION

6-01 GENERAL

All fire hydrants shall comply fully with AWWA Standard C502, latest revision, ANSI/NSF 61, and NFPA 1963-2003, for dry barrel hydrants and standards and specifications of the Spartanburg Water System. Where discrepancies exist, the more stringent (in the opinion of the Water System) shall govern. Hydrants shall be the particular model name or number by either of the manufacturers listed in Paragraph 6-02 and shall be modified as specified in this section.

6-02 MANUFACTURE AND NOMENCLATURE

Hydrants shall be any of the following:

Mueller - Centurion
American-Darling Valve - Mark 73
Kennedy Valve Co. - Guardian

6-03 GENERAL CONSTRUCTION

Hydrants shall be compressive type, self-lubricating, non-freezing, and provided with a safety flange and coupling. The operating unit shall be totally sealed from the barrel and all working parts shall be continuously and automatically lubricated. Drain mechanism shall be simple, positive and automatic in operation. The safety flange on barrel and safety coupling on valve stem shall operate to prevent damage to barrel and stem in case of a traffic accident. The force of the impact shall break the flange and spread the coupling. The ground line shall be marked on the lower barrel and the flange and coupling shall be above the ground line marking and constructed so as to permit rapid and inexpensive replacement. Hydrant shall be constructed to permit rotating nozzles in any direction by loosening safety flange bolts and revolving the upper barrel at any time without digging or cutting off water. All working parts of the hydrant, including the seat ring, shall be removable through the top without digging or removing the hydrant, including the shoe, from its installed location. Seat rings shall be so shaped and arranged as to be readily removable. Hydrants shall have bronze to bronze seating and bronze to bronze threads. Natural rubber or other material which will support microbiological growth may not be used for any gaskets, O-rings, and other products used for jointing pipes, valves, or other appurtenances which will expose the material to the water. All gaskets shall be AWWA approved.

Hydrants shall be the type as listed above by any of the manufacturers listed above, but with modifications or features as listed in the remainder of this section.

- A. Hydrants shall be designed for a working pressure of 150 psi and tested to 300 psi. At the time of delivery, the supplier shall furnish written certification that each hydrant has been tested and has passed the test.
- B. Three nozzles shall be provided. Two 2 1/2-inch connectors shall be provided 180 degrees apart and one 4 1/2-inch at 90 degrees to the other nozzles shall be provided. Nozzles shall be all bronze threaded into the barrel, or "locked" to the barrel and sealed with o-ring seat and locked into place with locking device. Locking device shall be inaccessible from outside the hydrant. Threads shall be as specified in the NFPA 1963-2003 Standard for Fire Hose Connections as follows:
- 1) Fire Hose Connection: 2.5" diameter with 7 1/2 threads per inch;
 - 2) Pumper Connection: 4.5" diameter with 4 threads per inch;
 - 3) Caps shall have nuts of the same size as the operating nut specified in Paragraph C below. Caps shall be secured to the barrel with non-linking chain loop on the caps for free turning of the cap during removal.
- C. The operating nut shall be one piece bronze or cast iron construction, pentagon shape, and measure 1 1/4-inch from the point to flat area of the base and shall be the same size as the nozzle cap. An arrow shall be cast into the weather cap or bonnet indicating the direction of opening which shall be counterclockwise (open left). An O-ring seal shall be provided to seal operating nut to the bonnet. Hold down nut shall be all bronze with O-ring seals on the inside sealing against the operating nut and on the outside sealing against the bonnet.
- D. Lubrication system shall be either oil or grease. Oil reservoirs shall have an external filler plug made of brass or stainless steel. Grease fittings shall be brass or stainless steel. Oil and grease reservoirs shall be sealed to a bronze stem sleeve by two (2) O-rings. Bronze stem sleeves shall be O-ring sealed to the stem. All thrust bearing surfaces shall be able to be lubricated without bonnet removal. A thermo set anti-friction washer shall be located between the thrust collar of the operating nut and the hold down nut or plate. Oil filter plug or grease fitting shall permit adding lubricant, filling reservoir, and checking lubricant level without removing bonnet, or weather cap.
- E. Hydrants shall be traffic models having the upper and lower barrels joined approximately 2 inches above the bury line by a traffic flange, breaking ring, or ground-line coupling, providing 360 degree rotation of the upper barrel while hydrant is in service. "Break-away" bolts will not be acceptable. The lowest nozzle shall be a minimum of 18 inches above the ground-line or bury line. A corrosion proof safety coupling shall connect the upper and lower stems. The safety coupling shall be attached to the stem with either bronze or stainless steel pins, screws or clips. The safety coupling shall be of the torque diverting type and shall be designed such that no

pieces fall into the lower barrel when the coupling fractures upon impact and designed to prevent fractures through the screws or pins holding the coupling to the stem.

- F. The upper barrel shall be manufactured of cast iron or ductile iron. The lower barrel and shoe shall be manufactured of cast iron or ductile iron. Interior of shoe shall be coated with epoxy, a total of 4 mils thick, or with two (2) coats of an asphaltic varnish, each coat with a minimum thickness of 1 1/2 mils and a total minimum thickness of 3 mils. Any coating shall meet the requirements of AWWA C502 and shall be suitable for potable water. The brand name, year of manufacture and valve opening size shall be cast on the outside of upper barrel.
- G. Drain holes shall be provided at the lowest possible elevation to assure complete drainage of all water from the hydrant. A minimum of two external drain holes or ports 180 degrees apart shall be provided with a minimum diameter of 1/4-inch. Two internal drain holes shall be provided, each at least 1/4-inch diameter. Hydrant design shall be such that drain ports are flushed with full line pressure each time the hydrant is opened and closed. Drain valve facings shall be mechanically attached to the upper valve plate by means of stainless steel or bronze screws or stainless steel pins. If two drain holes are provided, they shall be 180 degrees apart, and no drain holes shall be at the back base of the shoe where concrete thrust blocks will be poured. Seat rings shall be bronze and shall screw into bronze drain or shoe rings. Seat rings shall be sealed by o-rings. All internal bronze components shall conform to Section 4.4, Table 1 of AWWA Standard C502.
- H. Hydrants shall be for 3'-6" bury (unless otherwise specified by the Spartanburg Water System) when ordered. Bury shall be cast in lower barrel or stenciled in 2-inch painted letters. Hydrants shall be extendable in 6-inch increments by means of extensions. Extensions shall be provided which shall be of the same material as the shoe and lower barrel and shall be complete with one (1) set of all necessary bolts and nuts, safety flange, gaskets, stem couplings and stem extensions and stem pins.
- I. Main-valve assembly and seat ring shall be removable with a lightweight seat wrench furnished by the manufacturer. All tools required for this assembly shall be furnished by the supplier. At least one complete set of disassembly tools shall be furnished for every 50 hydrants supplied. One operating wrench shall be supplied for each twelve (12) hydrants supplied based on a "running total" number of hydrants sold and not each order.

6-04 MATERIALS AND EQUIPMENT

A particular manufacturer of hydrants may not have the exact part described below, which is acceptable. It is the intent of these specifications that a manufacturer will supply this standard hydrant modified or with options supplied as specified.

- A. Hydrants shall be equipped with the following options at the factory prior to shipment.

- (1) Rubber (Buna N) or cellulose fiber gaskets throughout;
- (2) Travel stop nut or equivalent for position stop;
- (3) Rubber or metal weather shield;
- (4) Bronze to bronze drain arrangement - bronze hydrant seat and bronze o-ring;
- (5) Chains to attach nozzle cap to hydrant;
- (6) "Spartanburg Standard Hydrant" and the supplier's logo shall be stenciled on the lower barrel.

B. Hydrant materials shall be in accordance with the table as follows:

ITEM NO.	DESCRIPTION	MATERIAL
1.	Operating Nut	Bronze or Cast Iron
2.	Weather Cap/Weather Seal	Cast Iron or Rubber
3.	Hold Down Nut "O"-Ring	Rubber
4.	Hold Down Nut	Bronze
5.	Bonnet "O"-Ring	Rubber
6.	Anti-Friction Washer	Plastic, Nylon
7.	Thrust Washer	Plastic, Teflon
8.	Lubrication Plug	Brass or Stainless Steel
9.	Bonnet	Cast Iron
10.	Bonnet Bolts (Galvanized) - ASTM 307	Cadmium or Zinc Plated Steel
11.	Bonnet Gasket	Rubber
12.	Upper Stem	Steel with Bronze Sleeve
13.	Stem "O"-Rings	Rubber

14.	Nozzle Retaining Screw	Stainless Steel
15.	Hose and Pumper Nozzles	Bronze
16.	Hose and Pumper Nozzles Gasket	Rubber
17.	Hose and Pumper Nozzles "O"-Ring	Rubber
18.	Hose and Pumper Nozzle Cap	Cast Iron
19.	Chains	Steel
20.	Chain Connector	Steel
21.	Upper Barrel	Cast Iron or Ductile Iron
22.	Safety Stem Coupling	Anodized Steel or Cast Iron
23.	Safety Flange Bolt (Galvanized) Steel - ASTM 307	Cadmium or Zinc Plated
24.	Safety Flange Gasket	Rubber
25.	Safety Flange	Cast Iron or Ductile Iron
26.	Cotter Pins	Stainless Steel or Bronze
27.	Clevis Pins	Stainless Steel or Bronze
28.	Lower Stem	Steel
29.	Lower Barrel	Cast Iron or Ductile Iron
30.	Stem Pin	Stainless Steel
31.	Drain Valve Pin	Stainless Steel
32.	Drain Valve Facing	Rubber, Polyethylene, or leather
33.	Drain Valve Facing Screw	Stainless Steel or Bronze
34.	Upper Valve Plate	Bronze Iron

35.	Shoe Bolt	ASTM 307 - Steel Cadmium or Zinc (Galvanized) Plated
36.	Drain Ring Housing Gasket	Rubber
37.	Elbow/Bottom Gasket	Rubber
38.	Top Seat Ring "O"-Ring	Rubber
39.	Drain Ring Housing	Cast Iron
40.	Drain Ring Housing Bolt	Zinc Plated (Galvanized) or Cadmium Plated ASTM 307 Steel
41.	Drain Ring	Bronze
42.	Seat Ring	Bronze
43.	Bottom Seat Ring "O"-Ring	Rubber
44.	Main Valve	Rubber
45.	Bottom Valve Plate	Cast Iron
46.	Lower Valve Plate	Cast Iron
47.	Cap Nut Seal	Rubber
48.	Lock Washer	Stainless Steel
49.	Cap Nut	Ductile Iron
50.	Shoe	Cast Iron or Ductile Iron

Clarification of the materials is as follows:

(a) Rubber refers to Buna N synthetic rubber. Natural rubber shall not be provided in any parts.

(b) Stainless steel refers to ASTM 276, Grade 302 or better.

6-05 PAINTING

- A. The interior and exterior parts of the hydrant shall be cleaned in accordance with AWWA Specification C502, latest edition. Interior coatings shall be suitable for potable water.
- B. A primer shall be applied from the ground line up in accordance with the AWWA C502, latest edition.
- C. All exposed exterior surfaces below the ground line shall be coated with two coats of asphalt varnish. Each coat shall be at least 2 mils thick. The first coat shall dry thoroughly before the second coat is applied.
- D. Interior surfaces shall be coated with two (2) coats of asphalt varnish in accordance with AWWA C502, latest edition. Each coat shall be at least 2 mils thick.
- E. Chains shall receive two coats, at least 2 mils thick each, of aluminum paint. Base coat shall dry for a minimum of 48 hours before second coat is applied.
- F. Caps and bonnet shall receive two coats, at least 2 mils thick each, of the NFPA Standard paint color. The NFPA standard calls for bonnets and caps to be color-coded to indicate the hydrant's available flow at 20 p.s.i.

Standard color codes are as follows:

NFPA 291, Chap. 3		
Class C	Less than 500 GPM	Red
Class B	500-999 GPM	Orange
Class A	1000-1499 GPM	Green
Class AA	1500 GPM & above	Light Blue

Base coat shall dry for a minimum of 48 hours before second coat is applied.

- G. The body shall receive two coats, each 2 mils thick, of red paint. The first coat shall be thoroughly dry before the second is applied.
- H. Paint shall be as follows:
 - 1) Chain aluminum paint shall be one of the below.
 - a. Gilman #45-6F Chrome Aluminum
 - b. PPG #6-230 (2-901) Chrome Aluminum
 - c. Sherwin-Williams Chrome Aluminum

- 2) Body shall be painted with heavy grade, high gloss enamel which shall be one of the following:
 - a. Gilman #57-16F Fire Engine Red
 - b. PPG #6-301 Safety Red
 - c. Sherwin-Williams Safety Red
- 3) Spartanburg Water System shall be responsible for painting the fire hydrant components per the NFPA Color Code.

6-06 INSTALLATION

- A. **GENERAL:** Hydrants shall be installed plumb and jointed as specified for pipe and fittings. The installation of hydrants shall include the installation of concrete blocking, rodding and washed crushed stone backfill as shown in and/or as specified herein.
- B. The preferred method of installing a fire hydrant in a new subdivision will be through the use of a "hydrant tee" or "valve restraining" tee in which the hydrant isolation valve is mounted directly on the branch tee. In some cases the use of a hydrant tee will not be possible, in which case the isolation valve shall be installed on the end of a short pipe spool piece which is restrained to a standard MJ tee. Refer to CONSTRUCTION DETAIL NO. 9.
- C. Fire hydrants shall be located as shown on the plans and shall be field located by the SWS Inspector in a manner to provide complete accessibility, and in such a manner that the possibility of damage from vehicles or injury to pedestrians will be minimized.
- D. Generally, when placed behind a curb, the face of the fire hydrant barrel shall be 12 inches from the back of the curb. The distance shall be approved by the Engineering Department in coordination with the Spartanburg Fire Department.
- E. No hydrants shall be located closer than ten (10) feet to the beginning point of curvature of the curb or road at street intersection. Where there are not curbs, then the hydrant location shall be as shown on the plans.
- F. All fire hydrants shall be plumbed and shall have the pumper nozzle perpendicular to the curb. Fire hydrants shall be set with the "Bury Line" marker set to the established grade or as directed by the Inspector.
- G. Each fire hydrant shall be connected to the main with a minimum 6-inch branch connection of the same material as the pipeline. Gate valves shall be used on all fire

hydrant branches.

- H. The proper length of hydrant extension shall be used, when necessary, to raise the bury line of the hydrant to grade. The use of multiple short extensions when one of longer length is needed will not be permitted (ie, 2 - 6" extensions shall not be installed instead of a single 12" extension). A maximum of two extensions per hydrant will be allowed.
- I. Clean, washed gravel, no larger than #57 stone, shall be placed around the shoe of the fire hydrant, 6" above and for a radius of 18-inches around the weep holes. Hydrants shall be set with stone free of dirt and set to drain freely. Three (3") inches of additional stone (18-inch radius around the weep holes) shall be added for each 6-inch of hydrant extension. Hydrant drains shall not be connected to or located within ten (10) feet of sewer systems.
- J. The shoe of each fire hydrant shall be well braced against UNDISTURBED earth and at the end of the trench with a poured concrete brace block and it shall be tied to the water main with suitable metal tie-rods, as directed by the Engineering Department and shown on the plans.

6-07 FIRE SERVICES

- A. Fire Services, in general, shall be installed and jointed as specified in Section 3, WATER MAIN MATERIALS AND INSTALLATION;
- B. Specific regulations regarding approved back-flow preventers and piping arrangements to be used in fire service pits are covered in the Spartanburg Water System Cross Connection Control Manual and in SECTION 4, Paragraph 4-08, A. through F. of these Specifications. A copy of this document can be obtained by contacting the Spartanburg Water System Water Quality Department at 253-9632 or on the web site at www.SpartanburgWater.org.
- C. The installation of a fire service shall comply with the details provided with the approved construction drawings, all applicable Federal, State and Local regulations, and the requirements presented in these Specifications.

6-08 FIRE SERVICE VAULTS

A. SCOPE

This section contains the current specifications for fire service vaults that are to be built for customers of the Spartanburg Water System. The Spartanburg Water System does not own its customers' fire service vaults. However, the Spartanburg

Water System will, on occasion, have a need to enter the fire service vaults. It is for this reason that the vault must be constructed in accordance with the minimum specifications as described below.

B. ACCESS DOOR

- 1) Door shall be made of aluminum, diamond plated, with a double leaf opening and manufactured for 300 lbs. per square foot live load.
- 2) Doorframe shall be aluminum and all hardware shall be stainless steel.
- 3) Door shall have a slam lock and an automatic “hold open” mechanism shall be part of unit.

C. LADDER

- 1) All ladders shall be made of aluminum and shall be a “ships ladder”. Ladder steps shall be a minimum of 17 inches wide with non-skid rungs that are spaced a maximum of 16 inches apart.
- 2) Ladders shall be attached to pit wall or floor with a minimum of 4 stand-offs with holes for anchor bolt and washers.
- 3) The first rung of the ladder shall be a maximum of 12 inches below top of vault opening.

D. STEPS

- 1) Commercially manufactured steps shall be a minimum of 17 inches wide with non-skid treads.
- 2) Angle frame steps shall be made for casting in a poured in place wall.
- 3) Steps requiring a core-drilled hole shall have anchoring or non-removable features.
- 4) The top step shall be a maximum of 12 inches below the top of the vault opening.
- 5) All subsequent steps shall be spaced a maximum of 16 inches apart.

E. WALL SLEEVES, PIPE OPENINGS

- 1) The inside diameter of the sleeve is required to have a critical dimension of 4 inches greater than the nominal pipe size. (i. e. 6-inch pipe requires 10-inch inside diameter sleeve).
- 2) Sleeves cast in place shall be made from steel pipe, ductile iron pipe, or C-900 PVC pipe cut to the length of wall dimension.
- 3) A cast in place or precast wall alternate is a core-drilled hole to the critical inside diameter size.
- 4) All sleeves shall have a smooth surface in order to properly receive the sleeve seals.

F. SLEEVE SEALS

Commercially manufactured sleeve seals, ie. "Link Seals", or manhole pipe boot shall be required.

G. FIRE DEPARTMENT RISER

- 1) All riser pipes shall be galvanized steel or ductile iron. PVC pipe will not be allowed.
- 2) A wafer type check valve with ball drip meeting all requirements of U. L. and F. M. shall be installed vertically or horizontally to the riser tee.

H. FIRE DEPARTMENT CONNECTION

- 1) The fire authority for the locality of the installation shall make requirements for the type of fire department connection. It shall be the responsibility of the The type FDC will not be specified by SWS; the Contractor to confirm that the FDC complies with the local jurisdiction.
- 2) The vault can be constructed by a variety of methods.
 - a. Poured in place reinforced concrete.
 - b. Precast reinforced concrete.
 - c. Filled concrete masonry units on reinforced concrete footings.
- 3) The vault shall be designed by others. The Spartanburg Water System is not responsible for the structural design of the vault.

I. PIPE PIERS AND SUPPORTS

Pipe piers and supports shall be constructed in accordance with one of the following:

- 1) Solid concrete bricks and mortar with dimensions as indicated by the design professional.
- 2) Poured in place reinforced piers.
- 3) Precast reinforced concrete with shims to ensure contact to fittings.

J. STONE

In instances where stone is required in the bottom of the fire service vault, washed stone grade size #57 (3/4") shall be used.

SECTION 7

CLASSIFIED EXCAVATION

7-1 GENERAL

Classified excavation shall include the removal and disposal of rock or hardpan requiring methods other than conventional excavation equipment.

- A. "Rock Excavation" shall be the excavation of such material which cannot be removed by means other than by blasting or with a jack hammer or other means approved by the Engineer. "Unclassified" excavation shall include the excavation of all types of materials that do not fall into the category of "rock excavation" as defined above. The classification of excavation shall be determined by the SWS Engineering Department. It shall be the Contractor's responsibility to notify the SWS Engineering Department when he believes that rock excavation is encountered. **THE CONTRACTOR WILL NOT BE CREDITED FOR ANY ROCK QUANTITIES EXCAVATED BEFORE SUCH NOTICE IS GIVEN.**
- B. Clearance: Ledge rock, boulders and larger stone shall be removed to provide a clearance of at least 6 inches below and on each side of all pipe, valves, and appurtenances. This specified minimum clearance is the minimum clear distance which will be permitted between any part, projection or point of such rock, boulder, or stone and any part of the water main.
- C. Subgrade: Where excavation is made in rock or boulder, the subgrade shall be prepared by backfilling with an approved select material in 6-inch compacted layers and each layer shall then be thoroughly compacted to not less than 95% of the maximum dry density as determined by a Standard Proctor Test (ASTM D698) so as to provide a uniform and **CONTINUOUS BEARING** and support for the pipe along the entire pipe length between bell holes. The minimum depth of the compacted backfill material shall be 6 inches.

7-2 BLASTING

- A. **GENERAL:** All blasting, where required, shall be done under the personal supervision of a person duly licensed in the State of South Carolina to engage in the use or storage of explosive materials. All necessary measures to protect life and property shall be taken. Where in close proximity to buildings, structures, transmission lines, utility lines or other facilities, timber mats or other means of preventing damage from flying debris shall be used. Ample and suitable signals shall be given in proximity to the work before each blast, and flagmen shall be placed on all

roads beyond the danger zone in every direction to warn traffic. Contractor shall be responsible for all damage resulting from blasting.

- B. Procedure: Blasting for excavation will be permitted only after securing the approval of the Spartanburg Water System Engineering Department, only after a South Carolina State Blasting Permit has been obtained and a copy given to the SWS Inspector, and only when proper precautions are taken for the protection of persons and property. The hours of blasting will be fixed by the Contractor and approved by the SWS Engineering Department. Blasting operations and storage of explosives shall be conducted in strict accordance with existing ordinances, regulations, and laws of local, State, and Federal agencies.
- C. Damage Liability: All blasting shall be done with the utmost care so as not to endanger life or property. Whenever directed, the number and size of the charges shall be reduced. All damages or injuries resulting from blasting operations shall be reported immediately to the SWS Engineering Department. Contractor shall be responsible for all damage resulting from blasting and shall supply liability insurance to cover any damage. Certificates of insurance shall be filed with the SWS Engineering Department prior to commencing blasting work. The policy shall cover blasting over the duration of the project.
- D. Limits: Where new water lines are being constructed or connections being made to existing mains, blasting operations shall not be conducted within fifty (50) feet of the end of such mains. The use of explosives shall be limited to a minimum distance of twenty-five (25) feet from any and all utilities or structures or as specified by the Spartanburg Water System.
- E. Operations: Blasting operations shall be conducted in strict accordance with the S.C. Explosives Control Act, all applicable Spartanburg Water System, city, county, state and federal ordinances and regulations. All exposed structures shall be carefully protected from the effects of blast and all blast areas shall be covered with heavy timbers, mats or other suitable protection. The blasting shall be done only by blasting personnel licensed in the State of South Carolina. Very light charges must be used to prevent damages to adjacent structures. In no case shall caps or other explosives be kept at the place where dynamite or any other explosive is stored.
- F. Traffic Controls: Ample and suitable signals shall be given in proximity to the work before each blast, and flagmen and appropriate signs shall be placed on all roads beyond the danger zone in every direction to warn traffic.
- G. Pre and Post-Blast Property Survey Requirements. Spartanburg Water may require a pre- and post-blast property survey, depending on the proximity of the work to businesses, residences or other structures which may be affected by the ground or

atmospheric vibrations which could result from the blasting. The following is a description of the type of survey and the reporting which may be required.

- 1) Description: The locations of the properties which may be affected shall be determined by a Contractor's representative qualified in vibration analysis / monitoring and damage assessment associated with blasting. The Contractor shall arrange with property owners affected by the project to obtain the rights-of-entry to their properties in order to engage in a pre-blast and post-blast property damage survey. The Contractor shall submit a Pre- and Post-Blast Property Survey Report to the Engineer to document the investigation of the buildings on these properties.

- 2) Investigation Methods: the investigation shall consist of visually inspecting and recording all existing defects in the structures. The structures shall be thoroughly inspected from top to bottom, inside and out. The Report shall include names of inspectors, date of inspections, and descriptions and locations of defects. In addition, the Contractor shall mark existing cracks in such a way that future observations would indicate whether cracks continue to open or spread. Photographs shall be used in verifying written descriptions of damaged areas.

a. Pre-blast Survey:

The Contractor shall arrange for professional photography capable of producing sharp, grain-free, high-contrast pictures with good shadow details for construction monitoring at the properties. Photographs shall be taken so that details of the buildings will be clear and well defined. The intent is to procure a record of the general physical condition of the buildings. Camera location shall be changed for each of the photographs and shall be varied so that all portions of the buildings' exterior surfaces will be covered by the view.

Each photograph shall contain the following information (if applicable):

Project Title
Project No.:
Property Address:
Building Description:
View
Looking
Date
Photographer

Photographs shall be 8 inches by 10 inches (200 mm by 250 mm), black and white glossy, mounted on paper with a flap for binding.

b. Blast Monitoring

Spartanburg Water reserves the right to require blast monitoring during the work. Monitoring may include the use of seismographs and other appropriate devices which are capable of storing data in digital form

c. Post-blast Survey

The Contractor shall conduct a second inspection of each affected property once blasting is complete. The Contractor shall visually inspect and photograph each structure to verify the post-blast condition. The Contractor shall follow the same inspection procedures as previously outlined herein before for the pre-blast survey.

- 3) Reports: Pre and Post-Blast Property Survey Report shall be typed on bond paper in text form with headings, indexes, etc., and shall be submitted within 30 calendar days of the final blasting. An evaluation of the property impacts from the blasting activities shall be included in the Report. Rights for subsequent use shall become the property of the Contracting Authority.

SECTION 8

BORING AND AERIAL CROSSINGS

8-01 SCOPE

This section contains the current specifications for the installation of pipe by various methods other than conventional “open cut” including the following:

- Boring (including specialized boring methods other than Directional Drilling)
- Horizontal Directional Drilling (HDD)
- Pipe supported on piers
- Pipe attached to bridges (or structures which have an intended purpose other than supporting the water main).

The conventional “open cut” method of pipe installation is adequately covered in SECTION 4 of these Specifications. However, plans which incorporate alternative pipe installation methods, which are the subject of this section, must be prepared by engineers specifically trained and experienced in the particular method used. The specifications listed below are not intended to replace or be used as a substitute for the detailed design by a licensed engineer.

The review of plans by the Spartanburg Water Engineering Department will only serve to insure compliance with SCDHEC and Spartanburg Water specifications. The design and use of alternative installation methods include various risks which may not exist with other methods; the Design Engineer and Contractor must accept full responsibility for the liabilities associated with these alternative methods. In situations where substantial risks exist, the Spartanburg Water System reserves the right to require additional liability insurance coverage, and/or extended warranties, beyond that noted in SECTION 1 and SECTION 11 of these Specifications.

8-02 BORING (INCLUDING JACK AND BORE, IMPACT MOLE, CLOSED-FACE BORE, MICRO-TUNNELING and others)

Where shown on the approved plans, pipe shall be installed under highways, railroads, or other obstacles by boring. The Contractor shall furnish all labor and materials necessary to complete the bore, install steel casing if required, and install carrier pipe per the approved plans.

- A. All bores under railroads shall be performed as required by railroad specifications. The Design Engineer shall be responsible for compliance with all railroad related permitting and design requirements.

- B. Service line bores under highways may be made without encasement unless otherwise noted on the plans.
- C. If steel casing is required, unless otherwise noted on plans, encasement up to and including 48-inches in diameter shall be installed by boring and jacking (either augur or closed-face). Larger encasement shall be by tunneling. Refer to CONSTRUCTION DETAIL NO. 10
- D. GENERAL REQUIREMENTS:
- 1) Authorities: All aspects of crossing construction shall conform to the requirements of the South Carolina Department of Transportation and/or railroads.
 - 2) Insurance: It shall be the responsibility of the Contractor and/or his subcontractor to comply with all insurance requirements of the highway or railroad work within their right-of-way if the limits are higher than the limits of the insurance requirements of this contract.
 - 3) Inspection: Crossing construction operations shall be subject to inspection by the Owner's representative and by the highway or railroad representative, who shall have full authority to stop work if, in his opinion, it would cause damage to the roadway or railway section, endanger traffic or endanger life.
 - 4) Prior to beginning work, the Contractor shall submit to the Engineer a work plan detailing the procedure and schedule to be used to execute the project. The work plan shall include as a minimum:
 - a. a description of all equipment to be used;
 - b. a list of personnel and their qualifications and experience (including back-up personnel in the event that an individual is unavailable);
 - c. list of subcontractors;
 - d. a schedule of work activity;
 - e. a safety plan (including MSDS of any potentially hazardous substances to be used);
 - f. traffic control plan (if applicable);

- g. an environmental protection plan and contingency plans for possible problems.

The work plan shall be comprehensive, realistic and based on actual working conditions for this particular project. Plan shall document the thoughtful planning required to successfully complete the project.

E. ADDITIONAL REQUIREMENTS

- 1) Contractor shall comply with all requirements of the highway or railroad relating to temporary work, inspection, watchmen, flagmen, traffic barriers, protection of personnel and property, work restrictions, work scheduling, insurance and such other requirements. The Contractor shall pay for all costs associated with meeting these requirements, except as otherwise specified.
- 2) Where steel casing is required, it shall be within the limits of the highway or railway right-of-way and shall be installed to the proper line and grade; no open excavation will be allowed within the limits of the steel casing without the Engineer's approval. The steel casing shall be furnished and installed in accordance with additional requirements specified herein.
- 3) All work shall be completed to the full satisfaction of the highway or railroad engineer, or his authorized representative.
- 4) For all work on railroad right-of-way, the Contractor shall notify the railroad division Superintendent at least 72 hours prior to entering railroad right-of-way to begin construction.

F. **INSTALLATION BY THE BORING METHOD:** Installation of the water main and, the steel pipe casing, where required, shall be by the dry boring method at locations shown on the Drawings. Installation shall include all related work and services such as mobilization, construction and maintenance of work pits, R/W maintenance and restoration, traffic maintenance, excavation, dewatering, sheeting, shoring, bracing, bulkhead, clean up, and move out. Installation of steel casing shall be in accordance with the applicable regulations of the South Carolina Department Transportation, the specific Railroad company; the Detail Drawings and these Specifications. All excavations for pit and bore shall be unclassified. Refer to CONSTRUCTION DETAIL NO. 10

- 1) Boring Pit:
 - a. The boring pit shall be solid sheeted, braced, shored, and dewatered as necessary to provide a safe operation;

- b. The limits of the bore pit shall be contained on public right-of-way unless prior construction or permanent easements have been secured;
 - c. Provide protection to other utilities and roadways;
 - d. The Contractor shall take all precautions, and shall comply with all requirements as may be necessary to protect private or public property;
- 2) Line and Grade: The Contractor shall set the boring rig so that, after the water main and, the casing pipe, if required on the project, is (are) installed the elevations of the water main shall conform accurately to the grades and alignment fixed or given by the Engineer.
- 3) Boring:
- a. Where encasement is required, the water main diameter and steel casing diameter shall be as noted on the plans. The hole shall be bored and encased through the soil by a cutting head on a continuous auger mounted inside the steel casing.
 - b. The boring of the hole and installation of the steel casing shall be simultaneous. Lengths of casing shall be fully welded to the preceding section in accordance with American Welding Society recommended procedures. The Contractor shall bear the cost of any corrective action required to meet line and grade requirements shown on the plans.
 - c. The distance to which excavation is carried ahead of the casing shall be not more than is absolutely necessary for installation purposes, and will be subject to approval of the Engineer. The work shall be performed so that no voids occur in the earth surrounding the casing and so that ground settlement adjacent to and within the limits of the pipeline crossing is eliminated.
 - d. If voids occur or are encountered outside the pipe, the Contractor shall stop the work and contact the agency having jurisdiction (SCDOT, County). The Contractor shall correct this condition using the method required by the agency. One method of correcting this condition is grout injection as follows:
 - i. holes shall be drilled at 10-foot centers to near the top of the steel casing;
 - ii. the voids filled with a 1:3 Portland cement grout at sufficient pressure to fill voids and prevent embankment settlement.

- iii. If disruption of traffic will occur during the work, the Contractor shall obtain an approved Traffic Control Plan prior to commencing the work. All traffic control requirements shall be the responsibility of the Contractor.
 - e. If it becomes necessary to abandon an incomplete or unacceptable bore, the abandoned encasement shall be capped and filled completely with 1:3 Portland cement grout. Abandonment procedures shall be completed prior to moving to another boring location. All costs in connection with an abandoned bore, including the construction cost and capping and filling costs, shall be at the Contractor's expense.
- 4) Steel casing installed by boring and jacking shall be welded steel pipe conforming to ASTM A139, Grade B, and shall be of the sizes shown on the plans. Pipe shall be bituminous coated on the outside. Casing size and minimum wall thickness shall be as follows:

Carrier Pipe Diameter (inches, nominal)	Required Casing Diameter (inches, nominal)	Casing Thickness (inch)
4"	8	.0188 (3/16)
6"	12	.0188 (3/16)
8	16	0.250 (1/4)
10	18	0.250 (1/4)
12	20	0.281
14	22	0.312
16	24	0.344
20	28	0.406
24	32	0.438
30	38	0.5
36	44	0.5
48	56	0.75
60	68	0.75
Greater than 60	Per Design	Per Design

When steel casing is installed without protective coating or cathodic protection, the wall thickness shall be increased a minimum of 0.063 inch greater than the thickness shown above.

- 5) Boring without encasement shall be bored through the soil and the pipe pushed through the bore hole. The diameter of the bore shall be no larger or more than 4-inches greater than the diameter of the bell of the pipe.
- E. Casing Spacers: All carrier pipe installed inside encasement shall be supported by spacers ("spiders") as called for on the plans. Spacers shall be fabricated from quality ASTM

A36/A structural steel with continuous meg welds at each joint. The flanges for the two-piece spacer supports shall be formed with half bands. The legs shall be welded to the bands and the skids welded to the legs. After fabrication, the spacers shall be coated with bituminous dip. Grade 5 bolts with nylon locking nuts shall be used to secure the spacer supports to the carrier pipe. Spacers shall be manufactured by Spider Manufacturing, Inc., Cascade, Inc., or other approved supplier. The casing spacers must be submitted to the Spartanburg Water System Engineering Department as part of the plan review. Refer to CONSTRUCTION DETAIL NO.10.

8-03 HORIZONTAL DIRECTIONAL DRILLING (HDD)

- A. SCOPE OF WORK This section contains guidelines and specifications applicable to the installation of pipelines using horizontal directional drilling (HDD). It includes minimum requirements for design, materials and equipment used for the horizontal directional drilling for the substantially trenchless construction of pipelines. The section also includes materials, dimensions and other pertinent properties of pipe and required accessories. These properties provide minimum performance requirements for various components including joints.
- B. SUBMITTALS:
- 1) All items listed under paragraph 8-02 D. above shall be submitted for approval
 - 2) Specifications on material to be used shall be submitted to Engineer. The material shall include the pipe, fittings, drilling mud, drilling additives and any other item, which is to be an installed component of the project or used during construction.
 - 3) Historically, High Density Polyethylene Pipe (HDPE) was the only material used for HDD installation of water mains. However, during recent years, additional materials are being installed by HDD Contractors, including fusible PVC and restrained joint ductile iron. Alternate pipe materials, other than HDPE, will be considered on a case-by-case basis by Spartanburg Water. The use of alternate materials for HDD project shall be submitted to the Spartanburg Water Engineering Department for review and approval. Spartanburg Water makes no commitment regarding the future use of HDD as a pipe installation method, based on previous projects or assumed approvals.
- C. GENERAL
- 1) The bore path alignment and design for HDD shall be based on the Engineer's plans and other factors. Some factors which must be considered are the acceptable bend radius or maximum deflection capabilities of the joint (if jointed pipe is used)

- 2) Prior to the start of drilling, reaming and pipe placement operations, the Contractor shall properly locate and identify all existing utilities in proximity to the pipeline alignment. The Contractor shall confirm the alignment of all critical utilities, using vacuum excavation or other suitable excavation method, for further detailed confirmations as necessary.

D. EQUIPMENT AND EXPERTISE

- 1) The Contractor shall have equipment and expertise, appropriate for horizontal directional drilling installations. This includes the preparation and maintenance of the bore path using drilling fluids appropriate for the geology of the soils. The Contractor shall also have experience in safety and dependability installing, in similar geology, similar size and length of piping involved.
- 2) The directional drilling machine shall consist of a hydraulically powered system to rotate, push and pull hollow drill pipe into the ground at variable angles down to 8 degrees above horizontal, while delivering a pressurized fluid mixture to a guidable drill (bore) head. The machine shall have a capacity to adequately complete the drilling and piping installation. The machine shall be anchored to the ground to withstand the pulling, pushing and rotating pressure required to complete the crossing.
- 3) The hydraulic power system shall be self-contained with sufficient pressure and volume to power drilling operations. Hydraulic system shall be free of leaks. Rig shall have a system to monitor the maximum pull-back pressure during the pull-back operation. The rig shall be grounded during drilling and pull-back operations. There shall be a system to detect electrical current from the drill string and an audible alarm, which automatically sounds when an electrical current is detected.
- 4) The drill head shall be a steerable type and shall provide the necessary cutting surfaces and drilling fluid jets. Mud motors shall be adequate power to turn the required drilling tools.
- 5) The equipment shall incorporate a conventional electromagnetic sound walkover system or Magnetic Guidance System (MGS) probe or proven gyroscopic probe and interface shall be used to provide a continuous and accurate determination of the location of the drill head during the drilling operation. The guidance shall be capable of tracking at the maximum depth required and in any soil condition, including hard rock. It shall enable the driller to guide the drill head by providing immediate information to the tool face, azimuth (horizontal direction), and inclination (vertical direction). The guidance system shall be accurate to $\pm 2\%$ of the vertical depth of the borehole at sensing position at depths up to one hundred feet and accurate within 1.5 meters horizontally.

- 6) The Guidance System shall be of a proven type and shall be setup and operated by personnel trained and experienced with this system. The Operator shall be aware of any geo-magnetic anomalies and shall consider such influences in the operation of the guidance system if using a magnetic system.

E. DRILLING FLUID (MUD) SYSTEM

- 1) A self-contained, closed, drilling fluid mixing system shall be of sufficient size to mix and deliver drilling fluid composed of bentonite clay, potable water and appropriate additives. Mixing system shall be able to molecularly shear individual bentonite particles from the dry powder to avoid clumping and ensure thorough mixing. The drilling fluid reservoir tank shall be a minimum of 500 gallons. Mixing system shall continually agitate the drilling fluid during drilling operations.
- 2) Additives to drilling fluid such as drill soap, polymers, etc. shall be “environmentally safe” and be approved for such usage. No diesel fuel shall be used.

F. OTHER EQUIPMENT

- 1) Pipe rollers shall be of sufficient size to fully support the weight of the pipe while being hydro-tested and during pull-back operations. Sufficient number of rollers shall be used to prevent excess sagging of pipe. Rollers shall be used as necessary to assist in pull back operations and in layout/jointing of piping.
- 2) Hydraulic or pneumatic pipe rammers may only be used if necessary and with the authorization of Design Engineer. Other devices or utility placement systems for providing horizontal thrust other than those previously defined in the preceding sections shall not be used unless approved by the Design Engineer prior to commencement of the work. Consideration for approval shall be made on an individual basis for each specified location. The proposed device or system shall be evaluated prior to approval or rejection on its potential ability to complete the utility placement satisfactorily without undue stoppage and to maintain line and grade within the tolerances prescribed by the particular conditions of the project.

G. GENERAL

- 1) The Engineering Field Technician must be notified 48 hours in advance of starting work. The Directional Bore shall not begin until the Engineering Field Technician is present at the job site and agrees that proper preparations for the operation have been made. The approval of the Engineering Field Technician for beginning the installation shall in no way relieve the Contractor of the ultimate responsibility for the satisfactory completion of the work.

- 2) All personnel shall be fully trained in their respective duties as part of the directional drilling crew and in safety. Contractor must show job history and reference list of equal or greater size and length of piping involved. The Supervisor must have at least two years directional drilling experience. A competent and experienced supervisor representing the Drilling Contractor shall be present at all times during the actual drilling operations. A responsible representative who is thoroughly familiar with the equipment and type work to be performed, must be in direct charge and control of the operation at all times.
- 3) Testing and acceptance of water mains installed by HDD shall be as indicated in SECTION 4 of these Specifications.

8-04 PIPE SUPPORTED ON PIERS

- A. GENERAL: This section addresses the situation in which the water main must cross natural or man-made terrain features, with the pipe exposed above-ground, rather than crossing underground. The guidelines below refer to water mains in the Spartanburg Water distribution system, and may not apply to other aerial installations such as within treatment plants or other isolated facilities. The Engineer shall be responsible for all details associated with the design of pier-supported piping systems. All details related to a planned aerial crossing on piers shall be submitted the Spartanburg Water Engineering Department with the preliminary plan submittal package.
- B. MATERIALS:
 - 1) Ductile iron pipe shall be used for all aerial crossings, the required wall thickness shall be specified by the Engineer.
 - 2) The DIP joint configuration shall be as specified;
 - 3) Fittings and appurtenances shall be as specified;
 - 4) Long span pipe may be used to reduce the number of joints; this material shall be submitted to the Spartanburg Water Engineering Department for approval.
- C. DESIGN CONSIDERATIONS
 - 1) The carrying capacity of the supports themselves,
 - 2) The strength of the structure from which a pipe may be suspended
 - 3) Unusual or additional loads not in the scope of this section. Such loading may include seismic, frequency or resonance of vibrations, wind, water current, and other special design considerations.

- 4) It is also necessary to ensure a minimum of lateral and vertical stability at the supports for aboveground piping. Deflected pipe joints can result in thrust forces of hydrostatic or hydrodynamic origin, and, if not laterally and vertically restrained, unbalanced forces may result in additional joint deflection and possible failure of the pipeline.
- 5) Thermal expansion of ductile iron pipelines supported above ground is not usually of concern in correctly designed and installed systems because of the nature of the push-on joint. A 50° Celsius change in temperature results in expansion or contraction of a 6m length of ductile iron pipe of approximately 3.4mm. This is easily accommodated by correctly installed pipe and joints.
- 6) Occasionally, where support structures are expected to have significantly different behavior than the pipeline, special considerations for expansion, contraction, and supports may be necessary;
- 7) Supports should generally be positioned immediately behind the pipe bells. Supports should normally not be placed under spigots adjacent to bells, due to possible undesirable effects on joints.
- 8) Pipe supports should cradle the pipe in a saddle. This cradling, which should follow the contour of the pipe, minimizes stress concentrations at the supports. It is recommended that the saddle angle of the support be between 90° and 120°. Little or no benefit is gained by increasing the saddle angle more than 120°. With angles smaller than 90°, the maximum stress tends to increase rapidly with decreasing saddle angle.
- 9) Supports, piles, and/or foundations should be adequately designed from a structural and soil-engineering standpoint to safely handle any loads transferred from the pipe.
- 10) Refer to CONSTRUCTION DETAIL NO. 12. NOTE: The construction details provided in these Specifications are suggestions only and do not relieve the Design Engineer from the responsibility and obligation to consider all issues related to the proper design of all structures and systems and compliance with all applicable regulations and standards.

8-05 PIPE ATTACHED TO BRIDGES

A. **APPROVALS:** Attachment of water mains to bridges or other structures must be approved by the agency with jurisdiction over the structure. It shall be the responsibility of the Design Engineer to obtain written authorization and approval as needed from all agencies including (but not limited to) the following:

- 1) SCDOT

- 2) The City of Spartanburg
- 3) Spartanburg County.

B. GENERAL: All pipe, fittings and appurtenances shall be assembled and joined in accordance with the instructions in this Section and manufacturer's recommendations and shall accurately conform to the dimensions established. Pipe hanger assemblies shall be the type and size indicated on the plans and shall meet the requirements stated on the plans and stated herein. The pipe hanger shall be either a yoke pipe roll or a clevis. All pipe fittings and appurtenances shall be adequately supported and anchored, protected from damage and freezing, and accessible for repair and replacement.

- 1) Steel Yoke Pipe Roll Hanger: If the hanger is to be a yoke pipe roll type, it shall be a Grinnell "adjustable steel yoke pipe roll," or approved equal. The yoke, roll rod and hex nuts shall be manufactured from carbon steel and the roll shall be cast iron. Each hanger shall have a maximum recommended load of not less than 1200 lbs.
- 2) Pipe Hanger Clevis: If the pipe hanger is to be a clevis type, it shall be a Grinnell "adjustable clevis for cast iron pipe," or approved equal. The clevis shall be manufactured from carbon steel and shall have a maximum recommended load of not less than 1940 lbs.
- 3) Rods: Rods shall be the diameter and length shown on the plans. Rods shall be carbon steel with a minimum yield strength of 60,000 psi. Rods shall be threaded to match the hanger hardware.

C. EXISTING BRIDGE: Where a pipeline is to be installed on an existing bridge, it shall be supported by hangers attached to the bridge by anchors drilled and embedded in the bottom of the bridge deck as shown on the construction plans.

- 1) Concrete Anchors: Shall be the Hilti HVA Adhesive Anchor System or approved equal with 7/8-inch diameter and a minimum embedded depth of 6 5/8 inches. Tensile bond strength shall be 28,720 lbs minimum.
- 2) Installation: During assembly, the vertical position of the hanger on the rod shall be adjusted to provide consistent clearance between the pipe and the bridge deck. The hanger rod nuts shall be tightened securely. Each completed hanger assembly shall be coated with 17.5 mils of Koppers Bitumastic 300-M, or equal.

D. NEW BRIDGE: Where a pipeline is to be installed on a bridge which is being newly constructed, arrangements will be made by the Spartanburg Water System to have concrete inserts cast in place in the bottom of the bridge deck when it is being formed.

The pipeline will be supported by hangers attached to these inserts as shown on the construction plans.

- 1) Concrete Inserts: Concrete inserts shall be the Grinnell "wedge type concrete insert," or approved equal. The inserts shall be manufactured from carbon steel and have a galvanized finish. The nut shall be iron. Maximum recommended load shall be not less than 1,200 lbs. Inserts shall be installed in place by nailing each insert to the wooden form at the locations shown on the plans before the concrete is poured into the form. Two one foot lengths of 3/8-inch rebar shall be installed in the slots of each insert as shown on the plans and shall be cast in place with the inserts. After the bridge is poured, set and the forms removed, the knockout plate in each insert shall be removed with a screwdriver.
- 2) Installation: The wedge nut should be put on the rod before inserting into the concrete insert body. Insert the nut into the slot and turn rod so the elongated nut lies across the slot. Screw rod through nut until rod is firmly against the top of the recess.
- 3) After assembly of pipe, clevis and rod, the vertical position of the clevis on the rod shall be adjusted to provide consistent clearance between the pipe and the bridge deck. The hanger rod nuts shall be tightened securely. Each completed hanger assembly shall be coated with 17.5 mils of Koppers Bitumastic 300-M, or equal.

SECTION 9

PAVING AND SURFACING

9-01 SCOPE:

This section covers cutting and replacing pavement for installation of utilities, as shown on the plans and as specified herein.

9-02 DESIGN CRITERIA

Reference 2007 SCDOT Standard Specifications for Highway Construction
Reference Spartanburg County Standard Specifications for Construction of Roads

9-03 CUTTING AND REPLACING PAVEMENT:

- A. Cutting: All pavement shall be neatly cut to a straight edge in advance of trenching, with the method of cutting subject to approval of the Engineer. Cutting pavement shall be sawed with suitable concrete saw cutting equipment. Pavement shall be cut 12 inches wider than the excavated area on each side. Ragged and irregular edges shall be redone.
- B. Trench Backfilling under pavement shall be as specified in SECTION 4 of these Specifications..
- C. Base for pavement shall be crusher run stone for all secondary highways and non-highway streets, and concrete for all primary highways. Base shall be placed in accordance with plan or encroachment permit details. Base width shall be as shown on the plans of encroachment permits for the various types pavement cuts.
 - 1) Crusher run stone shall be graded 1-1/2 inches and down, with fines being added if necessary. Stone shall be well mixed and compacted by tamping and rolling so as to prevent settlement. Crusher run base material shall be placed at the same time that the trench is backfilled. Backfilling to the top of the trench, to be cut out and replaced with base material at a later date, will not be allowed.
 - 2) Base for highway pavement and adjacent drives shall be 8 inches of crusher run stone, stabilized with 5% Portland cement. Base shall be thoroughly mixed prior to compaction.
 - 3) Base for non-highway pavement and adjacent drives shall be 8 inches of crusher run stone, without the addition of cement.

- 4) Concrete base shall consist of 10 inches of concrete. Concrete shall be designed to produce a compressive strength of 3000 psi at 28 days. Design of mix and source of supply shall be subject to approval of the Design Engineer.
- D. Pavement shall be replaced with the same type of pavement that existed prior to cutting, and shall consist of bituminous surfacing, bituminous plant mix pavement. The Contractor shall contact the highway department and obtain the specifications for the mix to be used for any one or group of pavement cuts.
- 1) Pavement shall be repaired within the same week that it is cut. If inclement weather delays pavement replacement, Contractor shall not cut additional pavement until he has notified the Engineer and received specific permission and instructions.
 - 2) For bituminous pavement or surfacing, the entire area to be resurfaced (including edges of existing pavement) shall be primed with an acceptable asphalt prime coat just prior to placing the new pavement.
- E. The Construction Details included with these specifications are general. The requirement of the agency having jurisdiction over the roadway which is being impacted by the work shall govern. Refer to CONSTRUCTION DETAIL NO. 13.
- F. All Work on State Highways shall be done in strict accordance with the South Carolina Highway Department requirements. It shall be the responsibility of the Contractor to familiarize himself with all such requirements. He shall obtain from the Owner a copy of all required encroachment permits, and shall conform to all requirements and stipulations therein.
- G. All Work on County Highways or Roads, Town or City Street shall be done in strict accordance with requirements of the agency having jurisdiction thereof. The Contractor shall secure permits from the applicable agency involved and furnish a copy to the District. Paragraphs A, B, C and D of this section also apply.

9-04 REMOVING AND REPLACING SIDEWALK:

Where pipe is to be placed under an existing concrete sidewalk, the concrete shall be removed in construction units unless their length is more than 10 feet, in which case, the concrete shall be cut as specified for pavement. Backfill shall be thoroughly compacted for the entire depth of the trench.

- A. Sidewalk shall be replaced with 3,000 psi concrete 4 inches thick, except for driveways where it shall be 6 inches thick. Concrete shall be placed monolithic and dressed off with a wooden float, brush and edging tool. Where pipe is to be placed

under a concrete walk, the Contractor may, with permission of the Engineer, install the pipe by boring instead of removing and replacing the walk.

- B. Curb and Gutter: If pipe is to be placed under curb and gutter, it shall be done by boring. No additional payment will be made therefore.

SECTION 10

GRASSING AND EROSION CONTROL

10-01 SCOPE

This section contains specifications for the materials, equipment, construction, measurement, and payment for the seeding, interseeding, fertilizing, applying nitrogen and lime when specified, and mulching in conformity with the Plans and the Specifications or as directed by the Engineer or Inspector. Interseeding consists of the planting of centipede grass seed within the existing turf.

10-02 MATERIALS

A. General

At the time of delivery, furnish invoices for materials received in order to determine the application rate of materials.

B. Seed

Ensure that seed conforms to state laws and the requirements and regulations of the South Carolina Department of Agriculture (SCDA). Provide individually packaged or bagged and tagged varieties of seed that show the name of seed, net weight, origin, percentages of germination and purity, lot number, and other information required by the South Carolina Department of Agriculture. SWS reserves the right to test and reject or approve any or all seed before application of the seed. For mixtures of different types of seed called for in the seeding schedule, weigh and mix in the proper proportions.

C. Seeding Schedules

Unless otherwise provided, select the type of seeding from the tables shown below for the upper state regions as applicable to the project. The upper state region includes all of Spartanburg, Greenville, Union, and Cherokee Counties. The total seed rate in pounds per acre is the sum total shown for all the varieties of seed opposite the schedule number in the seeding schedules included herein.

Adhere to the following two seeding schedules.

Seeding Schedule for Permanent Vegetation Upper State				
Schedule No.	Common Name of Seed	Pounds/acre		Planting Dates
		Rural	Urban ¹	
1	Common Bermuda (hulled) ²	23	23	March 15 to August 14
	Sericea Lespedeza (scarified) ²	50	50	
	Kentucky 31 Fescue	50	50	
	Weeping Lovegrass ²	10	10	
2	Kentucky 31 Fescue	50	50	August 15 to March 14
	Sericea Lespedeza (or hulled, unscarified) ²	50	50	
	Common Bermuda (or hulled) ³	30	30	
	Weeping Lovegrass ²	10	10	
	Reseeding Crimson Clover ⁴	20	0	
	Annual Rye Grass ⁵	5	15	
	Rye Gram	20	0	

Notes:

¹ Includes rural areas adjacent to well-developed lawns

² Not required on shoulders, medians, etc. and on slopes under 5 feet in height.

³ Do not use Giant Bermuda seed including NK-37.

⁴ Inoculate Reseeding Crimson Clover in accordance with Subsection 810.2.4. Do not plant clover in medians or in rural areas adjacent to well-developed lawns.

⁵ The use of Italian Rye Grass is prohibited on all projects.

Adhere to the following schedule for interseeding.

Interseeding Schedule			
Schedule No.	Common Name of Seed	Pounds per acre	Planting Dates
1	Centipede	30	October 15 to July 15

810.2.3.3 Temporary Vegetation Seeding Schedule

Adhere to the following seeding schedules for temporary vegetation.

Seeding Schedules For Temporary Vegetation Upper and Lower State			
Schedule No.	Common Name of Seed	Pounds per acre	Planting Dates
1	Brown Top Millet	50	April 1 to August 15
2	Rye Green	55	August 16 to March 01
	Annual Ryegrass ¹	15	
¹ The use of Italian Rye Grass is prohibited on all projects.			

Add oat grain at the rate of 10 pounds per acre to schedules if the seeding date is between March 1 and April 16.

D. Inoculants

Provide an inoculant for treating reseeding crimson clover seed of a pure culture of nitrogen-fixing bacteria selected for a maximum vitality and ability to transform nitrogen from the air into soluble nitrates and deposit them into the soil. Ensure that inoculants consist of purebred cultures and are not more than one year old.

E. Commercial Fertilizer

Provide commercial fertilizers that comply with state fertilizer laws. When a fertilizer is required for any grass, use a mixed fertilizer with a designation such as 10-10-10, where the first number represents the minimum percent of nitrogen required, the second number represents the minimum percent of available phosphoric acid required, and the third number represents the minimum percent of water soluble potash required in the fertilizer. For centipede grass, use only 15-0-15 or 16-4-8 fertilizer.

F. Lime

Ensure that lime is agricultural grade, standard ground limestone conforming to the current *Rules, Regulations, and Standards of the Fertilizer Board of Control*. These rules, regulations, and standards are promulgated and issued by the Fertilizer Board of Control at Clemson University in accordance with Section 16 of the South Carolina Liming Materials Act. Ensure that each bag has affixed in a conspicuous manner a tag

or label, or in the case of bulk sales, a delivery slip showing the brand or trade name, calcium carbonate equivalent, percent by weight passing prescribed U.S. Standard sieves, and other pertinent information to identify lime as agricultural grade, standard ground limestone. The Contractor may substitute liquid lime for ground lime if it meets all requirements for agricultural grade lime specified herein, except percent by weight passing U.S. Standard Sieves, which is waived for liquid lime.

G. Tackifiers as Mulch Binders

1) Emulsified Asphalt

If emulsified asphalt is used as a tackifier, ensure that emulsified asphalt is diluted at the manufacturing plant with water, if necessary, to provide a homogenous and satisfactory material for spraying.

2) Chemical Tacking Agents

If a chemical tacking agent is used, ensure that it consists of a polymer synthetic resin, polypectate, liquid latex, or other material that gives similar adhesive properties as asphalt emulsion when sprayed on straw and cellulose fiber mulches. Chemical tacking agents require approval by the Spartanburg Water Engineering Department.

H. Straw Mulch

Use straw mulch material consisting of straw or hay. Use straw that consists of stalks of wheat, rye, barley, oats, or other approved straw. Use hay that consists of Timothy, Peavine, Alfalfa, Coastal Bermuda, or other grasses. Ensure that these materials are reasonably dry and reasonably free from mature seed-bearing stalks, roots, or bulblets of Johnson Grass, Nutgrass, Sandburg, Wild Garlic, Wild Onion, Wild Mustard, Crotolaria, Pigweed, Witchweed, and Cocklebur. Comply with all state and federal domestic plant quarantine regulations.

I. Wood Fiber Hydroseeding Mulch

1) Use wood fiber hydroseeding mulch made from wood chip particles manufactured particularly for discharging uniformly on the ground surface when dispersed by a hydraulic water sprayer. Ensure that it remains in uniform suspension in water under agitation and blends with grass seed and fertilizer to form homogeneous slurry. Make certain that the fibers intertwine physically to form a strong moisture-holding mat on the ground surface and allow rainfall to percolate the underlying soil. Use a fiber material that is heat processed and contains no germination or growth-inhibiting factors.

2) Use a fiber material dyed (non-toxic) an appropriate color to facilitate the uniform application of material.

3) Use suppliers that certify that their product has been laboratory and field

tested and meets all of the foregoing requirements based upon such testing. Ensure that the weight specifications from suppliers and for all applications of this material refer only to the absolute air-dry weight of the fiber material. Absolute air-dry weight is based on the normal weight standard of the Technical Association of the Pulp and Paper Industry for wood fiber hydroseeding mulch and is considered equivalent to 10% moisture. Ensure that the manufacturer marks each package of the wood fiber hydroseeding mulch to show the air-dry weight content.

- J. Cellulose Fiber Hydroseeding Mulch
Use cellulose fiber hydroseeding mulch consisting of recycled magazine stock products shredded into small pieces for application by hydraulic seeding equipment. Ensure that It mixes readily and uniformly under agitation with water and blends with grass seed and fertilizer to form homogeneous slurry. When applied to the ground surface, ensure that the material forms a strong moisture-holding mat, allows rainfall to percolate to the underlying soil, and remains in place until the grass root system is established. Ensure that the material contains no growth inhibiting characteristic or organisms. Obtain mulch from suppliers that certify that their product meets these requirements.

10-03 INSTALLATION OF GRASS AND RELATED MATERIALS

- A. Seeding Dates and Rates of Application
Perform seeding during the periods and at the rates specified in the seeding schedules above. The Contractor may perform seeding work throughout the year using the schedule prescribed for the given period. Do not conduct seeding work when the ground is frozen or excessively wet. Produce a satisfactory stand of grass meeting the requirements of this section, regardless of the period of the year in which the work is performed. Perform interseeding during the periods and at the rates specified in the interseeding schedule. Conduct the interseeding with a no-till drill calibrated to deliver the specified rate of seed per acre.
- B. Preparation of Ground Before Seeding
Ensure that the areas seeded are uniform and conform to the finished grade and cross-section shown on the Plans or as otherwise directed by the Engineer. Perform minor shaping and evening of uneven and rough areas outside the graded section as needed in order to provide for more effective erosion control and ease of subsequent mowing operations. Loosen the seedbed (including cut slopes) to a minimum depth of 3 inches before agricultural lime, fertilizer, or seed is applied. Clear the areas to be seeded of stones larger than 2½ inches in any dimension, roots, and other debris. Temporarily seed slopes to coincide with the embankment work in 10-foot increments. When 10 feet of fill is in place, seed the slope. Track the slopes vertically to help hold the seed in place

- C. **Applying Organic Topsoil**
At areas to be grassed where the existing seedbed has little or no topsoil, topsoil may be furnished and placed on the seedbed to ensure a good stand of grass
- D. **Applying Lime and Fertilizer**
When called for in the Contract, spread lime and/or fertilizer uniformly over the designated areas and thoroughly mix with the soil to a depth of approximately 2 inches. Apply fertilizer at the rate of 1000 pounds per acre unless otherwise directed. Apply lime at the rate of 2000 pounds per acre, unless otherwise specified. Unless otherwise provided, do not apply lime for temporary seeding. Adequately scarify steep slopes, which are inaccessible to power equipment and re subject to slides. Fertilizer may be applied as a mixture of fertilizer and seed by approved mechanical spreaders or by hydraulic methods. When fertilizer is applied in a combination seed and fertilizer drill, no further incorporation as necessary. Apply the fertilizer and seed together when the hydraulic method of seeding is used. Remove all stones larger than 2½ inches in any dimension, larger clods, roots, or other debris brought to the surface. Fertilizer of a different analysis than that specified on the Plans may be substituted if approved by the Engineer. If a different fertilizer is approved, apply the fertilizer at such a rate per acre to give at least the amount of nitrogen, phosphoric acid and potash as would have been accomplished had the originally specified fertilizer been used and applied at the specified rate. If the substitute fertilizer meets the minimum analysis of at least one or more of the three basic ingredients, do not consider the excess in calculating the required quantity of the substituted fertilizer. Payment is made for the number of tons of fertilizer which would have been required if the originally specified fertilizer had been used at the specified rate. For Interseeding, apply fertilizer at the rate of 500 pounds per acre. Use 15-0-15 or 16-4-8 fertilizer
- E. **Permanent Vegetation**
Produce a satisfactory stand of perennial vegetation with a root system that is developed sufficiently to survive dry periods and winter weather, and is capable of re-establishment in the spring. The perennial vegetative cover must have a minimum coverage density of 70% for the seeded areas. Using the seed specified above, determine the rate of application necessary to produce the required stand of grass and follow the application procedures as specified herein
- F. **Temporary Vegetation**
Obtain a satisfactory stand of vegetation that is capable of erosion control. Using the seed specified above, determine the rate of application necessary to produce the required results. Ensure that the temporary vegetation provides minimum density coverage of 70% of the seeded area.
- G. **Temporary Seeding**
Sow seed within 24 hours following the application of fertilizer and preparation of seedbed as specified above. Sow seed at the required rate by hand or by methods as outlined above. Compact or cover the seeded areas as specified above On small

areas inaccessible to machinery, the Contractor may cover the seed by hand rakes or other methods satisfactory to the Engineering Field Technician. Apply fertilizer at the rate of 500 pounds per acre or as directed by the Engineering Field Technician. Lime is not required in temporary seeding unless otherwise specified. No tackifiers or mulches are required for temporary seeding. The Contractor may use temporary seeding in isolated problem areas or, where it is not feasible or practicable to bring an area to final slope, grade and finish so that the permanent seeding can be performed without subsequent serious disturbance by additional grading.

H. Seeding (Unmulched)

Ensure seeding without mulch (unmulched) conforms to Method A or B as prescribed below, except do not use Method A in urban areas or in areas adjacent to sidewalk, guardrail, curb, curb and gutter, or concrete median.

1) Method A: Seeding with Emulsified Asphalt Tackifier

Sow seed within 24 hours following the application of fertilizer and lime and preparation of the seedbed as specified above. Uniformly sow seed at the rate specified by the use of approved mechanical seed drills, rotary hand seeders, hydraulic equipment, or any other type of equipment that produces a uniform application of the seed. Except on steep slopes where mechanical equipment cannot operate satisfactorily, compact all seeded areas by means of a cultipacker or light roller. Compaction is not necessary if seeds are planted by mechanical seed drills that perform a compaction procedure. On slopes that are inaccessible to compaction equipment, cover the seed by dragging spiked-chains, by light harrowing, or by other methods satisfactory to the Engineer. Within 24 hours following compaction of the seeded areas, uniformly apply emulsified asphalt, diluted at the manufacturing plant with an equal amount of water, over the seeded areas at a rate of 0.15 to 0.32 gallon of the dilution per square yard. The RCE will determine the exact rate of application. Before spraying emulsified asphalt, cover parts of bridges, culverts, guardrail, signs, sidewalk, curb and gutter, catch basins, pipe ends, and other structures as necessary to prevent discoloration.

2) Method B: Seeding with Wood Fiber Mulch Tackifier,

Cellulose Fiber Mulch Tackifier, or Wood/Cellulose Fiber Mix Tackifier
Apply lime and prepare the ground as shown on the Plans or as provided above. Choose one of the following tackifiers: wood fiber tackifier, cellulose fiber tackifier, or wood/cellulose fiber mix tackifier and apply with a mixture of water, seed, and fertilizer at the rate of 1500 pounds per acre. Use hydraulic equipment for the application of slurry of water, fertilizer, seed, fiber, and tackifier. Use equipment with a built-in agitation system and an operating capacity sufficient to agitate, suspend, and homogeneously mix the slurry. Ensure that the slurry distribution lines are large enough to prevent clogs. Equip the discharge line with a set of hydraulic spray nozzles to provide even distribution of the slurry on the various areas seeded. Use a slurry tank

with a minimum capacity of 1000 gallons. Combine all of the seed, fertilizer, tackifier, and water into the slurry tank for distribution of all ingredients in one operation by the hydraulic seeding method specified herein. Combine the materials in a manner recommended by the manufacturer. Regulate the slurry mixture so that the amounts and rates of application result in a uniform application of all materials at rates not less than the amounts specified. Using the color of the slurry as a guide, spray the prepared seedbed with a uniform visible coat. Apply the slurry in a sweeping motion in an arched stream falling like rain and allow the slurry to build upon itself until an even coat is achieved.

I. Seeding (Mulched)

Ensure that seeding with mulch conforms to Method A, B, or C as prescribed below, except do not use Method A in urban areas or in areas adjacent to sidewalk, guardrail, curb, curb and gutter, or concrete median.

1) Method A: Seeding with Straw or Hay Mulch

Sow seed as specified in Method A of Section I above. Within 24 hours following covering of the seed, uniformly apply straw or hay mulch material at the rate of 2 tons per acre. Spread mulch by hand, by appropriate mechanical spreaders, or by blowers. Use mulch that allows sunlight to penetrate and air to circulate but also partially shades the ground and conserves soil moisture. Use emulsified asphalt meeting the requirements of Section 10-02 H. above, or other approved tacking agent, to hold the newly laid mulch in place. Ensure that the emulsified asphalt is diluted at the manufacturing plant with an equal amount of water. Uniformly apply the material as a film over the mulch at approximately 0.20 gallon of dilution per square yard. Make certain that the film is sufficient to bond together the mulch particles without giving a heavy coating of the asphalt material. Ensure that the film prevents wind erosion. Other tacking agents may be used and applied at the manufacturer's recommended rate. Replace displaced mulch.

2) Method B: Seeding with Straw and Hydroseeding Mulch

Apply seed as in Method A of Section I above, then cover with straw tacked with the manufacturer's recommended rate of wood, cellulose, or a wood/cellulose mix hydroseeding mulch; or straw tacked with manufacturer's recommended rate of a combination of tacking agent and any of the aforementioned hydroseeding mulches.

3) Method C: Hydroseeding

Hydroseed using 1500 pounds per acre of wood, cellulose, or a wood/cellulose mix hydroseeding mulch with the manufacturer's recommended rate of an approved tacking agent.

J. Application of Nitrogen

As soon as the plants show satisfactory growth, apply nitrogen evenly at the rate of

48 pounds per acre on the areas designated by the RCE. Unless otherwise permitted, apply the nitrogen in a solid form rather than in a liquid state. Do not apply nitrogen to stands of *sericea lespedeza*. Unless otherwise provided, do not apply nitrogen to temporary vegetation.

10-04 TURF MAINTENANCE

A. Mowing

Mow areas seeded or sodded , or other areas as necessary, to maintain the project in a satisfactory manner. Perform mowing where directed by the Engineer. Commence mowing within three business days following verbal notification by the Engineer. Failure to comply with the above may be grounds for stopping work on the project (or withholding payment of the next pay estimate if a Capital project)

- 1) Use mowing equipment equipped with safety devices designed to prevent injury or property damage caused by flying debris propelled from under the mowing equipment. Keep all mowing equipment in good operating condition and maintain to provide a clean, sharp cut of vegetation at all times. If the Inspector determines the equipment is defective to the point that the quality of work or safety is affected, immediately repair or replace the equipment.
- 2) Ensure that mowing results in a vegetation height of 4 to 6 inches, unless otherwise directed by the Inspector. Mow as closely as possible to all fixed objects, exercising care not to damage trees, plants, shrubs, signs, delineators, or other appurtenances that are a part of the facility. Hand trim around such objects if required and to the satisfaction of the Inspector.
- 3) Immediately remove and properly dispose of any debris thrown on the roadway by the mowing operation. Mowed grass is not normally removed unless it becomes a hazard. Do not perform mowing when, in the opinion soil and weather conditions are such that rutting or other damage to the project may occur. The three-business day period noted above will be extended until the soil and weather conditions become suitable for mowing on the project.

B. Maintenance

Perform all maintenance necessary to keep seeded areas in a satisfactory condition until the work is finally accepted. This includes mowing, repairing washes, and additional applications of seed, fertilizer, and mulch to areas where a satisfactory stand of grass has not been achieved.

C. Stand of Grass

Before acceptance of the seeding performed for the establishment of permanent vegetation, produce a uniform perennial vegetative cover with a density of 70% of the seeded area. Ensure that the root system is developed sufficiently to survive dry

periods and winter weather and is capable of reestablishment in the spring. Before acceptance of the seeding performed for the establishment of temporary vegetation, produce a stand of grass sufficient to control erosion for a given area and length of time before the next phase of construction or the establishment of permanent vegetation commences

10-05 EROSION CONTROL MEASURES

Ensure that the equipment necessary for the proper construction of the work is on site, in acceptable working condition, and approved by the Engineering Field Technician as to both type and condition before the start of work under this section. Provide sufficient equipment to enable the work to proceed in accordance with the project schedule and completion of the work in the specified time.

A. Partial and Temporary Seeding

Coordinate seeding with the construction of cut and fill slopes. Limit the area of erodible material by bringing partially completed slopes to the required slope and perform seeding operations at that time as directed by the Engineering Field Technician. Temporarily seed slopes to coincide with the embankment work.

B. Erosion Control Measures

In addition to the erosion control measures specified herein and in the Plans and the Special Provisions, the Contractor is advised that all land disturbing activities (clearing and grubbing, excavation, borrow and fill) are subject to the requirements set forth in the following permits and regulations. The party responsible for each requirement will depend upon whether the project is a SWS Capital Project, or a Developer Project:

- 1) South Carolina Code of Regulations 63-380, Standard Plan for Erosion, Sediment, and Stormwater Runoff Control. The regulation may be viewed at the following Internet web address:
<http://www.scstatehouse.net/coderegs/c063.htm>
- 2) Erosion and Sediment Reduction Act of 1983 (Title 48, Chapter 18 of the South Carolina Code of Laws of 1983, as amended). Section 70 of this code authorized the South Carolina Department of Health and Environmental Control (SCDHEC) to administer this regulation with respect to lands under the jurisdiction of the South Carolina Department of Transportation. The code may be viewed at the following Internet web address:
<http://www.scstatehouse.net/code/t48c018.htm>
- 3) National Pollutant Discharge Elimination System (NPDES) General Permit Number SCR100000, effective September 1, 2006: The Environmental Protection Agency, in accordance with the Federal Clean Water Act, has

granted to the South Carolina Department of Health and Environmental Control (SCDHEC) the authority to administer the Federal NPDES permit program in the State of South Carolina. The permit may be viewed at the following Internet web address:

<http://www.scdhec.net/environment/water/docs/finalcgp.pdf>

- 4) In accordance with the NPDES General Permit, sign a Co-Permittee Agreement and Contractor Certification statement (shown in Part 3.2D of the General Permit) and require all subcontractors performing land-disturbing activities to sign a Co-Permittee Agreement and Contractor Certification statement as part of their subcontract. These certifications are incorporated into the proposal form for the Contract. By signing either form, the Contractor acknowledges that upon award and execution of the Contract, he/she accepts/ understands the terms and conditions of the *Storm Water Pollution Prevention Plan (SWPPP)* as required by the NPDES General Permit and may be legally accountable to SCDHEC for compliance with the terms and conditions of the *SWPPP*. In addition, the Contractor certifies that the NPDES certification statement and/or co-permittee status is made part of all its subcontracts.
- 5) Prepare and submit a *Contractor's Erosion Control Plan (CECP)* to the Spartanburg Water Engineering Department before the pre-construction conference. Ensure that the plan meets the requirements of the NPDES General Permit. The plan will be reviewed and approved by the Department before commencing any land disturbing activities. Upon approval of the *CECP*, the Engineer will complete and forward a *Notice of Intent (NOI)* to SCDHEC. If SCDHEC does not send a letter within 10 business days of receipt of the *NOI*, authorizing coverage, denying coverage, or advising that a review of the *CECP* will take place, coverage will be automatically granted.
- 6) At the pre-construction conference, with all contactors and subcontractors performing land-disturbing activities present, the *CECP* will be explained and discussed so that each contractor and subcontractor is made aware of their responsibilities in the *CECP*. Once approved, fully implement the *CECP*. Coordinate the prompt installation of erosion control devices with construction activities to maintain compliance with the above regulations and NPDES General Permit.
- 7) Conduct an Erosion and Sediment Control Inspection by an appointed Certified Erosion Prevention and Sediment Control Inspector (CEPSCI) from the Contractor at least every 7-calendar days. Both parties will acknowledge participation in the inspection by signing the inspection report and include their inspector's CEPSCI number on the report. Correct deficiencies noted during these inspections within the assigned priority period. On SWS Capital Projects, if deficiencies are not corrected within this timeframe, the Engineer,

Engineering Field Technician, or Owner's Representative will stop all work (except erosion and sediment control measures) until the deficiencies are corrected.

- 8) Give special attention to critical areas within the project limits (i.e., running streams, water bodies, wetlands, etc.). In these areas, the Contractor may be required to undertake immediate corrective action, but in no case allow these deficiencies to remain unresolved more than 7 days or 48 hours in accordance with their assigned priority after being identified during the Erosion and Sediment Control Inspection.
- 9) Closely follow the grading operations with the seeding operations. Shape and prepare the slopes for seeding as the grading progresses. Limit the amount of surface area exposed by land disturbing activities to 750,000 square feet. Commence seeding operations within 7 days following completion of construction activities within an area. Initiate stabilization measures within 7 days for an area where construction activities will be temporarily or permanently ceased for 21 days or longer.
- 10) Coordinate the installation of all other permanent erosion control items with the grading and seeding operations. These items include, but are not limited to, asphalt gutter and riprap. Construct gutter work before or promptly after the seeding is performed. Place riprap at the ends of pipe immediately after the pipe is laid and promptly install riprap ditch checks after ditch work has been performed. Failure to adequately comply with the provisions as detailed above or any other required erosion control measures will result in stoppage of all contract operations (except erosion and sediment control measures) until corrective action has been taken. Additional sanctions may be invoked by the Scheming accordance with their authority.
- 11) Keep the following documents at the Contractor's field office from the start of construction until the site is finally stabilized:
 - a. Copy of the *CECP*,
 - b. Copies of all the co-permittee agreements and Contractor certification statements
 - c. Copy of the permit,
 - d. Letter from DHEC authorizing permit coverage, and A marked-up set of site plans.
- 12) When uniform perennial vegetation achieves a cover density of 70%, submit a *Notice of Termination (NOT)* to SCDHEC to terminate coverage. Include a signed statement with the *NOT* certifying that all work on the site has been completed in accordance with the *SWPPP* and the NPDES General Permit for all sites one acre or greater.

Fines assessed on the Spartanburg Water by SCDHEC as the result of the Contractor's non-compliance or violation of said permit provisions will be paid by the Department and will subsequently be deducted from any monies due or that may become due to the Contractor. In case no monies are due or available, the fines incurred will be charged against the Contractor's Surety.

10-06 EROSION CONTROL MATERIALS

A. Temporary Erosion and Sedimentation Control Materials:

1) Silt Fence:

- a) Silt fence shall be polymer type netting with a built-in cord running throughout the top edge of the fabric. Posts shall be either steel or pressure treated fir, southern pine or hemlock and shall be spaced not more than six feet on center. Silt fence shall be provided with netting to provide reinforcing when necessary. Silt fence fabric shall have an Equivalent Opening Size (EOS) of 40 to 100. Silt fence fabric shall have a maximum permeability of 40 gallons per minute per square foot.
- b) Silt fence fabric shall be equal to Mirafi 100X, Amoco 1380 or Exxon GTF-100 Series.

2) Hay bales shall be clean, seedfree cereal hay type.

3) Netting shall be ½-inch, galvanized steel, chicken wire mesh.

4) Filter stone shall be coarse aggregate conforming to South Carolina Department of Highways and Public Transportation, Aggregate Number CR-14.

5) Concrete block shall be hollow, non-load-bearing type.

6) Plywood shall be ¾-inch thick exterior type.

B. Rip-Rap:

1) Use only one method throughout the job.

2) Stone Rip Rap: Use sound, tough, durable stones resistant to the action of air and water. Slabby or shaley pieces will not be acceptable. Unless shown or specified otherwise, stone rip rap shall be Type 1 rip rap.

- a) Type 1 Rip Rap: Stone pieces shall range in weight from a minimum of 25 pounds to a maximum of 250 pounds. At least 60 percent of the stone pieces shall weigh more than 150 pounds. Rip rap shall conform to South Carolina Department of Highways and Public Transportation Standard Specifications 804.04.
 - b) Type 2 Rip Rap: Stone shall vary in size with no pieces weighing more than 150 pounds. At least 20 percent of the stone pieces, excluding spalls, shall weigh more than 60 pounds, and no more than 20 percent of the stone pieces, excluding spalls, shall weigh less than 25 pounds. Rip rap size shall conform to South Carolina Department of Highways and Public Transportation Standard Specifications 804.03.
 - c) 200 Pound Rip Rap: Minimum weight of individual stones shall be 200 pounds.
- 3) Sand-Cement Bag Rip Rap:
- a) The bags shall be of cotton, burlap or fiber reinforced paper capable of containing the sand-cement mixture without leakage during handling and placing. Bags previously used for sugar or any other material which will adversely affect the sand-cement mixture shall not be used. Capacity shall be not less than 0.75 cubic foot, nor more than two cubic feet.
 - b) Sand and Portland cement shall be mixed at the maximum ratio of 5:1 by weight and shall obtain a minimum compressive strength of 500 psi in seven days. For sand-cement bag rip rap, the amount of water used shall be just enough to make up the optimum moisture content of the aggregate and cement, as determined by ASSHTO T 134. When sand-cement rip rap is to be pre-bagged, the sand-cement shall be mixed dry, and after placing each course, the bags shall be wet until sufficient moisture is present for proper cement hydration.

C. Filter Fabric:

- 1) The filter fabric for use under rip rap shall be a monofilament, polypropylene woven fabric meeting the specifications as established by Task Force 25 for the Federal Highway Administration. The filter fabric shall have an equivalent opening size (EOS) of 70.
- 2) Filter fabric under rip rap shall be equal to Mirafi, Amoco or Exxon.

D. Concrete:

- 1) Concrete shall have a compressive strength of not less than 3,000 psi, with not less than 5.5 bags of cement per cubic yard and a slump between 3 and 5 inches. Ready-mixed concrete shall be mixed and transported in accordance with ASTM C 94. Reinforcing steel shall conform to the requirements of ASTM A 615, Grade 60.
- 2) Provide a concrete mix design for job mixed concrete for the Engineer's approval.

E. Gabions:

- 1) Gabions shall be large, multi-celled, rectangular wire mesh boxes filled with rip rap to prevent erosion, scour or sloughing of an embankment. Gabions shall have the following features.
 - a) Hexagonal mesh pattern, which under stress will deform but not break.
 - b) Triple twist, which will make the mesh non-raveling.
 - c) Reinforcing wires woven into each corner, which will increase the strength at the stress points and help the gabion retain its shape, during and after filling.
 - d) A diaphragm securely attached to the base, which will prevent the shifting of the stone, and at the same time, reinforce the gabion.
- 2) The wire mesh shall have an opening of approximately 3 x 4-inches and shall be a minimum 12 gauge. Wire mesh shall be galvanized.
- 3) Gabion baskets shall be 12 feet long x 3 feet high with four cells.
- 4) Gabions shall be equal to Maccaferri Gabions, Inc.

10-07 EROSION CONTROL INSTALLATION

A. General:

- 1) Standards: Provide all materials and promptly take all actions necessary to achieve effective erosion and sedimentation control in accordance with the standards listed above, local enforcing agency guidelines and these Specifications.

- 2) Implementation: The work shown on the approved plans and working drawings shall be considered a minimum requirement. What is shown shall not relieve the Contractor of the responsibility to actively take all steps necessary to control soil erosion and sedimentation.

B. Temporary Erosion and Sedimentation Control:

- 1) Temporary erosion and sedimentation control procedures should be initially directed toward preventing silt and sediment from entering the creeks. The preferred method is to provide an undisturbed natural buffer, extending a minimal 5 feet from the top of the bank, to filter the run-off. Should this buffer prove infeasible due to construction activities being too close to the creek, or if the amount of sediment overwhelms the buffer, the Contractor shall place silt fences to filter the run-off and, if necessary, place permanent rip rap to stabilize the creek banks. When excavation activities disturb the previously stated preventative measures, or if they are not maintained, or whenever the construction activities cross the creeks, check dams shall be installed downstream and within 200 feet of the affected area.
- 2) Silt dams, silt fences, traps, barriers, check dams, appurtenances and other temporary measures and devices shall be installed as indicated on the approved plans and working drawings, shall be maintained until no longer needed, and shall then be removed. Deteriorated hay bales and dislodged filter stone shall be replaced with new materials. Detention ponds, if constructed, shall be maintained in a condition ensuring that unfiltered water will not leave the pond.
- 3) Where temporary grassing is not appropriate, and where the Contractor's temporary erosion and sedimentation control practices are inadequate, the Engineer may direct the Contractor to provide temporary vegetative cover with fast growing seedings. Such temporary vegetative cover provided by the Contractor in compliance with the Best Management Practices of the Erosion and Sediment Control Practices for Developing Areas, specifically in the selection of species, planting dates and application rates for seedings, fertilizer and mulching, with the exception that kudzu shall not be permitted.
- 4) All erosion and sedimentation control devices, including check dams, shall be inspected by the Contractor at least weekly and after each rainfall occurrence and cleaned out and repaired by the Contractor as necessary.
- 5) Temporary erosion and sedimentation control devices shall be installed and maintained from the initial land disturbance activity until the satisfactory completion and establishment of permanent erosion control measures. At that time, temporary devices shall be removed.

C. Permanent Erosion Control: Permanent erosion control shall include:

- 1) Restoring the work site to its original contours, unless shown otherwise on the Drawings or directed by the Engineer.
- 2) Permanent vegetative cover shall be performed in accordance with "Grassing" below and prior sections 10-2 and 10-3.
- 3) Permanent stabilization of steep slopes and creeks shall be performed in accordance with "Rip Rap" of this Section.
- 4) Permanent erosion control measures shall be implemented as soon as practical after the completion of pipe installation or land disturbance for each segment of the Project. In no event shall implementation be postponed when no further activities related to pipe installation will impact that portion or segment of the Project. Partial payment requests may be withheld for those portions of the Project not complying with this requirement.

D. Grassing:

- 1) General:
 - a) All references to grassing, unless noted otherwise, shall relate to establishing permanent vegetative cover as specified herein for seeding, fertilizing, mulching, etc.
 - b) When final grade has been established, all bare soil, unless otherwise required by the Contract Documents, shall be seeded, fertilized and mulched in an effort to restore to a protected condition. Critical areas shall be sodded as approved or directed by the Engineer.
 - c) Specified permanent grassing shall be performed at the first appropriate season following establishment of final grading in each section of the site.
 - d) Permanent grassing shall be of perennial species.
- 2) Replant grass removed or damaged in residential areas using the same variety of grass and at the first appropriate season. Where sod is removed or damaged, replant such areas using sod of the same species of grass at the first appropriate season. Outside of residential or landscaped areas, grass the entire area disturbed by the work on completion of work in any area. In all areas, promptly establish successful stands of grass.

- 3) Grassing activities shall comply with the Best Management Practices of the Erosion and Sediment Control Practices for Developing Areas, specifically for the selection of species, with the exception that kudzu shall not be permitted, planting dates and application rates for seeding, fertilizer and mulching. Where permanent vegetative cover (grassing) cannot be immediately established (due to season or other circumstances) the Contractor shall provide temporary vegetative cover.

E. Rip-Rap:

- 1) Unless shown otherwise on the Drawings, rip rap shall be placed where ordered by the Engineer, at all points where banks of streams or drainage ditches are disturbed by excavation, or at all points where their natural vegetation is removed. Carefully compact backfill and place rip rap to prevent subsequent settlement and erosion. This requirement applies equally to construction along side of stream or drainage ditch as well as crossing a stream or drainage ditch.
- 2) When trenching across a creek, place rip rap a distance of 10 feet upstream and 10 feet downstream from the top of the trench excavation. Place rip rap across creek bottom, across creek tanks and extend rip rap placement five feet beyond the top of each creek bank.
- 3) Preparation of Foundations: The ground surface upon which the rip rap is to be placed shall be brought in reasonably close conformity to the correct lines and grades before placement is commenced. Where filling of depressions is required, the new material shall be compacted with hand or mechanical tampers. Unless at creek banks or otherwise shown or specified, rip rap shall begin in a toe ditch constructed in original ground around the toe of the fill or the cut slope. The toe ditch shall be two feet deep in original ground, and the side next to the fill or cut shall have that same slope. After the rip rap is placed, the toe ditch shall be backfilled and the excess dirt spread neatly within the construction easement.
- 4) Placement of Filter Fabric: The surface to receive fabric shall be prepared to a relatively smooth condition free from obstructions, depressions and debris. The fabric shall be placed with the long dimension running up the slope and shall be placed to provide a minimum number of overlaps. The strips shall be placed to provide a minimum width of one foot of overlap for each joint. The filter fabric shall be anchored in place with securing pins of the type recommended by the fabric manufacturer. Pins shall be placed on or within 3-inches of the centerline of the overlap. The fabric shall be placed so that the upstream strip overlaps the downstream strip. The fabric shall be placed loosely so as to give and therefore avoid stretching and tearing during placement of the stones. The stones shall be dropped no more than three feet

during construction. The fabric shall be protected at all times during construction. The fabric shall be protected at all times during construction from clogging due to clay, silts, chemicals or other contaminants. Any contaminated fabric or any fabric damaged during its installation or during placement of rip rap shall be removed and replaced with uncontaminated and undamaged fabric at no expense to the Owner.

- 5) Placement of Rip Rap: The rip rap shall be placed on a 6-inch layer of soil, crushed stone or sand overlaying the filter fabric. This 6-inch layer shall be placed to maximize the contact between the soil beneath the filter fabric and the filter fabric. Rip rap shall be placed with its top elevation conforming with the natural slope of the stream bank and stream bottom.
 - a) Stone Rip Rap: Stone rip rap shall be dumped into place to form a uniform surface and to the thickness specified on the Drawings. The thickness tolerance for the course shall be 6-inches and +12-inches. If the Drawings or Bid do not specify a thickness, the course shall be placed to a thickness of not less than 18-inches.
 - b) Sand-Cement Bag Rip Rap: The bags shall be uniformly filled to the maximum capacity which will permit satisfactory tying. The bagged rip rap shall be placed by hand with the tied ends facing the same direction, with close, broken joints. When directed by the Engineer or required by the Drawings, header courses shall be placed. After placing, the bags shall be rammed or packed against one another to produce the required thickness and form a consolidated mass. The top of each bag shall not vary more than 3-inches above or below the required plane.
- 6) Gabions:
 - a) Where, in the opinion of the Engineer, the slope of the banks of the stream is too steep to support rip rap, gabions shall be provided in lieu of rip rap.
 - b) Gabions shall be assembled according to the manufacturer's recommendations. Laterally adjoining gabions shall be wired together by vertical edges. Vertically adjoining gabions shall be wired together along the front and back edges. Rip rap size for gabion construction shall be large enough not to fall out of gabions, but small enough to form three layers. Gabions shall be placed over a 6-inch layer of soil, crushed stone or sand overlaying a filter fabric. This 6-inch layer shall be placed to maximize the contact between the soil beneath the filter fabric and filter fabric.

SECTION 11

WARRANTY

11-01 GENERAL WARRANTY FOR ONE YEAR AFTER COMPLETION:

For a period of at least one year after the Spartanburg Water Systems' (SWS) Final Inspection, the Contractor warrants the fitness and soundness of all work done and materials and equipment put in place under the contract and neither the final certificate of payment nor any provision in the contract documents nor partial or entire occupancy of the premises by the Owner shall constitute an acceptance of work not done in accordance with the contract documents or relieve the Contractor of liability in respect to any express warranties of responsibility for faulty materials or workmanship. The Contractor shall remedy any defects in the work and pay for any damage to other work resulting therefrom, which shall appear within a period of one year from the date of final acceptance of the work unless a longer period is specified.

A second SWS inspection will be conducted 10 months after the date of acceptance of the project. The Owner will be notified of observed defects after the "10-month" inspection is conducted. The contractor will correct any defects prior to the expiration of the one-year warranty.

- A. If in fulfilling the requirements of the contract or of any guarantee embraced therein or required thereby, the Contractor disturbs any work guaranteed under another contract, he shall restore such disturbed work to a condition satisfactory to the Engineer, and shall guarantee such restored work to the same extent as it was guaranteed under such other contract.
- B. If the Contractor, after notice, fails to proceed promptly to comply with the terms of the guarantee, the Owner may have the defects corrected and the Contractor and his Surety shall be liable for all expenses incurred.
- C. All special guarantees applicable to definite parts of the work that may be stipulated in the specifications or other papers forming a part of the Contract shall be subject to the terms of this paragraph during the first year of the life of such special guarantee.

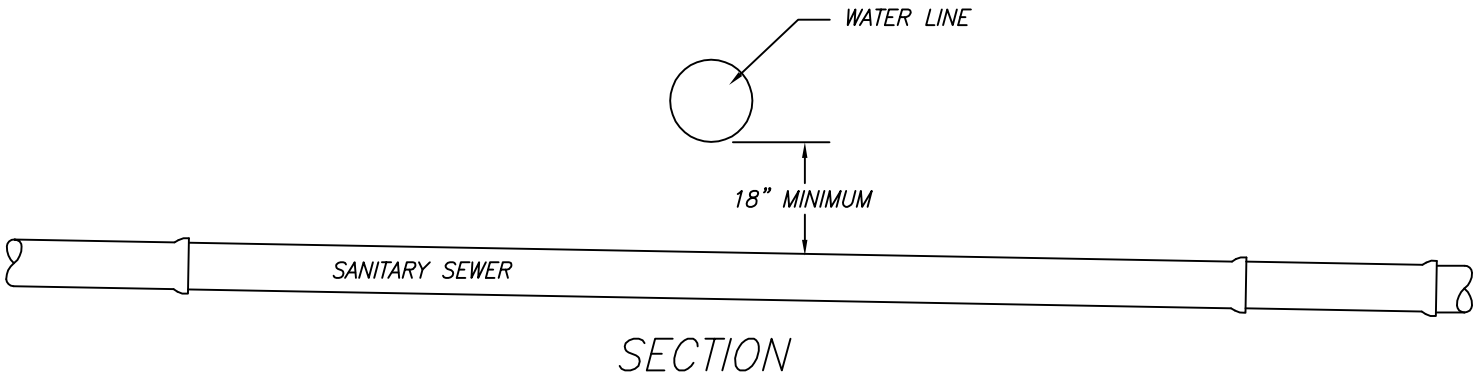
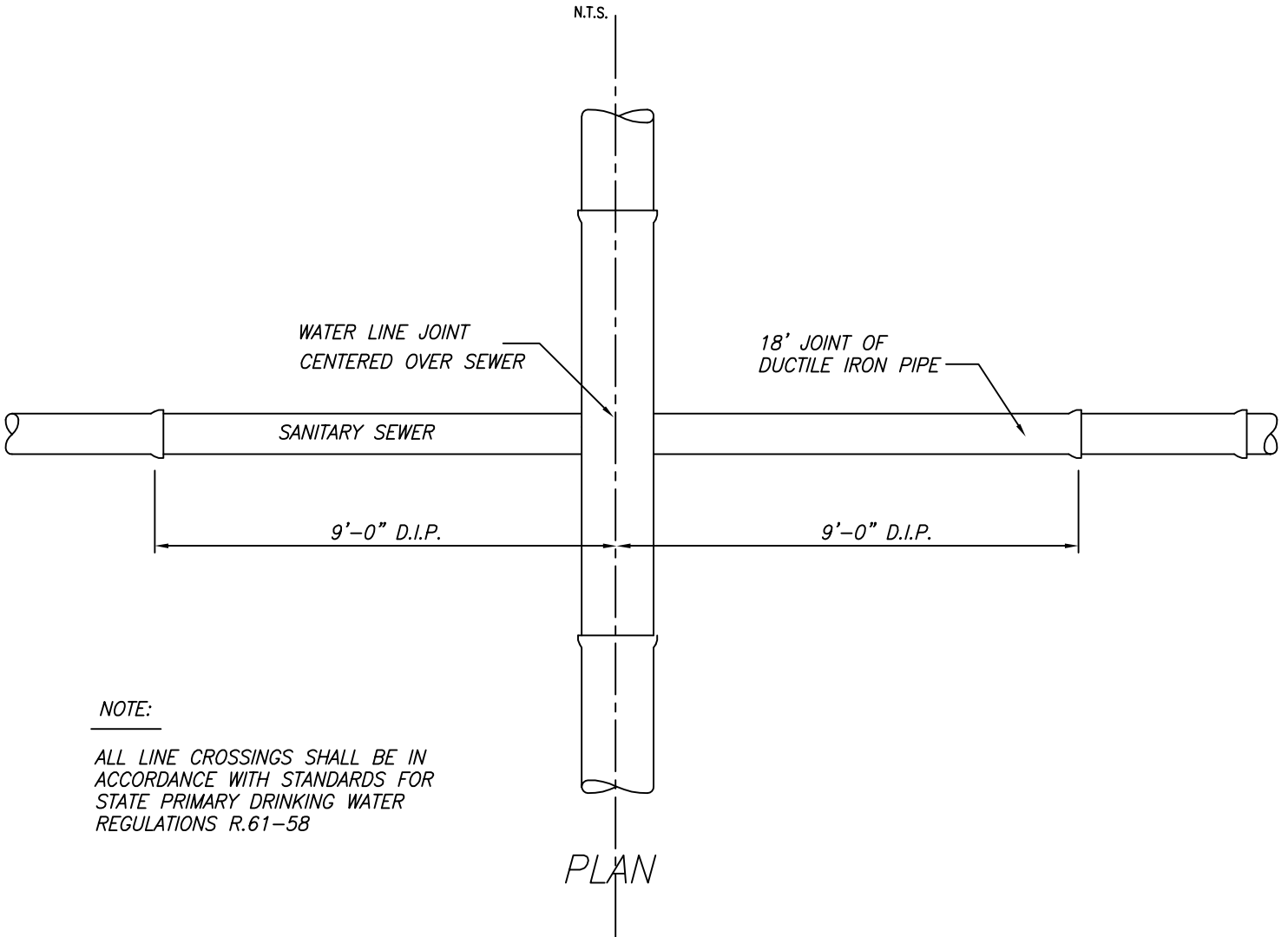
11-02 MAINTENANCE:

In addition to the guarantee stipulated in the Contract, each Contractor shall fully maintain all work performed under his contract for sixty (60) days after final completion and acceptance of the work. The retained percentage of contract payments shall not be due until after the 60 days maintenance period, except that the Owner may at his discretion

release such retainer earlier.

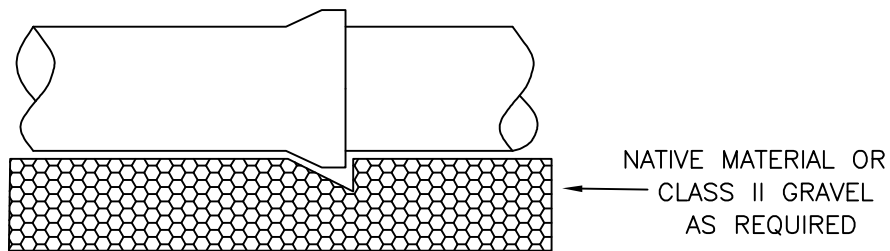
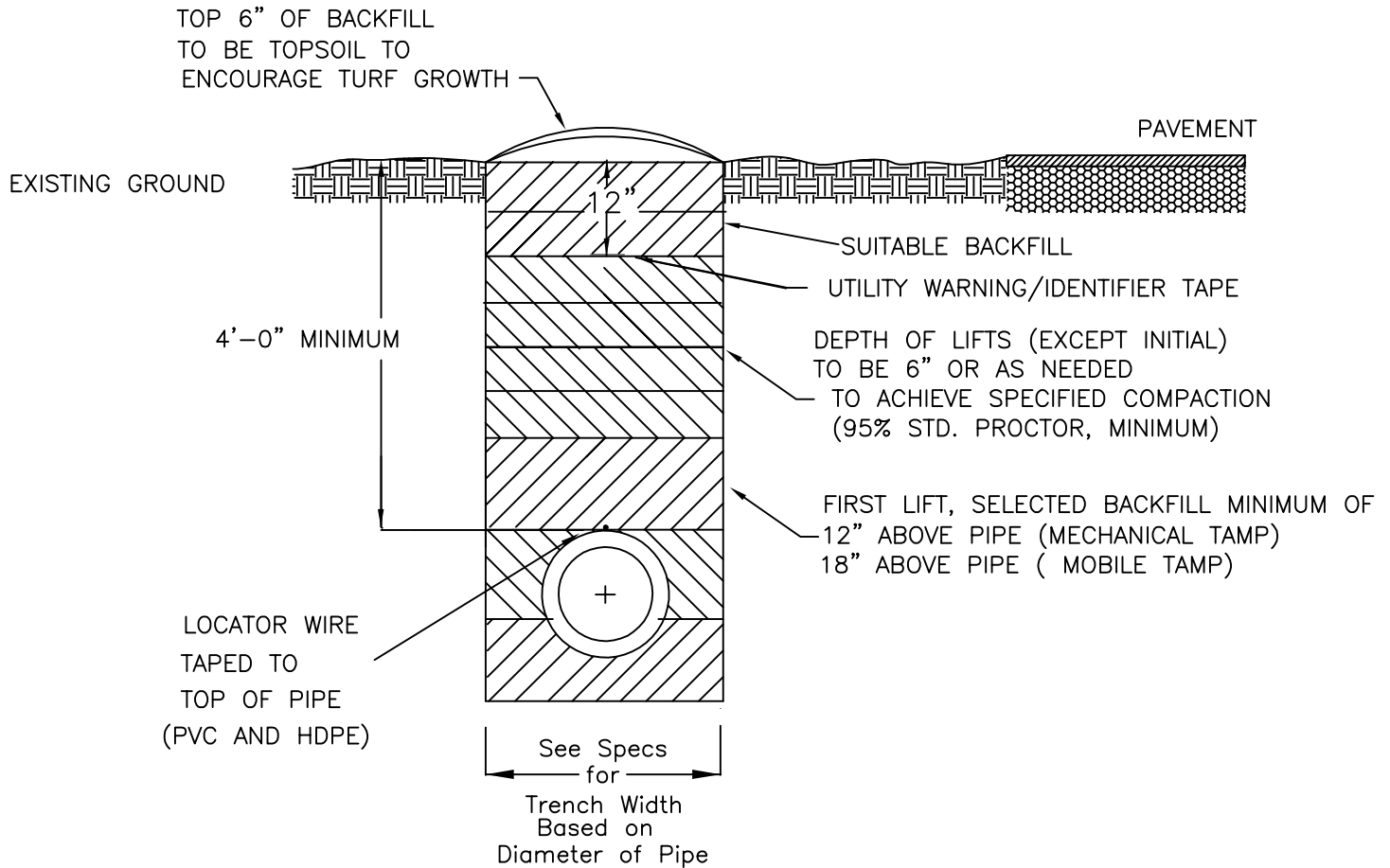
CONSTRUCTION DETAIL NO. 1

SANITARY SEWER AND WATER LINE/
CROSSING DETAIL



CONSTRUCTION DETAIL NO. 2

TYPICAL TRENCHING DETAIL

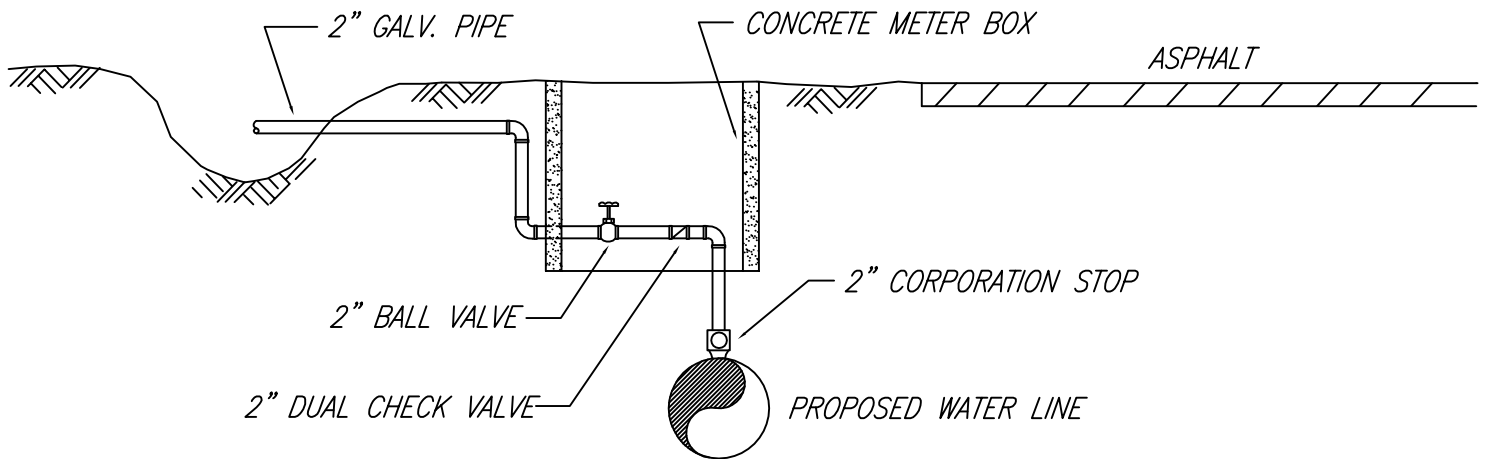


BELL HOLES REQUIRED. PIPE TO BE
 CONTINUOUSLY SUPPORTED ALONG
 LENGTH OF BARREL EXCEPT AT BELL

CONSTRUCTION DETAIL NO. 3

PERMANENT "BLOW-OFF" DETAIL

N.T.S.



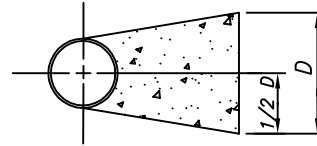
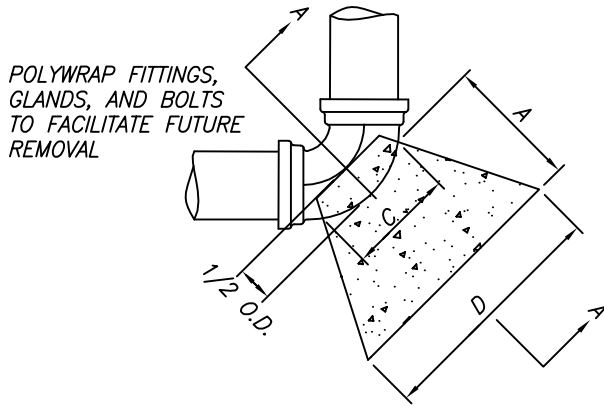
USE CHART BELOW TO
DETERMINE BLOW-OFF SIZE:

<u>PIPE</u>	<u>B.O.</u>
2"	3/4"
2 1/2"	1"
3"	1 1/4"
4"	1 1/2"
6"	2"
8"	2 1/2"

FOR LINES LARGER THAN 8"
USE FIRE HYDRANT

CONSTRUCTION DETAIL NO. 4 CONCRETE THRUST BLOCK DETAIL

N.T.S.



SECTION A-A

MINIMUM DIMENSIONS FOR CONCRETE BLOCKING

BEND	SIZE	DIMENSIONS				CY
		A	B	C	D	
11 1/4°	6"	1'-0"	2'-0"	4"	1'-0"	0.05
	8"	1'-0"	2'-0"	5"	1'-0"	0.05
	12"	1'-0"	2'-0"	7"	1'-0"	0.05
	16"	1'-0"	2'-0"	1'-0"	2'-0"	0.22
	20"	2'-0"	3'-0"	1'-3"	2'-0"	0.32
22 1/2°	6"	1'-0"	2'-0"	6"	1'-0"	0.05
	8"	1'-0"	2'-0"	7"	1'-0"	0.05
	12"	1'-0"	2'-0"	10"	2'-0"	0.11
	16"	2'-0"	4'-0"	1'-0"	2'-0"	0.37
	20"	2'-0"	4'-0"	1'-3"	3'-0"	0.58
45°	6"	1'-0"	2'-0"	6"	1'-0"	0.05
	8"	1'-0"	2'-0"	7"	2'-0"	0.10
	12"	2'-0"	3'-0"	11"	3'-0"	0.44
	16"	3'-0"	5'-0"	1'-0"	3'-0"	1.00
	20"	4'-0"	6'-0"	1'-3"	4'-0"	2.15
90°	6"	1'-0"	2'-0"	1'-0"	2'-0"	0.11
	8"	2'-0"	3'-0"	1'-2"	2'-6"	0.37
	12"	2'-0"	4'-0"	2'-0"	4'-0"	0.84
	16"	4'-0"	6'-0"	2'-2"	4'-9"	2.84
	20"	4'-0"	7'-0"	2'-8"	6'-4"	4.51
TEES & PLUGS	6"	1'-0"	2'-0"	10"	1'-6"	0.08
	8"	1'-9"	2'-6"	1'-1"	2'-0"	0.23
	12"	2'-6"	3'-9"	1'-7"	3'-0"	0.75
	16"	3'-0"	5'-0"	2'-2"	4'-0"	1.59
	20"	4'-0"	6'-0"	2'-8"	5'-0"	3.21

FOR 3" & 4" USE 6" SIZES

DESIGN DATA:

- DIMENSIONS OF THRUST BLOCK IN FEET BASED ON 2000 POUNDS PER SQUARE FOOT SOIL BEARING PRESSURE AND 200 POUNDS PER SQUARE INCH TEST PRESSURE. ACTUAL INSIDE DIAMETER OF DUCTILE IRON PIPE, CLASS 51 USED AS STANDARD.
- CONCRETE SHALL HAVE A COMPRESSIVE STRENGTH OF 3000 P.S.I. AT 28 DAYS. HIGH EARLY CONCRETE SHALL BE USED.

NOTE

SOIL CONDITIONS SHALL BE VERIFIED BY THE S.S.S.D. INSPECTOR BEFORE DESIGN IS IMPLEMENTED.

CONSTRUCTION DETAIL NO. 5

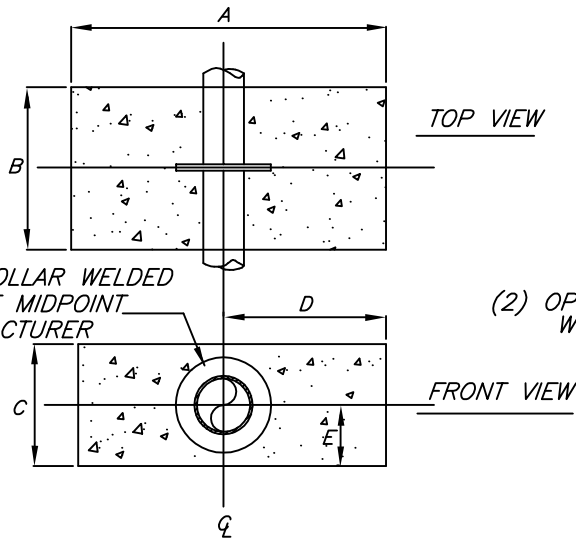
TYPICAL CONCRETE COLLAR DETAIL

(WITH WELD-ON THRUST COLLAR OR MEGA-LUGS)

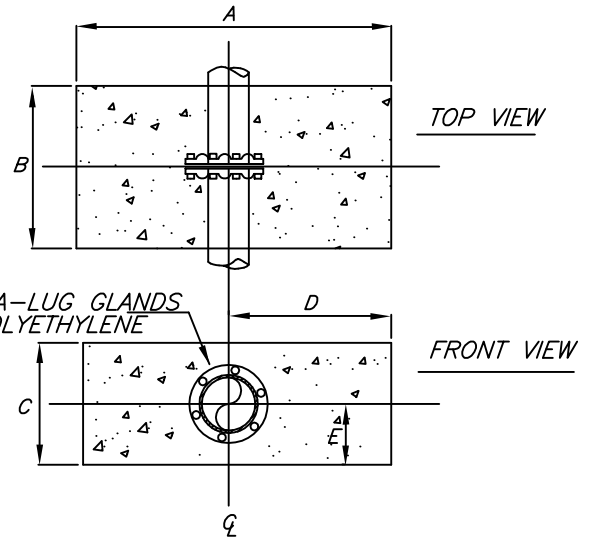
N.T.S.

NOTES:

- 1) DIMENSIONS OF CONCRETE COLLARS BASED ON 2000 P.S.F. SOIL BEARING.
- 2) SPECIFICATIONS OF MEGA-LUGS SHALL CONFORM TO THE PIPE MANUFACTURERS SUPPLIED SHOP DRAWINGS, WHICH SHALL INDICATE A THRUST RATING NOT LESS THAN THAT INCLUDED IN THE CHART BELOW.
- 3) DIMENSIONS OF WELDED STEEL OR DUCTILE IRON THRUST COLLARS SHALL CONFORM TO THE PIPE MANUFACTURER'S SUPPLIED SHOP DRAWINGS WHICH SHALL INDICATE A THRUST RATING NOT LESS THAN THAT INCLUDED IN THE CHART BELOW.
- 4) CONCRETE SHALL HAVE A COMPRESSIVE STRENGTH OF 3,000 P.S.I. AT 28 DAYS. "HIGH EARLY" CONCRETE SHALL BE USED.
- 5) SOIL CONDITIONS SHALL BE VERIFIED BY THE S.W.S. INSPECTOR PRIOR TO CONSTRUCTION.
- 6) FOR 3" PIPE USE 4" DIAMETER THRUST RATING.



DETAIL "A"



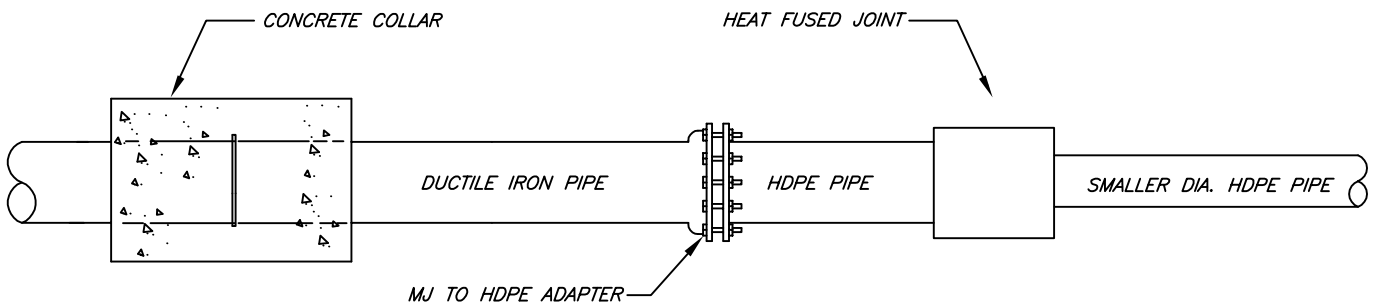
DETAIL "B"

PIPE SIZE	A	B	C	D	E	CY.	WELDED THRUST COLLAR MINIMUM RATING
4"	3'-0"	2'-0"	1'-6"	1'-6"	0'-8"	0.33	4,500 lbs
6"	4'-0"	2'-0"	1'-6"	2'-0"	0'-9"	0.44	9,300 lbs
8"	4'-6"	2'-0"	2'-0"	2'-3"	1'-0"	0.67	16,000 lbs
12"	6'-0"	2'-0"	3'-0"	3'-0"	1'-6"	1.33	34,000 lbs
16"	6'-6"	2'-0"	4'-6"	3'-3"	2'-3"	2.17	59,000 lbs

CONSTRUCTION DETAIL NO. 6

DIP TO HDPE TRANSITION

N.T.S.



NOTE:

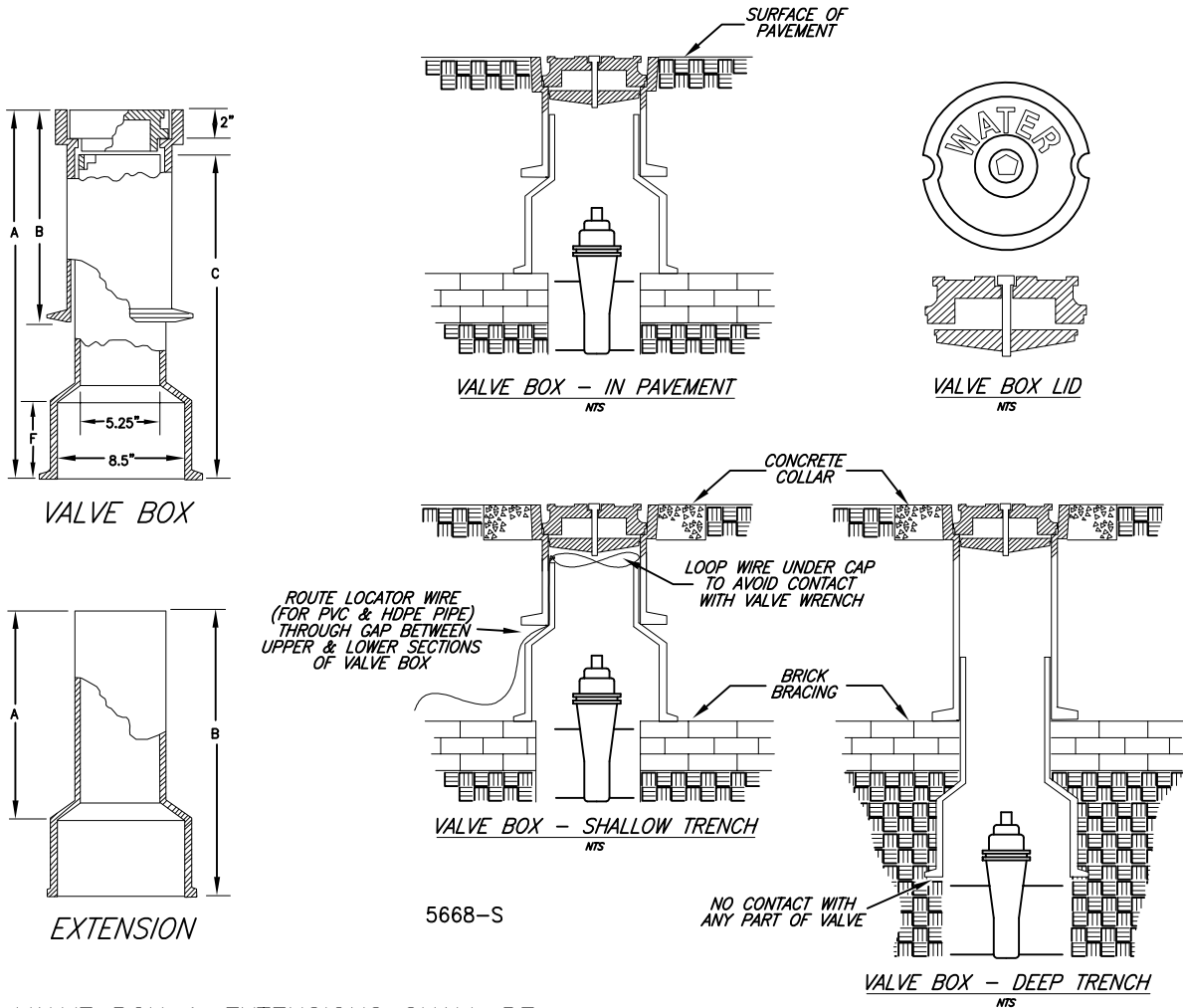
INSTALLATIONS OF THE TYPE SHOWN ABOVE
MUST BE DESIGNED BY A LICENSED ENGINEER AND MUST
INCLUDE CONSIDERATION FOR THE FOLLOWING CONDITIONS:

- SOIL TYPE
- PIPE SIZE AND TYPE
- EXCAVATION DEPTH
- TEST PRESSURE
- OPERATING PRESSURE

THE DESIGN MUST BE SUBMITTED TO THE SPARTANBURG
WATER ENGINEERING DEPT FOR APPROVAL.

CONSTRUCTION DETAIL NO. 7 VALVE BOX DETAILS

NTS



VALVE BOX & EXTENSIONS SHALL BE BINGHAM & TAYLOR. SEE CHART BELOW FOR SIZES

Size No.	Extension Range-A	Top Section No.	Section Dim. B	& Cover Wt.	Bottom Section No.	Section Dim. C	Wt.	Height Bell-F	Wt.
5461-S	18-24	54-S	10.5	35.0	61-S	15.0	24.0	6.5	59.0
5561-S	23-29	55-S	15.5	42.0	61-S	15.0	24.0	6.5	65.1
5562-S	27-36	55-S	15.5	42.0	62-S	24.5	33.0	6.5	75.0
5564-S	39-48	55-S	15.5	42.0	64-S	36.0	46.0	8.5	88.0
5662-S	38-48	56-S	26.5	57.0	62-S	24.5	33.0	6.5	90.0
5664-S	39-60	56-S	26.5	57.0	64-S	36.0	46.0	8.5	103.0
5468-S	63-68	Longer Boxes Made By Adding Extensions to No.5664-S							
5568-S	63-73								
5668-S	63-84								

VALVE BOXES

Size No.	Increases Length A	Overall Length B	Wt.
63-E	9.0	13.0	20.0
64-E	14.0	18.0	23.0
65-E	20.0	24.0	31.5
66-E	24.0	30.0	36.5
67-E	30.0	36.0	46.0

EXTENSIONS



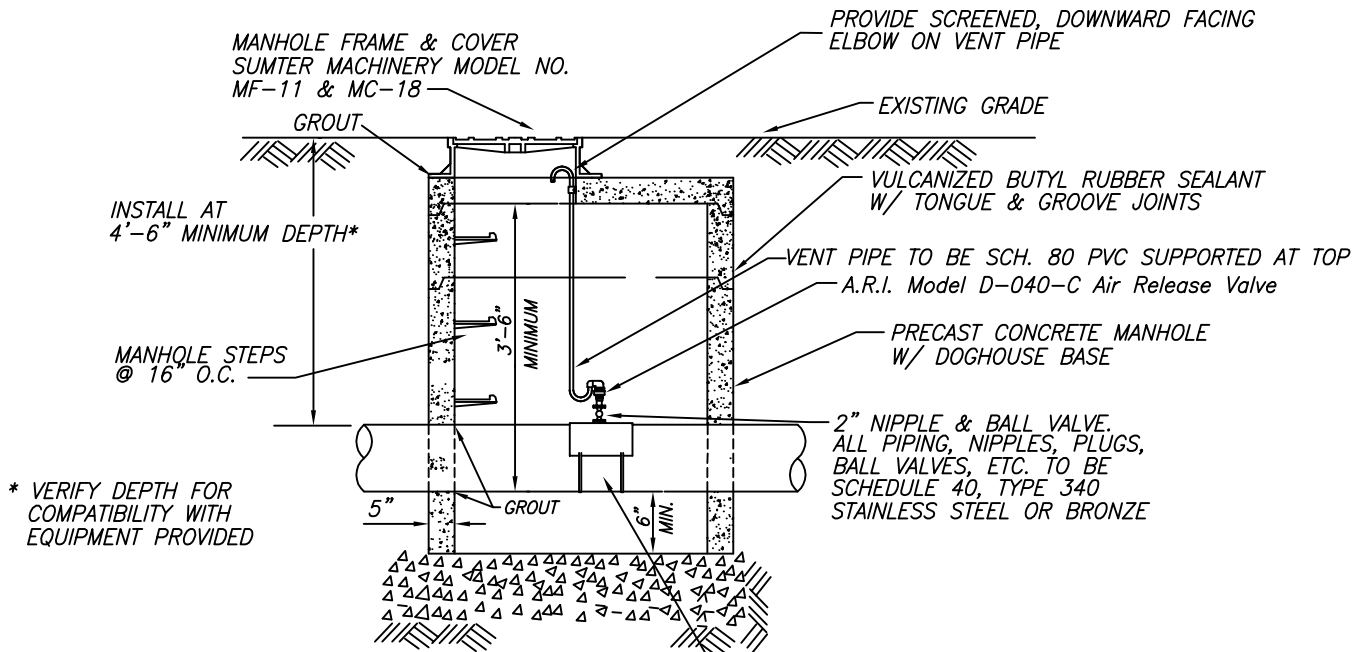
TYPICAL
VALVE BOX

SCALE: NONE REVISION DATE: JULY 6, 2009

CONSTRUCTION DETAIL NO. 8

WATER MAIN AIR RELEASE VALVE AND MANHOLE

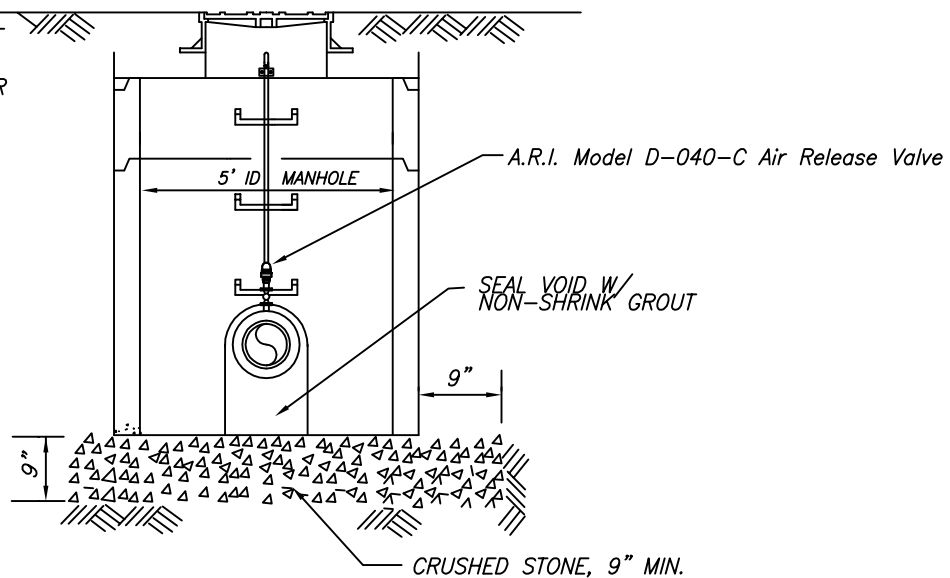
N.T.S.



DUCTILE IRON SERVICE
SADDLE TAPPED 2" NPT
W/ DOUBLE STAINLESS
STEEL STRAP-CARRIER
PIPE DRILLED 2". USE
PVC SERVICE SADDLE
WHEN TAPPING PVC.

IN SOME CASES, THE DESIGN ENGINEER
MAY SUBMIT AN ALTERNATE DESIGN
WHICH INCORPORATES A REMOTE
MOUNTED AIR RELEASE VALVE WHICH
IS CONNECTED TO THE WATER MAIN
BY AN APPROPRIATELY-SIZED PIPING
ARRANGEMENT, COMPLETE WITH
ISOLATION VALVES AND VAULT.

ANY ALTERNATE DESIGN SHALL
COMPLY WITH ALL REQUIREMENTS OF
SCDHEC R.61-58 AND SHALL BE
SUBMITTED TO SPARTANBURG WATER
FOR APPROVAL.

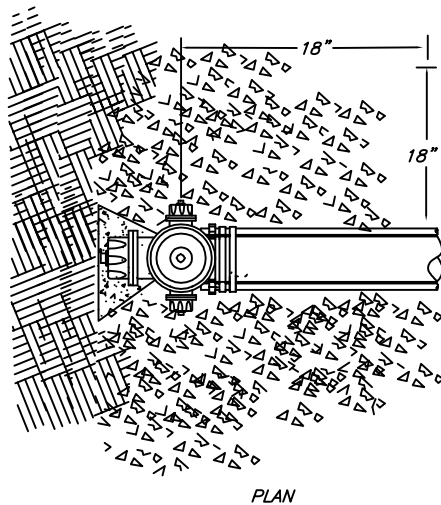
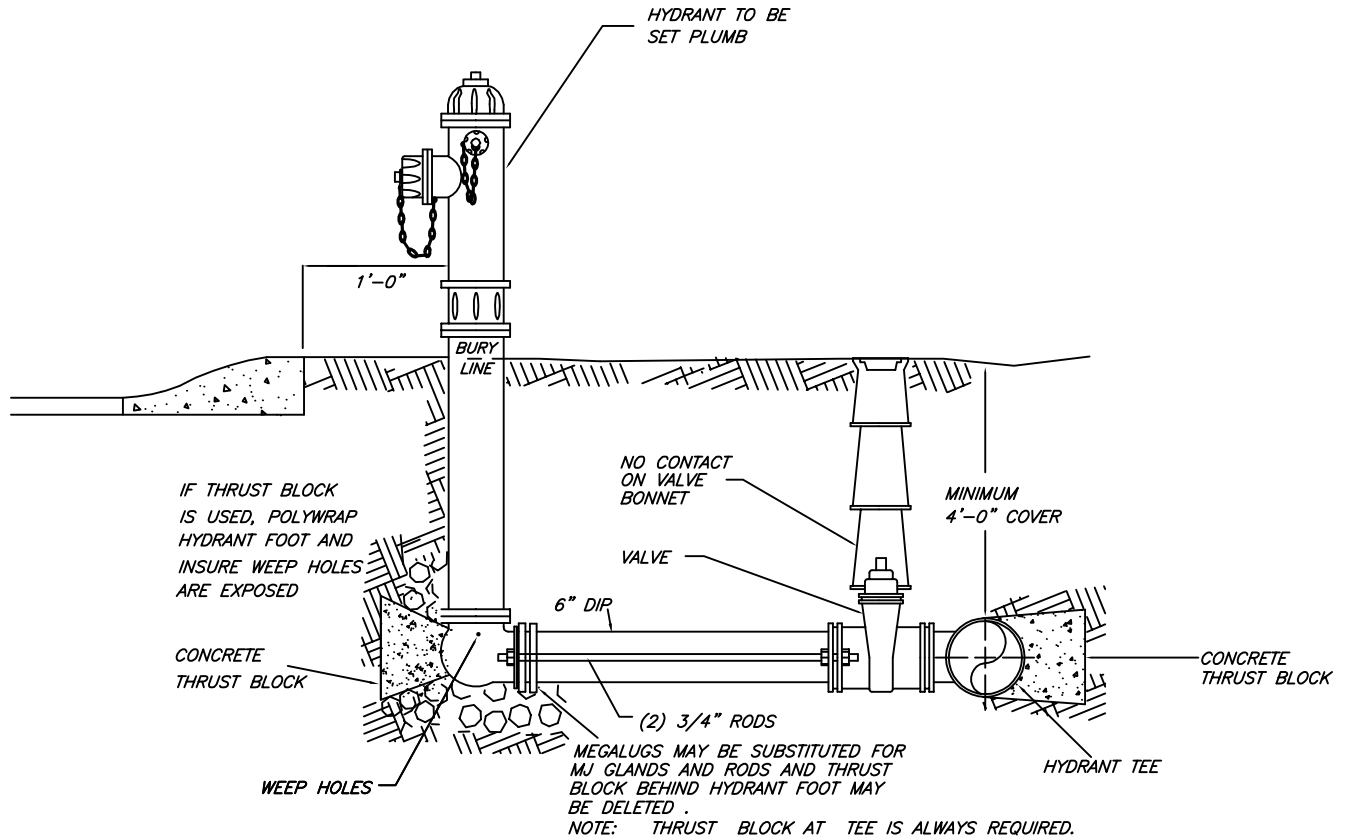


CONSTRUCTION DETAIL NO. 9

TYPICAL FIRE HYDRANT INSTALLATION WITH HYDRANT TEE

(ARRANGEMENT WITH MJ TEE OR TAPPING SLEEVE AND VALVE SIMILAR)

N.T.S.

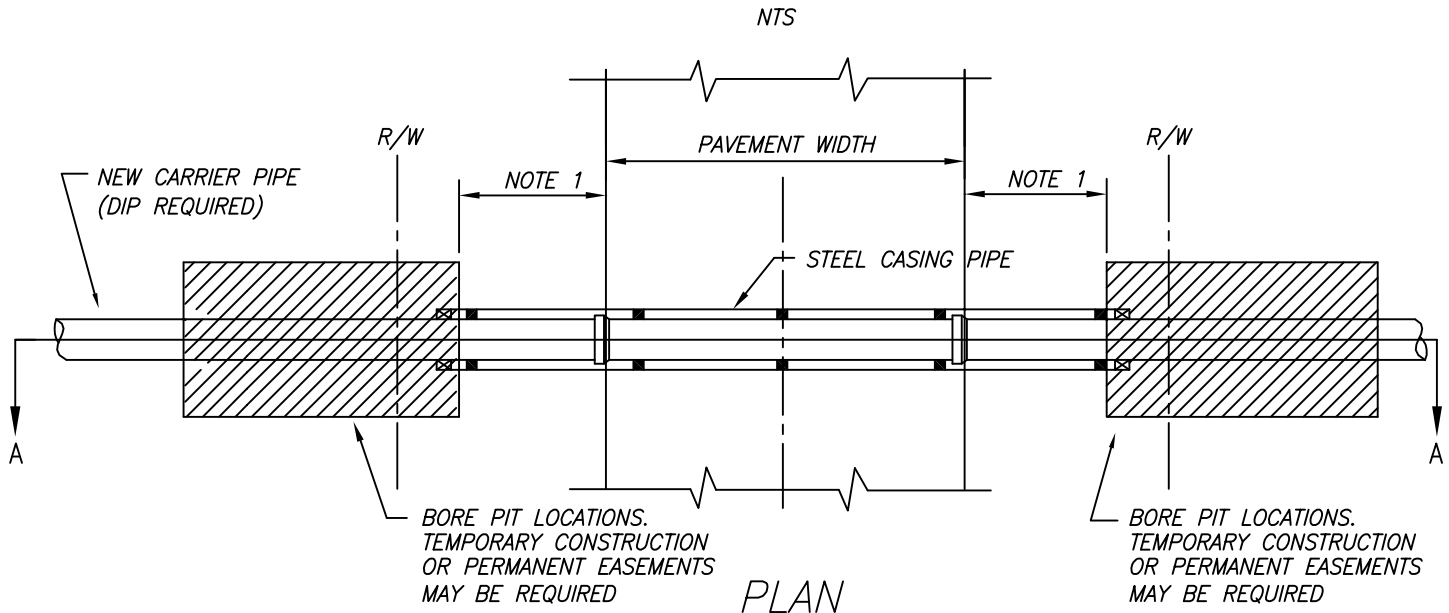


NOTES

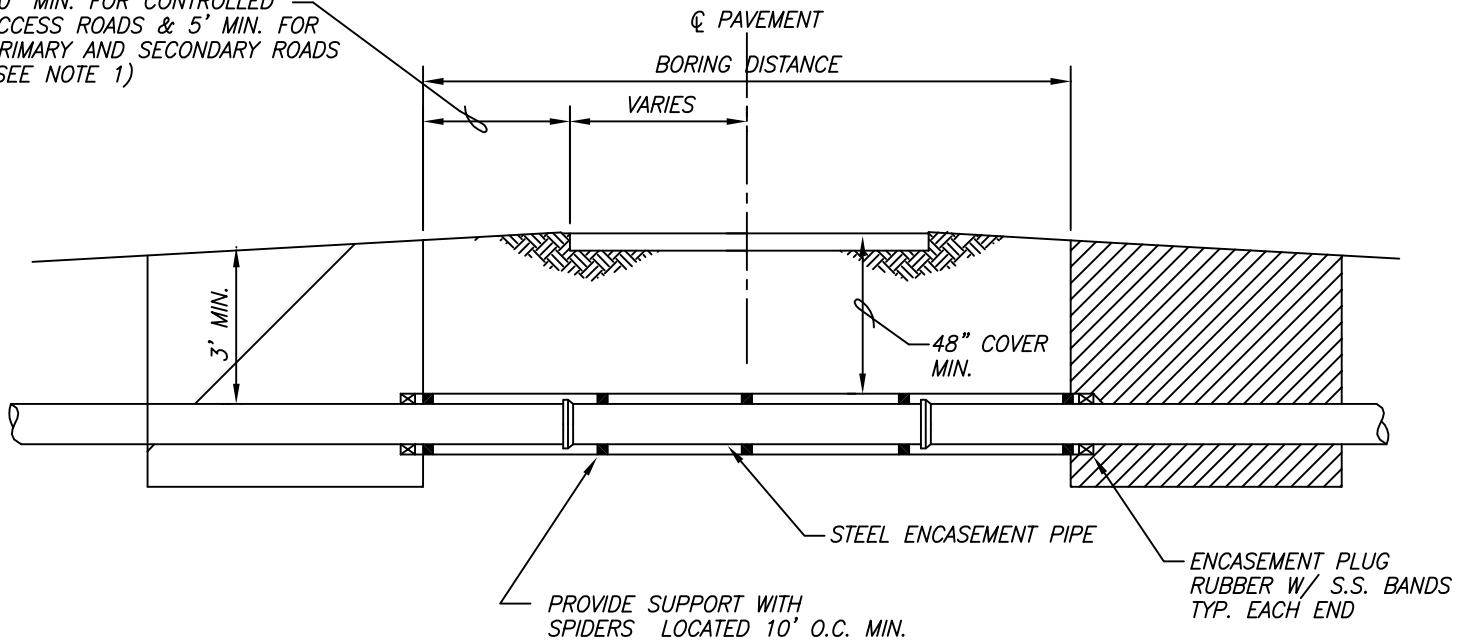
- 1) RODS TO BE MADE OF STEEL HAVING A TENSILE STRENGTH OF 95,000 P.S.I.
- 2) AFTER INSTALLATION, ALL STEEL COMPONENTS, INCLUDING RODS, STRAPS, NUTS, BOLTS, COUPLINGS AND CLAMPS SHALL BE COATED WITH 17.5 MILS OF KOPPERS BITUMASTIC 300-M OR EQUAL.

CONSTRUCTION DETAIL NO. 10

CASING PIPE BORE AND JACK DETAIL



30" MIN. FOR CONTROLLED ACCESS ROADS & 5' MIN. FOR PRIMARY AND SECONDARY ROADS (SEE NOTE 1)

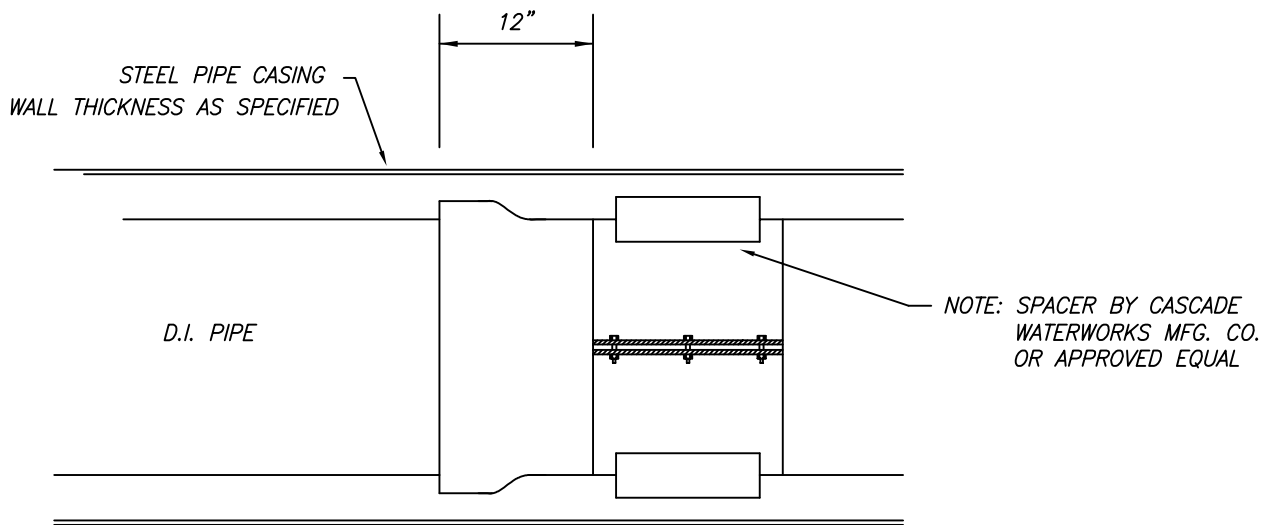
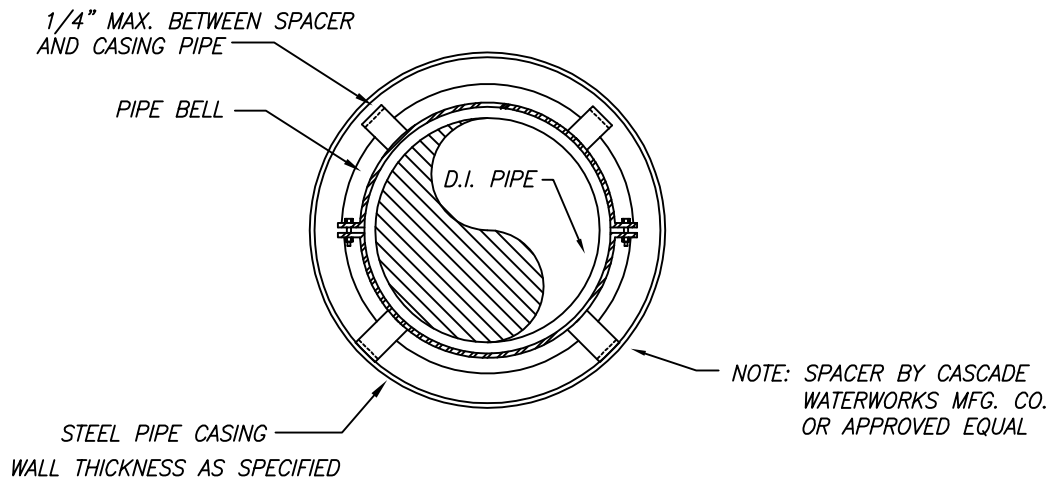


NOTES:

1. THE NEAR EDGE OF THE PIT CAN BE NO CLOSER TO THE EDGE OF THE TRAVELWAY THAN ITS DEPTH BELOW THE SURFACE OF THE TRAVELWAY UNLESS BULKHEADED.
2. ALL PIPE WITHIN AND TO 5' FROM THE CASING TO BE D.I.P.
3. ALL PIPING IN CASING SHALL UTILIZE LOCKING GASKETS SUPPLIED BY THE PIPE MANUFACTURER.

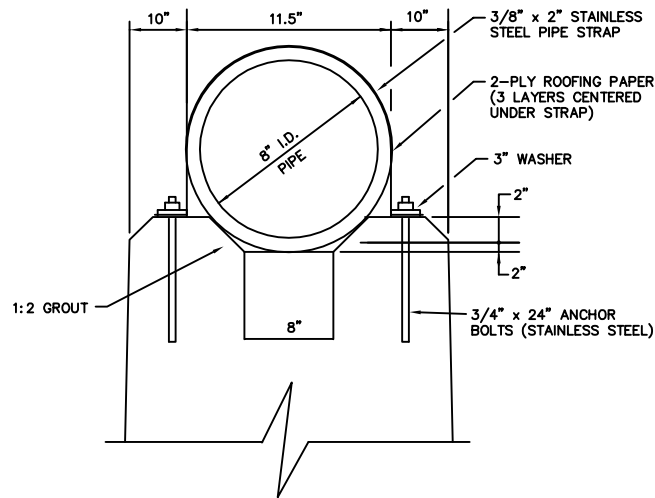
CONSTRUCTION DETAIL NO. 11
CARRIER PIPE INSTALLATION IN CASING

N.T.S.



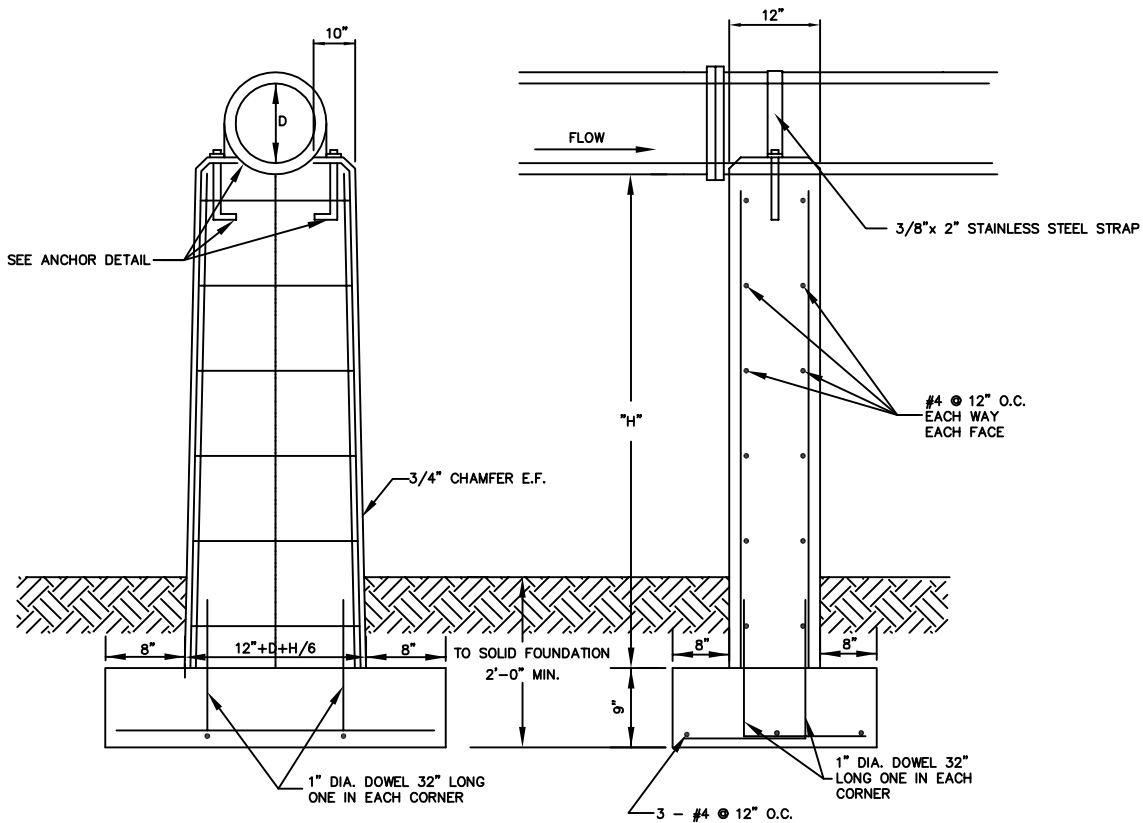
CONSTRUCTION DETAIL NO.12 PIPE SUPPORTED ON CONCRETE PIERS

NOT TO SCALE



ANCHOR DETAIL

NOT TO SCALE



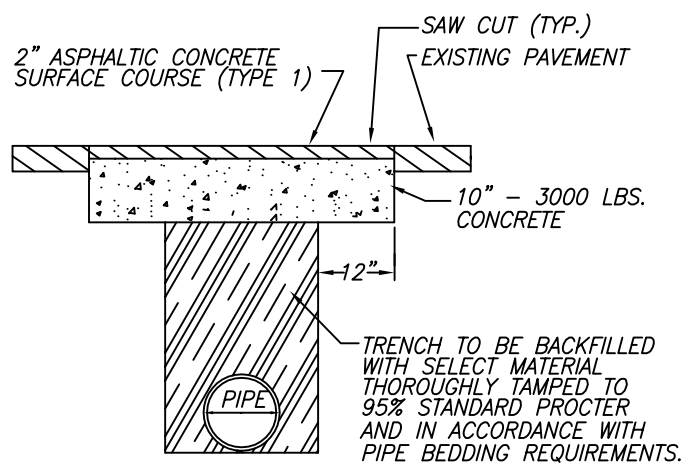
NOTE: ALL HARDWARE TO BE HOT DIPPED GALVANIZED

NOTE: THIS CONSTRUCTION DETAIL IS A SUGGESTED DESIGN ONLY AND DOES NOT RELIEVE THE DESIGN ENGINEER FROM THE RESPONSIBILITY AND OBLIGATION TO CONSIDER ALL ISSUES RELATED TO THE PROPER DESIGN OF ALL STRUCTURES AND SYSTEMS AND COMPLIANCE WITH ALL APPLICABLE REGULATIONS AND STANDARDS. THE DESIGN ENGINEER SHALL SUBMIT ALL PIER SUPPORTED PIPING SYSTEMS TO THE SPARTANBURG WATER SYSTEM ENGINEERING DEPARTMENT FOR APPROVAL.

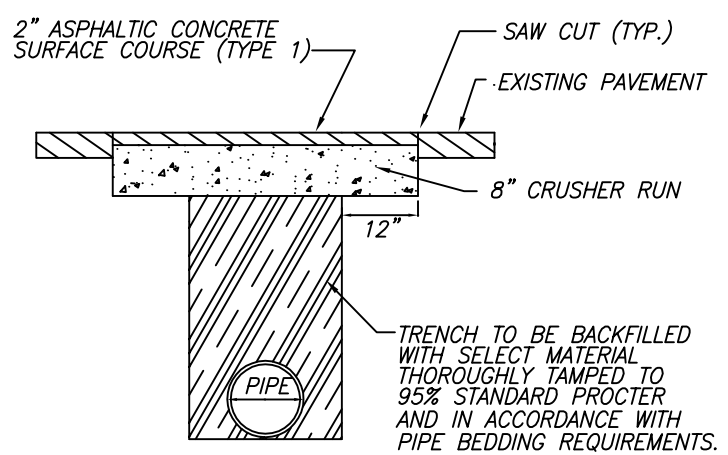
CONSTRUCTION DETAIL NO. 13

TYPICAL PAVEMENT REPAIR DETAILS

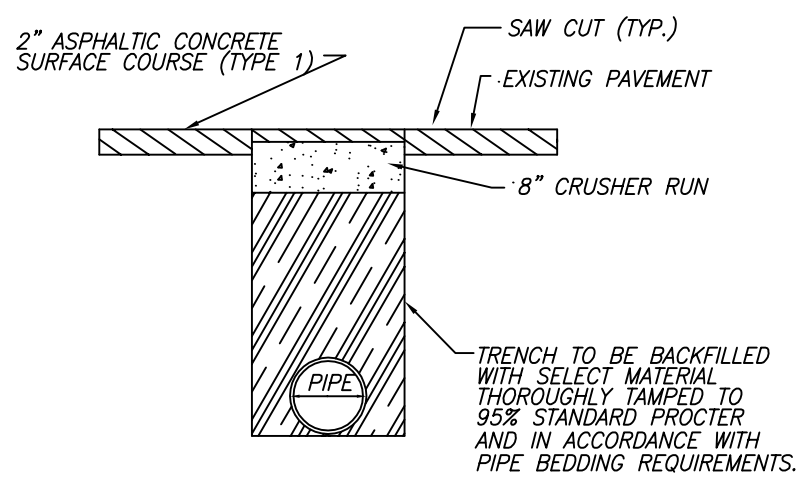
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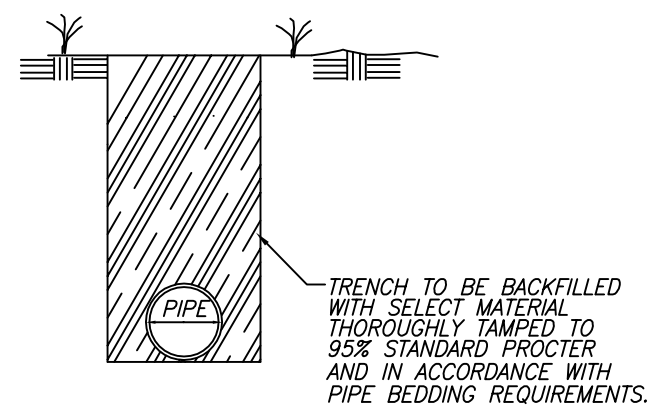
HIGH VOLUME



LOW VOLUME



DRIVEWAYS



TYPICAL TRENCH

***TECHNICAL
SPECIFICATIONS
FOR
SANITARY SEWER
SYSTEM IMPROVEMENTS***



SPARTANBURG SANITARY SEWER DISTRICT

SPARTANBURG, SOUTH CAROLINA

June 2009

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SECTION 1

GENERAL PROVISIONS

- 1-01 INTENT AND SCOPE OF PLANS AND SPECIFICATIONS: It is the intent of the plans and specifications that one shall supplement the other, but not necessarily duplicate one another. Any work called for in one and omitted in the other shall be executed as if called for in both in order that the work be fully completed according to the complete design as determined by the Consulting Engineer (Engineer) and approved by the Spartanburg Sanitary Sewer District's Project Manager. Should any discrepancy appear in or between the drawings and specifications, the specifications will govern. It is to be understood that the work described in the specifications and shown on the plans shall be complete in every detail whether every necessary item is particularly mentioned or not and the Contractor shall be held to provide all items of labor and materials necessary for the satisfactory completion of the indicated work. Any provisions contained in the specifications or shown on the standard drawings which are not applicable to the work pertaining to this project shall be disregarded. All testing shall be accomplished in accordance with these specifications and only at the discretion of the Spartanburg Sanitary Sewer District Project Manager shall any portions of the testing be waived.
- A. The Contractor shall check all dimensions, elevations, quantities and instructions shown on the plans or given in the specifications and shall notify the Engineer should any discrepancy of any kind be found in the plans, specifications or conditions at the site. He will not be allowed to take advantage of any discrepancy, error or omissions. If any discrepancy is discovered, the Engineer with Spartanburg Sanitary Sewer District's approval will issue full instructions pertaining thereto and the Contractor shall carry out these instructions as if originally specified.
- B. The Specifications are divided into Sections for convenience of reference. The materials, work, etc., mentioned or specified in one part are not intended to be limited to that part only, but shall be applied with equal force to any other part or division of work where such materials, work, equipment, etc., are mentioned or required to properly provide for acceptable work according to the true intent of the drawings and specifications. Reference to standard specifications (ASTM, AWWA, ANSI, etc.), national codes, local or state codes and laws and ordinances shall mean the latest edition of said document in effect at the time of taking bids unless specifically stated otherwise.
- C. Drawings shall be followed in construction of the work and all dimensions and elevations shown on the Plans shall be accurately maintained. Scaled measurements will not be allowed and no work shall be performed when dimensions or elevations are not indicated until such dimensions or elevations are obtained from the Engineer.

1-02 MATERIALS AND WORKMANSHIP: It is the intent of these Specifications that the Contractor shall furnish first-class materials and do all work in a first-class manner so that the completed job shall be thoroughly satisfactory in every respect. To this end, the Contractor shall utilize all of his construction experience and shall consult with the Engineer regarding items in the Plans and Specifications which may be altered to the benefit of the work.

A. Materials, Services and Facilities: It is understood that except as otherwise specifically stated in the specifications, the Contractor shall provide and pay for all materials, labor, tools, equipment, water, light, power, transportation, superintendence, temporary construction of every nature, and all other services and facilities of every nature whatsoever necessary to execute, complete and deliver the work within the specified time.

Materials must be approved for use before being purchased by the Contractor. The Contractor shall submit to the Engineer a list of such materials or products, and the shop drawings, together with such samples as may be necessary for determination of their acceptability and obtain material/product approval. No request for payment will be approved until this list has been received and approved by the Spartanburg Sanitary Sewer District Engineering Department. Delay caused by obtaining approvals for substitute materials will not be considered justifiable grounds for an extension of construction time.

B. Shop Drawings: Shop Drawings are original drawings prepared by the Contractor, or a subcontractor or supplier, which illustrate some portion of the work and show fabrication, layout, and setting or erection details. Shop drawings shall also include manufacturer's catalog sheets, brochures, diagrams, schedules, performance charts, illustrations and other standard descriptive data, as required. Shop drawings shall be clearly marked to identify specific materials, finishes, products or models, and shall show all required dimensions and clearances, performance characteristics and capacities, wiring diagrams and controls.

1) The Contractor shall review and check all shop drawings for accuracy and conformance with the contract documents. The Contractor's review shall include verifying field measurements, field construction criteria, dimensions, catalog numbers and similar data. Prior to submission to the Engineer, all shop drawings shall be marked, stamped or otherwise certified as approved by the Contractor, dated and signed or initialed. Any shop drawings not so marked will be returned to the Contractor without the Engineer's review.

2) The Contractor shall schedule the submission of shop drawings to allow sufficient time for review by the Engineer and the Spartanburg Sanitary Sewer District (hereinafter referred to as the "District"), corrections and resubmissions by the Contractor, and re-checking by the Engineer/District, as necessary. The Engineer will review shop drawings within two (2) weeks

from date received.

- 3) A minimum of two (2) copies of each submittal indicating approval by the Engineer shall be submitted to the District.
- 4) The Contractor shall not begin fabrication or work which requires submittals until return of submittals with the full approval.

1-03 SOURCE OF SUPPLY AND QUALITY OF MATERIALS

The source of supply of all materials and equipment shall be submitted to the District's Engineering Department for review before orders are placed. Suppliers of reinforcing steel, fabricated metal work, and metal castings may be required to submit guarantees of conformity with the Drawings and Specifications. If required, representative preliminary samples of the character and quality prescribed shall be submitted by the Contractor or producer for examination and tested in accordance with the methods specified below. Only materials conforming to the requirements of the specifications shall be used in the work. Any materials proposed to be used may be inspected or tested during their preparation and use. If, after inspecting and testing and/or trial, it is found that initial sources of supply do not furnish an acceptable product in conformity with the Specifications, the Contractor shall be required to furnish materials that comply with the specifications. No materials, which after approval have become unfit for use, shall be used in the work or remain on the jobsite.

1-04 SAMPLES AND TESTING OF MATERIALS

Testing and certification of materials may be required by the Engineer if the quality of such materials are in question. In the event the materials do not meet specifications, the Contractor shall pay for the testing and provide materials which meet the specifications. If the materials meet specifications, District will pay for the testing. Unless otherwise specified, materials tests shall be made in accordance with the standards of the American Society for Testing and Materials (ASTM), and by a commercial testing laboratory approved by the Engineer. Reports of tests shall promptly be furnished to the Engineer. Test shall be arranged by the Contractor as directed by the Engineer. The cost of all specified inspection and testing of materials shall be paid by the Contractor.

1-05 PRECONSTRUCTION CONFERENCE:

- A. Upon SCDHEC construction permit issuance, if applicable, the Consulting Engineer shall contact the District's Project Manager to schedule a preconstruction conference. The conference shall be scheduled no less than three (3) days in advance.
- B. The conference shall be attended by:
 - District Project Manager

- District Engineering Field Technician (EFT)
- Representative of Consulting Engineer
- Representative of the Contractor and/or the Contractor's Project Foreman
- Representative of any Subcontractors involved with project.

C. At least two (2) days prior to the preconstruction conference, the Consulting Engineer shall provide the District Project Manager with four sets of plans and specifications stamped "issued for construction". Project cut sheets and applicable shop drawings shall be provided as soon as possible after the preconstruction conference and prior to starting construction.

1-06 INSPECTION: The Engineer shall provide for the inspection of all materials used and all work done under these specifications, by assistants and the District EFT(s) under his direction. Such inspection may extend to any or all parts of the work and to the preparation or manufacture of materials used, whether within the limits of the work or at any other place. The Contractor shall furnish the Engineer all information relating to the work and to the materials which the Engineer may deem necessary or pertinent and with such samples of materials as may be required. The Contractor shall, at his own expense, supply labor and assistance as may be necessary in handling material for proper inspection.

- A. The representatives of the Owner, Engineer and any State, Federal or other agency having jurisdiction over the work, shall have access to the work wherever it is in preparation or progress, and the Contractor shall provide proper facilities for such access and inspection.
- B. The District EFT shall be authorized to inspect all work done and all materials furnished, including preparation, fabrication and manufacture of the materials to be used. The District EFT shall not be authorized to alter or waive requirements of the Drawing and Specifications. The District EFT shall call to the attention of the Contractor to failures of the work and/or materials to conform to the Drawings and Specifications. The District EFT may reject materials or suspend work until questions at issue can be referred to, and decided by, the District Project Manager or designated representative. The presence of the District EFT shall in no way lessen the responsibility of the Contractor.
- C. The Contractor shall furnish all necessary facilities and assistance to make any examination of the complete work if such examination is deemed advisable by the Engineer. If any of the work is found defective in any respect, the Contractor shall defray the expense of the examination and satisfactory reconstruction. If the work is found acceptable, the expense of the examination shall be added to the Contractor's final estimate.
- D. Work covered up without consent or approval of the District must, if required by the District EFT, be uncovered for examination and properly restored at the Contractor's expense.
- E. If the Specifications, the Engineer's instructions, codes, laws, ordinances, or any

public authority require any work to be specially tested or approved, the Contractor shall give the Engineer timely notice of its readiness for inspection; and, if the inspection is by an authority other than the Engineer, of the date fixed for such inspection.

- F. Final Inspection: Upon notice from the Contractor that work is complete, the Engineer and the will make a final inspection, and will notify the Contractor in writing of all defective, incomplete or otherwise unacceptable work revealed by the inspection. The Contractor shall immediately correct all such deficiencies to the satisfaction of the Engineer and District. The Engineer will then certify the project in writing to SCDHEC, copying the District, and request a final regulatory agency inspection.

1-07 VERIFICATION OF DIMENSIONS AND ELEVATIONS:

Dimensions and elevations indicated on the drawings in reference to existing structures, location of utilities, sewer inverts, or other information on existing facilities, are the best available data obtainable but are not guaranteed by the Engineer. The Engineer will not be responsible for their accuracy. Before proceeding with any work dependent upon the data involved, the Contractor shall field check and verify all dimensions, grades, inverts, lines, elevations, or other conditions of limitations at the site of the work to avoid construction errors or damage to existing facilities. If any work is performed by the Contractor, or any subcontractors, prior to adequate verification of applicable data, any resultant extra cost for adjustment of work necessary to conform to existing conditions, or damage to existing facilities, shall be assumed by the Contractor without reimbursement or compensation by the Owner or the District.

If the Contractor, in the course of the work, finds any discrepancy between the drawings and the physical conditions of the locality, or any errors or omissions in drawings or in the layout as given by survey points and instructions, he shall immediately inform the Engineer, in writing. The Engineer will promptly investigate the reported conditions and, after District approval, shall issue such instructions as may be necessary for the proper execution of the work. Any work done after such discovery and prior to receipt of such instructions shall be at the risk of the Contractor.

1-08 CARE OF EXISTING FACILITIES:

In executing the work, the Contractor shall exert every effort not to damage any existing utilities or the Owner's existing facilities or to break into them. Any damage that is done thereto shall be promptly repaired by the Contractor or by the Owner, at the Owner's option, and at the Contractor's expense. Damage to the District's lines shall be repaired by the District. The contractor shall not interrupt or interfere with the operation of existing utilities or facilities during construction except when absolutely necessary. When this is the case, he shall consult with the Engineer, Owner and the utility company as to procedure, and shall be governed by their decision. Any damage done shall be promptly reported to the affected

utility for repair. Damage to the District's existing facilities shall be repaired promptly.

- A. The Engineer does not guarantee that all existing facilities such as buildings, fences, pipelines, electrical lines, conduit, telephone cable, service connections, or other facilities are shown on the plans. It shall be the Contractor's responsibility to locate and protect all such existing facilities prior to beginning construction.
- B. Contractor's Responsibilities. Contractor shall conduct his operations in a manner and sequence which will provide for the continued transportation of wastewater flows during construction of this project. Contractor shall take all actions required to prevent discharge of sewer flow from the system to the ground or any stream. Any construction actions that impede or interrupt flow shall be carefully executed and monitored to prevent surcharging and overflow.
- C. Any existing surface or subsurface improvements, such as pavement, curbs, sidewalks, pipe or utilities, footings, or structures (including portions thereof), trees and shrubbery, not indicated on the drawings or noted in the specifications as being removed or altered shall be protected from damage during construction of the project. Any such improvements damaged during construction of the project shall be restored to a condition equal to that existing at time of award of contract.
- D. Any such improvements damaged during construction of the project shall be restored to a condition equal to that existing at time of award of contract. All repairs to utility services shall be coordinated with the applicable utility company, and shall be made in strict accordance with their requirements.

1-09 CONNECTING TO EXISTING WORK:

It shall be the express responsibility of the Contractor to connect his work to each part of the existing work or work previously installed as required by the drawings and specifications to provide a complete installation. Connections to existing sewer lines, prior to completion, may be allowed by the District on a case by case basis where requested by the Contractor and approved by the District Project Manager; otherwise, connections to existing sewer lines shall be made only after all inspections are completed and all punch list items have been adequately addressed. During construction of new sewer lines, no physical connection to any existing pipeline by open channel or sawed off pipe shall be allowed until all lines upstream and/or downstream of connection have been approved for use by DHEC.

1-10 INSURANCE:

The Contractor shall not start work under this contract until he has obtained all the insurance required under this paragraph and such insurance has been approved by the Owner. The Contractor shall not allow any subcontractor to start work on his subcontract until the insurance required of the subcontractor has been so obtained and approved.

- A. Compensation and Employer's Liability Insurance: The Contractor shall procure and maintain during the life of the contract the statutory Workmen's Compensation and Employer's Liability Insurance for all of his employees to be engaged in work on the project under the contract. The Contractor shall require all subcontractors to provide Workmen's Compensation and Employer's Liability Insurance of all their employees to be engaged in such work.
- B. General Public Liability and Property Damage Insurance: The Contractor shall procure and maintain during the life of the contract General Public Liability and Property Damage Insurance, including vehicle coverage, to protect him from all claims for destruction of or damage to property, arising out of or in connection with any operations under the contract, whether such operations be by himself or by any subcontractor under him, or anyone directly or indirectly employed by the Contractor or by a subcontractor under him. The amount of such insurance shall be not less than the following limits of liability.
- 1) \$500,000 for all damages arising out of bodily injury, including death, at any time resulting therefrom, sustained by any one person in any one accident; and \$500,000 aggregate for any such damages sustained by two or more persons in any one accident.
 - 2) \$200,000 for all property damage sustained by any one person in any one accident; and \$200,000 aggregate for any such damage sustained by two or more persons in any one accident.
- C. Special Hazards Insurance: Where special hazards are encountered in the work under this contract, such hazards shall be covered by a rider to the policy or policies required under subparagraph B in an amount not less than those stipulated under subparagraph B. The Contractor shall be responsible for procuring this insurance before performing any work involving special hazards.
- D. Flood Insurance: The Contractor shall procure and maintain during the life of the contract adequate flood insurance to cover all work on this project.
- E. Certificates of Insurance: Prior to starting any work, the Contractor shall furnish the Owner with certificates showing the type, amount, class of operations, effective dates and expiration dates of all insurance policies. Each certificate shall contain the following statement: **"The insurance covered by this certificate shall not be cancelled or materially altered, except after ten (10) days written notice has been received by the Owner."**
- F. Railroad Insurance:
- 1) The Contractor shall be able to furnish the Railway Company the following:
 - a) Certificate of Workmen's Compensation or Employer's liability insurance according to the laws of the State.

- b) Certificate of the contractor's Public Liability Insurance, to protect the Contractor and Subcontractor:
 - 1) For loss of life or injury to any one person in an amount not less than \$150,000 for any one person and not less than \$300,000 for any one accident.
 - 2) For property loss or damage in an amount not less than \$150,000 for any one accident and not less than \$300,000 aggregate.
- c) The original policy of Railroad Protective Liability Insurance naming the Railway Company as the insured.
 - 1) For loss of life or injury to any one person in the amount not less than \$150,000 for any one person and not less than \$300,000 for any one accident.
 - 2) For property loss or damage in an amount not less than \$150,000 for any one accident and not less than \$300,000 aggregate.

SECTION 2

RIGHTS-OF-WAY AND EASEMENTS

2-01 SCOPE:

This section covers the requirements and work pertaining to the rights-of-way and easements necessary for the construction of the project.

2-02 WORK ON RIGHTS-OF-WAY AND EASEMENTS:

- A. The Owner will obtain all land and rights-of-way necessary for all work under this contract, except for County, Town or City roads or streets. If all land and rights-of-way are not obtained before construction begins, the Contractor shall start work only upon such land and rights-of-way previously obtained by the Owner, and no claims for damages will be allowed because of such delay. If the Owner is unable, for any reason, to obtain the land and rights-of-way necessary for the work, the contract time will be extended as required to cover the time lost by such delay. The Contractor shall secure copies of all applicable right-of-way plats to be kept at the job site during construction.
- B. Contractor shall confine his construction operations to the immediate vicinity of the location shown on the plans and in no case shall he encroach beyond the limits of the Owner's property or rights-of-way. The exact location of the rights-of-way limits shall be shown on the rights-of-way plats which will be furnished to the Contractor. He shall place materials, equipment, supplies, etc., so as to cause the least possible damage to property and interference with traffic. His method of operation and placing of equipment shall be subject to the approval of the Engineer. Any damage done to property outside the rights-of-way limits shall be the financial responsibility of the Contractor. Any vehicular access to right-of-way which crosses private property shall be by written permission of the property owner with copy of same provided to the Spartanburg Sanitary Sewer District Engineering Field Technician (EFT).
- C. It shall be the duty of the Contractor to locate the limits of the rights-of-way, or property lines, prior to beginning construction. He shall be solely responsible for any damage to trees, crops or other property outside the boundaries of the rights-of-way and shall make satisfactory settlement for any damage directly with the property owner involved.
- D. Clearing and Grubbing. Contractor shall consult with the Spartanburg Sanitary Sewer District (hereinafter referred to as the "District") Engineering Department and Engineer prior to beginning clearing and a full understanding is to be reached as to procedure. Contractor shall then conduct clearing and grubbing operations in strict accordance with these agreements

- E. All operations shall be conducted with full consideration of all proper and legal rights of the Owner, adjacent property owners and the public, and with the least possible amount of inconvenience to them. Care shall be taken to protect adjacent property.
- F. Contractor shall perform all clearing and grubbing work required for the installation of the complete work. Clearing shall consist of the removal and disposal of all pavement, stumps, trees, brush, debris, or other such materials in the path of the work.
- G. No burying of cleared debris on the right-of-way will be allowed.
- H. Any vehicular access to the right-of-way which crosses private property shall be by written permission of the property owner with copy of same provided to the Engineering Field Technician.
- I. Erosion control measures as shown on the plans, and/or as required by SECTION 10: GRASSING AND EROSION CONTROL, shall be put in place during clearing and grubbing and before trench excavation.
- J. Clearing Along Right Of Way: Where trees, brush, stumps or exposed roots exist within rights-of-way, the full width of the right-of-way shall be completely cleared and grubbed. Stumps shall be removed and roots shall be grubbed at least two (2) feet below the ground surface.
- K. Burning Of Cleared Material shall be in strict accordance with all applicable local, state and federal regulations pertaining to open burning and smoke abatement. Prior to burning, approval and where applicable written permits, must be obtained from all applicable agencies;
- L. Minor Structures may exist on the right-of-way. The disposition of the structures shall be so noted as shown on the plans by either; (1) left in place in a condition equal to prior to construction; (2) removed and disposed of by the Contractor; (3) removed for construction and replaced in a condition equal to prior to construction; (4) relocated as shown on the plans. If the Contractor notes structures on the right-of-way that are not shown on the plans or the disposition is not noted on the plans, he shall contact the District Engineering Department as to which of the above methods shall be followed.
- M. Removal and Replacement of Fences: Fences shall be removed as required by construction and replaced to property owners' satisfaction with materials as good as that which was removed. Temporary fencing, as required, shall be installed to property owners' satisfaction until permanent fencing can be erected.
- N. Trees or Shrubbery along the highways, roadways, and streets shall not be disturbed unless absolutely necessary. Approval must be obtained from the District Engineering

Department prior to any such removal. Any such trees or shrubbery which may be necessary to be removed shall be heeled in and replanted. Heeling in and replanting shall be done under the direction of an experienced nurseryman. Trees or shrubbery that die within twelve (12) months of replacement shall be replaced by the Contractor at no expense to the District.

O. Construction Operations: All work along highways, streets and roadways shall be in accordance with the following sequence of construction operations, so as to least interfere with traffic.

1) Trenching, Laying and Backfilling: It is the intent of these specifications that there shall be minimum interruption to traffic and all traffic control shall be in accordance with the regulations and requirements of the South Carolina Department of Transportation, Spartanburg County and/or the local jurisdiction. By entering into the construction agreement, the Contractor agrees to hold the District harmless from and against any and all liabilities and claims of any nature whatsoever relating to or arising from traffic control. The trench shall not be opened any further ahead of pipe laying operations than is necessary for proper laying operations, and trenches shall be progressively backfilled and consolidated, and excess material removed immediately behind laying operations so as not to interfere with traffic.

2) Shaping: Immediately after backfilling operations are complete, any damaged cut and fill slopes, side ditches and ditch lines, shall be reshaped and returned to original level and condition. Topsoil, sod and any other materials removed from shoulders shall be replaced in accordance with the requirements of, and to the full and complete satisfaction of the South Carolina Department of Transportation, Spartanburg County, the local jurisdiction, and the District.

3) Grassing: See SECTION 10: GRASSING AND EROSION CONTROL.

4) Capability: When installing pipelines and appurtenances, sufficient personnel and equipment will be provided so as to simultaneously carry out all of the above operations.

2-03 WORK ON STATE AND COUNTY HIGHWAYS OR ROADS, TOWN OR CITY ROADS OR STREETS, RAILROAD AND OTHER UTILITY RIGHTS-OF-WAY:

A. The Contractor shall not begin excavation, grading, fill, storm drainage, paving and any other construction or installations on any property or in any right-of-way of streets, highways, public carrier lines, utility lines (either aerial, surface or subsurface), etc. until the necessary permits are secured. The Contractor shall conform to all

requirements of the authorities having jurisdiction and to the applicable requirements of the specifications. Contractor shall make all necessary arrangements with the proper authorities, including approval of construction methods, etc., and shall pay all costs charged in connection with work. Contractor shall notify the South Carolina Department of Transportation at least 24 hours in advance of any work performed on State roads and shall notify Spartanburg County Roads and Bridges at least 24 hours in advance of any work performed on County roads.

- B. The Contractor shall provide full time flagmen, with appropriate flags and signage, at all times when work is in progress along highways. Suitable warning and descriptive signs shall be placed at each end of the working area while work is in progress along highways. These signs shall be well tended, and shall be placed at sufficient distances from the work so that ample warning is given to approaching traffic. Signs shall be adequately lighted at night. All traffic control devices and methods shall comply with the latest edition of the Manual on Uniform Traffic Control Devices.
- C. Where pipe is installed in open cut across a highway, the cut shall be immediately backfilled and all work of repairing the pavement completed within the same week that it is cut. The Contractor shall keep at least one full lane open for traffic at all times. Any subsequent settlement shall be immediately corrected and repaired. Refer to SECTION 9.03 for paving and surfacing specifications.
- D. Where a pipeline crossing under a highway is installed within encasement pipe, the encasement pipe shall be provided as specified in SECTION 8-02: BORING.
- E. Unless otherwise indicated, no excavated material shall be placed on the pavement side of the ditch along highways. The least possible amount of ditch shall be left open when work is not in progress, and equipment shall be removed from the pavement and shoulders during shutdown periods. Shoulders of roadways shall be left in good acceptable condition, and all disturbed topsoil and grass shall be replaced.
- F. The Contractor shall not begin work on any property of any Railroad until the District has secured necessary permits. Contractor shall conform to all requirements of the Railroad, or its authorized representatives, in the construction of this portion of the work. The Contractor shall also pay the cost of flagmen or other expenses of the railroad in protecting rail or vehicular traffic. He shall notify the railroad of the time that the work will be done and shall not begin work until authorized by Railroad officials.

2-04 RESTORATION OF RIGHTS-OF-WAY:

- A. During construction, the Contractor shall maintain the site and adjacent public and private property, including streets and highways, free from accumulations of waste debris, rubbish and dirt caused by his operations. Dry materials and rubbish shall be

wet down as necessary to prevent blowing dust.

- B. Immediately after completion of the work, or any substantial unit or portion of it, the Contractor shall remove all unused material, refuse and dirt placed by him in the vicinity of the work and shall leave the premises in a neat and orderly condition, satisfactory to the Engineer.

- C. The right-of-way shall be restored to the original condition. Horizontal benches shall be provided to facilitate access to the site and shall be located where directed by the Engineer and the District. Fill material, where required, shall be free of grass, roots, rock and other objectionable material and shall be spread evenly and properly compacted. The entire right-of-way shall be graded, dressed off and cleaned up to the satisfaction of the Engineer, the District, other agencies having jurisdiction, and property owner, where applicable.
 - 1) Where work is along streets or highways and dirt has been placed on the pavement, the pavement shall be swept clean of all dirt after backfill has been completed.

 - 2) Site: The Contractor shall clean up behind the work as much as is reasonably possible as the work progresses, but in no case shall the pipe laying operation be more than 1000 feet ahead of complete cleanup. Federal regulations require that temporary stabilization measures be implemented within 14 days of the time when construction activities have been completed in an area of a phased project.

 - 3) Upon completion of the work and before acceptance of the Final Payment for the project by the Owner, the Contractor shall remove all his surplus and discarded materials, excavated material and rubbish from the roadways, sidewalks, parking areas, lawns and all adjacent property; shall restore, in an acceptable manner, all property, both public and private, which has been disturbed or damaged during the prosecution of the work; and shall leave the whole site in a neat and presentable condition.

 - 4) Except where specifically directed otherwise by the property owner, the entire construction right-of-way shall be provided with a permanent grass cover within 30 days after backfilling. Topsoil shall be replaced and seed planted, fertilized and watered until a grass cover satisfactory to the Engineer and property owner is obtained. If necessary, a temporary grass cover shall be provided until a permanent cover can be established. Grassing shall be as specified in SECTION 10. If required by the property owner, shrubbery shall be replaced to the satisfaction of the Engineer and the property owner.

SECTION 3

MANHOLES

3-01 SCOPE:

This section covers the construction of manholes, including frames, covers and steps as shown in plans and as specified herein.

3-02 DESIGN CRITERIA

Manholes and appurtenances shall be of the type and size shown on the plans. Manholes shall conform to the requirements of ASTM/AWWA C478.

Reference Standards of the American Society of Testing of Materials (ASTM)

A48 / A48M - 03(2008) Standard Specification for Gray Iron Castings

C32-05 Standard Specification for Sewer and Manhole Brick (Made from Clay or Shale)

C443-03 Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets

C478-03a Standard Specification for Precast Reinforced Concrete Manhole Sections

C497-03a Standard Test Methods for Concrete Pipe, Manhole Sections, or Tile

C923-02 Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes and Laterals

C924-02 Standard Practice for Testing Concrete Pipe Sewer Lines by Low-Pressure Air Test Method

C990-03a Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants

C1214-02 Standard Test Method for Concrete Pipe Sewer lines by Negative Air Pressure (Vacuum) Test Method

3-03 MATERIALS:

Shop drawings and related data for manhole material, frames, covers and steps shall be submitted to the Engineer for review.

A. Manhole Material shall be precast concrete unless otherwise approved by the Engineer and the Spartanburg Sanitary Sewer District (hereinafter referred to as the "District"). The minimum diameter of all manholes shall be four feet. The minimum wall thickness shall be five inches.

- 1) Precast Concrete Manholes shall conform to ASTM C478, and shall consist of precast reinforced concrete riser sections, a monolithic base section, and an eccentric, concentric or flat slab top section as required, all in accordance with

the details shown on the plans. Minimum compressive strength of concrete for all sections shall be 4000 psi. Maximum allowable absorption of concrete shall be 8 percent of the dry mass. Manhole interior walls, tables and inverts shall be a smooth surface free of voids, depressions, chips, rough edges and high spots. Pipe openings shall be provided in base sections as required. Lifting holes may be provided in each section for ease of handling. Concentric cones or flat tops may be used for manholes less than five feet in depth; provided specific approval has been given by the District Engineering and Maintenance & Construction (M&C) Departments. Refer to CONSTRUCTION DETAIL No. 1.

- 2) Joint Sealant shall be either by butyl rubber ring joint, 1-inch diameter, conforming to ASTM C990, or rubber O-ring gaskets conforming to ASTM C443, latest revision. Cement mortar joints will not be acceptable, except that each joint shall be wiped inside the manhole with cement mortar after assembly. Refer to CONSTRUCTION DETAIL No. 2
- 3) Inverts shall be factory constructed precast concrete or field constructed using brick and cement mortar. Tables on sides of inverts shall be constructed of brick and cement mortar not less than ½ -inch thickness with 1:12 slope from the manhole wall to the trough with rough brushed finish. At end manholes, a "false" invert shall be constructed to drain accumulation of water from manhole bottom. Troughs shall be trowelled smooth and free of high or low spots and rubbed smooth after setting up. Refer to CONSTRUCTION DETAILS No. 1 and No. 3.
- 4) The minimum manhole inside diameter shall be 4'. Larger manholes are specified for larger diameter sewer pipe, or when inside drops are constructed. Refer to Table 3.1 below and CONSTRUCTION DETAIL No. 3.

Table 3.1

Line Size	Standard Manhole ID	Inside Drop Manhole ID
< 12"	4'	5'
12" – 15"	5'	6'
15" – 24"	6'	8'
>24"	8'	Not Approved

- 5) Brick shall be common red clay and conform to ASTM C32, Grade MS, standard size 2-1/4 x 3-3/4 x 8 inches, and shall be free of chips, cracks and other defects that impair strength or usefulness. There shall be no more than four courses of brick used to bring the manhole ring and cover to the proper elevation.
- 6) Grade Rings may be used in lieu of brick for elevation adjustment. Grade rings shall conform to ASTM C478 and shall be made of reinforced concrete with a

minimum compression strength of 4,000 psi. Maximum elevation adjustment with grade rings shall be 9". If additional elevation adjustment is required, a new cone section of the proper height shall be installed.

- 7) Concrete used in manhole construction shall be composed of Portland cement, sand, coarse aggregate, water and approved admixtures, designed to provide a minimum compressive strength of 4,000 psi at 28 days, unless otherwise noted.

B. Frames and Covers shall be of gray cast iron conforming to ASTM A48 (latest version), Class 30, and shall conform in general to the details for each type shown on the plans. Casting shall be of uniform quality and free from blowholes, porosity, hard spots, shrinkage distortion and other defects. Frames and covers shall be smooth, well-cleaned and given a bituminous coating which is tough and tenacious when hot and not tacky or brittle. All castings shall be manufactured true to pattern, and component parts shall fit together in a satisfactory manner. Frames and covers shall have machined bearing surfaces to prevent rocking. The following frame and covers shall be specified for the application indicated:

- 1) Standard Frame and Cover shall be USF-668, KL as manufactured by U.S. Foundry or V-1384 as manufactured by East Jordan Iron Works;
- 2) Waterproof Frame and Cover shall be USF-668, KL-BWTL as manufactured by U.S. Foundry or approved bolt-down unit compatible with V-1384 as manufactured by East Jordan Iron Works;
- 3) Flat Slab Frame and Cover shall be USF-1261, KL as manufactured by U.S. Foundry or V-1384-4 as manufactured by East Jordan Iron Works;

To be considered an approved equal, the frame and cover must be interchangeable with approved frames and covers and meet applicable weight criteria. Frames and covers shall be certified by the manufacturer for use under AASHTO H-20 loading conditions as a minimum. Refer to CONSTRUCTION DETAIL No. 4.

C. Manhole Steps shall be of composite plastic steel construction. Minimum design live load of steps shall be a single concentrated load of 300 pounds. Steps shall have nonskid top surfaces, and shall be designed so that the foot cannot slip off the end. Steps shall have a minimum cross-sectional dimension of 1-inch, and a minimum width of 10 inches. Steps shall be evenly spaced on 16-inch centers with each step embedded in the wall a minimum of 3 inches. Each step shall project a minimum of 4 inches from the wall as measured from the point of embedment. Composite steel steps shall consist of a 1/2-inch deformed steel reinforcing rod encapsulated in a polymer polypropylene plastic. Reinforcing rods shall conform to ASTM A615, Grade 60, and polypropylene plastic shall conform to ASTM D2146, Type II, Grade 16906

D. Corrosion-proof coatings: The District will require corrosion-proof linings for

installations subject to high levels of hydrogen sulfide gas, where a sewer force main discharges into a manhole, or in any installation where corrosion of the concrete manhole structure may be expected. If a corrosion-proof structure is required, all exposed interior surfaces and structures, including the interior of the frame and cover, walls, bench and invert shall be protected. The method of providing a corrosion-proof structure and the sub-contractor who will be performing this specialized work shall be submitted to the Engineering and the M&C Departments for approval. Refer to SECTION 14 of this document for approved technologies and other requirements related to the protection of manholes from corrosion.

3-04 INSTALLATION:

- A. Manholes shall be installed: at the end of each line; at all changes in grade, size, or alignment; at all intersections; and at distances not greater than four hundred (400') feet for gravity wastewater lines fifteen (15") inches or less, and five hundred (500') feet for gravity wastewater lines eighteen (18") inches to thirty (30") inches. Greater spacing may be permitted in larger wastewater lines. Clean outs may be used only for special conditions and shall not be substituted for manholes.
- B. Precast Concrete Manholes: Each section shall be handled and installed in such a manner and by such means as to prevent damage. All manhole sections damaged during handling and installation will be rejected as directed by the Engineer, and replaced at no additional cost to the Owner. All lifting holes shall be plugged and sealed watertight as recommended by the manufacturer.
 - 1) Base sections shall be installed on a firm 6-inch washed stone foundation so prepared to prevent settlement and misalignment. Pipe openings shall be placed at the exact elevation and location to receive entering pipes. Base section shall be set such that the center of the manhole will coincide with the intersection of the incoming and outgoing pipes. The resulting angle shall be no less than 90 degrees and so constructed that both halves of the trough shall be of equal length and radius. Manhole bases set off center shall be removed and reset.
 - 2) Riser and top sections shall be installed plumb and such that all manhole steps are in alignment. Joint sealant shall be of the type specified above. Joints shall be made in accordance with the manufacturer's recommendations, and to insure a watertight installation. Each joint inside the manhole shall be wiped with cement mortar plaster after installation.
 - 3) Pipe connections shall be made by a flexible synthetic rubber boot mechanically clamped to the manhole and to the pipe to provide a watertight seal and designed to accommodate pipe movement up to 2 inches radially or 22 degrees angularly in any direction. The synthetic rubber boot shall have a minimum wall thickness of 3/8 inch. The synthetic rubber material shall conform to ASTM C-923 (latest version). Bands, clamps and other metal accessories shall be of

Series 304 stainless steel. Approved manhole boots shall be Kor-N-Seal as manufactured by NPC or PSX Direct Drive as manufactured by Press-Seal. Refer to CONSTRUCTION DETAIL No. 5

C. Outside Drop Manholes. When fall across a manhole exceeds 2 feet from the invert of the upper to the invert of the lower pipe, an outside drop shall be constructed. Refer to CONSTRUCTION DETAIL No. 6

- 1) The outside drop shall be constructed of SDR-35 PVC pipe and gasketed PVC fittings.
- 2) At the discretion of the Engineering Field Technician, the lower drop fitting may enter the manhole just above the table, and a suitable “trough” constructed of brick and mortar.
- 3) The lower fitting shall be supported by a concrete pad which is poured on a compacted washed stone base;
- 4) The drop pipe shall be supported with stainless steel straps spaced 4’ apart. If the drop pipe is less than 4’ in length, a minimum of two straps shall be installed, evenly spaced on the length of the pipe.
- 5) After assembly of the drop structure, and approval by the Engineering Field Technician, the entire assembly shall be encased in washed stone.

D. Inside Drop Manholes. Where approved by the Engineering Department during the design phase of the project, inside drops may be permitted.

- 1) To provide adequate clearance for access by maintenance personnel, an inside drop manhole will require that the next larger size manhole be used, than would be needed if an outside drop we installed. Refer to CONSTRUCTION DETAIL No. 7.
- 2) The sewer pipe shall be inserted through the manhole wall and sealed with a standard manhole boot;
- 3) A tee shall be placed on the pipe with run vertical, the pipe shall be extended to the manhole table and a 45° bend shall be installed on the end to direct flow into the invert.
- 4) Inside piping shall be secured to manhole wall with stainless steel straps spaced 4’ apart and securely anchored to manhole wall. If the drop pipe is less than 4’ in length, a minimum of two straps shall be installed, evenly spaced along the length of the pipe.

E. Doghouse Manholes. Where shown on the plans or directed by the Engineer, new

sewers shall be connected to existing sewer by installing a "doghouse" manhole over the existing sewer line.

- 1) The doghouse manhole shall be pre-cast with the same requirements as a standard manhole, except that an extended base which is formed at least 1' beyond the outside diameter of the manhole shall added. No field-modified manholes (jack-hammered) shall be allowed. Refer to CONSTRUCTION DETAIL No. 8
- 2) Doghouse manholes shall be required to pass the same vacuum testing as a standard manhole.
- 3) After completion of the new sewer line, a table shall be formed in the doghouse manhole.
- 4) At the discretion of the Engineering Field Technican (EFT), the top section of the old sewer line may be removed and the bottom section allowed to remain to form the invert through the manhole.
- 5) If, for any reason, the EFT determines that the procedure in item 4) above is not feasible, the old sewer line shall be removed from inside the manhole and to and a proper invert formed across the manhole using brick and mortar in the standard manner.

F. Manhole Tops shall be set to the proper elevation as shown on the plans, or as directed by the Engineer.

- 1) Where manholes are located in streets or roads, tops shall be set to conform to the finished grade and slope of the roadway.
- 2) Tops of manholes in yards or other fine grade areas shall be set flush with ground elevation and have a water tight manhole cover, unless otherwise specified or unless otherwise directed by the Engineer. Water tight manhole cover will not be required if ground can be graded to drain away from manhole. Tops may be adjusted a maximum of 9" in elevation using common red clay brick conforming to ASTM C32, Grade MS, Standard size 2-1/4 x 3-3/4 x 8 inches or grade rings conforming to ASTM C478. If more than 9" of height adjustment is needed, the correct height manhole cone shall be installed.
- 3) In cultivated fields, wooded areas and along outfall sewers, manhole tops shall be set a minimum of 18" to 24" above ground elevation, unless the line is subject to flooding or other hazards. In such instances, manhole tops shall be set to the elevations given by the Engineer and shall have bolt-down covers.
- 4) The top elevation of all manholes must be above the fifty year flood plain, or

have bolt-down, watertight manhole covers.

- F. Backfilling Manholes shall conform to requirements for backfilling trenches, Section 4, except that no backfill shall be placed around manholes until all mortar has properly set.
- G. Testing of manholes shall be as specified in SECTION 12-03 of this document.

SECTION 4

GRAVITY SEWER MATERIALS AND GENERAL INSTALLATION

4-01 SCOPE:

This section contains the current specifications for materials to be used in projects to be integrated into the Spartanburg Sanitary Sewer District (hereinafter referred to as the "District"). The District has established specific manufacturers as the standard for various items within its system. Such standardization is for the express purpose of expediting maintenance procedures. All requests for approval of an "or equal" item must be submitted to the District in writing. All pipe, fittings, and joint materials shall conform to Section C of the AWWA Standards and SCDHEC R.61-67.

Gravity sanitary sewer lines shall be provided as shown on the plans and as specified herein. Clearing, grubbing, installation of manholes, trench excavation and backfill, and cutting and replacing pavement shall be as specified in other sections.

4-02 DESIGN CRITERIA

Reference Standards of the American National Standards Institute (ANSI), the American Society of Testing of Materials (ASTM), and the American Waterworks Association (AWWA).

ASTM A-746, ANSI A21.50 (AWWA C150) and of ANSI A21.51 (AWWA C151)
Ductile Iron Pipe with a standard outside coating of coal tar or asphalt base material

ANSI A21.11 (AWWA C111). ANSI A21.10 (AWWA C110) or ANSI A21.53 (AWWA C153) joints for ductile iron pipe and fittings

ASTM D638 – Test Method for Tensile Properties of Plastics.

ASTM D3034 or D3033 PVC gravity wastewater pipe and fittings

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

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

ASTM D3262 - Standard Specification for "Fiberglass" (Glass-Fiber-Reinforced Thermosetting-Resin) Sewer Pipe.

ASTM D3681 – Standard Test Method for Chemical Resistance of "Fiber glass" Pipe in

Deflected Condition.

ASTM D4161 - Standard Specification for "Fiberglass" (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe Joints Using Flexible Elastomeric Seals.

4-03 MATERIALS:

A. Pipe for gravity sewers shall be either ductile iron, polyvinyl chloride (PVC), or fiberglass polymer-mortar, except where other material is specifically called for. Pipe material shall be specified as follows:

1) Ductile Iron Pipe for gravity sewers shall be designed to conform to ASTM A-746 latest version and ANSI 21.50 (AWWA C150), latest revision. Pipe shall be designed for a rated working and pressure of 150 psi plus a surge allowance of 100 psi, unless otherwise noted, and a thickness class of 50 through 56 as required by the laying condition and depth of cover. Pipe shall be slip joint or mechanical joint ends conforming to ANSI A21.10 and/ or A21.11, latest revision, except where other type ends are shown or specified.

a) Ductile iron pipe for sanitary sewers shall be coated on the inside with 40 mils of Protecto 401 Ceramic Epoxy and outside with a standard bituminous coating.

b) All bells and spigots for sanitary sewer pipe shall be coated with a minimum of 8 mils of Protecto 401 Joint Compound or approved equal.

c) Material shall be subject to such testing as the Engineer may require should its acceptability be questioned.

2) Polyvinyl Chloride Pipe (PVC):

a) When approved by the District, PVC pipe may be used for sewer projects within the District's jurisdiction for the following applications:

1) Gravity sewer collection lines serving residential or commercial users.

2) Individual service laterals for applications described in 1) above.

3) Trunk lines.

b) PVC pipe shall not be used for:

- 1) On any project in which the pipeline could carry wastewater having a temperature greater than 120°F.
 - 2) On any project in which the pipeline would or has the potential to deteriorate due to highly corrosive industrial wastewater.
 - 3) On any project for which use of PVC pipe is disapproved by the District.
- c) PVC pipe and fittings shall be homogeneous throughout and free from visible cracks, holes, foreign inclusions or other injurious defects. The pipe shall be as uniform as commercially practical in color, opacity, density, and other physical properties.
- d) PVC pipe smooth wall for gravity sewer lines shall be type PSM SDR 35 PVC Stiffness Factor 46 Sewer Pipe conforming to the latest edition of ASTM D3034. Pipe shall be bell and spigot type with elastomeric gasket joints providing a watertight seal. Standard laying lengths of pipe shall be minimum 13.0 feet.
- e) PVC pipe shall be in accordance with the specifications herein and as manufactured by J-M Manufacturing Inc., Uponor ETI Company, Certainteed Products Corp., North America Pipe Co., Diamond Plastics, or District-approved equal.
- f) PVC corrugated sewer pipe with a smooth interior shall conform to the requirements of ASTM F-949-93. Sizes 4"-36" minimum pipe stiffness when measured in accordance with ASTM D2412 shall be 50 psi. PVC corrugated sewer pipe shall be manufactured by Uponor ETI, Contech, or District approved equal.
- g) PVC open profile (ribbed) sewer pipe with a smooth interior shall conform to the requirements of ASTM F-794. Profile wall pipe stiffness shall be a minimum of 60 psi in sizes 8"-12" and 46 psi in sizes 15"-30" when tested at 5% deflection in accordance with ASTM D2412. Pipe shall have ribs running perpendicular to the axis of the pipe. PVC profile wall pipe shall be manufactured by Uponor ETI or District approved equal.
- h) Material Testing: PVC gravity sewer pipe shall be tested by an independent laboratory acceptable to the Engineer. Tests shall be made in accordance with ASTM D3034, F-794, or F-949 and shall include tests for wall thickness, pipe flattening, impact resistance, pipe stiffness, joint tightness, and extrusion quality. Test results confirming that the pipe meets these specifications shall be furnished to the

Engineer for each shipment of pipe.

3) Fiberglass polymer-mortar pipe

Fiberglass polymer-mortar pipe may be approved for use in the District's gravity collection systems. The Engineer shall request approval for this material as part of the normal submittal process for plans and specifications.

- a) Pipe shall be manufactured either by the centrifugal casting or the mandrel molding process to result in a dense, nonporous, corrosion-resistant, consistent composite structure.
- b) The interior surface of the pipes exposed to sewer flow shall be manufactured using a resin with a 50% elongation (minimum) when tested in accordance with D638. The interior surface shall provide crack resistance and abrasion resistance. The exterior surface of the pipes shall be comprised of sand and resin layer which provides UV protection to the exterior.
- c) Joints: Unless otherwise specified, the pipe shall be field connected with fiberglass sleeve couplings that utilize elastomeric sealing gaskets as the sole means to maintain joint watertightness. The joints must meet the performance requirements of ASTM D4161. Joints at tie-ins, when needed, may utilize gasket-sealed closure couplings.
- d) Acceptable Manufacturers shall be HOBAS Pipe USA, Ameron, or approved equal.
- e) Diameters: The actual outside diameter (18" to 48") of the pipes shall be in accordance with ASTM D3262.
- f) Lengths: Pipe shall be supplied in nominal lengths of 20 feet. Actual laying length shall be nominal +1, -4 inches.
- g) End Squareness: Pipe ends shall be square to the pipe axis with a maximum tolerance of 1/8"

4-04 GENERAL GRAVITY SEWER PIPELINE INSTALLATION

(Refer to SECTION 6 for specific excavation and backfilling requirements).

- A. Pipe Handling: Pipe shall be hauled to the site and distributed along the trench prior to laying. All pipe shall be protected during handling against impact shocks and free fall, and shall be kept clean at all times. Equipment used to handle and transport the pipe shall be of suitable design and properly operated so as to prevent damage to the pipe. All such damage shall be repaired prior to installation of the pipe and to the satisfaction of the Engineer. All damaged pipe shall be rejected and removed from the

work site. Keep gaskets away from oil, grease, excessive heat and direct rays of the sun. Keep PVC pipe covered during storage to prevent damage by sunlight. At the EFT's discretion, any pipe which appears to be faded by exposure to sunlight will be rejected.

B. Installation: Pipe shall be installed in accordance with the best practice, manufacturer's instructions and Engineer's direction. Where the pipeline crosses under or is installed on a highway or railroad right-of-way, work shall be done in accordance with such requirements specified in Section 2, and in accordance with the requirements of the District.

- 1) Gravity sewer pipe in trenches shall be laid to produce a straight line of pipe on a uniform grade. Each pipe shall be laid to form a close joint with the preceding pipe so as to form a smooth inside flow line. All misalignment of pipe shall be corrected by the Contractor at his expense. All pipe shall be laid upgrade with bell end of pipe upgrade.
- 2) Ductile iron pipe shall be installed in accordance with all applicable provisions of ASTM A746, the manufacturer's instructions and at the Engineer's direction. Underground pipe shall be installed using suitable slip joints or mechanical joints as shown on the plans.
 - a) DIP may be laid directly on native soils (with bell holes) unless over-excavation has occurred, in which case aggregate bedding shall be required.
 - b) All adapters necessary for the proper jointing of pipe shall be provided. Connections to other types of pipe shall be made with a gasketed, PVC bell x bell or bell x spigot coupling ("Harco Coupling") or approved equal or watertight coupling suitable for application. The proposed transition coupling shall be submitted to the District Engineering Department for approval. "Fernco" or similar rubber, strapped, couplings are specifically prohibited for use in making main-sewer pipe connections or transitions on PVC or DIP sewers, on NEW pipe installations. "Fernco" or "Flexseal" couplings are only approved for making repairs, including the replacement of a section of damaged pipe.
 - c) Cut ends of Ductile Iron Pipe shall have the Protecto 401 coating repaired using the manufacturer's recommended procedures. Freshly-applied Protecto-401 coating shall be allowed to fully cure prior to the cut pipe being installed.
- 3) PVC gravity sewer line shall be installed in accordance with ASTM D2321, the manufacturer's instructions and as specified herein. Cover over PVC pipe shall be no less than 3 feet. Joints shall form a watertight and airtight seal.

- 4) Rest the full length of each section of pipe solidly on the pipe bedding, with recesses excavated to accommodate bells, couplings and joints.
- 5) Take up and relay pipe that has the grade or joint disturbed after laying.
- 6) Do not lay pipe in water, or when trench conditions are unsuitable for the work; keep water out of the trench until jointing is completed;
- 7) Cut pipe neatly and without damage to the pipe. Bevel edges according to the manufacturer's recommendations.
- 8) Pipe shall be pushed into place by use of a bar or other means approved by the District. Hydraulic excavators, backhoes, or other machinery shall not be used to push slip-joint pipe together.
- 9) Pipe on piers shall be ductile iron, and shall be properly installed in accordance with the details shown on the plans. Refer to SECTION 8 of this document.
- 10) Pipe Connections: Pipe connection to new manholes shall be made by using a flexible synthetic rubber boot mechanically clamped to the manhole and to the pipe to provide a watertight seal and designed to accommodate pipe to 2 inches radially or 22 degrees angularly in any direction. The synthetic rubber boot shall have a minimum wall thickness of 3/8-inch. The synthetic rubber material shall conform to ASTM C433. Bands, clamps, and other material accessories shall be of Series 304 stainless steel as specified in Section 3.

C. Steep Slope Protection

Sewers on 20 percent slopes or greater shall be anchored securely with concrete collars. Refer to CONSTRUCTION DETAIL NO. 9, spaced as follows:

- 1) Not over 36 feet center to center on grades 20 percent and up to 35 percent;
- 2) Not over 24 feet center to center on grades 35 percent and up to 50 percent; and
- 3) Not over 16 feet center to center on grades 50 percent and over.
- 4) All gravity sewer piping which is laid on a slope requiring concrete collars shall be ductile iron.

- D. Connecting to Existing Sewers: Where shown on the plans or directed by the Engineer, new sewers shall be connected to existing sewers either by constructing a manhole over an existing line (doghouse manhole) or by coring through the wall of an existing manhole.

- 1) Doghouse Manhole: After approval of the new sewer line project by the District, the old sewer shall be broken out and the inverts properly formed. On manholes without turns in direction, it will be permitted to use the lower half of the old pipe as the new invert. Refer to Section 3 and CONSTRUCTION DETAIL No. 8.
 - 2) An Existing Manhole shall have an opening cored at the proper elevation and the sewer pipe inserted. Where possible, the sewer extension shall be designed so that manhole penetrations are made above the level of the table, so as to avoid the need to disrupt the existing invert or sewer flow. The hole which is cored in the manhole wall shall be made using the proper mechanical concrete coring equipment which is operated by skilled personnel. The hole shall be cored to receive the properly-sized manhole boot. The area inside the manhole boot shall be completely filled around the pipe with non-shrink grout so as to be watertight. Refer to CONSTRUCTION DETAIL No. 5. A channel shall then be formed over the manhole table, or the table cut through and the channel formed in it, as may be required by the grade.
- D. A pipeline crossing under a highway shall be installed either by open cut, or boring or tunneling. Materials and method of crossing shall be as indicated on the plans for each crossing under the highway and specified in SECTION 9. The appropriate encroachment permit(s) from the local governing authority shall be kept on the job site at all times.
- E. Concrete Protection: Concrete supports, walls and other protective work shall be provided at locations as shown on the plans or as directed by the Engineer.

SECTION 5

SEWER FORCE MAIN: MATERIALS AND GENERAL INSTALLATION

5-01 SCOPE:

This section contains the current specifications for materials to be used in projects to be integrated into the District's system. The District has established specific manufacturers as the standard for various items within its system. Such standardization is for the express purpose of expediting maintenance procedures. All requests for approval of an "or equal" item must be submitted to the District in writing. All pipe, fittings, and joint materials shall conform to Section C of the AWWA Standards and SCDHEC R.61-67.

Force mains shall be provided as shown on the plans and as specified within. Clearing, grubbing, trench excavation and backfill, and cutting and replacing pavement shall be specified in other sections.

5-02 DESIGN CRITERIA

Reference Standards of the American National Standards Institute (ANSI) and American Waterworks Association (AWWA)

A21.5/AWWA C105 Polyethylene Encasement for Gray and Ductile Cast-Iron Piping for Water and Other Liquids.

A21.10/AWWA C110 Gray-Iron and Ductile-Iron fittings, 3" through 48" Inches for Water and Other Liquids.

A21.11/AWWA C111 Rubber Gasket Joints for Cast-Iron and Ductile-Iron Pressure Pipe and Fittings.

A21.15/AWWA C115 Flanged Cast-Iron and Ductile-Iron Pipe With Threaded Flanges.

A21.16/AWWA C116 Fusion-Bonded Epoxy Coatings.

A21.50/AWWA C150 Thickness Design of Ductile-Iron Pipe.

A21.51/AWWA C151 Ductile-Iron Pipe Centrifugally Cast, In Metal Molds or Sand-Lined Molds, for Water or Other Liquids.

A21.53/AWWA C153 Ductile-Iron Compact Fittings for 3" thru 48".

B16.1 Cast-Iron Pipe Flanges and Flanged Fittings, Class 25, 125, 250, and 800.

Reference Standards of the American Water Works Association (AWWA)

C600 Installation of Ductile-Iron Water Mains and Appurtenances.

C900, C905 Polyvinyl Chloride (PVC) Pipe

C901-02, C906 High Density Polyethylene (HDPE) Pipe

5-03 MATERIALS:

A. Ductile Iron Pipe

- 1) Use Class 50, complying with ANSI/AWWA C151/A21.51 and having a minimum pressure rating of 350 psi.
- 2) Use mechanical or push-on joints complying with ANSI/ AWWA C111/A21.11 as modified by ANSI/AWWA C151/A21.51.
- 3) Use rubber gaskets and lubricant complying with ANSI/AWWA C111/A21.11.
- 5) Use only lubricants provided by pipe manufacturer to lubricate gasket.
- 6) All ductile iron pipe which is used in sewer force main applications shall have a internal coating of Protector 401 Ceramic Epoxy which is applied in accordance with the manufacturer's recommended procedures
 - a. Pipe internal coating shall be a minimum of 40 mils of Protecto-401
 - b. All bells and spigots for shall be coated with a minimum of 8 mils of Protecto 401.
- 7) Approved pipe manufacturers are as follows:
 - a. Griffin Pipe
 - b. American Pipe
 - c. U.S. Pipe
 - d. McWane Group (includes Atlantic States and Clow Products)

NOTE: All ductile iron pipe installed in the District shall be of domestic manufacture which is defined as physically manufactured within the limits of the continental United States of America.

- 8) Push-on and Mechanical Joints shall conform to ANSI A21.11/AWWA C111. The pipe is to be supplied in minimum 18 foot lengths with either push-on joints or mechanical joints.
 - a. Push-On Joints as supplied by the following manufacturers are approved.
 - i. Griffin Pipe Product: "Super Bell-Tite" joints;
 - ii American Pipe Product: "Fastite" joint;
 - iii U.S. Pipe Product "Tyton" joint;

- iv McWane Group (includes Atlantic States and Clow Products)
“Tyton” joint 4” – 24” , “Fastite” joint 30” – 36”
 - b. Mechanical Joints in accordance with ANSI A21.11/AWWA C111
- 9) Restrained Joint Pipe shall conform to ANSI A21.11/AWWA C111.
- a. American Pipe Product: Flex Ring.
 - b. U.S. Pipe Product: TR FLEX.
 - c. Griffin Pipe Product: SNAP-LOK.
 - d. McWane Group (includes Atlantic States and Clow Products)
- 10) Push-on Joint Restraint rubber gaskets shall conform to ANSI A21.11/AWWA C111 with stainless steel locking segments vulcanized into gasket, and shall be have an operating pressure of 250 psi or greater. The joints shall be capable of being disassembled and are approved for use only on ductile iron pipe, 4” through 12” diameter inclusive.

Manufacturers:

- a. U.S. Pipe Product: Field-Lok Gasket.
 - b. American Product: Fast Grip
- 11) External Restraint of DIP Bell and Spigot Joints

DIP bell and spigot joints may be restrained by the use of the following external restraint fixtures only if specifically approved by the District’s Maintenance and Construction (M&C) or Engineering Departments. In all cases, the installation of these fixtures shall be performed as specified by the manufacturer, shall be shown on the approved plans, and shall be specifically called out on the Record Drawings.

TABLE 5-1: DIP External Restraint Fixtures

Manufacturer	Model #	Notes
EBAA Iron Sales, Inc.	MEGALUG Series 1700 Restraint Harness	DIP Only
Ford	Uni-Flange Series 1300 or 1390	DIP Only
Sigma Corporation	One-Lok SLDH Restraint Harness	DIP Only

Except as specifically listed above, no other unique, proprietary, or other pipe or joint restraint method shall be approved as an “equal” prior to being submitted for review by the District Engineering Department.

12) Flanged Joints shall conform to ANSI A21.11/AWWA C115. Bolts and nuts shall conform to ANSI A21.11/AWWA C111.

- i. Flanged joints are only approved for ABOVE-GROUND installations;
- ii. Piping used with flanged joints shall be minimum Thickness Class 53;

B. PVC PIPE

PVC pipe shall be approved in sizes from 4-inch through 12-inch nominal diameter in accordance with AWWA C900, ASTM D2241. PVC pressure pipe in diameters larger than 12-inch is not approved for use anywhere in the District.

1) All PVC pipe shall be designed and manufactured in accordance with AWWA C900, latest revision, from virgin polyvinyl chloride resin meeting cell Class 12454-A or 12454-B as defined in ASTM D1784. All compounds shall qualify for a rating of 4000 psi for water at 73.4 degrees Fahrenheit per the requirements of PPI TR3.

- a. PVC (as described and specified above) is the only type of “thermoplastic” pipe approved for use in the District.
- b. Thermoplastic PVC pipe is not approved for use in any above-grade application.

2) PVC pipe shall be pressure class 200 (DR14) furnished in ductile iron pipe equivalent outside diameters in 20-foot lengths.

3) Each length of PVC pipe shall bear markings indicating the following information at intervals not to exceed five (5') feet: (1) manufacturer's name or trademark, (2) nominal pipe size and OD base, (3) AWWA material code designation, (4) dimension ratio, (5) AWWA pressure class, (6) AWWA C900 designation, and (7) product record code.

4) All PVC pipe shall be elastomeric-gasket bell-end pipe. One gasket shall be furnished with each length of PVC pipe.

5) Fittings used in the laying of PVC pipe shall be iron fittings as described below. Fabricated or molded PVC fittings will not be acceptable in any application.

6) PVC PIPE INSPECTION

- a. Each pipe shipment shall be inspected with care by the Contractor and the District's Engineering Field Technician. Any pipe which is

warped, cracked, discolored, abraded, misshapen, or otherwise damaged shall be considered unsuitable and shall not be used. Any unsuitable material discovered during the inspection or at any other time shall be removed from the job site.

- b. If the load shifted during transport, has broken packaging, or shows rough treatment, each pipe length shall be carefully inspected for damage.
- c. It is assumed that all handling and storage of the PVC pipe by all persons who handle, transport, and/or store, these PVC pipe materials prior to their delivery to the job site is in accordance with the requirements of the Uni-Bell PVC Pipe Association. Any damage resulting from improper handling, transportation, or storage prior to or during the time the pipe material is on the work site shall cause the piping materials to be rejected.

7) SHIPPING, RECEIVING, UNLOADING PVC PIPE

- a. Shipping: All pipe material shall be shipped in a manner to ensure that the pipe is not damaged.
- b. Receiving: When receiving the PVC pipe shipment at the job site, the Contractor shall exercise established precautions.
- c. Unloading: Preferred unloading is in package units using mechanical equipment; however, the pipe can be unloaded individually by hand. Mechanical equipment shall be operated so that it does not strike adjacent pipe and that pipe being moved does not strike anything.
- d. Unloading unpackaged PVC Pipe: PVC pipe may be unloaded and moved individually by hand if not packaged or if mechanical equipment is not available.
- e. Unloading Package Units: When unloading package units, the following instructions shall be carefully followed:
 - i. Remove restraints from the top unit loads;
 - ii. If there are boards across the top and down the sides of the load which are not part of pipe packaging, remove them;
 - iii. Use a fork lift with thin chisel forks, extend forks (or front end loader equipped with forks) to remove each top unit (one at a time) from the truck. Remove back units first. Do not run the forks too far under units as fork ends striking

adjacent units may cause damage. Insure forks are fully engaged;

- iv. If a fork lift is not available, a spreader bar with fabric straps which are capable of handling the load (with straps spaced approximately 8 feet apart and looped under the load) may be used. Cables may also be used if cushioned with rubber hose sleeves or other material to prevent abrasion of the pipe
- v. During the removal and handling, be sure that the units do not strike anything. Severe impact could cause damage, particularly during cold weather;
- vi. Do not handle units with individual chains or single cables, even if padded;
- vii. Do not attach cables to unit frames or banding for lifting;
- viii. Pipe package units shall be placed and stored on level ground;
- ix. Package units shall not be stacked more than eight feet high. Units shall be protected by dunnage;
- x. To unload lower units, repeat the above unloading process;
- xi. If unloading equipment is not available, pipe may be unloaded by removing individual pieces by hand. However, care shall be taken to insure that pipe is not dropped or damaged.

8) STORAGE REQUIREMENTS FOR PVC PIPE:

- a. PVC pipe shall be stored, if possible, at the job site in the unit packages provided by the manufacturer. Caution shall be exercised to avoid compression, damage or deformation to the bell ends of the pipe. Pipe shall be stored on level ground.
- b. If stored as individual pieces, pipe shall be arranged and supported so that there can be no compression, damage or deformation to the bell ends.
- c. When unit packages of PVC pipe are stacked, insure that the weight of the upper units does not cause deformation to the pipe in lower units.

- d. PVC pipe unit packages shall be supported by racks or dunnage to prevent damage to the bottom during storage. Supports shall be spaced to prevent pipe bending.
- e. When exposure to direct sunlight for an extended period is unavoidable, PVC pipe shall be covered with opaque material while permitting adequate air circulation above and around the pipe as required to prevent excessive heat accumulation.
- f. PVC pipe shall not be stored close to heat sources or hot objects such as heaters, boilers, steam lines, engine exhaust, etc.
- g. When unit packages of PVC pipe are stacked, insure that the height of the stack does not result in instability which could cause stack collapse, pipe damage or personnel injury.
- h. The interior as well as all sealing surfaces of pipe, fittings and other accessories shall be kept free from dirt and foreign matter.
- i. Gaskets shall be protected from exposure to heat, direct sunlight, ozone, oil, and grease.

9) HANDLING REQUIREMENTS FOR PVC PIPE:

- a. When using fork lifts or other handling equipment, prevent damage to PVC pipe.
- b. In handling PVC pipe, avoid impact blows, abrasion damage, and gouging or cutting by metal surfaces or rocks. Avoid stressing bell joints and damage of bevel ends.
- c. Pipe shall be lowered, not dropped, from trucks and into trenches.
- d. In preparation for pipe installation, placement of pipe (stringing) shall be as close to the trench as practical and on the opposite side from the excavated earth. Bell ends shall point in the direction of work progress.
- f. Pipe stringing shall not extend further than 100 feet beyond the installation.
- g. subfreezing temperatures, extra caution is required in handling PVC pipe to prevent impact damage.

10) EXTERNAL RESTRAINT OF PVC BELL AND SPIGOT JOINTS

PVC bell and spigot joints may be restrained by the use of the following external restraint harnesses only if specifically approved by the Spartanburg

Water Maintenance and Construction (M&C) or Engineering Departments. In all cases, the installation of these fixtures shall be performed as specified by the manufacturer, and shall be shown on the approved plans.

TABLE 5-2: PVC Pipe External Restraint Harness

Manufacturer	Model #	Notes
EBA Iron Sales, Inc.	Series 1500 Bell Restraint Harness	C-900 PVC
Ford	Uni-Flange Series 1390	DR-14 PVC Only
Sigma Corporation	Series PVP PV-Lok	PVC Only

C. HIGH DENSITY POLYETHYLENE (HDPE) PIPE

1) HDPE PIPE MANUFACTURE

HDPE pipe in Iron Pipe Size (IPS) and Ductile Iron Pipe Size (DIPS) 4” and above shall be manufactured to the requirements of ASTM F714 and AWWA C906, latest edition. Black PE materials used for the manufacture of polyethylene pipe and fittings shall be PE 3408 high density polyethylene meeting ASTM D3350 cell classification 345464C.

- a. Unless otherwise specified by the Design Engineer, HDPE pipe shall be Pressure Class 200 (DR-9) or greater wall thickness.
- b. The pipe is to be supplied in minimum 20 foot lengths with thermal butt fusion joints in accordance with ASTM D3261.

2) INSTALLATION

- a. Installation of HDPE pipe shall comply with the manufacturer’s recommendations.
- b. HDPE pipe shall be joined by the thermal butt-fusion method only, and the process shall comply in all respects with the pipe and equipment manufacturer’s recommendations.
- c. The equipment used to accomplish the thermal butt-fusion process shall be specifically manufactured for this purpose and shall incorporate a data-logger function which digitally records the conditions during the fusion process. The data-logger shall be capable of recording the conditions present during each individual butt-fusion operation, including time duration and temperature. A digital and hard copy of the data-logger record shall be provided to the District EFT for the work accomplished each day. These records shall be reviewed for compliance with the manufacturer’s recommendations. Any fusion which does not comply shall be rejected. The affected

joint and shall be cut out and replaced with an acceptable butt-fused joint.

- d. In installations where there will be a transition from HDPE to DIP or PVC slip-joint pipe, special restraint procedures are required to counteract the tendency of HDPE pipe to expand and contract due to changes in temperature. Refer CONSTRUCTION DETAIL No. 10.

2) INSPECTION

The Engineering Field Technician shall inspect the pipe for cracks and other defects immediately before installation. Any pipe containing defects which are discovered during the inspection or at any other time shall be removed from the job site.

D. FITTINGS

- 1) Fittings shall be ductile iron fittings manufactured in accordance with ANSI/AWWA C153/A21.53, latest revision. Where compact fittings are not available, fittings shall be full size iron fittings manufactured in accordance with ANSI/AWWA C110/A21.10 and ANSI/AWWA C111/A21.11, latest revisions. The working pressure rating shall be 350 psi.
- 2) Only MJ x MJ (for buried service) or Flange x Flange (for above-ground service) are approved. Push-on or other socket-type joints are not approved in any application, and proprietary restraining methods are not approved except as noted below.
- 3) Ductile iron shall be in accordance with ASTM A-536, latest revision, with minimum physical qualities of 70,000 psi tensile strength, 50,000 psi yield strength and 5% elongation.
- 5) Restraint of joints at MJ fittings shall be achieved through the installation of an approved restrainer gland with “auto-torque” twist-off heads. See below

TABLE 5-3: Approved Restrainer Glands for DIP and PVC with Ductile Iron Fittings

Manufacturer	Model #	Notes
EBAA Iron Sales, Inc.	MEGALUG Series 1100	DIP Only
EBAA Iron Sales, Inc.	MEGALUG Series 2000PV	PVC Only
Ford	Uni-Flange Series 1400	DIP Only
Ford	Uni-Flange Series 1500	PVC Only
Sigma Corporation	Series SLD One-Lok	DIP Only
Sigma Corporation	Series SLC One-Lok	PVC Only

NOTE: The use of a restrained joint at a fitting in no way insures the restraint of the pipe/fitting as a system. The Design Engineer shall be responsible for designing the force main piping system with proper consideration for all issues related to piping restraint, and the installation must be per the approved design.

- E. All Ductile Iron Fittings shall be factory-coated as follows. Field coating of DIP fittings is not authorized except to repair minor imperfections which may arise during handling:
- 1) Internal Coating shall be 40 mils Protecto-401
 - 2) External Coating shall be either one of the following:
 - a. Bituminous coat in accordance with ANSI/AWWA C104/A21.4.
 - b. Fusion-bonded epoxy coating shall be coated with in accordance with AWWA C-116.
- F. Sewer air/vacuum valves shall be SAAR Short Version D-025 as manufactured by A.R.I.

5-04 GENERAL FORCE MAIN INSTALLATION

(Refer to Section 6 for specific excavation and backfilling requirements).

- A. Pipe Handling: Handle pipe accessories so as to ensure delivery to the trench in sound, undamaged condition.
- 1) When using PVC material, keep pipe covered during storage to prevent damage by sunlight.
 - 2) Carry pipe into position - do not drag. Do not dump or drop any of the materials of this section into the trench.
 - 3) Lower pipe and accessories into trench by means of ropes, belt slings, or other equipment approved by the Engineer.
 - 4) Thoroughly clean interior of pipe and accessories before lowering pipe into trench. Keep clean during laying operations by plugging or other methods approved by the Engineer.
 - 5) Where any part of coating or lining is damaged, repair to the approval of the Engineer and at no additional cost to the Owner.
 - 6) Rubber Gaskets: Keep gaskets away from oil, grease, excessive heat and direct rays of the sun. Store in a cool dark place until just prior to time of installation.
 - 7) Before installation, inspect each piece of pipe and fitting for defects. Material

found to be defective before or after laying shall be replaced with sound material meeting the specified requirements, and without additional cost to the Owner.

B. Pipe Installation: Unless indicated otherwise herein, all pressure force main pipe shall be installed in the manner indicated in SECTION 6 of this document. Sewer lines in relation to water lines shall be located in accordance with Standards for Wastewater Facility Construction: R.61-67.300.A.14.

- 1) Pipelines intended to be straight shall be so laid.
- 2) Where vertical or horizontal alignment requires deflection from straight line or grade, such deflection shall not exceed maximum deflection recommended by the pipe manufacturer. If alignment requires deflection exceeding recommended limits, furnish special bends or a sufficient number of shorter lengths of pipe to provide angular deflections within the allowable limits.
- 3) Rest the full length of each section of pipe solidly on the pipe bed, with recesses excavated to accommodate bells, couplings and joints. Refer to CONSTRUCTION DETAILS No. 11 and 12.
- 4) Take up and relay pipe that has the grade or joint disturbed after laying.
- 5) Do not lay pipe in water, or when trench conditions are unsuitable for the work; keep water out of the trench until jointing is completed.
- 6) Cut pipe neatly and without damage to the pipe. Bevel edges.
- 7) Cut ends of Ductile Iron Pipe shall have the Protecto 401 coating repaired using the manufacturer's recommended procedures. Freshly-applied Protecto-401 coating shall be allowed to fully cure prior to the cut pipe being installed.
- 8) If mechanical joint pipe or fittings are used, a torque wrench will be required to tighten the "tee" bolts. Torque required for "tee" bolts used on pipe up to 24 inches shall be 90 lb. Bolts shall be tightened in proper sequence as recommended by the manufacturer.
- 9) Pipe shall be pushed into place by use of a bar or other means approved by the District.

C. Thrust restraint: All plugs, caps, tees, bends, and other items as may be indicated on the plans, shall be provided with reaction blocking, tie rods, or other approved restraining methods or as shown on the drawings for lines 2-inches in diameter and larger.

- 1) Concrete Blocking and Rodding:
 - a. Concrete used for blocking, collars and "Deadman" type thrust blocks

shall have a compressive strength of 3,000 psi at 28 days. High early strength concrete shall be used.

- b. Concrete shall be poured to the dimensions shown on the plans and formed when directed by the Engineering Field Technician. The large side (backs) of the blocking shall bear against undisturbed, hard, solid earth. Blocking shall be poured to bear against the pipe or fitting and allow sufficient area for repair and the easy removal of nuts and bolts. The pipe or fitting shall be wrapped with 8 mil polyethylene (according to AWWA C-105) for a suitable distance either side of the thrust block to prevent the concrete from bonding to the pipe, fitting, or fasteners. Refer to CONSTRUCTION DETAIL NO. 13.
- c. Backfilling on poured concrete will not be permitted on concrete for 24 hours after pouring, and no water will be permitted in mains for at least 24 hours after concrete blocking is poured.
- d. Metal Straps and rods shall be made of steel having a tensile strength of 95,000 psi. If required by the Engineer, the Contractor shall supply acceptable certification of tensile strength. All steel components, including rods, straps, nuts, bolts, couplings and clamps shall be coated with 17.5 mils of Thick and Quick Mastic, or equal. Contractor shall supply coating and coat all the tie rods, clamps and miscellaneous steel used for anchoring purposes.
- e. Concrete Collars poured on the last joint of pipe in a dead end run, shall be poured around a thrust collar which shall be installed according to the manufacturer's recommendations (unless welded on, which must be done at the factory). This collar shall be installed on the pipe midway between the MJ bell and the spigot. Pipe manufacturer's shop drawings must be submitted for each size collar to be used indicating that the collar is designed to, at a minimum, restrain the force created by a 250 psi line pressure as listed in the table below. Field welding thrust collars will not be allowed. Refer to CONSTRUCTION DETAIL NO. 9

TABLE 5-4: Thrust forces created by 250PSI test pressure

Pipe Size Nominal Inch	Test Pressure (PSI)	Thrust (LBS)
4	250	3,140
6	250	7,065
8	250	12,560
10	250	19,625
12	250	28,260
14	250	38,465
16	250	50,240
18	250	63,585
20	250	78,500
24	250	113,040
28	250	153,860
30	250	176,625
32	250	200,960
36	250	254,340
40	250	314,000
44	250	379,940
48	250	452,160

- 2) Certain applications require special thrust restraint procedures and designs which should be submitted to the Spartanburg Water Engineering Department for review.

D. Restrained Joint Pipe:

Restrained joint piping materials shall meet the requirements stated in Section 5-03 A, DUCTILE IRON PIPE and 5-03 D FITTINGS, and shall be as those shown on the shop drawings submitted by the Contractor and approved by the Engineer.

E. Tracer wire and warning tape installation:

- 1) General: Wherever PVC or HDPE pressure pipe is installed, tracer wire and warning tape shall be installed to facilitate future location of the force main.
- 2) Materials:
 - a. Tracer wire shall be 14 gauge solid copper wire. Wire shall be continuous.
 - b. Warning tape shall be brightly colored non-biodegradable plastic ribbon. The words "Warning PVC Sewer Line" shall be printed continuously along the length of the ribbon in large letters.
 - c. Test boxes shall be 4-inch ID plastic with cast iron cover and collar.

3) INSTALLATION:

- a. Tracer wire shall be taped to the top of the pipe (“12-o’clock position”) using strips of duct tape or other suitable adhesive tape spaced a minimum of every 5 feet along the entire length of the pipe.
- b. Tracer wires shall begin and terminate in the test boxes. Test boxes shall be installed at each location as shown on the plans, spaced at intervals not to exceed 500 feet. Test boxes shall not be installed in streets or driveways.
- c. Tracer wire between boxes shall be continuous, unbroken lengths. The tracer wire shall not be installed in tension, but neither shall there be "coils" in the wire. The ends of the tracer wires shall be installed in the test boxes. The length of each tracer wire in each box shall be long enough to extend no less than one foot and no greater than two feet above ground level and shall be attached to the terminal board.
- d. Breaks shall be repaired by splicing with a split-bolt clamp or pre-approved equal. Repairs by "twisting" the two ends together will not be accepted.
- e. Warning tape shall be buried in the backfill approximately one foot below grade, directly over the top of the PVC or HDPE pipeline. Tape shall be laid in continuous lengths. Any breaks or tears shall be repaired before proceeding with the backfilling operations. Refer to CONSTRUCTION DETAIL NO. 11.

- 4) TESTING: After construction and backfilling is complete, but before final inspection, the District’s Engineering Field Technician will test the tracer wire with standard District locating equipment. If the Engineering Field Technician determines that the tracer is not operating properly, the Contractor shall locate and correct the problem. The pipelines will not be accepted and placed in operation until the tracer system is acceptable

F. Sewer air/vacuum valve:

- 1) Air/vacuum valves shall be installed at high points in the force main and/or as designated by the Engineer. The air/vacuum valves shall be designed specifically for the flows and operating pressures of the particular system and shall be SAAR Short Version D-025 as manufactured by A.R.I. Inc.
- 2) An inlet isolation gate valve (Type 316 stainless steel) shall be provided. All connection piping external to the air release valve shall be Schedule 40 T-316 SS.

- 3) Air/vacuum valves shall be enclosed in a five-foot diameter precast manhole with a flat slab top as a minimum standard. Refer to CONSTRUCTION DETAIL No. 14.
- 4) Submittals on air/vacuum valves shall be sent to the District's Engineering Department for approval before ordering.

SECTION 6

TRENCH EXCAVATION AND BACKFILL

6-01 SCOPE:

Work consists of all necessary trench excavation and backfill work as shown on the plans and as specified herein.

6-02 GENERAL:

Trench excavation shall be confined to the construction area as shown on the plans, and shall be done in an approved manner with proper equipment. Excavation and backfilling shall be suspended during rain and inclement weather, or when unsatisfactory field conditions are encountered, unless otherwise directed by the Engineer. At all times during construction, Contractor shall maintain proper drainage in the construction area, and shall take all measures necessary for erosion and sediment control.

A. Location in Relation to Water Mains: Sewer lines in relation to water lines shall be located in accordance with Standards for Wastewater Facility Construction: R.61-67.300.A.14. When sewers are proposed adjacent to any existing or proposed potable water supply facility, the following requirements apply:

- 1) Potable Water Supply Interconnections. There shall be no physical connections between a public or private potable water supply system and a sewer, or appurtenance thereto, which may permit the passage of any sewage or polluted water into the potable supply. No potable water pipe shall pass through or come into contact with any part of a sewer manhole.
- 2) Horizontal and Vertical Separation from Potable Water Mains. Sewers shall be laid at least 10 feet horizontally from any existing or proposed potable water main. The distance shall be measured edge to edge. In cases where it is not practical to maintain a 10 foot separation, approval for a deviation must be obtained from SCDHEC. This request must be supported by data from the design engineer. Such deviation may allow installation of the sewer closer to a potable water main, provided that the potable water main is in a separate trench or on an undisturbed earth shelf located on one side of the sewer and at an elevation so the bottom of the potable water main is at least 18" above the top of the sewer.
- 3) Crossings. Sewers crossing potable water mains shall be laid to provide a minimum vertical separation of 18" between the outside of the potable water main and the outside of the sewer. This shall be the case where the potable water main is either above or below the sewer. Whenever possible, the potable water main shall be located above the sewer main. Where a new sewer line

crosses a new potable water main, a full length of ductile iron pipe shall be used for both the sewer line and potable water main, and the crossing shall be arranged so that the joints of each line shall be as far as possible from the point of crossing and each other. Where a potable water main crosses under a sewer, adequate structural support shall be provided for the sewer line to prevent damage to the potable water main while maintaining line and grade.

Refer to CONSTRUCTION DETAIL No. 15

- B. Existing Utilities: The Contractor shall be solely responsible for locating and verifying the location of all existing utilities. The Contractor shall take every precaution to protect existing utilities from damage during construction operations. If damage occurs, the utility involved shall be promptly contacted and repairs made at their direction and at the Contractor's expense. The work shall meet the approval of the utility involved. If the respective utility desires to make repairs with its own forces, the Contractor shall bear all the expenses of the work.
- 1) When interruptions of existing utilities occur, temporary service shall be provided as directed and approved by the respective utility involved.
 - 2) Notification of intent to excavate:
 - a) South Carolina Underground Utility Damage Prevention Act (S.C. Code Ann., 58-35-10, CT-SEQ, Supp. 1978) requires persons to ascertain the location of underground public utility property prior to excavation or demolition in certain situations. The Act also requires such persons to give timely notice of intent to excavate or demolish prior to commencing such operations. Failure to comply could subject the violator to a civil penalty for each violation of the Act.
 - b) Notification of intent to excavate may be given by calling this toll free number: "811".
 - 3) If existing utilities are found to conflict with the permanent facilities being constructed under this Section, immediately notify the Engineer and secure his instructions.
 - 4) Do not proceed with permanent relocation of utilities until verbal instructions are received from the Engineer.

6-03 TRENCH EXCAVATION:

- A. Trenches for pipe shall be excavated along the lines designated by the Engineer and to the depths necessary for laying sewers to the required grades. The cover over PVC pipe shall not be less than 3 feet. Where the cover is less than 3 feet, that section shall be ductile iron pipe.

- 1) Do not excavate trench more than 200 feet ahead of pipe laying, unless permitted by the Engineer.
- 2) Where trenching occurs in existing lawns, and seeding is not an option, remove turf in sections with appropriate turf cutting equipment and keep damp. Replace turf upon completion of the backfilling.
- 3) Where trenching takes place in existing concrete or asphalt pavement, the pavement shall be saw cut a width 2 feet wider than the top width of the trench, unless otherwise noted on the drawings. Ragged edges of pavement shall be recut as required prior to paving to form a straight and uniform alignment.
- 4) Sides of trenches shall be kept as nearly vertical as possible. Maximum trench width up to a level 24 inches above the top of the pipe shall be as shown on the plans.
- 5) Water which is found in or accumulates in trenches shall be pumped, bailed or otherwise removed. All machinery required for pumping or bailing shall be furnished by the Contractor. Trenches shall be kept free of water while pipe is being laid. Disposal of water after removal shall be satisfactory to the Engineer. There will be no disposal of water into existing sewer.

6-04 CLASSIFICATION OF EXCAVATION:

All excavation shall be unclassified, except as otherwise specified below.

A. Classified Excavation: This item covers the excavation of solid rock for pipelines and structures, disposal of excavated rock, and backfilling of the excavation to the level of the original ground line. Work shall include all labor, materials, equipment and permits required for excavation of rock.

- 1) Classified excavation shall be material which cannot be removed by means other than blasting or with air hammer. Material which can be removed by ripping shall not be considered "classified excavation."
- 2) Where rock is encountered at grade on pipelines, the trench shall be excavated to a depth as shown in the improved ditch bedding details and the pipe bedded in angular material as specified in SECTION 6-05 A. below. Rock excavation in pipe trenches shall be removed 8 inches beyond each side of the pipe outside diameter and 6 inches below the outside bottom of the pipe. Payment for rock will be at the unit price stated in the bid.
- 3) Contractor shall give the Engineer ample notice so that he or the District's Engineering Field Technician (EFT) may be on hand to measure the rock as it is excavated and before any backfilling has taken place.

- B. Blasting: All blasting, where required, shall be done under the personal supervision of a licensed individual thoroughly skilled in this class of work. All necessary measures to protect life and property shall be taken. Where in close proximity to buildings, transmission lines, telephone lines or other facilities, timber mats or other means of preventing damage from flying debris shall be used. Ample and suitable signals shall be given in proximity to the work before each blast, and flagmen shall be placed on all roads beyond the danger zone in every direction to warn traffic. Contractor shall be responsible for all damage resulting from blasting. The Blasting Permit Number shall be given to the District's EFT prior to blasting.

6-05 BEDDING OF PIPE:

- A. Pipe bedding material for PVC pipe shall be angular material in a general size range of 1/4-inch to 3/4-inch, at a minimum depth of 4 inches below bottom of pipe and to the depth of 6 inches where classified excavation is necessary.
- 1) Select material for backfill shall be suitable material from the excavation free of large stones, hard lumps, debris and other objectionable material. If select material is not available from the excavation, it shall be hauled to the site at Contractor's expense.
 - 2) Angular material shall be crushed stone or gravel conforming to ASTM D448, either Size No. 67 or Size No. 57.
 - 3) All trenches shall be excavated below the established subgrade as required to provide for preparation of trench bottoms in strict accordance with the improved ditch bedding details as shown. Stone bedding shall be so shaped that the load is supported throughout the entire length of the pipe barrel, and not at the pipe bells. Bell holes shall be dug to relieve bells of the load and to provide for completion of joints.
 - 4) Pipe bedding for ductile iron pipe shall be Class "D" or Class "C" as required by conditions or designated on plans.
 - 5) Class "B" bedding shall be required where:
 - (a) PVC pipe is used. Bedding shall extend a minimum of 4 inches below pipe and up to the springline of pipe. Where rock is encountered, bedding shall extend a minimum of 6 inches below pipe. Angular material shall be as specified in Section 6-05 A.2) above.
 - (b) Pipe depth exceeds 18 feet.
 - (c) Specifically noted on the plans or where directed by Engineer or EFT. Refer to CONSTRUCTION DETAIL No. 12

6-06 BACKFILLING OF TRENCHES:

Backfilling of trenches shall progress as rapidly as pipe-laying will permit.

- A. Backfill around the pipe and above the top of the pipe to a height of at least 12 inches above the top of the pipe shall be placed in layers not more than 6 inches thick. Only select material or angular material (where required) shall be used for this portion of backfill. As fast as the material is placed, it shall be cut under the haunches of the pipe with a shovel and thoroughly compacted with light tamps for the full width of the trench to provide support for the bottom and sides of the pipe. Backfilling shall be carried up evenly on both sides in 6-inch lifts to 12 inches above the pipe.
- B. Trench backfilling shall be deposited in level lifts, free of objectionable material and boulders and thoroughly compacted. No rock shall be placed in backfill that cannot be easily removed by hand. Compaction shall be such as to prevent future settlement and shall be done by acceptable means, approved by the Engineer.
- 1) Compaction will be accomplished by the use of a mechanical hand tamp or "sheepsfoot" trench roller. Where a mechanical hand tamp is used, lifts shall be placed in a maximum of 12-inch layers for 95% compaction and the range from 18-24 inch layers for 90% compaction. Where a sheepsfoot roller is used, lifts shall be placed in a maximum of 18-inch layers for 95% compaction and 18-24 inch layers for 90% compaction. Either method will require four passes up and down the trench line on either side of the pipe (one pass will be defined as one run up the trench and back down again).
 - 2) A hydro tamp may be used for compaction for the final two feet of backfill provided there is a minimum of seven feet of cover over the pipe.
 - 3) Rolling with rubber tired vehicles or track type equipment will not be allowed.
 - 4) Compaction shall be at least 90% of maximum as established by ASTM D698 (Standard Proctor); except that under pavement, compaction shall be at least 95% of maximum per ASTM D698.
- C. Under pavement, the top of the trench shall be filled with an aggregate base as specified in SECTION 9-03 C.
- 1) Tamp each layer to a density equivalent of not less than 95% of ASTM D698 Proctor Curve (Standard Proctor).
 - 2) Provide additional compaction by leaving the backfilled trench open to traffic while maintaining the surface with crushed stone.
 - 3) Refill any settlement with crushed stone and continue such maintenance until

replacement of pavement is authorized by the Engineer or EFT.

- D. Contractor shall be responsible for final subsidence of all trenches, and shall leave trenches flush with the original ground after all settlement has taken place. Any settlement of backfill below finish grade shall be promptly corrected. Trenches shall be protected against scour due to surface drainage.
- E. Backfill around manholes shall, in general, conform to the requirements for backfilling trenches, except that no backfill shall be placed around manholes until all mortar has properly set.
- F. Backfill may be subject to a compaction test by an independent laboratory selected by the Engineer or the District. If compaction fails the test, Contractor shall remove and replace backfill to the satisfaction of the Engineer and the District, and shall also pay for the cost of the test.

SECTION 7

SEWER SERVICE CONNECTIONS

7-01 SCOPE:

This section covers the requirements for the construction of service connections to District owned lines.

7-02 DESIGN CRITERIA:

Service connections shall be installed at the locations designated by the District and in conformity to the same ditching and bedding detail as used on the main sewer line construction.

- A. The maximum diameter of service connections to main sewer lines shall be 4”;
- B. Service lines larger than 4” shall be connected to manholes. Refer to CONSTRUCTION DETAIL No. 16

7-03 GENERAL MATERIALS:

- A. Wyes shall be 8-inch, 10-inch, 12-inch, etc., by 4 inches of the same material as the main line pipe and shall have the same type gasketed connections. Tees will not be allowed.
- B. Bends shall be standard 4-inch, 11.25° (1/8) pipe bends. Bends and joints shall be as specified for service pipe.
- C. Service Pipe installed as part of main sewer line construction shall be standard 4-inch service pipe. PVC service pipe shall be 4-inch SDR 35 pipe which complies with the same requirements as the main sewer, conforming to ASTM D3034, F-794 or F-949 with gasketed joints and all required markings consistent with main line material.
- D. Service Pipe installed by a plumber in conjunction with a main line tap, existing stub out or manhole shall be either 4-inch ductile iron, SCH 40 PVC, or PVC pipe consistent with the existing stub out pipe (see section 7-03 C. above).
- E. Main line tapping saddles shall be Predco Fastfit Sewer Tap Saddle with Stabilizing Bands, ROMAC CB Sewer Saddle or approved equal.

7-04 INSTALLATION OF SERVICE LINES ON NEW SEWER PROJECTS:

Service connections shall be properly installed at the required locations. All wyes, bends, service pipe and other appurtenances shall be provided as required for each connection. All joints shall be installed so as to provide watertight connections.

- A. Catalog cuts and related data for all material shall be submitted to the Engineering Field Technician and the Engineer for review.
- B. Wye joints shall be installed as directed, with the branch turned to the proper direction, or as shown on the plans. Wyes shall be firmly supported by methods and materials used for bedding of main line pipe. Branch of wyes shall be installed at an angle 45° to the springline unless grade requirement dictate otherwise.
- C. Bends for service lines shall be placed in the wyes where directed by the Engineer, or where necessary for proper alignment.
- D. When installed during sewer line construction, service pipe shall be installed to the proper line and grade from the sewer line to the property line at a grade of not less than $1/4"$ per foot. Backfilling and bedding procedures shall be as for sewer line mains. Water tight plugs shall be placed in the end of service line stubs. Plugs shall be as recommended by the pipe manufacturer and shall be installed in accordance with the manufacturer's recommendation. Refer to CONSTRUCTION DETAIL No. 17. Suitable markers shall be installed at the ends of service line stubs for above ground location. A suitable marker shall include a section of pipe of the same material as service line extended one to two feet above ground surface.
 - 1) Service line stub locations at the property line shall be recorded by the Contractor and furnished to the Engineer to be included on the as-built drawings.
 - 2) Service line locations shall be referenced to the station location of the main at the point the service line intersects the sewer main. In the event a service line is not installed at a 90° angle to the sewer main, the station of the service line at the property line shall be referenced to the main line station. The information shall also include the perpendicular distance from the center of the sewer main to the end of the service line and the depth of the sewer line.
 - 3) The service line location data referenced in item 2) above shall be included on the As-Built drawings in a Table of Sanitary Sewer Tap Locations as shown in CONSTRUCTION DETAIL No. 18.

7-05 SERVICE CONNECTIONS TO EXISTING LINES:

- A. Materials:
 - 1) Minimum pipe size connection to either existing sewer main lines or manholes shall be 4 inches.
 - 2) Taps into existing sewer main lines shall use a gasketed fitting in conjunction with a "Predco Fastfit" sewer tap saddle or ROMAC CB Sewer Saddle (or approved equal). Saddles shall be mounted on pipe according to manufacturer's recommendations. Refer to CONSTRUCTION DETAIL No. 19

- 3) Taps directly into manholes shall be made by coring the manhole wall and installing the proper size manhole boot. Refer to CONSTRUCTION DETAIL No. 16.

B. Installation:

- 1) Taps will not be made prior to applicable fees being paid and a sewer connection permit being obtained from the Spartanburg Water New Connections Department
- 2) The main line will be tapped only when no service line stub is available. In the event the service line stub cannot be located by the District personnel, the plumber/ contractor will be allowed to tap the line. Service line shall be installed at an angle of 45° to the springline unless grade requirements dictate otherwise.
- 3) Ties to Existing Service Line Stubs:
 - a) Connection shall be made with the proper watertight connector suitable for the application.
 - b) Connection shall remain visible until inspection by the District Engineering Field Technician (EFT).
 - c) Backfill shall be carefully placed and tamped around the connection as to prevent any settlement or movement.
- 4) Taps to Sewer Main Lines:
 - a) Tap saddles shall be installed in accordance with manufacturer's recommendations.
 - b) Holes for saddles shall be 4.5 inches in diameter and shall be made by mechanical hole cutters or by keyhole saw or saber saw only. "Hammer Taps" are not approved. Holes shall be laid out with a template at an angle of 45° to the vertical (unless grade requirements dictate otherwise) and shall be deburred and carefully beveled to provide a smooth hole shaped to conform to the fitting. Care shall be taken to prevent any foreign material from entering the cut-in pipe opening. Any material or debris that does enter the line shall be removed.
 - c) Where applicable, saddle and pipe mating surfaces shall be wiped clean and dry. Epoxy cement shall be used in cementing in accordance with the cement manufacturer's recommendations and ASTM D2855.
 - d) Service line shall be connected to the Predco tap saddle or ROMAC

CD saddle by means of a fixture specified by the tap saddle manufacturer.

- e) Spartanburg Sanitary Sewer District tap inspection shall be conducted after hole is cut, **BUT BEFORE CONNECTION IS MADE UP.**
- f) If integrity of sewer main is breached during tap installation:
 - i. Where the installation of the tap causes visible cracks or splits in the clay sewer line, the sewer main line will be encased in concrete for the full length of the cracked pipe.
 - ii. Where the installation of the tap causes visible cracks or splits in the PVC sewer line, the cracked sewer line shall be cut out and replaced with a section of the appropriate size SDR-35 PVC using gasketed, PVC, bell x bell or bell x spigot couplings (“Harco Coupling”) or approved equal watertight coupling suitable for the application. The EFT shall determine the length of damaged sewer main to be replaced to remove all damaged material. The EFT, at their discretion, may approve “Fernco” or similar rubber, strapped, couplings in making PVC or DIP main-sewer pipe connections.
 - iii. Any sewer line damaged during the installation of a tap, shall be repaired at no cost to the District.
- g) In the event water is entering into the ditch, the contractor/plumber shall pump the ditch as dry as necessary to make the complete connection visible at the time of inspection.
- h) Backfill shall be carefully placed and tamped around the connection so as to prevent any settlement or movement. Where a cracked pipe is encased in concrete, backfilling shall not commence until the encasement has hardened.

5) Taps to Manholes:

- a) Service line must enter manhole at angle no less than 90° to the direction of flow.
- b) For manholes less than 12 feet in depth:
 - i. Plumber/contractor shall core drill the manhole wall directly above manhole table to a diameter specified by the manhole boot manufacturer. If the slope of table is less than 2 1/2" per foot, the invert of service line shall enter manhole 6" above table, and a suitable service invert formed on the table. Refer to CONSTRUCTION DETAIL NO. 16.

- ii. Pipe connections shall be made by a flexible synthetic rubber boot mechanically clamped to the manhole and to the pipe to provide a watertight seal and designed to accommodate pipe movement up to 2 inches radially or 22 degrees angularly in any direction. The synthetic rubber boot shall have a minimum wall thickness of 3/8 inch. The synthetic rubber material shall conform to ASTM C-923 (latest version). Bands, clamps and other metal accessories shall be of Series 304 stainless steel. Approved manhole boots shall be Kor-N-Seal as manufactured by NPC or PSX Direct Drive as manufactured by Press-Seal. Refer to CONSTRUCTION DETAIL NO. 5
 - iii. The void area inside the manhole boot shall be filled with non-shrink grout such as "Preco Plug," or approved equivalent, and walls shall be trowelled smooth.
 - iv. A curved trough shall be formed on/in manhole table to direct flow into the main invert. If the service enters below the table, then table must be removed and a new trough formed.
 - v. Spartanburg Sanitary Sewer District tap inspection shall be held before backfilling commences. Work must be visible and dewatered during inspection.
 - vi. Backfill shall be carefully placed and tamped around the connection so as to prevent any settlement or movement and shall commence only after non-shrink grout has sufficiently hardened.
- c) For manholes greater than 13.5 feet in depth, an inside drop may be installed. Inside drops on existing (4' ID) manholes are allowed for 6" services; however, it is critical that the drop be constructed so as minimize the intrusion into the manhole. Also, no restriction of the normal use of the manhole steps is allowed. Refer to CONSTRUCTION DETAIL NO. 7.
- i. Plumber/contractor shall core drill the manhole wall a minimum of four feet below ground surface. If four feet cannot be obtained, notify the Spartanburg Sanitary Sewer District Engineering Department before proceeding.
 - ii. A manhole boot shall be installed as given in paragraph 3) b) ii. above.
 - iii. Service pipe shall be inserted through the manhole wall.
 - iv. A tee shall be placed on pipe with run horizontal for clean out,

and a PVC plug, with a section removed, inserted in the run of the tee. The half-plug will create a dam prevent high flows from overrunning the drop, but will permit the entry of rodding tools for cleaning.

- v. The drop pipe shall extend to the manhole table and a 45° bend shall be installed on the end. The 45° bend shall be rotated toward the direction of water flow in the invert.
- vi. Inside piping shall be secured to the manhole wall by means a stainless steel strap spaced every 4 vertical feet and securely anchored to manhole wall. The space between the entering pipe and the manhole opening shall be sealed with a non-shrink grout.
- vi. A curved trough shall be formed on/in manhole table to direct flow into main invert. The trough shall extend beyond the opening of the 45° bend to its curvature or change in direction.
- vii. The void area inside the manhole boot shall be filled with non-shrink grout such as "Preco Plug," or approved equivalent, and the walls shall be trowelled smooth.
- viii. Spartanburg Sanitary Sewer District tap inspection shall be held before backfilling commences. Work must be visible and dewatered.
- ix. Backfill shall be carefully placed and tamped around the connection so as to prevent any settlement or movement only after non-shrink grout has sufficiently hardened.
- x. The Spartanburg Sanitary Sewer District reserves the right to deny the installation of an inside drop for any reason. If an inside drop is planned, the plumber should contact the Spartanburg Sanitary Sewer District Engineering Department to confirm approval prior to proceeding with the work.

C. Inspection of Taps to Existing Lines:

- 1) Plumber shall contact the New Connections Department (585-5629 or 585-2033) approximately eight hours before tap inspection will be needed. Tap to main lines shall remain **UNCONNECTED AND DEWATERED** until the tap has been approved by District EFT.
- 2) In the event a road or street must be cut in order to make the connection, the plumber will obtain a road/street cut permit and have it at the job site at the time of the inspection. If the road/street cut permit is not available at this

time, the tap will not be inspected.

- 3) Service lines over 100 feet in length will be tested for infiltration/exfiltration by the District-approved method covered in SECTION 12.
- 4) If tap fails inspection, the connection will be corrected at no expense to the District. District inspection is required after correction and tap shall remain uncovered and dewatered until tap passes inspection.
- 5) Failed Inspections:
 - a) Any tap which fails inspection shall be corrected within 5 working days, after the date on which the first inspection was performed;
 - b) The City or the County Building Inspection Department(s) shall be notified of any tap which is not corrected and successfully re-inspected within this time frame.

SECTION 8

BORING AND AERIAL CROSSINGS

8-01 SCOPE

This section contains the current specifications for the installation of pipe by various methods other than conventional “open cut” including the following:

- Boring (including specialized boring methods other than Directional Drilling)
- Horizontal Directional Drilling (HDD)
- Pipe supported on piers
- Pipe attached to bridges (or structures which have an intended purpose other than supporting the pipe).

The conventional “open cut” method of pipe installation is covered in SECTIONS 4, 5 and 6 of these Specifications. However, plans which incorporate alternative pipe installation methods, which are the subject of this section, must be prepared by engineers specifically trained and experienced in the particular method used. The specifications listed below are not intended to replace or be used as a substitute for the detailed design by a licensed engineer.

The review of plans by the Spartanburg Sanitary Sewer District Engineering Department will only serve to insure compliance with SCDHEC and District specifications. The design and use of alternative installation methods include various risks which may not exist with other methods; the Design Engineer and Contractor must accept full responsibility for the liabilities associated with these alternative methods. In situations where substantial risks exist, the District reserves the right to require additional liability insurance coverage, and/or extended warranties, beyond that noted in SECTION 1 and SECTION 14 of these Specifications.

8-02 BORING (INCLUDING JACK AND BORE, IMPACT MOLE, CLOSED-FACE BORE, MICRO-TUNNELING and others)

Where shown on the approved plans, pipe shall be installed under highways, railroads, or other obstacles by boring. The Contractor shall furnish all labor and materials necessary to complete the bore, install steel casing if required, and install carrier pipe per the approved plans.

- A. All bores under railroads shall be performed as required by railroad specifications. The Design Engineer shall be responsible for compliance with all railroad related permitting and design requirements.
- B. Service line bores under highways may be made without encasement unless otherwise noted on the plans.

C. If steel casing is required, unless otherwise noted on plans, encasement up to and including 48-inches in diameter shall be installed by boring and jacking (either augur or closed-face). Larger encasement shall be by tunneling. Refer to CONSTRUCTION DETAIL NO. 20.

D. GENERAL REQUIREMENTS:

- 1) Authorities: All aspects of crossing construction shall conform to the requirements of the South Carolina Department of Transportation, the applicable railroad or other agency having jurisdiction.
- 2) Insurance: It shall be the responsibility of the Contractor and/or his subcontractor to comply with all insurance requirements of the highway or railroad work within their right-of-way if the limits are higher than the limits of the insurance requirements of this contract.
- 3) Inspection: Crossing construction operations shall be subject to inspection by the Owner's representative and by the highway or railroad representative, who shall have full authority to stop work if, in his opinion, it would cause damage to the roadway or railway section, endanger traffic or endanger life.
- 4) Prior to beginning work, the Contractor shall submit to the Engineer a work plan detailing the procedure and schedule to be used to execute the project. The work plan shall include as a minimum:
 - a. a description of all equipment to be used;
 - b. a list of personnel and their qualifications and
 - c. experience (including back-up personnel in the event that an individual is unavailable);
 - d. list of subcontractors;
 - e. a schedule of work activity;
 - f. a safety plan (including MSDS of any potentially hazardous substances to be used);
 - g. traffic control plan (if applicable);
 - h. an environmental protection plan and contingency plans for possible problems.

The work plan shall be comprehensive, realistic and based on actual working conditions for this particular project. Plan shall document the thoughtful planning required to successfully complete the project.

E. ADDITIONAL REQUIREMENTS

- 1) Contractor shall comply with all requirements of the highway or railroad relating to temporary work, inspection, watchmen, flagmen, traffic barriers, protection of personnel and property, work restrictions, work scheduling, insurance and such other requirements. The Contractor shall pay for all costs associated with meeting these requirements, except as otherwise specified.
- 6) If steel casing is required, it shall be within the limits of the highway or railway right-of-way and shall be installed to the proper line and grade; no open excavation will be allowed within the limits of the steel casing without the Engineer's approval. The steel casing shall be furnished and installed in accordance with additional requirements specified herein.
- 7) All work shall be completed to the full satisfaction of the highway or railroad engineer, or his authorized representative
- 4) For work on railroad right-of-way, the Contractor shall notify the railroad division Superintendent at least 72 hours prior to entering railroad right-of-way to begin construction.

F. INSTALLATION BY THE BORING METHOD: Installation of the sewer main and, the steel pipe casing, where required, shall be by the dry boring method at locations shown on the Drawings. Installation shall include all related work and services such as mobilization, construction and maintenance of work pits, R/W maintenance and restoration, traffic maintenance, excavation, dewatering, sheeting, shoring, bracing, bulkhead, clean up, and move out. Installation of steel casing shall be in accordance with the applicable regulations of the South Carolina Department Transportation, the specific Railroad company; the Detail Drawings and these Specifications. All excavations for pit and bore shall be unclassified. Refer to CONSTRUCTION DETAIL No. 20

- 1) Boring Pit:
 - a. The boring pit shall be solid sheeted, braced, shored, and dewatered as necessary to provide a safe operation;
 - b. The limits of the bore pit work space shall be contained on public right-of-way unless prior construction or permanent easements have been secured;
 - c. Provide protection to other utilities and roadways;
 - d. The Contractor shall take all precautions, and shall comply with all requirements as may be necessary to protect private or public property;

- 2) Line and Grade: The Contractor shall set the boring rig so that the installation of the sewer pipe (and the casing pipe if required) conform accurately to the grades and alignment on the approved Drawings.
- 3) Boring:
 - a. Where encasement is required, the sewer main diameter and steel casing diameter shall be as noted on the plans. The hole shall be bored and encased through the soil by a cutting head on a continuous auger mounted inside the steel casing.
 - b. The boring of the hole and installation of the steel casing shall be simultaneous. Lengths of casing shall be fully welded to the preceding section in accordance with American Welding Society recommended procedures. The Contractor shall bear the cost of any corrective action required to meet line and grade requirements shown on the plans.
 - c. The distance to which excavation is carried ahead of the casing shall be not more than is absolutely necessary for installation purposes, and will be subject to approval of the Engineer. The work shall be performed so that no voids occur in the earth surrounding the casing and so that ground settlement adjacent to and within the limits of the pipeline crossing is eliminated.
 - d. If voids occur or are encountered outside the pipe, the Contractor shall stop the work and contact the agency having jurisdiction (SCDOT, Spartanburg County, etc.). The Contractor shall correct this condition using the method required by the agency. One method of correcting this condition is grout injection as follows:
 - i. holes shall be drilled at 10-foot centers to near the top of the steel casing;
 - ii. the voids filled with a 1:3 Portland cement grout at sufficient pressure to fill voids and prevent embankment settlement.
 - iii. If disruption of traffic will occur during the work, the Contractor shall obtain an approved Traffic Control Plan prior to commencing the work. All traffic control requirements shall be the responsibility of the Contractor.
 - e. If it becomes necessary to abandon an incomplete or unacceptable bore, the abandoned encasement shall be capped and filled completely with 1:3 Portland cement grout. Abandonment procedures shall be completed prior to moving to another boring location. All costs in connection with an

abandoned bore, including the construction cost and capping and filling costs, shall be at the Contractor's expense.

- 4) Steel casing installed by boring and jacking shall be welded steel pipe conforming to ASTM A139, Grade B, and shall be of the sizes shown on the plans. Pipe shall be bituminous coated on the outside. Casing size and minimum wall thickness shall be as follows:

Table: 8-1: Steel casing diameter and thickness according to size of carrier pipe.

Carrier Pipe Diameter (inches, nominal)	Required Casing Diameter (inches, nominal)	Casing Thickness (inch)
4"	8	.0188 (3/16)
6"	12	.0188 (3/16)
8	16	0.250 (1/4)
10	18	0.250 (1/4)
12	20	0.281
14	22	0.312
16	24	0.344
20	28	0.406
24	32	0.438
30	38	0.5
36	44	0.5
48	56	0.75
60	68	0.75
Greater than 60	Per Design	Per Design

When steel casing is installed without protective coating or cathodic protection, the wall thickness shall be increased a minimum of 0.063 inch greater than the thickness shown above.

- 5) Boring without encasement shall be bored through the soil and the pipe pushed through the bore hole. The diameter of the bore shall be no larger than 4-inches greater than the diameter of the bell of the pipe.
- F. Casing Spacers: All carrier pipe installed inside encasement shall be supported by spacers ("spiders") as called for on the plans. Spacers shall be fabricated from quality ASTM A36/A structural steel with continuous meg welds at each joint. The flanges for the two-piece spacer supports shall be formed with half bands. The legs shall be welded to the bands and the skids welded to the legs. After fabrication, the spacers shall be coated with bituminous dip. Grade 5 bolts with nylon locking nuts shall be used to secure the spacer supports to the carrier pipe. Spacers shall be manufactured by Spider Manufacturing, Inc., Cascade, Inc., or other approved supplier. The casing spacers must be submitted to the

Spartanburg Sanitary Sewer District Engineering Department as part of the plan review.
Refer to CONSTRUCTION DETAIL NO.21.

8-03 HORIZONTAL DIRECTIONAL DRILLING (HDD)

- A. **SCOPE OF WORK** This section contains guidelines and specifications applicable to the installation of pipelines using horizontal directional drilling (HDD). It includes minimum requirements for design, materials and equipment used for the horizontal directional drilling for the substantially trenchless construction of pipelines. The section also includes materials, dimensions and other pertinent properties of pipe and required accessories. These properties provide minimum performance requirements for various components including joints.
- B. **SUBMITTALS:**
- 1) All items listed under paragraph 8-02 D. above shall be submitted for approval
 - 2) Specifications on material to be used shall be submitted to Engineer. The material shall include the pipe, fittings, drilling mud, drilling additives and any other item, which is to be an installed component of the project or used during construction.
 - 3) Historically, High Density Polyethylene Pipe (HDPE) was the only material used for HDD installation of sewer mains. However, during recent years, additional materials are being installed by HDD Contractors, including fusible PVC and restrained joint ductile iron. Alternate pipe materials, other than HDPE, will be considered on a case-by-case basis by the District. The use of alternate materials for HDD project shall be submitted to the Spartanburg Sanitary Sewer District Engineering Department for review and approval. The District makes no commitment regarding the future use of HDD as a pipe installation method, based on previous projects or assumed approvals.
- C. **GENERAL**
- 1) The bore path alignment and design for HDD shall be based on the Engineer's plans and other factors. Some factors which must be considered are the acceptable bend radius or maximum deflection capabilities of the joint (if jointed pipe is used)
 - 2) Prior to the start of drilling, reaming, and pipe placement operations, the Contractor shall properly locate and identify all existing utilities in proximity to the pipeline alignment. The Contractor shall confirm the alignment of all critical utilities, using vacuum excavation or other suitable "soft dig" excavation method, for further detailed confirmations as necessary.

D. EQUIPMENT AND EXPERTISE

- 1) The Contractor shall have equipment and expertise, appropriate for horizontal directional drilling installations. This includes the preparation and maintenance of the bore path using drilling fluids appropriate for the geology of the soils. The Contractor shall also have experience in safety and dependability installing, in similar geology, similar size and length of piping involved.
- 2) The directional drilling machine shall consist of a hydraulically powered system to rotate, push and pull hollow drill pipe into the ground at variable angles down to 8 degrees above horizontal, while delivering a pressurized fluid mixture to a guidable drill (bore) head. The machine shall have a capacity to adequately complete the drilling and piping installation. The machine shall be anchored to the ground to withstand the pulling, pushing and rotating pressure required to complete the crossing.
- 3) The hydraulic power system shall be self-contained with sufficient pressure and volume to power drilling operations. Hydraulic system shall be free of leaks. Rig shall have a system to monitor the maximum pull-back pressure during the pull-back operation. The rig shall be grounded during drilling and pull-back operations. There shall be a system to detect electrical current from the drill string and an audible alarm, which automatically sounds when an electrical current is detected.
- 4) The drill head shall be a steerable type and shall provide the necessary cutting surfaces and drilling fluid jets. Mud motors shall be adequate power to turn the required drilling tools.
- 5) The equipment shall incorporate a conventional electromagnetic sound walkover system or Magnetic Guidance System (MGS) probe or proven gyroscopic probe and interface shall be used to provide a continuous and accurate determination of the location of the drill head during the drilling operation. The guidance shall be capable of tracking at the maximum depth required and in any soil condition, including hard rock. It shall enable the driller to guide the drill head by providing immediate information to the tool face, azimuth (horizontal direction), and inclination (vertical direction). The guidance system shall be accurate to $\pm 2\%$ of the vertical depth of the borehole at sensing position at depths up to one hundred feet and accurate within 5 feet (1.5) meters horizontally.
- 6) The Guidance System shall be of a proven type and shall be setup and operated by personnel trained and experienced with this system. The Operator shall be aware of any geo-magnetic anomalies and shall consider such influences in the operation of the guidance system if using a magnetic system.

E. DRILLING FLUID (MUD) SYSTEM

- 1) A self-contained, closed, drilling fluid mixing system shall be of sufficient size to mix and deliver drilling fluid composed of bentonite clay, potable water and appropriate additives. Mixing system shall be able to molecularly shear individual bentonite particles from the dry powder to avoid clumping and ensure thorough mixing. The drilling fluid reservoir tank shall be a minimum of 500 gallons. Mixing system shall continually agitate the drilling fluid during drilling operations.
- 2) Additives to drilling fluid such as drill soap, polymers, etc. shall be “environmentally safe” and be approved for such usage. No diesel fuel shall be used.

F. OTHER EQUIPMENT

- 1) Pipe rollers shall be of sufficient size to fully support the weight of the pipe while being hydro-tested and during pull-back operations. Sufficient number of rollers shall be used to prevent excess sagging of pipe. Rollers shall be used as necessary to assist in pull back operations and in layout/jointing of piping.
- 2) Hydraulic or pneumatic pipe rammers may only be used if necessary and with the authorization of Design Engineer. Other devices or utility placement systems for providing horizontal thrust other than those previously defined in the preceding sections shall not be used unless approved by the Design Engineer prior to commencement of the work. Consideration for approval shall be made on an individual basis for each specified location. The proposed device or system shall be evaluated prior to approval or rejection on its potential ability to complete the utility placement satisfactorily without undue stoppage and to maintain line and grade within the tolerances prescribed by the particular conditions of the project.

G. GENERAL

- 1) The Engineering Field Technician must be notified 48 hours in advance of starting work. The directional bore shall not begin until the Engineering Field Technician (EFT) is present at the job site and agrees that proper preparations for the operation have been made. The approval of the EFT for beginning the installation shall in no way relieve the Contractor of the ultimate responsibility for the satisfactory completion of the work.
- 2) All personnel shall be fully trained in their respective duties as part of the directional drilling crew and in safety. Contractor must show job history and reference list of equal or greater size and length of piping involved. The Supervisor must have at least two years directional drilling experience. A competent and experienced supervisor representing the Drilling Contractor shall be present at all

times during the actual drilling operations. A responsible representative who is thoroughly familiar with the equipment and type work to be performed, must be in direct charge and control of the operation at all times.

- 3) Testing and acceptance of sewer lines installed by HDD shall be as indicated in SECTION 12 of these Specifications as applicable.

8-04 PIPE SUPPORTED ON PIERS

A. **GENERAL:** This section addresses the situation in which the sewer line must cross natural or man-made terrain features, with the pipe exposed above-ground, rather than crossing underground. The guidelines below refer to sewer lines in the Spartanburg Sanitary Sewer District (hereinafter referred to as the "District") collection system, and may not apply to other aerial installations such as within treatment plants or other isolated facilities. The Engineer shall be responsible for all details associated with the design of pier-supported piping systems. All details related to a planned aerial crossing on piers shall be submitted the District's Engineering Department with the preliminary plan submittal package.

B. **MATERIALS:**

- 1) Ductile iron pipe shall be used for all aerial crossings, the required wall thickness shall be specified by the Engineer.
- 2) The DIP joint configuration shall be as specified;
- 3) Fittings and appurtenances shall be as specified;
- 4) Long span pipe may be used to reduce the number of joints; this material shall be submitted to the District's Engineering Department for approval.

C. **DESIGN CONSIDERATIONS**

- 1) The carrying capacity of the supports themselves,
- 2) The strength of the structure from which a pipe may be suspended
- 3) Unusual or additional loads not in the scope of this section. Such loading may include seismic, frequency or resonance of vibrations, wind, water current, and other special design considerations.
- 4) It is also necessary to ensure a minimum of lateral and vertical stability at the supports for aboveground piping. Deflected pipe joints can result in thrust forces of hydrostatic or hydrodynamic origin, and, if not laterally and vertically restrained, unbalanced forces may result in additional joint deflection and possible failure of the pipeline.

- 5) Thermal expansion of ductile iron pipelines supported above ground is not usually of concern in correctly designed and installed systems because of the nature of the push-on joint. A 120° F change in temperature results in expansion or contraction of a 20' length of ductile iron pipe of approximately 1/8". This is easily accommodated by correctly installed pipe and joints.
- 6) Occasionally, where support structures are expected to have significantly different behavior than the pipeline, special considerations for expansion, contraction, and supports may be necessary;
- 7) Supports should generally be positioned immediately behind the pipe bells. Supports should normally not be placed under spigots adjacent to bells, due to possible undesirable effects on joints.
- 8) Pipe supports should cradle the pipe in a saddle. This cradling, which should follow the contour of the pipe, minimizes stress concentrations at the supports. It is recommended that the saddle angle of the support be between 90° and 120°. Little or no benefit is gained by increasing the saddle angle more than 120°. With angles smaller than 90°, the maximum stress tends to increase rapidly with decreasing saddle angle.
- 9) Supports, piles, and/or foundations should be adequately designed from a structural and soil-engineering standpoint to safely handle any loads transferred from the pipe.
- 10) Refer to CONSTRUCTION DETAIL NO. 22. NOTE: The construction details provided in these Specifications are suggestions only and do not relieve the Design Engineer from the responsibility and obligation to consider all issues related to the proper design of all structures and systems and compliance with all applicable regulations and standards.

8-05 PIPE ATTACHED TO BRIDGES

- A. APPROVALS: Attachment of sewer lines to bridges or other structures must be approved by the agency with jurisdiction over the structure. It shall be the responsibility of the Design Engineer to obtain written authorization and approval as needed from all agencies including (but not limited to) the following:
 - 1) SCDOT
 - 2) The City of Spartanburg
 - 3) Spartanburg County.

- B. **GENERAL:** All pipe, fittings and appurtenances shall be assembled and joined in accordance with the instructions in this Section and manufacturer's recommendations and shall accurately conform to the dimensions established. Pipe hanger assemblies shall be the type and size indicated on the plans and shall meet the requirements stated on the plans and stated herein. The pipe hanger shall be either a yoke pipe roll or a clevis. All pipe fittings and appurtenances shall be adequately supported and anchored, protected from damage and freezing, and accessible for repair and replacement.
- 1) Steel Yoke Pipe Roll Hanger: If the hanger is to be a yoke pipe roll type, it shall be a Grinnell "adjustable steel yoke pipe roll," or approved equal. The yoke, roll rod and hex nuts shall be manufactured from carbon steel and the roll shall be cast iron. Each hanger shall have a maximum recommended load of not less than 1200 lbs.
 - 2) Pipe Hanger Clevis: If the pipe hanger is to be a clevis type, it shall be a Grinnell "adjustable clevis for cast iron pipe," or approved equal. The clevis shall be manufactured from carbon steel and shall have a maximum recommended load of not less than 1940 lbs.
 - 3) Rods: Rods shall be the diameter and length shown on the plans. Rods shall be carbon steel with a minimum yield strength of 60,000 psi. Rods shall be threaded to match the hanger hardware.
- C. **EXISTING BRIDGE:** Where a pipeline is to be installed on an existing bridge, it shall be supported by hangers attached to the bridge by anchors drilled and embedded in the bottom of the bridge deck as shown on the construction plans.
- 1) Concrete Anchors: Shall be the Hilti HVA Adhesive Anchor System or approved equal with 7/8-inch diameter and a minimum embedded depth of 6 5/8 inches. Tensile bond strength shall be 28,720 lbs minimum.
 - 2) Installation: During assembly, the vertical position of the hanger on the rod shall be adjusted to provide consistent clearance between the pipe and the bridge deck. The hanger rod nuts shall be tightened securely. Each completed hanger assembly shall be coated with 17.5 mils of Koppers Bitumastic 300-M, or equal.
- C. **NEW BRIDGE:** Where a pipeline is to be installed on a bridge which is being newly constructed, arrangements will be made by the District to have concrete inserts cast in place in the bottom of the bridge deck when it is being formed. The pipeline will be supported by hangers attached to these inserts as shown on the construction plans.
- 1) Concrete Inserts: Concrete inserts shall be the Grinnell "wedge type concrete insert," or approved equal. The inserts shall be manufactured from carbon steel and have a galvanized finish. The nut shall be iron. Maximum recommended load shall be not less than 1,200 lbs. Inserts shall be installed in place by nailing each

insert to the wooden form at the locations shown on the plans before the concrete is poured into the form. Two one foot lengths of 3/8-inch rebar shall be installed in the slots of each insert as shown on the plans and shall be cast in place with the inserts. After the bridge is poured, set and the forms removed, the knockout plate in each insert shall be removed with a screwdriver.

- 2) Installation: The wedge nut should be put on the rod before inserting into the concrete insert body. Insert the nut into the slot and turn rod so the elongated nut lies across the slot. Screw rod through nut until rod is firmly against the top of the recess.
- 3) After assembly of pipe, clevis and rod, the vertical position of the clevis on the rod shall be adjusted to provide consistent clearance between the pipe and the bridge deck. The hanger rod nuts shall be tightened securely. Each completed hanger assembly shall be coated with 17.5 mils of Koppers Bitumastic 300-M, or equal.

SECTION 9

PAVING AND SURFACING

9-01 SCOPE:

This section covers cutting and replacing pavement for installation of utilities, as shown on the plans and as specified herein.

9-02 DESIGN CRITERIA

Reference SCDOT Standard Specifications for Highway Construction (latest edition)
Reference Spartanburg County Standard Specifications for Construction of Roads

9-03 CUTTING AND REPLACING PAVEMENT:

- A. Cutting: All pavement shall be neatly cut to a straight edge in advance of trenching, with the method of cutting subject to approval of the Engineer. Cutting pavement shall be sawed with suitable concrete saw cutting equipment. Pavement shall be cut 12 inches wider than the excavated area on each side. Ragged and irregular edges shall be redone.
- B. Trench Backfilling under pavement shall be as specified in SECTION 6 of these Specifications..
- C. Base for pavement shall be crusher run stone for all secondary highways and non-highway streets, and concrete for all primary highways. Base shall be placed in accordance with plan or encroachment permit details. Base width shall be as shown on the plans of encroachment permits for the various types pavement cuts.
 - 1) Crusher run stone shall be graded 1-1/2 inches and down, with fines being added if necessary. Stone shall be well mixed and compacted by tamping and rolling so as to prevent settlement. Crusher run base material shall be placed at the same time that the trench is backfilled. Backfilling to the top of the trench, to be cut out and replaced with base material at a later date, will not be allowed.
 - 2) Base for highway pavement and adjacent drives shall be 8 inches of crusher run stone, stabilized with 5% Portland cement. Base shall be thoroughly mixed prior to compaction.
 - 3) Base for non-highway pavement and adjacent drives shall be 8 inches of crusher run stone, without the addition of cement.

- 4) Concrete base shall consist of 10 inches of concrete. Concrete shall be designed to produce a compressive strength of 3000 psi at 28 days. Design of mix and source of supply shall be subject to approval of the Design Engineer.
- D. Pavement shall be replaced with the same type of pavement that existed prior to cutting, and shall consist of bituminous surfacing, bituminous plant mix pavement. The Contractor shall contact the highway department and obtain the specifications for the mix to be used for any one or group of pavement cuts.
- 1) Pavement shall be repaired within the same week that it is cut. If inclement weather delays pavement replacement, Contractor shall not cut additional pavement until he has notified the Engineer and received specific permission and instructions.
 - 2) For bituminous pavement or surfacing, the entire area to be resurfaced (including edges of existing pavement) shall be primed with an acceptable asphalt prime coat just prior to placing the new pavement.
- E. The Construction Details included with these specifications are general. The requirement of the agency having jurisdiction over the roadway which is being impacted by the work shall govern. Refer to CONSTRUCTION DETAIL NO. 23.
- F. All Work on State Highways shall be done in strict accordance with the South Carolina Highway Department requirements. It shall be the responsibility of the Contractor to familiarize himself with all such requirements. He shall obtain from the Owner a copy of all required encroachment permits, and shall conform to all requirements and stipulations therein.
- All Work on County Highways or Roads, Town or City Street shall be done in strict accordance with requirements of the agency having jurisdiction thereof. The Contractor shall secure permits from the applicable agency involved and furnish a copy to the District. Paragraphs A, B, C and D of this section also apply.

9-04 REMOVING AND REPLACING SIDEWALK:

Where pipe is to be placed under an existing concrete sidewalk, the concrete shall be removed in construction units unless their length is more than 10 feet, in which case, the concrete shall be cut as specified for pavement. Backfill shall be thoroughly compacted for the entire depth of the trench.

- A. Sidewalk shall be replaced with 3,000 psi concrete 4 inches thick, except for driveways where it shall be 6 inches thick. Concrete shall be placed monolithic and dressed off with a wooden float, brush and edging tool. Where pipe is to be placed

under a concrete walk, the Contractor may, with permission of the Engineer, install the pipe by boring instead of removing and replacing the walk.

- B. Curb and Gutter: If pipe is to be placed under curb and gutter, it shall be done by boring. No additional payment will be made therefore.

SECTION 10

GRASSING AND EROSION CONTROL

10-01 SCOPE

This section contains specifications for the materials, equipment, construction, measurement, and payment for the seeding, interseeding, fertilizing, applying nitrogen and lime when specified, and mulching in conformity with the Plans and the Specifications or as directed by the Engineer or Engineering Field Technician. Interseeding consists of the planting of centipede grass seed within the existing turf.

10-02 MATERIALS

A. General

At the time of delivery, the Contractor shall retain delivery tickets, packing slips, or other documentation for materials received in order to determine the application rate of materials.

B. Seed

Ensure that seed conforms to state laws and the requirements and regulations of the South Carolina Department of Agriculture (SCDA). Provide individually packaged or bagged and tagged varieties of seed that show the name of seed, net weight, origin, percentages of germination and purity, lot number, and other information required by the South Carolina Department of Agriculture. The Spartanburg Sanitary Sewer District, hereinafter referred to as the "District", reserves the right to test and reject or approve any or all seed before application of the seed. For mixtures of different types of seed called for in the seeding schedule, weigh and mix in the proper proportions.

C. Seeding Schedules

Unless otherwise provided, select the type of seeding from the tables shown below for the upper state regions as applicable to the project. The upper state region includes all of Spartanburg, Greenville, Union, and Cherokee Counties. The total seed rate in pounds per acre is the sum total shown for all the varieties of seed opposite the schedule number in the seeding schedules included herein.

Adhere to the following two seeding schedules.

Seeding Schedule for Permanent Vegetation Upper State				
Schedule No.	Common Name of Seed	Pounds/acre ¹		Planting Dates
		Rural	Urban	
1	Common Bermuda (hulled) ³	20	25	March 15 to August 14
	Sericea Lespedeza (scarified) ⁴	50	50	
	Kentucky 31 Fescue	50	20	
	Weeping Lovegrass ²	10	10	
2	Kentucky 31 Fescue	50	20	August 15 to March 14
	Sericea Lespedeza (or hulled, unscarified) ²	50	20	
	Common Bermuda (or hulled) ³	30	30	
	Weeping Lovegrass ²	10	10	
	Reseeding Crimson Clover ⁴	20	0	
	Annual Rye Grass ⁵	5	15	
	Rye Grass	20	0	

Notes:

¹ Includes rural areas adjacent to well-developed lawns

² Not required on shoulders, medians, etc. and on slopes under 5 feet in height.

³ Do not use Giant Bermuda seed including NK-37.

⁴ Inoculate Reseeding Crimson Clover in accordance with Subsection 810.2.4. Do not plant clover in medians or in rural areas adjacent to well-developed lawns.

⁵ The use of Italian Rye Grass is prohibited on all projects.

Adhere to the following schedule for interseeding.

Interseeding Schedule			
Schedule No.	Common Name of Seed	Pounds per acre	Planting Dates
1	Centipede	10	October 15 to July 15

810.2.3.3 Temporary Vegetation Seeding Schedule

Adhere to the following seeding schedules for temporary vegetation.

Seeding Schedules For Temporary Vegetation Upper and Lower State			
Schedule No.	Common Name of Seed	Pounds per acre	Planting Dates
1	Brown Top Millet	50	April 1 to August 15
2	Rye Grain	55	August 15 to March 01
	Annual Ryegrass ¹	15	
¹ The use of Italian Ryegrass is prohibited on all projects.			

Add oat grain at the rate of 10 pounds per acre to schedules if the seeding date is between March 1 and April 16.

D. Inoculants

Provide an inoculant for treating reseeding crimson clover seed of a pure culture of nitrogen-fixing bacteria selected for a maximum vitality and ability to transform nitrogen from the air into soluble nitrates and deposit them into the soil. Ensure that inoculants consist of purebred cultures and are not more than one year old.

E. Commercial Fertilizer

Provide commercial fertilizers that comply with state fertilizer laws. When a fertilizer is required for any grass, use a mixed fertilizer with a designation such as 10-10-10, where the first number represents the minimum percent of nitrogen required, the second number represents the minimum percent of available phosphoric acid required, and the third number represents the minimum percent of water soluble potash required in the fertilizer. For centipede grass, use only 15-0-15 or 16-4-8 fertilizer.

F. Lime

Ensure that lime is agricultural grade, standard ground limestone conforming to the current *Rules, Regulations, and Standards of the Fertilizer Board of Control*. These rules, regulations, and standards are promulgated and issued by the Fertilizer Board of Control at Clemson University in accordance with Section 16 of the South Carolina Liming Materials Act. Ensure that each bag has affixed in a conspicuous manner a tag or label, or in the case of bulk sales, a delivery slip showing the brand or trade name, calcium carbonate equivalent, percent by weight passing prescribed U.S. Standard

sieves, and other pertinent information to identify lime as agricultural grade, standard ground limestone. The Contractor may substitute liquid lime for ground lime if it meets all requirements for agricultural grade lime specified herein, except percent by weight passing U.S. Standard Sieves, which is waived for liquid lime.

G. Tackifiers as Mulch Binders

1) Emulsified Asphalt

If emulsified asphalt is used as a tackifier, ensure that emulsified asphalt is diluted at the manufacturing plant with water, if necessary, to provide a homogenous and satisfactory material for spraying.

2) Chemical Tacking Agents

If a chemical tacking agent is used, ensure that it consists of a polymer synthetic resin, polypectate, liquid latex, or other material that gives similar adhesive properties as asphalt emulsion when sprayed on straw and cellulose fiber mulches. Chemical tacking agents require approval by the District Engineering Department.

H. Straw Mulch

Use straw mulch material consisting of straw or hay. Use straw that consists of stalks of wheat, rye, barley, oats, or other approved straw. Use hay that consists of Timothy, Peavine, Alfalfa, Coastal Bermuda, or other grasses. Ensure that these materials are reasonably dry and reasonably free from mature seed-bearing stalks, roots, or bulblets of Johnson Grass, Nutgrass, Sandburg, Wild Garlic, Wild Onion, Wild Mustard, Crotolaria, Pigweed, Witchweed, and Cocklebur. Comply with all state and federal domestic plant quarantine regulations.

I. Wood Fiber Hydroseeding Mulch

1) Use wood fiber hydroseeding mulch made from wood chip particles manufactured particularly for discharging uniformly on the ground surface when dispersed by a hydraulic water sprayer. Ensure that it remains in uniform suspension in water under agitation and blends with grass seed and fertilizer to form homogeneous slurry. Make certain that the fibers intertwine physically to form a strong moisture-holding mat on the ground surface and allow rainfall to percolate the underlying soil. Use a fiber material that is heat processed and contains no germination or growth-inhibiting factors.

2) Use a fiber material dyed (non-toxic) an appropriate color to facilitate the uniform application of material.

3) Use suppliers that certify that their product has been laboratory and field tested and meets all of the foregoing requirements based upon such testing. Ensure that the weight specifications from suppliers and for all applications of this material refer only to the absolute air-dry weight of the fiber material.

Absolute air-dry weight is based on the normal weight standard of the Technical Association of the Pulp and Paper Industry for wood fiber hydroseeding mulch and is considered equivalent to 10% moisture. Ensure that the manufacturer marks each package of the wood fiber hydroseeding mulch to show the air-dry weight content.

- J. Cellulose Fiber Hydroseeding Mulch
Use cellulose fiber hydroseeding mulch consisting of recycled magazine stock products shredded into small pieces for application by hydraulic seeding equipment. Ensure that it mixes readily and uniformly under agitation with water and blends with grass seed and fertilizer to form homogeneous slurry. When applied to the ground surface, ensure that the material forms a strong moisture-holding mat, allows rainfall to percolate to the underlying soil, and remains in place until the grass root system is established. Ensure that the material contains no growth inhibiting characteristic or organisms. Obtain mulch from suppliers that certify that their product meets these requirements.

10-03 INSTALLATION OF GRASS AND RELATED MATERIALS

- A. Seeding Dates and Rates of Application
Perform seeding during the periods and at the rates specified in the seeding schedules above. The Contractor may perform seeding work throughout the year using the schedule prescribed for the given period. Do not conduct seeding work when the ground is frozen or excessively wet. Produce a satisfactory stand of grass meeting the requirements of this section, regardless of the period of the year in which the work is performed. Perform interseeding during the periods and at the rates specified in the interseeding schedule. Conduct the interseeding with a no-till drill calibrated to deliver the specified rate of seed per acre.
- B. Preparation of Ground Before Seeding
Ensure that the areas seeded are uniform and conform to the finished grade and cross-section shown on the Plans or as otherwise directed by the Engineer. Perform minor shaping and evening of uneven and rough areas outside the graded section as needed in order to provide for more effective erosion control and ease of subsequent mowing operations. Loosen the seedbed (including cut slopes) to a minimum depth of 3 inches before agricultural lime, fertilizer, or seed is applied. Clear the areas to be seeded of stones larger than 2½ inches in any dimension, roots, and other debris. Temporarily seed slopes to coincide with the embankment work in 10-foot increments. When 10 feet of fill is in place, seed the slope. Track the slopes vertically to help hold the seed in place.
- C. Applying Organic Topsoil
At areas to be grassed where the existing seedbed has little or no topsoil, topsoil may be furnished and placed on the seedbed to ensure a good stand of grass.

D. Applying Lime and Fertilizer

When called for in the Contract, spread lime and/or fertilizer uniformly over the designated areas and thoroughly mix with the soil to a depth of approximately 2 inches. Apply fertilizer at the rate of 1000 pounds per acre unless otherwise directed.

Apply lime at the rate of 2000 pounds per acre, unless otherwise specified. Unless otherwise provided, do not apply lime for temporary seeding. Adequately scarify steep slopes, which are inaccessible to power equipment and are subject to slides. Fertilizer may be applied as a mixture of fertilizer and seed by approved mechanical spreaders or by hydraulic methods. When fertilizer is applied in a combination seed and fertilizer drill, no further incorporation is necessary. Apply the fertilizer and seed together when the hydraulic method of seeding is used. Remove all stones larger than 2½ inches in any dimension, larger clods, roots, or other debris brought to the surface. Fertilizer of a different analysis than that specified on the Plans may be substituted if approved by the Engineer. If a different fertilizer is approved, apply the fertilizer at such a rate per acre to give at least the amount of nitrogen, phosphoric acid and potash as would have been accomplished had the originally specified fertilizer been used and applied at the specified rate. If the substitute fertilizer meets the minimum analysis of at least one or more of the three basic ingredients, do not consider the excess in calculating the required quantity of the substituted fertilizer. Payment is made for the number of tons of fertilizer which would have been required if the originally specified fertilizer had been used at the specified rate. For Interseeding, apply fertilizer at the rate of 500 pounds per acre. Use 15-0-15 or 16-4-8 fertilizer.

E. Permanent Vegetation

Produce a satisfactory stand of perennial vegetation with a root system that is developed sufficiently to survive dry periods and winter weather, and is capable of re-establishment in the spring. The perennial vegetative cover must have a minimum coverage density of 70% for the seeded areas. Using the seed specified above, determine the rate of application necessary to produce the required stand of grass and follow the application procedures as specified herein.

F. Temporary Vegetation

Obtain a satisfactory stand of vegetation that is capable of erosion control. Using the seed specified above, determine the rate of application necessary to produce the required results. Ensure that the temporary vegetation provides minimum density coverage of 70% of the seeded area.

G. Temporary Seeding

Sow seed within 24 hours following the application of fertilizer and preparation of seedbed as specified above. Sow seed at the required rate by hand or by methods as outlined above. Compact or cover the seeded areas as specified above. On small areas inaccessible to machinery, the Contractor may cover the seed by hand rakes or other methods satisfactory to the Engineering Field Technician. Apply fertilizer at the rate of 500 pounds per acre or as directed by the Engineering Field Technician. Lime is not required in temporary seeding unless otherwise specified. No tackifiers or mulches are required for temporary seeding. The Contractor may use temporary

seeding in isolated problem areas or, where it is not feasible or practicable to bring an area to final slope, grade and finish so that the permanent seeding can be performed without subsequent serious disturbance by additional grading.

H. Seeding (Unmulched)

Ensure seeding without mulch (unmulched) conforms to Method A or B as prescribed below, except do not use Method A in urban areas or in areas adjacent to sidewalk, guardrail, curb, curb and gutter, or concrete median.

1) Method A: Seeding with Emulsified Asphalt Tackifier

Sow seed within 24 hours following the application of fertilizer and lime and preparation of the seedbed as specified above. Uniformly sow seed at the rate specified by the use of approved mechanical seed drills, rotary hand seeders, hydraulic equipment, or any other type of equipment that produces a uniform application of the seed. Except on steep slopes where mechanical equipment cannot operate satisfactorily, compact all seeded areas by means of a cultipacker or light roller. Compaction is not necessary if seeds are planted by mechanical seed drills that perform a compaction procedure. On slopes that are inaccessible to compaction equipment, cover the seed by dragging spiked-chains, by light harrowing, or by other methods satisfactory to the Engineer. Within 24 hours following compaction of the seeded areas, uniformly apply emulsified asphalt, diluted at the manufacturing plant with an equal amount of water, over the seeded areas at a rate of 0.15 to 0.32 gallon of the dilution per square yard. The RCE will determine the exact rate of application. Before spraying emulsified asphalt, cover parts of bridges, culverts, guardrail, signs, sidewalk, curb and gutter, catch basins, pipe ends, and other structures as necessary to prevent discoloration.

2) Method B: Seeding with Wood Fiber Mulch Tackifier,

Cellulose Fiber Mulch Tackifier, or Wood/Cellulose Fiber Mix Tackifier
Apply lime and prepare the ground as shown on the Plans or as provided above. Choose one of the following tackifiers: wood fiber tackifier, cellulose fiber tackifier, or wood/cellulose fiber mix tackifier and apply with a mixture of water, seed, and fertilizer at the rate of 1500 pounds per acre. Use hydraulic equipment for the application of slurry of water, fertilizer, seed, fiber, and tackifier. Use equipment with a built-in agitation system and an operating capacity sufficient to agitate, suspend, and homogeneously mix the slurry. Ensure that the slurry distribution lines are large enough to prevent clogs. Equip the discharge line with a set of hydraulic spray nozzles to provide even distribution of the slurry on the various areas seeded. Use a slurry tank with a minimum capacity of 1000 gallons. Combine all of the seed, fertilizer, tackifier, and water into the slurry tank for distribution of all ingredients in one operation by the hydraulic seeding method specified herein. Combine the materials in a manner recommended by the manufacturer. Regulate the slurry mixture so that the amounts and rates of application result in a uniform application of all materials at rates not less than the amounts

specified. Using the color of the slurry as a guide, spray the prepared seedbed with a uniform visible coat. Apply the slurry in a sweeping motion in an arched stream falling like rain and allow the slurry to build upon itself until an even coat is achieved.

I. Seeding (Mulched)

Ensure that seeding with mulch conforms to Method A, B, or C as prescribed below, except do not use Method A in urban areas or in areas adjacent to sidewalk, guardrail, curb, curb and gutter, or concrete median.

1) Method A: Seeding with Straw or Hay Mulch

Sow seed as specified in Method A of Section I above. Within 24 hours following covering of the seed, uniformly apply straw or hay mulch material at the rate of 2 tons per acre. Spread mulch by hand, by appropriate mechanical spreaders, or by blowers. Use mulch that allows sunlight to penetrate and air to circulate but also partially shades the ground and conserves soil moisture. Use emulsified asphalt meeting the requirements of Section 10-02 H. above, or other approved tacking agent, to hold the newly laid mulch in place. Ensure that the emulsified asphalt is diluted at the manufacturing plant with an equal amount of water. Uniformly apply the material as a film over the mulch at approximately 0.20 gallon of dilution per square yard. Make certain that the film is sufficient to bond together the mulch particles without giving a heavy coating of the asphalt material. Ensure that the film prevents wind erosion. Other tacking agents may be used and applied at the manufacturer's recommended rate. Replace displaced mulch.

2) Method B: Seeding with Straw and Hydroseeding Mulch

Apply seed as in Method A of Section I above, then cover with straw tacked with the manufacturer's recommended rate of wood, cellulose, or a wood/cellulose mix hydroseeding mulch; or straw tacked with manufacturer's recommended rate of a combination of tacking agent and any of the aforementioned hydroseeding mulches.

3) Method C: Hydroseeding

Hydroseed using 1500 pounds per acre of wood, cellulose, or a wood/cellulose mix hydroseeding mulch with the manufacturer's recommended rate of an approved tacking agent.

J. Application of Nitrogen

As soon as the plants show satisfactory growth, apply nitrogen evenly at the rate of 48 pounds per acre on the areas designated by the RCE. Unless otherwise permitted, apply the nitrogen in a solid form rather than in a liquid state. Do not apply nitrogen to stands of *sericea lespedeza*. Unless otherwise provided, do not apply nitrogen to temporary vegetation.

10-04 TURF MAINTENANCE

A. Mowing

Mow areas seeded or sodded , or other areas as necessary, to maintain the project in a satisfactory manner. Perform mowing where directed by the Engineer. Commence mowing within three business days following verbal notification by the Engineer. Failure to comply with the above may be grounds for stopping work on the project (or withholding payment of the next pay estimate if a Capital project)

- 1) Use mowing equipment equipped with safety devices designed to prevent injury or property damage caused by flying debris propelled from under the mowing equipment. Keep all mowing equipment in good operating condition and maintain to provide a clean, sharp cut of vegetation at all times. If the Engineering Field Technician (EFT) determines the equipment is defective to the point that the quality of work or safety is affected, immediately repair or replace the equipment.
- 2) Ensure that mowing results in a vegetation height of 4 to 6 inches, unless otherwise directed by the EFT. Mow as closely as possible to all fixed objects, exercising care not to damage trees, plants, shrubs, signs, delineators, r other appurtenances that are a part of the facility. Hand trim around such objects if required and to the satisfaction of the EFT.
- 3) Immediately remove and properly dispose of any debris thrown on the roadway by the mowing operation. Mowed grass is not normally removed unless it becomes a hazard. Do not perform mowing when, in the opinion soil and weather conditions are such that rutting or other damage to the project may occur. The three-business day period noted above will be extended until the soil and weather conditions become suitable for mowing on the project.

B. Maintenance

Perform all maintenance necessary to keep seeded areas in a satisfactory condition until the work is finally accepted. This includes mowing, repairing washes, and additional applications of seed, fertilizer, and mulch to areas where a satisfactory stand of grass has not been achieved.

C. Stand of Grass

Before acceptance of the seeding performed for the establishment of permanent vegetation, produce a uniform perennial vegetative cover with a density of 70% of the seeded area. Ensure that the root system is developed sufficiently to survive dry periods and winter weather and is capable of reestablishment in the spring. Before acceptance of the seeding performed for the establishment of temporary vegetation, produce a stand of grass sufficient to control erosion for a given area and length of time before the next phase of construction or the establishment of permanent vegetation commences

10-05 EROSION CONTROL MEASURES

Ensure that the equipment necessary for the proper construction of the work is on site, in acceptable working condition, and approved by the Engineering Field Technician as to both type and condition before the start of work under this section. Provide sufficient equipment to enable the work to proceed in accordance with the project schedule and completion of the work in the specified time.

A. Partial and Temporary Seeding

Coordinate seeding with the construction of cut and fill slopes. Limit the area of erodible material by bringing partially completed slopes to the required slope and perform seeding operations as soon as feasible. Temporarily seeding of slopes shall coincide with the embankment work.

B. Erosion Control Measures

In addition to the erosion control measures specified herein and in the Plans and the Special Provisions, the Contractor is advised that all land disturbing activities (clearing and grubbing, excavation, borrow and fill) are subject to the following requirements

- 1) Work must be conducted in accordance with the requirements of applicable permits and Federal, State, and local regulations;
- 2) All necessary permits must be obtained prior to the commencement of land-disturbing activities.
- 3) Copies of all permits, sedimentation and erosion control plans, etc. shall be kept on site at all times until the project is closed out.
- 4) The Contractor shall retain primary responsibility for compliance with all regulations and may be subject to fines or other penalties for any violations regardless of a lack of knowledge of those regulations.

SECTION 11

SEWER PUMP STATIONS

11-01 SCOPE:

This section covers the installation/construction of sewer pump stations including all labor, materials, tools, equipment and performance of all work necessary or incidental to furnish a pump station as shown on the plans and specified herein.

11-02 DESIGN CRITERIA

A gravity sanitary sewer system shall be constructed, as needed, to provide sanitary sewer service to residential or commercial developments. The following specifications shall apply to those projects for which a sewer pump station has been approved by the Spartanburg Sanitary Sewer District, hereinafter referred to as the "District".

- A. The design and construction of sewer pump stations in the District shall comply with the current version of the SCDHEC Standards for Wastewater Facility Construction: R.61-67.300, C.
- B. The Engineer should submit the following design calculations:
 - 1) Station service area Design Wastewater Flows. Wastewater flows shall be calculated for the following conditions:
 - a. Start-up and service area build-out Peak Hourly Flow (PHF).
 - b. Start-up and service area build-out Average Daily Flow (ADF).
 - c. Flows shall be calculated in accordance with Appendix A of SCDHEC Standards for Wastewater Facility Construction: R.61-67. The Owner's Engineer may be required to evaluate the impact of the new flow on existing downstream gravity systems or pump stations. The District reserves the right to require upgrades to downstream pump stations, or gravity systems, which do not have adequate capacity to accept the additional flow.
 - 2) Hydraulic Analysis
 - a. The Engineer shall evaluate and design the pump/force main system and select pump(s) and force main(s) to provide the required capacity and pressure.

- b. The Engineer shall develop hydraulic system curves that indicate the required pump operating conditions. System curves shall be developed for pump suction (if applicable) and discharge piping, and shall include all valves, fittings and other items that may cause energy losses. Analysis shall be provided showing the effects of new and old pipe conditions, the net positive suction head requirements, the hydraulic efficiency, the horsepower requirements, the revolutions per minute, and other operating conditions required for each pump and combination of pumps.
 - c. Hydraulic system curves shall be developed using the Hazen-Williams equation for “C” factors which are consistent with the force main pipe, both for new and old pipe condition and under high and low wetwell conditions. Hydraulic system curves shall be overlain on the manufacturer’s pump curves. Computer generated curves may also be included. The Engineer shall provide pump and system curves for the selected pump(s) to the District for review and approval.
 - d. Depending on the application, the District may require that the pump design include a provision for upgrade for future flow by changing impellers only.
- 3) Force main velocity between 2 and 5 feet per second with one pump operating;
 - 4) Wet well dimensions and pump control set points shall provide for the following:
 - (4) cycles/hour for average daily flow
 - (10) cycles/hour for peak flow
- Inlet gravity piping shall not be used to improve storage.
- 5) Provide certification that motor and control circuits will permit ten (10) cycles/hour;
 - 6) Minimum 2 pumps of equal capacity capable of handling the expected peak flow;
 - 7) Flotation calculation for wet well;
 - 8) Pump station must be operational during flooding to the 25-year flood elevation, and station structures and equipment shall be protected from physical damage due to flooding to the 100-year flood elevation.
 - 9) An all-weather access road shall be provided

10) Each pump station shall be fenced or secured in a locked building or enclosure or located in a restricted area to prevent access by unauthorized persons.

11) Water Hammer

- a. The Engineer shall consider the potential impact of water hammer and cyclic loadings that are inherent in wastewater force mains. In circumstances where water hammer may be a concern (force main discharging at a higher elevation than the pump station, force main profile with significant elevation changes, etc.) the District may require that the Engineer submit a detailed water hammer (surge) analysis.
- b. All elements of the piping system must be designed to withstand the maximum water hammer in addition to the static head and cyclic loading.
- c. The District may require that any or all of the following provisions be included in the designed methods of addressing water hammer in force main systems
 - 1. The addition of surge control devices (surge valves) in the piping system;
 - 2. The addition of variable frequency drives (VFDs) or “soft-starters” as part of the pump motor control equipment;
 - 3. Strengthening of piping system components.

f. Hydrogen Sulfide Potential

Engineer shall evaluate the hydrogen sulfide potential in accordance with the following guidelines. Hydrogen sulfide controls shall be designed and constructed based on the following:

- a. Detention Time less than 35 minutes: No hydrogen sulfide controls required.
- b. Detention Time 35 to 90 minutes: Protect the force main discharge manhole with a protective coating. Products shall be approved by the District. (Refer to SECTION 3 of this Document). The District reserves the right to require the protective coating of additional, downstream manholes.
- c. Detention Time greater than 90 minutes: Install an active hydrogen sulfide control system. There are a variety of technologies which have been developed to address the problem of hydrogen sulfide in sewer systems, both from an aesthetic (odor) concern and from an

equipment (corrosion) concern. The District reserves the right to require that the Engineer submit for review a control system which addresses both concerns.

13) Electrical service

- a. All sewer pumps shall be designed to operate on 3-phase electrical power. However should 3-phase power not be readily available, the District may approve the installation of an appropriate Variable Frequency Drive (VFD) to supply 3-phase power to the pumps. Refer to Section 11-04 J.
- b. If an Engineer proposes the installation of single-phase motors and VFD's as an alternative to extending 3-phase power to the site, the District may require the submission of an economic comparison of these alternatives during the design review.

11-03 SUBMITTALS:

A. Shop Drawings shall be submitted for review and shall include the following:

- 1) Design calculations as required under SECTION 11-02 above.
- 2) Pump and motor manufacturer's data to show conformance with the plans and specifications, including drawings showing station dimensions, details and location of accessories, clearances required, capacity, functional description, and pump delivery curves.
- 3) Construction materials including precast concrete, all hardware and accessories, chain link fence materials,
- 4) Detailed description of controls including wiring diagram for all panel controls and electrical equipment, and all miscellaneous appurtenances.

B. Pump Test: A written report of pump tests shall be provided with each pump prior to shipment. Standard Running Tests shall be performed to show characteristic curves for each pump, showing actual performance. Pump tests shall be Standard running Test by the manufacturer based on criteria of the test code of the Hydraulic Institute Standards for Centrifugal Pumps. The District may require that the manufacturer furnish Factory Certified performance curves for each pump.

C. Service Manuals shall be furnished for each type of equipment specified in this section. The manual shall contain a description of equipment, complete accessory and parts list, and complete installation, operation and maintenance instruction, and trouble shooting procedures. A draft copy of the Service Manual shall be submitted prior to the testing described in SECTION 11-07 A., and the completeness and accuracy of the Manual shall be checked by the Manufacturer's Representative and the District's EFT. After final approval of the Manual three copies of the approved

manual shall be provided.

- D. Changes in structures, piping, electrical work, or other work which is necessary to accommodate equipment supplied by the Contractor shall be made at no additional cost to Owner. No equipment structure shall be constructed until certified equipment dimensions and requirements are available to the Contractor in the form of approved shop drawings.

11-04 MATERIALS AND EQUIPMENT:

Major items of equipment shall include (but are not limited to) the following:

- A. For Submersible and Suction-lift Stations (either configuration is acceptable)
- 1) Non-clog sewage pumps, either submersible or self-priming capable of passing a 3" sphere;
 - 2) Each pump shall have the necessary characteristics and be properly selected to perform under the operating characteristics shown in the Engineer's design calculations.
 - 3) Flanged spring-and-lever check valves;
 - 4) Flanged AWWA resilient seat, hand-wheel operated, gate valves with non-rising stem or fully-ported, lever operated, plug valves;
 - 5) Flanged ductile iron discharge piping and fittings
 - 6) A tee, valve, and male cam lock quick-connect coupling arrangement to provide bypass pumping capability. All bypass piping components shall be located in a below-grade vault to provide freeze protection. On submersible pump stations, the bypass piping may be incorporated within the valve vault, provided the vault is properly sized to permit access for maintenance. Refer to CONSTRUCTION Detail No. 24.
 - 7) Pressure Gauges:
 - a. Submersible pump stations shall have a pressure gauge installed prior to each discharge check valve and a single pressure gauge downstream of the check valves and gate valves.
 - b. Suction-lift pump stations shall have a pressure gauge installed prior to each discharge check valve and a vacuum gauge installed on the suction piping;
 - c. Pressure and vacuum gauges shall be minimum 4.5" diameter and shall display both PSI and feet of water head;

- d. Gauges shall be equipped with isolation ball valves to allow removal of gauges while the station is in operation.
 - e. Gauges shall be mounted so that they may be read without the need for personnel to enter the valve vault on submersible stations.
- 8) Non-rising stem gate valve located in ground outside of valve pit supplied with tee handle;
 - 9) One double door aluminum wet well equipment access hatch with fall-protection grating; Refer to CONSTRUCTION DETAIL NO. 25.
 - 10) One stainless steel duplex central control panel mounted in a free standing panel;
 - 11) Level control shall be via MultiTrode level sensing and control system with float back-up;
 - 12) 2 mercury-free back-up float switches with mounting bracket;
 - 13) Pump Station monitoring shall be performed by the unit supplied by Generating Solutions and shall be compatible with the current monitoring package in use by the District;
 - 14) 3" vent duct with screen;
 - 15) Wet well with monolithically cast base and risers
 - 16) Spare parts shall be provided as follows: 1 upper and 1 lower mechanical seal for the duplex pump station.
 - 17) Potable water supply with backflow prevention device
 - 18) The perimeter of the pump station site shall be enclosed with chain link fence . The entrance gate shall be 20 feet in width (2 panels, 10 feet each) and shall be aligned to provide the most-suitable access to the wet well by a vacuum truck. Refer to SECTION 11-05 and CONSTRUCTION DETAIL No. 26
 - 19) The manufacturer's technical representative shall inspect the completed installation, correct or supervise the correction of any defect, and instruct the operating personnel in the proper operation and maintenance of the equipment.

B. For Submersible Stations

- 1) Submersible Non-Clog Sewage Pumps: The pumps shall be designed to pump raw sewage wastewater, sludge and other fibrous materials without injurious damage during operation. The design shall be such that the lifting cover,

stator housing and volute casing are of ASTM A48, Class 25 gray iron construction, with all nuts, bolts, washers and other fastening devices coming into contact with the sewage constructed of 316 stainless steel. Pumps shall be Flygt, ABS, or Smith & Loveless.

- 2) Seals: Motors shall be protected by tandem mechanical seals running in an oil bath. Seal chamber shall be oil filled to lubricate seal face and to transmit heat from shaft to outer shell. Seal faces shall be lapped tungsten carbide and welded to stainless steel retainers; seal faces shall be lapped to a flatness of one light band. The upper seals shall be tungsten carbide against carbon and lower seals are to be tungsten carbide. A double electrode shall be mounted in the seal chamber to detect any water entering the chamber through the lower seal. Water in the chamber shall cause a red light to turn on at the control box. This signal shall not stop motor but shall act as a warning only, indicating service is required. One spare upper and lower seal each shall be provided by the manufacturer for each duplex pump station.
- 3) Impeller shall be cast iron and of the non-clog enclosed type. The impeller shall be of hard alloy gray iron construction, dynamically balanced, double shrouded, single vane, with a smooth long thoroughfare and having no acute angles, capable of passing a minimum 3" solids. A stainless steel rotating wear ring shall be installed on the impeller with stationary volute wear ring of nitrile rubber, to provide efficient sealing between the volute and impeller. Impeller is to be driven by stainless steel shaft key and impeller is held in place with stainless steel lock screw and washer. Impeller and motor shall lift off of case as a unit without disturbing piping.
- 4) Motors: The pump motors shall be non-overloading for full performance range, of Class F insulation, NEMA B design, rated 155° C maximum, 1.10 minimum service factor and housed in a watertight housing. The motor housings shall be air filled. Motor is to be heat shrink fit in the housing, no bolts, pins or other fastening devices shall be allowed. Motors shall not contain any insulating fluid consisting of material classified as hazardous waste by the EPA such as tetrachloroethylene or PCB. Motors shall be provided with thermal sensors in the motor windings designed such that the pump will automatically shut off and set off an alarm condition on high temperature condition. Motor shall be designed for continuous duty, capable of sustaining a minimum of ten (10) starts per hour with motor housing completely unsubmerged. Pump and motor shall be a product of the same manufacturer.
- 5) Power Cords and Control Cords shall be double sealed. Sufficient cord shall be provided to suit the arrangement shown on the plans, minimum 25 ft. of each cord. The cable shall enter the pump through a heavy duty entry assembly, which shall be provided with single cylindrical grommet flanked by stainless steel washers to protect against leakage. Epoxies, silicones or other secondary systems are not acceptable. The cable must have a strain relief assembly as part of standard construction. The power cord shall connect to a terminal board in the pump which separates the incoming service from the

pump motor. Wire nut connectors are not acceptable. Insulation of power and control cords shall be type SO or STOW. Both control and power cords shall have a green carrier ground conductor that attaches to motor frame. Power cords and control cords shall junction at a NEMA 4X box mounted outside the well, but not inside the control panel. Cords shall be connected in a manner to allow removal of pumps for maintenance.

- 6) Discharge Elbow: The discharge elbow shall be permanently installed in the wet well along with the discharge piping. The entire weight of the pump shall be supported by the elbow.
- 7) Discharge Coupling: Each pump shall be supplied with a sliding guide bracket which shall be an integral part of the pump volute and accepts the discharge elbow specified elsewhere. The pump shall be guided into position by two stainless steel pipes, 2 inches in diameter. Seal of the pump at the discharge flange is to be accomplished by a simple downward linear motion of the pump with the entire weight of the pump guided to and pressing against the discharge connection; no part of the pump shall bear directly on the station floor and no rotary motion of the pump shall be required for sealing. Sealing at the discharge is to be effected by either a metal to metal contact or by a proprietary replaceable , resilient seal, to insure a positive leak proof system and for ease of removal. The pump shall be guaranteed not to leak at the discharge flange. Other forms of guiding, such as straightening vanes, etc., shall not be considered equal.
- 8) Pump Guide Rails with End Brackets shall be provided for each pump. Guide rails shall be 2.0 inch, type 316 stainless steel pipe with an intermediate stainless steel support. Each pump shall connect automatically and firmly to the discharge piping when lowered into place. It shall not be necessary to enter the wet well to remove or replace a pump.
- 9) Complete flanged discharge piping and 90° elbows inside the wet well;
- 10) In addition to the general pump tests listed in Paragraph 11-03 B), additional tests specific to submersible pumps shall be required as follows;
 - a. The Test shall include motor and cable insulation and moisture test, 30 minutes operation at a submerged depth of at least six feet and
 - b. A second insulation of moisture test after submerged operation.
 - c. This shall be in addition to, or in conjunction with the Standard Running Test.

C. For Suction-lift Stations

- 1) Design requirements consist of a factory-built pump station package which shall be the product of a single supplier who assumes responsibility for the

integration and proper operation of the specified components.

- 2) The station shall be complete with all equipment specified herein, including a prefabricated enclosure which includes provision for access by service personnel for routine inspections, as well as for all required maintenance, including complete removal of pumps, motors, piping, controls, etc.
- 3) In addition to the station enclosure, principle items of equipment shall include
 - a. Two self-priming (or vacuum priming), centrifugal sewage pumps,
 - b. Direct drive, or V-Belt drive
 - c. Motors,
 - d. Suction and discharge piping
 - e. Valves, including discharge check valves and bypass arrangement;
 - f. Motor Control Panel
 - g. automatic liquid level control system, and internal wiring;
- 4) Pump Design:
 - a. Pumps shall be self-priming or vacuum priming, centrifugal type, designed specifically for handling raw, unscreened, domestic sanitary sewage;
 - b. The rotating assembly, which includes the impeller, shaft, mechanical shaft seal, lip seals, bearings, seal plate and bearing housing, must be removable as a single unit without disturbing the pump casing (volute) or piping.
 - c. Shaft seals, impeller, and motors shall comply with the requirements given in paragraphs 11-03, B. 2) through 4) above;
 - d. Adjustments of the impeller face clearance shall be accomplished by external means.
- 5) The need for a suction check valve shall not be required as part of the re-priming operation;
- 6) The pump must demonstrate the ability to reprime and deliver full capacity within 5 minutes after the pump is energized in the un-primed condition, test fluid shall be water;
- 7) Suction and discharge pressures shall be monitored by oil-filled gauges, graduated in PSI and feet of water, mounted in a resilient panel which will reduce vibration of the gauges. Gauge installations shall be complete and shall included a shutoff valve for each gauge at the point of connection to the suction and discharge pipes.
- 8) Station Enclosure:

- a. The station enclosure shall contain and protect all pumps, interior piping, valves, and associated controls.
 - b. A blower shall be provided to exchanged station air volume at least once every 2 minutes. Blower shall energize automatically at approximately 70°F and turn off at 55°F and shall be protected by a circuit breaker. Exhaust and inlet locations shall prevent the entrance of rain, snow, or debris.
 - c. A 1300/1500 watt, 115V electric heater shall be provided with cord and grounding plug;
 - d. Interior fluorescent or incandescent lighting shall be provided and shall comply with local building codes.
 - e. All access hatches and/or doors shall be equipped with heavy-duty, galvanized padlock hasps, compatible with padlocks which shall be supplied by the District;
- 9) Station Enclosure Warranty: In addition to the general warranty requirements presented in SECTION 11-07, the pump station manufacturer shall warrant all equipment which is specific to the station enclosure to be of quality construction, free of defects in material and workmanship. A written warranty shall include specific details described below:
- a. Fiberglass components of the station enclosure shall be warranted for 20 years to resist UV damage or corrosion from moisture without the use of special protective coatings.
 - b. All other equipment and parts shall be warranted for 5 years except for those items normally consumed in service such as light bulbs, oils, grease, etc.
 - c. Components failing to perform as specified shall be repaired or replaced by the manufacturer or his representative without cost of parts or labor to the District.

D. Wet well structure

- 1) One monolithically cast base section and a 12-inch long base slab extension for counter flotation.
- 2) The wet well risers/top sections shall have a minimum wall thickness of 7".
- 3) Both top slab and bottom slab shall have a minimum thickness of 8".
- 1) Openings in the wet well Sections may be cast-in or cored, with the exception

of the influent pipe opening which shall be cored in the wall. Wet well diameter and height shall be as shown on the plans or directed by the Engineer.

- 2) All precast concrete units shall be poured and vibrated using steel forms, in a PCI (Prestressed Concrete Institute) certified manufacturing facility. The complete pump station shall be manufactured by Tindall Concrete Products, or approved equal.

E. The valve vault

Shall consist of a concrete structure (round or rectangular in shape) sized to adequately house the equipment and allow room for removal of equipment and regular maintenance. Refer to CONSTRUCTION DETAIL NO. 24

- 1) Depth shall be as shown on the plans.
- 2) All pipe wall penetrations shall be through cast-in or cored holes with flexible rubber sealing connections (manhole boot);
- 3) The bottom slab of the structure shall have a minimum thickness of 6" with a grout slope bottom to a 3-inch diameter drain with flap valve on the end returning to the wet well.

F. Concrete cement shall be Type II, having a maximum Tri-calcium aluminate (3CaOAL2O3) content of 8%. Coarse aggregate shall be sound, crushed, angular granitic stone only. Smooth or rounded stone is not acceptable. Fine aggregate and coarse aggregate shall meet the requirements of ASTM C33. Calcium Chloride or admixtures containing Calcium Chloride shall not be used in the concrete mix.

G. Reinforcing shall meet or exceed the minimums described in ASTM C478.

H. Flexible Pipe-Connectors: Watertight connections between all pipe and wet well shall be achieved with flexible pipe connectors conforming to ASTM C923.

I. Electrical Controls: Controls shall be provided in a separately mounted NEMA 4X enclosure either mounted on the rack or mounted within the pump station enclosure. The Controls shall include all devices necessary to receive phase volt cycle power and shall perform functions described herein. Refer to CONSTRUCTION DETAIL NO. 27.

- 1) The Main Control Panel enclosure shall be provided with a lockable blank front panel door with all control functions mounted inside the enclosure on a sub-panel (unless the panel is located inside the suction-lift station lockable enclosure). Panel wiring and devices shall meet standards of the National Electric Code (NEC) and NEMA. All wiring shall be color coded, numbered, bundled and tied, minimum 16 gauge, Type MTW or THW 600 volt, inside the panel. Terminals, wires and connections shall be identified on the wiring

diagram shop drawings and in the service manual. Internal components shall be identified by nameplates. Enclosures shall have an outside deadfront and hasp for padlocking. Interior lights, switches, starter resets, elapsed time meters, circuit breakers and other operator devices shall be located on a separate interior face panel hinged to allow access to internal wiring and other devices. Panel frame, circuits and conduits shall be grounded to meet NEC.

- 2) The Main control panel shall be equipped with the following:
 - a. An adequately sized main circuit breaker for each pump; circuit breakers shall be Westinghouse, Square D or GE.
 - b. A magnetic starter with three quick-trip, ambient-compensated overloads for each pump;
 - c. A 7-digit running time meter for each pump recording hours and tenths of an hour;
 - d. A green running indicator light (LED) for each pump,
 - e. "Hand-Off-Automatic" selector switches for each pump
 - f. A red seal failure indicator light (LED) for each pump (submersible pumps only)
 - g. Switches shall be heavy duty type K,
 - h. All indicator lights shall be LED's.
 - i. A terminal set of dry contacts shall be provided for monitoring the following conditions:
 - i. Pump Failure for any condition (overload, circuit breaker trip, over-temperature);
 - ii. High level alarm
 - iii. Any power-related trouble (phase loss, low voltage, control power loss, etc.);
 - iv. Wet well level (4-20mA)
- 3) Level Controls shall consist of the MultiTrode MTDPC - Basic Two Pump Controller and the MultiTrode Probe. Backup liquid-level indication shall be provided by individual heavy duty tilt-type, mercury-free float switches (Consolidated Electric 9G, or equal).

- 4) Controls shall alternate the lead pump with the lag pump and shall, on rising water level, control the level of lead pump on, lag pump on and alarm on. On falling water level, controls shall turn all pumps off.
- a. The MultiTrobe Probe shall be mounted on the factory-supplied mounting bracket in a location which will not cause interference with pump removal.
 - b. Float switches shall be mounted on a stainless steel bracket within reach from the access hatch and away from incoming sewage turbulence. Each float switch shall be mounted on its own cord and shall be weighted individually to reduce the influence of turbulence. Ample extra cord shall be included to allow easy adjustment of float switches.
 - c. The pump controller shall automatically alternate lead and lag pump pumping cycle and shall automatically switch to the lag pump should the lead pump fail. Upon pump failure a red LED shall glow and remain on until the fault is corrected. The controller shall be equipped with built-in high water alarm circuit and shall display these conditions with a red LED. Green LED's shall also signal individual pump operation and identify which pump is acting as lead pump. A green LED shall indicate power to the controller. The controller for pump starting shall be such that only one pump can be started at a time. If both pumps are activated to run, then one shall not start until the other pump has started or obtained operating conditions (10 second delay).
- 5) An External Alarm shall be mounted outside as shown on the control panel. Alarm panel shall include a horn with minimum 100 dB at 20 feet, a flashing red light, a silence button, and a test switch to operate on 120 volt power supplied through the control panel. The silence button shall silence the horn. The light shall continue flashing until the alarm condition is corrected. The alarm shall include a spare contact to operate a telephone alarm system.
- 6) Dehumidifier or Heater. The Control panel shall be supplied with a condensation heater which is controlled automatically.
- 7) Station remote monitoring equipment shall be provided by Generating Solutions,

GENERATING SOLUTIONS, LLC
1646 West Highway 160, Suite E
Ft. Mill , SC 29708
Tel: 704-904-9461
Fax: 803.548.3854
rdawson@generatingsolutions.net
www.generatingsolutions.net

and shall include all related hardware including backup battery, battery charger, external antenna, and necessary cables, wiring, and circuit overload protection: The monitoring equipment shall receive input from the dry contacts listed in Paragraph 11-04, I. 2) i. above.

8) Motor Branch Components:

- a. Mounting: All motor branch components shall be of the highest industrial quality, securely fastened to a removable sub-plate with screws and lockwashers. The sub-plate shall be tapped to accept all mounting screws. Self-tapping screws shall not be used to mount any components.
- b. Circuit Breaker and Operating Mechanisms: A properly sized heavy duty air circuit breaker shall be furnished for each pump motor, and shall have a symmetrical RMS interrupting rating as noted on the drawings. All circuit breakers shall be sealed by the manufacturer after calibration to prevent tampering.
- c. A padlocking operating mechanism shall be installed on each motor circuit breaker. Operating handles for the mechanisms shall be located on the exterior of the control compartment door, with interlocks which permit the door to be opened only when circuit breakers are in the OFF position.
- d. Motor Starters: An open frame, across-the-line, NEMA rated magnetic motor starter shall be furnished for each pump motor. Starters of NEMA size 1 and above shall be designed for addition of at least two auxiliary contacts. Starters rated "O", "OO", or half size are not acceptable. Power contacts shall be double-break and made of cadmium oxide silver. All motor starters shall be equipped to provide under-voltage release and overload protection on all three phases. Motor starter contacts shall be easily replaceable without removing the motor starter from its mounted position. Acceptable starters are Furnace, GE, Square D or Westinghouse.

J. Variable Frequency Drives (VFDs). The following is a general specification for VFDs which may be used to power 3-phase motors from a single phase commercial power source. Refer to Section 11-02 B. 13).

- 1) This section provides specification requirements for Single Phase Input, solid-state, pulse-width modulated (PWM) Adjustable Frequency Drives, herein referred to as AC Drives, for use with NEMA® design B AC motors, or standard IEC motors.
- 2) Referenced Standards:

ANSI®/NFPA® 70 - National Electrical Code® (NEC®).

UL 508 - UL Standard for Safety Industrial Control Equipment.
UL 508C - UL Standard for Safety Power Conversion Equipment.
NEMA ICS7 : Industrial Control and Systems Variable Speed Drives
IEC 1800 : Adjustable speed Electrical power drive systems
SEMI-F47: Voltage Ride Thru

- 3) Submittals shall include VFD manufacturers standard operation manual and any applicable unit schematics.
- 4) Design Criteria
 - a. The drive should be a PWM (Pulse Width Modulated) transistorized inverter using IGBT's (Insulated Gate Bipolar Transistors) and must be fully digital.
 - b. The drive shall utilize Insulated Gate Bipolar Transistor (IGBT's) in its power section.
 - c. Input Filtering Section shall include a built-in RF/EMI filter for the single phase 200-240V units.
 - d. Rectifier Section that shall include diode bridge rectifier to convert AC to DC.
 - e. DC Filtering Section shall include capacitors to eliminate "ripple" affect on the DC bus to produce smooth DC bus voltage.
 - f. Switching Section that shall included Insulated Gate Bipolar Transistors (IGBT) to provided Pulse Width Modulation.
 - g. The AC drive shall have a user interface (keypad) that presents information in plain English text.
 - h. The AC Drive power converter shall be UL Plenum rated.
- 5) Ratings and overload capability of the VFD
 - a. The drive main input power shall be:
Single-phase 208-240VAC 50/60Hz
Single-phase 400-480VAC 50/60Hz
 - b. The drive shall have a tolerance for voltage +10%, -15% and frequency $\pm 5\%$.
 - c. The drive overload current shall be 100% continuous and 150% for 1 minute.
 - d. The drive manufacturer shall indicate all requirements for input or

output reactors.

- e. The efficiency of the AC Drive at 100% speed and load shall not be less than 97%.

6) ENVIRONMENTAL RATINGS

- a. The AC Drive shall meet IEC 60664-1 Annex A and NEMA ICS 1, UL standards.
- b. The AC Drive shall be designed to operate in an ambient temperature from -10 to 50 °C (14 to 122 °F).
- c. The maximum relative humidity shall be 95%, non-condensing.
- d. The AC Drive shall be rated to operate at altitudes less than or equal to 3300 ft (1000 m).
- e. The AC Drive shall meet the IEC 60721-3-3-3M3 operational vibration specification

7) PROTECTION

- a. Upon power-up, the AC Drive shall automatically test for valid operation of memory, loss of analog reference input, loss of communication, DC-to-DC power supply, control power and pre-charge circuit.
- c. The AC drive shall be rated for UL minimum short circuit currents per given horsepower rating.
- d. The AC Drive shall be protected against short circuits, between output phases and to ground.
- e. The AC Drive shall have under-voltage power-loss ride through performance per the SEMI F-47 voltage ride through standard and certified by a third party.
- f. The AC drive shall have a programmable ride-through function, which will allow the logic to maintain control for a minimum of one-second (60 cycles) without faulting.
- g. An auto restart function will provide selectable time for restart attempts after the fault has disappeared and other operating conditions permit the restart. The restart shall be performed by a series of automatic attempts separated by increasingly longer periods of time. This period of time shall be selectable.

- h. Upon loss of the analog process follower reference signal, the AC Drive shall be programmable to display a fault.
- i. The AC Drive shall have a solid-state UL 508C listed overload protective device and meet IEC 60947.
- j. The output frequency shall be software enabled to fold back when the motor is overloaded.
- k. There shall be two skip frequency ranges that can be programmed to a bandwidth of ± 2.5 Hz.

8) ADJUSTMENTS & CONFIGURATIONS

- a. The AC Drive shall be capable of storing the configuration in the keypad.
- b. The acceleration and deceleration ramp times shall be adjustable from 0.05 to 999.9 seconds.
- c. The memory shall retain and record run status and fault type of the past eight faults that tripped the drive.

9) KEYPAD DISPLAY INTERFACE

- a. A keypad display interface shall offer the modification of AC Drive adjustments through a touch keypad. All electrical values, configuration parameters, I/O assignments, application and activity function access, faults, local control, and adjustment storage, and diagnostics shall be accessible.
- b. The AC Drive model number, torque type, software revision number, horsepower, output current, motor frequency and motor voltage shall be listed on the drive identification portion of the LCD display.
- c. The keypad display shall have password protection that allows the keypad to be locked out from unauthorized personnel.
- d. The keypad shall be capable of displaying I/O assignment and status.

- 10) Warranty: The drive manufacturer shall guarantee the operation of the drive against failure due to defects for 18 months after shipment or 12 months of sale to the user, whichever comes first.

K. Alarms:

- 1) High Pump Temperature Protection: Each control panel shall be equipped with circuitry to override the level control system and shut down the pump motor(s) when required to protect the pump motor from damage caused by excessive temperature. A thermostat shall be mounted in each motor to detect its temperature, and a single relay shall be supplied for each thermostat. If the pump motor temperature should raise to a level which could cause damage, the thermostat shall cause the signal relay to drop out of the motor starter. An red electrical indicator LED, visible on the front of the control panel, shall indicate that the pump motor has been stopped because of a high temperature condition. The pump shall remain locked out until the pump has cooled and the circuit has been manually reset. Automatic reset of such a circuit shall not be acceptable.
 - 2) High Water Alarm: When the wet well level reaches a preset high water level, a switch shall energize a signal relay circuit to visibly indicate such on the front of the control panel. The relay shall maintain the signal until manually reset.
- L. Wiring: The pumping system as furnished by the manufacturer shall be completely wired, except for the power feeder lines to the panel main disconnect, final connections to remote alarm devices, pumps, and level switches. The Contractor shall be responsible for all interconnecting wiring and conduit.

All wiring, workmanship, and schematic wiring diagrams shall be in compliance with applicable standards and specifications set forth by the National Electrical Code (NEC).

- 1) Wire Identification and Sizing: Control circuit wiring inside the panel, with the exception of internal wiring of individual components, shall be 16 gauge minimum, Type MTW or THW, 600 volts. Wiring in conduit shall be 14 gauge minimum. Motor branch wiring shall be 10 gauge minimum.

Motor branch conductors and other power conductors shall not be loaded above 75° C temperature rating. Wires shall be clearly numbered at each end in conformance with applicable standards. The numbering on each wire shall correspond to a similar number on the terminal strip to which the wire is connected. All wire connectors in the control panel shall be of the ring tongue type with nylon insulated shanks. All wires on the sub-plate shall be bundled and tied. All wiring outside the panel shall be in conduit.
- 2) Wire Bundles: Control conductors connecting components mounted on the panel enclosure door shall be bundled and tied in accordance with good commercial practice. Bundles shall be made flexible at the hinged side of the enclosure. Adequate length and flex shall be allowed so that the door can swing to its full open position without undue mechanical stress or abrasion on the conductors or insulation. Bundles shall be clamped and held in place with mechanical fastening devices on each side of the hinge.

M. Power Supply: All stations shall be provided with a control power transformer, single phase primary, to 120 volts/1 ph/60 hertz secondary. Transformer shall be rated for the loads of the lights, alarms and control power. Power service for the pump motor circuits shall be as indicated on the pump data sheets.

N. Pipe, Fittings, Pressure Gauges, and Valves:

- 1) All wet well and valve pit piping and fittings shall be ANSI B16.1 125 lb. standard flange fitted. Pipe and fittings shall be of ductile iron construction and of the sizes indicated on the plans, minimum 4-inch diameter where sizes are not shown. All flange gaskets shall be 1/8" thick full face red rubber. Pipe supports shall be provided as needed.
- 2) Check valves shall be Mueller or Darling swing check type with outside lever and spring.
- 3) Resilient seat gate valves shall be Mueller or Darling.
- 4) Provide a female quick-disconnect fitting for bypass with a gate valve to isolate flow. Quick disconnect should be of a "cam-lock" style, which is, compatible with that used by the District Maintenance and Construction Department. For protection against freezing, on submersible stations, the gate valve shall be located in the valve vault, with only a short piece of pipe extending above ground, terminating with the camlock fitting.
- 4) Pressure gauges (2 required) shall be mounted in the valve vault (submersible stations) or inside the enclosure (suction-lift stations) on the pump side of each check valve and isolated with a shut-off valve. Each gauge shall be 4.5 inches diameter, liquid filled, with a PSI/head range of approximately 25% greater than the design TDH for the station, accurate to within 1% of range. Gauges shall be mounted to allow pressure sensing piping to be cleaned without removing the gauge.

O. Access Hatches:

- 1) The wet well and valve pit access hatches in non-traffic areas shall be constructed of 1/4" aluminum checker plate with all stainless steel hardware, upper guide holder and lifting cable or chain holder.
- 2) Hatches shall be designed for a minimum load of 300 psf. and shall be provided with a metal fall protection grating. Fall protection nets or other fabric devices are not acceptable.
- 3) Each hatch shall have a "slam-latch" which will lock automatically, with a proprietary release key included. Hatches and fall-protection grating shall be held open in the vertical position by means of a mechanical door prop of corrosion resistant zinc plated or stainless steel design. Props shall catch and

release automatically without the need to pull or adjust any handles or bars.

- 4) Hatch shall be as manufactured by Halliday, Bilco, U.S. Foundry, or approved equal. Refer to CONSTRUCTION DETAIL No.25

P. Brackets, Supports and Miscellaneous Metal Parts shall be 316 stainless steel and provided as needed to support piping, floats, controls and their equipment for a complete installation.

- 1) All anchor bolts shall be 316 series stainless steel and shall be secured using the Hilti RE-500 Injection Epoxy Anchor System (or equal); embedment depth shall be per the anchoring system manufacturer's guidelines;
- 2) All metal components inside the wetwell (fasteners, brackets, etc.) other than DIP and the pumps themselves, shall be 316 stainless steel;
- 3) An adequately-sized, stainless steel, lifting chain (minimum 3/8") and hook, shall be provided with each pump and shall be attached to a conveniently placed wall bracket at the entrance hatch.

Q. A Control Panel Rack shall be provided as shown in CONSTRUCTION DETAIL No. 27 in addition to the components listed above, the following hardware shall be mounted on the rack:

- 1) A lightning arrestor;
- 2) A volt surge capacitor;
- 3) The meter base box (supplied by Contractor);
- 4) A fusible disconnect switch or main breaker;
- 5) Manual Transfer Switch. Double throw transfer switch, either 100 Amp or 200 Amp, as required, 3 Pole, 240 volt or 460 volt NEMA 3R with field installed grounding kit Square D or equal.
- 6) Generator Receptacle. Male receptacle, 200 Amp, 4 wire, 4 Pole, to mate with Crouse-Hinds No. AR 2041-S22 plug or equal.

R. Potable Water Supply with Backflow Protection:

- 1) A reduced pressure zone backflow preventer shall be installed on the main water supply between the meter and any plumbing connections according to the water purveyor's installation requirements for relief valve discharge, periodic maintenance and freeze protection. Below ground installations of reduced pressure backflow devices are not approved. Above ground installations shall be housed in a "Hot Box" or approved equal. Typically, most installations shall be located 1' to 2' within the fenced area for the pump

station site and upstream of the hose bibb location. Alternate location for backflow preventer shall be coordinated and approved with the District's Engineering Field Technician (EFT).

- 2) The reduced pressure zone backflow preventer device shall be a Watts 909 or 009, or approved equal.
- 3) A 120V, 20amp, GCFI receptacle, in a weather-proof cover, shall be provided within the backflow preventer enclosure, and a thermostatically-controlled "heat tape" wrapped around the backflow device and piping to prevent freezing.
- 4) A Woodford Iowa Model Y34 (or approved equal) yard hydrant shall be provided in the location shown on the plans or as directed by EFT.

S. Control Panel Canopy (Submersible Stations Only)

- 1) A canopy shall be installed over the submersible pump station control panel as shown in CONSTRUCTION DETAIL NO. 27;
- 2) The canopy structure shall be designed for a minimum 70MPW wind load and shall be equipped with two 4' fluorescent lights which are operated by a weather-proof toggle switch.
- 3) The canopy shall be as supplied by Greer Awning and Siding, or approved equal.

T. Spare Parts

- 1) Submersible pumps shall be supplied with the following spare parts (for one pump):
 - a. One set of upper and lower bearings;
 - b. One replacement mechanical seal;
 - c. O-ring seal kit;
- 2) Suction-lift pumps shall be supplied with the following spare parts (for one pump):
 - a. One replacement mechanical seal;
 - b. O-ring seal kit;

11-05 INSTALLATION:

The station and valve vault shall be installed level and plumb by the Contractor on a bed of stone in accordance with the manufacturer's recommendations, as shown on the plans and described herein. Elevations shall conform to those shown on plans to within $\pm .02$ feet.

- A. Wet well sections shall be handled and installed in such a manner and by such means as to prevent damage. All sections damaged during handling will be and replaced at no additional cost to the Owner. All lifting holes shall be plugged and sealed watertight as recommended by the manufacturer. Wet well base shall be installed on a firm 12-inch washed stone foundation so prepared to prevent settlement and misalignment.
- B. Wet well sections shall be installed plumb and with all pipe holes at the proper elevation.

Riser Sections of the wet well shall be installed using butyl rubber sealant between sections for a water tight connection, in the same manner as for manholes. Refer to SECTION 3. In addition to the butyl rubber sealant, riser sections and flat slab top shall be sealed inside and outside, above and below water level by application of non-shrink grout at all joints for the entire circumference.

Wet well shall be tested for exfiltration by filling up with water to a level 2 feet below the top of the flat slab and measuring the amount of drop over one hour. Exfiltration shall not exceed 0.45 gallons per foot diameter per foot depth per day;

- C. Valve vault shall be installed on a firm 6-inch washed stone foundation so prepared as to prevent settlement and misalignment. The valve vault floor shall be built to provide positive drainage to the wet well. Steps shall not be installed in the valve vault. The valve vault hatch shall be large enough and positioned such that all the following can be performed without climbing into the vault:
- 1) Valve operation
 - 2) Observation of Pressure Gauges
 - 3) Connection of bypass piping to the male quick-connect coupling.
- D. Pumps and piping shall be installed in accordance with the written instructions provided in the shop drawings and indicated on the plans;
- 1) The manufacturer shall furnish such detailed instructions as may be required for proper installation.
 - 2) The manufacturer shall also furnish the services of a qualified service representative to inspect equipment installation, make minor adjustments and place equipment in permanent operation. The manufacturer's representative shall provide whatever items required to insure proper installation, operation

and instruction. Service shall be not less than one day and shall include inspection, minor adjustments, initial operational services and initial instruction.

- E. Lifting Cables shall be cut off flush to finish grade after installation.
- F. Painting: The pumps and equipment shall be supplied with the manufacturer's standard factory-applied finish.
- G. Wiring and conduit required between the control panel and the wet well and to devices located on the electrical service pole shall be provided by the Contractor according to the drawings.
- H. All site work including driveway, fencing, stone and drainage contours shall be provided by the Contractor and as detailed on drawings.
- I. After installation and cleaning up of construction debris, wet well shall be provided with water sufficient to provide start up and pump down tests as necessary to verify pump operation and efficiency for as long a period of time as necessary to accomplish such tasks.

11-06 PUMP STATION FENCING

A. MATERIAL:

All fencing, unless otherwise shown or specified shall be Class 2 Fencing, chain link type, 6 feet high, with zinc-coated (galvanized) fabric, three strands of barbed wire at the top of the fence and gates, and galvanized steel posts, as manufactured by Merchants Metals, Houston TX, or approved equal.

- 1) Fabric shall be 9 gage steel wire woven in 2-inch mesh, with zinc coating conforming to ASTM A392 with the coating weight 2.0oz. per sq. ft. of surface, and twisted at one salvage and knuckled at the other.
- 2) Barbed wire shall consist of two 12 gage steel stranded line wires with 14 gage steel wire barbs in 4 point pattern spaced 5 inches apart. Barbed wire shall be zinc coated (galvanized), minimum weight 1.2 oz. per sq. ft. of surface.
- 3) Posts, rails and appurtenances shall be hot dip galvanized with a minimum 2.0 oz. per sq.. ft. of surface.
- 4) Line Posts shall be 2.5-inch OD Schedule 40 steel pipe.
- 5) Terminal Posts shall be 2.876-inch OD Schedule 40 steel pipe, or 3.5 x 3.5-inch steel roll-formed sections, nominal weight 5.14 lbs. per ft.
- 6) Gate Posts shall be 4.00" OD, Schedule 40 steel pipe as specified below:

- 7) Top rail shall be 1.625 OD steel pipe, Schedule 40 or 1.625 x 1.25 inch steel channel sections, and provided with outside sleeve type couplings every 20 feet.
- 8) Top rail shall pass through line post tops to form a continuous brace from end to end of each stretch of fence. Top rail shall be fastened to terminal posts by heavy pressed steel connections.
- 9) Braces shall be of the same material as the top rail, and shall be installed midway between the top rail and the ground and extending from the terminal post to the first line post. Braces shall be securely fastened to posts by heavy pressed steel connections, then trussed from the line post back to the terminal post with a 3/8-inch diameter rod.
- 10) All fittings used in the complete fence assembly shall be cast iron or pressed steel and shall be zinc coated (galvanized) with a minimum of 1.2 oz. per sq. ft.
- 11) All posts shall be provided with caps, made of cast iron or pressed steel and shall be zinc coated (galvanized) with a minimum of 1.2 oz. per sq. ft. designed to exclude moisture from the posts.
- 12) Tension Arms shall be cast iron or pressed steel, zinc coated (galvanized) with a minimum of 1.2 oz. per sq. ft. and shall be designed to carry three strands of barbed wire at a 45° angle, with the top strand 12 inches above the fabric and 12 inches out from the fence line.
- 13) Gates. Access to the pump station enclosure shall be via a 2-leaf gate providing a clear entrance a minimum of 20' in width.
 - a. Gate Frame: Schedule 40 steel pipe, 1.9 inches OD, welded at corners or assembled with fittings.
 - b. Gate Hardware: Fork-type latch with gravity drop, center gate stop and drop rod, mechanical keepers, and two 180 degree gate hinges per leaf.
 - c. All gate hardware and fittings shall be zinc coated (galvanized) with a minimum of 1.2 oz. per sq. ft.

B. INSTALLATION:

- 1) Line posts shall be evenly spaced at intervals not exceeding 10 feet, and in true alignment with the fence line.
- 2) All posts shall be set plumb at least 36 inches deep in 2500 psi concrete footings, footings shall be not less than 10-inch diameter for line posts and 12-

inch diameter for terminal and gate posts. Top of footings shall be slightly rounded for water runoff.

- 3) Fabric shall be securely fastened to terminal posts by tension bars with pressed steel bands spaced 14 inches apart, to line posts with 6 gage wire clips spaced 14 inches apart and to the top rail with 9 gage tie wires spaced 24 inches apart.
- 4) Barbed wire shall be properly stretched and securely fastened to extension arms and gate posts.
- 5) Extension Arms shall be installed with the arms inclined outward.
- 6) Gates shall be installed with fabric and barbed wire overhang to match fence. Fabric shall be securely fastened to the frame. Diagonal truss rods shall be provided as required to prevent sag or twist. Gates shall be properly installed with all hardware and accessories to insure that they open and close freely without binding. A 2500 psi concrete footing at least 1 inches deep and drop rod retained shall be provided at the center of double gate openings.

11-07 QUALITY ASSURANCE AND CERTIFICATION:

- A. Final Certification: After installation and final testing of equipment and instrumentation, the manufacturer furnishing supervision and/or inspection services shall make written certification to both the Design Engineer and the District that his equipment and the controls have been properly installed and operate in accordance with the specifications and drawings, and that the operating and maintenance instructions have been furnished to the District.
- B. Warranty: The station manufacturer shall warranty the complete pump station and all equipment provided to be free from defects in materials and workmanship for one year from the date it is placed in permanent operation by the manufacturer's representative. Warranty shall include 100% coverage of the manufacturer's labor, materials and equipment to remove and replace defective materials and workmanship at no cost to the Owner.
- C. Pump Warranty: The pump manufacturer shall warranty the pumps supplied to the Owner for a period of five (5) years under normal use. The warranty must include 100% coverage of the manufacturer's shop labor and parts including bearings, seals and stators for the first year from the date the station was placed in operation, and then prorated coverage not excluding bearings, seals and stators, through the 5th year.

SECTION 12

INSPECTION AND TESTING

12-01 SCOPE

- A. All work shall be subject to inspection and approval prior to final acceptance for Operation and Maintenance (O&M) by the Spartanburg Sanitary Sewer District, hereinafter referred to as the "District".
- B. All testing shall be performed in the presence of the Engineer of Record or his representative and the District's Engineering Field Technician (EFT).
- B. This section includes testing of gravity sewer lines, manholes and sewer force mains. Pump station testing is covered in SECTION 11 of these Specifications.

12-02 GRAVITY SEWER LINE TESTING

A. VISUAL

Gravity sewer lines will be lamped or inspected by Closed-Circuit Television (see Section 12-05) and all pipe shall show a true line between manholes without defects in conditions, grade or alignment.

B. INFILTRATION:

All gravity sewer lines shall be checked for the potential for infiltration or exfiltration. All tests shall be conducted under the direction of the Engineer of Record and the District. Any line or manhole which fails the testing shall be repaired or replaced as needed.

1) The following test methods are approved by the District:

- a) Vacuum testing shall be used for manholes and other concrete structures (other than wetwells);
- b) Low-pressure air testing shall be used for gravity sewer lines;

C. LOW-PRESSURE AIR TEST:

1) Air test shall be conducted in strict accordance with the testing equipment manufacturer's instructions, including all recommended safety precautions. No one will be allowed in the manholes during testing. Equipment used for air testing shall be equipment specifically designed for this type of test and shall include: Shut-off valve, pressure regulating valve, pressure reduction valve, monitoring gauge (0 to 5 psi with minimum divisions of 0.10 psi or approved by the EFT), air compressor and plugs.

- 2) After an internal pressure of 4.0 psig is obtained, allow at least two minutes for air temperature to stabilize, adding only the amount of air required to maintain pressure. After stabilization period, adjust the air pressure to 3.5 psig and valve off air supply.
- 3) For ductile iron pipe, the section of the line being tested will be considered acceptable if the time required for a pressure drop of 1.0 psig is more than the time shown for each pipe size in the following table:

<u>Pipe Diameter</u> <u>(Inches)</u>	<u>Time/100 Ft.</u> <u>(Min. : Sec.)</u>
4 -----	0:18
8 -----	1:12
10 -----	1:30
12 -----	1:48
15 -----	2:06
18 -----	2:24

- 4) For PVC pipe determine the time in seconds that is required for the internal air pressure of 3.5 psig to reach 3.0 psig. Minimum permissible pressure holding time required for pressure to drop from 3.5 psig to 3.0 psig shall be as on the Air Test Table 12-A.

Table 12-A

**SPECIFICATION TIME REQUIRED FOR A 0.5 PSIG PRESSURE DROP
FOR SIZE AND LENGTH OF PIPE INDICATED FOR Q = 0.0015**

1 Pipe Dia. (In.)	2 Min. Time (Min: Sec.)	3 Length For Min. Time (Ft.)	4 Time For Longer Length (Sec.)	Specification Time for Length (L) Shown (Min:Sec)								
				100 Ft.	150 Ft.	200 Ft.	250 Ft.	300 Ft.	350 Ft.	400 Ft.	450 Ft.	
4	1:53	597	.190L	1:53	1:53	1:53	1:53	1:53	1:53	1:53	1:53	1:53
6	2:50	398	.427L	2:50	2:50	2:50	2:50	2:50	2:50	2:51	3:12	3:12
8	3:47	298	.760L	3:47	3:47	3:47	3:47	3:48	4:26	5:04	5:42	5:42
10	4:43	239	1.187L	4:43	4:43	4:43	4:57	5:56	6:55	7:54	8:54	8:54
12	5:40	199	1.709L	5:40	5:40	5:42	7:08	8:33	9:58	11:24	12:50	12:50
15	7:05	159	2.671L	7:05	7:05	8:54	11:08	13:21	15:35	17:48	20:02	20:02
18	8:30	133	3.846L	8:30	9:37	12:49	16:01	19:14	22:26	25:38	28:51	28:51
21	9:55	114	5.235L	9:55	13:05	17:27	21:49	26:11	30:32	34:54	39:16	39:16
24	11:20	99	6.837L	11:24	17:57	22:48	28:30	34:11	39:53	45:35	51:17	51:17
27	12:45	88	8.653L	14:25	21:38	28:51	36:04	43:16	50:30	57:42	64:54	64:54
30	14:10	80	10.683L	17:48	26:43	35:37	44:31	53:25	62:19	71:13	80:07	80:07
33	15:35	72	12.926L	21:33	32:19	43:56	53:52	64:38	75:24	86:10	96:57	96:57
36	17:00	66	25.384L	25:39	38:28	51:17	64:06	76:55	89:44	102:34	115:23	115:23

D. DEFLECTION TESTING:

- 1) After installation and backfilling all PVC, pipe shall be tested for deflection.
- 2) Deflection testing shall be performed a minimum of 30 days after installation and backfilling;
- 3) Lines shall be thoroughly cleaned prior to testing to insure accurate testing. The mandrel which is used for testing shall be a commercially-available item designed to comply with ASTM D2321. Either the Aluminum Fin Style or the Fixed Aluminum or Steel mandrel designs (as manufactured by the Cherne Industries, Lincoln, Nebraska, or equal) are acceptable. Refer to Table 12-B for which shows the average PVC sewer pipe ID and the 5% Deflection.

Table 12-B: Acceptable Deflection for PVC Sewer Pipe

Nominal Pipe Size	Pipe	Base ID*	5% Deflection
8"	SDR-35	7.665	7.28
10"	SDR-35	9.563	9.08
12"	SDR-35	11.361	10.79
15"	SDR-35	13.898	13.2
18"	SDR-35	16.976	16.13
21"	SDR-35	20.004	19.00
24"	SDR-35	21.964	20.87
27"	SDR-35	25.327	24.06

*Base Inside Diameter (Base ID) - Allows for out of roundness and wall thickness tolerances as defined by ASTM Standards D3034 and F679 for PVC Sewer Pipe

- 4) Deflection test record shall identify the location and deflection amount at all points where deflection exceeds 5%. Pipe with initial deflection exceeding 5% will be unacceptable, and shall be rebudded to the correct deflection and retested for deflection;
- 5) The following procedure shall be used in testing PVC or other non-rigid sewer pipeline:
 - a) The pipeline to be tested must be clean and free of debris that might cause the mandrel to jam. It is recommended that the line be cleaned with a hydrocleaner, washing in the direction of flow. Cleaning water shall not be discharged to existing sewer lines.
 - b) The mandrel shall be placed in the pipeline and pulled from manhole section to manhole section using one of the following methods:
 - i. The pulling shall be done by hand, with a smooth and easy pull to avoid jamming the mandrel if an obstruction is encountered

in the line. The mandrel should have a tow line on each end to facilitate removal should the mandrel become obstructed in the direction of pull. If the mandrel stops, lightly pull on it to see if it will clear the obstruction. When it appears that the mandrel will not go forward, record the distance from the manhole at which the mandrel is stuck and then pull the mandrel back.

- ii. The mandrel may be propelled through the pipe using a “parachute” device which is acted upon by the flow of air from a high-volume, low pressure air blower. The blower is placed over the forward manhole and draws air through the pipe being tested. The parachute is attached to the front of the mandrel, and a tow line connected to the rear, to retrieve the mandrel if it encounters an obstruction. The flow of air from the blower must be sufficient to inflate the parachute and transport the mandrel.

NOTE: The two methods listed above are the only approved methods for performing the mandrel testing. Under no circumstances shall the mandrel be pulled by any mechanically-powered device, such as a hydraulic or electric winch or windlass, which could generate a greater pulling force than the manual method and which could deform the mandrel. The EFT shall have final approval of the method of mandrel testing.

- c) A record of the testing, and retesting if necessary, shall be retained by the District’s EFT. The Engineer’s or his representative shall be responsible for retaining their own copy of the test results for submission to SCDHEC if necessary.

12-03 MANHOLE TESTING

- A. Manholes shall be true circles of acceptable concrete or masonry work with properly corbeled tops, satisfactory inverts and properly placed frames, covers and steps.
- B. Vacuum Testing: All manholes shall be subjected to a vacuum test. The Contractor will furnish all necessary equipment and labor needed for conducting the tests. The Contractor shall have the option to test manholes prior to backfilling. Preparation and testing of manholes shall be as follows:
 - 1) All mortar joints shall be adequately cured;
 - 2) Pipes entering and leaving the manhole shall be plugged;
 - 3) Draw a vacuum of 10 inches of HG (Mercury).

- 4) The test shall pass if the vacuum drops to no less than 9 inches HG in 1 minute.
- 5) If the manhole fails the test, the Contractor shall locate the leak(s), make proper repairs, and then re-test until a successful test is obtained.

12-04 FORCE MAIN TESTING

A. HYDROSTATIC TESTING:

- 1) General
 - a) Clean and flush line of dirt and foreign material.
 - b) Do not perform hydrostatic tests until at least 24 hours after installation of concrete thrust blocking.
 - c) Provide temporary plug and blocking at open ends.
 - d) The Contractor shall provide an approved test pump and a method of measuring water pumped into the pipeline which is acceptable to the Engineering Field Technician
- 2) The District Engineering Field Technician shall connect the Pressure Test Recording Device to an appropriate pressure tap on the force main, shall operate the device, and shall be present during the entire test.
- 3) The test pressure shall be 1.5 times the working pressure of the line or 150 psi, whichever is greater, as measured at the lowest point in the section of the line being tested, and no less than 1.25 times the working pressure as measured at the highest point in the section.
- 4) The pressure in the line shall be pumped up to the test pressure and be constantly maintained for 96 minutes and recorded on Pressure Recorders furnished by the District. During testing, the pressure must be maintained to within ± 5 psi of the test pressure.
- 5) Leakage is the quantity of water that must be supplied to the newly laid pipe or any closed-valved section to maintain the pressure within the limits stated above.

- 6) The allowable leakage (for DIP and PVC) is defined by the following AWWA formulas:

Ductile Iron Pipe

$$L = \frac{SD/P}{133200}$$

where

L = Allowable leakage in gallons per hour

S = Length of pipe in feet

D = Diameter of the pipe in inches

P = Average test pressure in psi

PVC Pipe

$$L = \frac{ND/P}{7,400}$$

where

L = Allowable leakage (gallons per hour)

N = # of joints in the length of pipe being tested

D = Nominal diameter of pipe (inches)

P = Average test pressure during the leakage test (psi)

- 7) NOTE: The formulas above do not apply to pressure testing of HDPE pipe. HDPE pipe shall be hydrostatically tested by following the manufacturer's procedures. Only hydrostatic (water pressure) testing is approved by the District; air pressure testing shall not be performed.
- 8) If the amount of leakage exceeds the allowable limit, the Contractor shall locate and repair the leaks and shall retest the line using the same test procedures. All visible leaks shall be repaired regardless of the amount of leakage.

12-05 CCTV INSPECTION

Summary: This section includes internal Closed Circuit Television (CCTV) inspection of sewers. Sewer interiors shall be inspected using color closed-circuit television (CCTV) camera, and document inspection on Digital Video Disk (DVD) with audio location and date information, DVD title information, and continuous tape counter. A hard copy of inspection log shall be provided.

A. QUALIFICATIONS

- 1) The CCTV equipment shall be operated by personnel who have been trained and certified in the particular equipment used.

- 2) The DVD audio track commentary shall be produce by personnel experienced and certified in locating breaks, obstacles, service connections, and other main sewer features by closed circuit television. The Pipeline Assessment Certification Program (PACP) administered by the National Association of Sewer Service Companies (NASSCO), or a similar program shall be consider the minimum qualification for the CCTV technician.

B. SUBMITTALS

- 1) Submit training records and certificates for all personnel involved in the CCTV work.
- 2) Quality Assurance: Submit one example DVD of previous sewer inspection work that shows operational and structural defects in sewers, complete with audio commentary and inspection log(s). Prior to submitting, finalized the DVD to prevent re-recording.
- 3) DVD and Inspection logs will be reviewed to determine if quality of CCTV image is acceptable, and if defects were properly identified and documented according to District requirements.
- 4) Modify equipment and/or inspection procedures to achieve report material of acceptable quality.
- 5) Do not commence Work prior to approval of report material quality by the District. Upon acceptance, report material shall serve as standard for remaining Work.

C. Inspection Logs: Unless otherwise indicated, submit inspection logs that include the following as a minimum:

- 1) Title: Project Name and District Project Number
- 2) "Performed for the Spartanburg Sanitary Sewer District"
- 3) Time of day
- 4) Manhole ID (from GIS)
- 5) Manhole to manhole pipe section
- 6) Pipe segment length
- 7) Pipe material
- 8) Line size
- 9) Compass direction of viewing Direction of camera's travel
- 10) Pipe depth
- 11) Operator name
- 12) Tape counter reading at beginning and end of each manhole to manhole pipe segment.

C. DVDs; must be in a format readable with standard viewing software such as Windows Media Player. If a specific software program is needed, please submit a copy of the software for preapproval.

D. Maintain copy of all inspection documentation (DVDs, databases, and logs) for duration of Work and warranty period.

E. PRODUCTS

1) MATERIALS AND EQUIPMENT

- a. DVD: 120 minute, minimum, high-quality color, type DVD-R, DVD-RW, or DVD+R
- b. Audio portion of composite DVD shall be sufficiently free from electrical interference and background noise to provide complete intelligibility of the oral report.
- c. Store in upright position with temperature range of 45 to 80 degrees F (7 to 27 degrees C) in an appropriate CD or DVD case to prevent scratches.
- d. Identify each DVD with tape labels showing District's name, Contractor's name, and each manhole-to-manhole pipe segment of sewer line represented on DVD or provide an Index or Table of Contents if more than one segment is on the disk.
- e. DVD Titling: Each segment shown on the DVD should have its own Chapter titled with the beginning and end point of the pipe segment;
- f. Television Inspection Camera(s):
 1. Equipped with rotating head, capable of 90-degree rotation from horizontal and 360-degree rotation about its centerline;
 2. Minimum Camera Resolution: 400 vertical lines and 460 horizontal lines.
 3. Focal Distance: Adjustable through range of 6 inches (152 mm) to infinity.
 4. Camera(s) shall be intrinsically safe and operative in 100 percent humidity conditions.
 5. Lighting Intensity: Remote-controlled and adjustable to minimize reflective glare.
 6. Lighting and Camera Quality: Provide clear, in-focus picture of entire inside periphery of sewer.
 7. Footage Counter: Measures distance traveled by camera in sewer, accurate to plus or minus 2 feet (0.6 m) in 1,000 feet (305 m).

F. SEWER FLOW REQUIREMENTS

- 1) Do not exceed depth of flow shown in Table 1 for respective pipe sizes as measured in manhole when performing TV inspection.
- 2) When depth of flow at upstream manhole of sewer line section being worked is above maximum allowable for TV inspection, District may require that the

flow be reduced to level shown in Table 12-C, by plugging or blocking of flow, or by pumping and bypassing of flow as specified.

TABLE 12-C: Maximum Depth of Flow for TV Inspection

Nominal Pipe Diameter	Maximum Depth of Flow
6" – 10"	20 percent of pipe diameter
12" - 24"	25 percent of pipe diameter

G. SEQUENCE OF WORK

- 1) Perform Work in the following sequence:
 - a. Clean sewer lines and manholes as needed to allow free travel of the camera.
 - b. Perform TV inspection to comply with requirements of this specification.

H. INSPECTION REQUIREMENTS

- 1) Access: The District Engineering Field Technician, or other District Representative, shall have access to observe monitor and other operations at all times.
- 2) DVD Commentary: Record the following information on audio track of inspection : DVD narrative of location, direction of view, manhole numbers, pipe diameter and material, date, time of inspection, and location of laterals and other key features.
 - a. DVD shall visually display this information at beginning and end of each manhole-to-manhole pipe segment.
 - b. DVD between manholes shall visually display length in feet from starting point of given segment.
- 3) Sewer Identification: DVD and inspection documentation shall include sewer line and manhole identifiers from the District's GIS (if available).
- 4) Image Perspective: Camera image shall be down center axis of pipe when camera is in motion.
 - a. Provide 360-degree sweep of pipe interior at points of interest, to more fully document existing condition of sewer.
 - b. Points of interest may include but are no limited to the following: defects, cracks, voids, connections, encrustations, mineral deposits, debris, sediment, and any location determined not to be clean or part of an improper liner installation.
 - c. Cabling system employed to transport camera and transmit its signal shall not obstruct camera's view.
- 5) Sewer Reach Length: Physically measure and record length of each sewer

reach from centerline of its terminal manholes.

- 6) Inspection Rate: Camera shall be pulled through sewer in either direction, but both inspections are to be in same direction. Maximum rate of travel shall be 30 feet (9 m) per minute when recording.

I. FIELD QUALITY CONTROL

District will review videotapes and logs to ensure compliance with requirements listed in this specification.

SECTION 13

GREASE, OIL, and SAND TRAPS or INTERCEPTORS

13-01 SCOPE:

- A. This section covers the requirements for the construction and installation of Grease, Oil and Sand Traps or Interceptors when required by the Spartanburg Sanitary Sewer District, hereinafter referred to as the “District”. As used in the paragraphs below, the term “Interceptor” shall refer to the structure which is designed to separate and hold grease, oil, sand, or other materials from the wastewater stream, to prevent the discharge to the District’s system. These structures are commonly referred to as “grease traps”, “sand traps” or “oil-water separators”.
- B. This section is not intended to be a comprehensive presentation of the District’s policies and procedures related to the control of grease, oil, sand, or other materials which may be prohibited from being discharged to the District’s wastewater collection, transmission or treatment system. The reader is referred to the full text of the “Spartanburg Sanitary Sewer District Grease Control Program”. Please contact the Water Quality Department at 864-253-9632, for additional information and assistance.

13-02 GENERAL PROVISIONS

- A. Grease, Oil and Sand Traps or Interceptors shall be provided when, in the judgment of the District, they are necessary for the proper handling of liquid wastes containing fats, oils, grease or solids which may be harmful to, or cause obstruction of, the publicly owned treatment works, or interfere with the operation of the treatment works.
- B. The following types of facilities will generally require the installation of an Interceptor:
 - 1) Food service establishments with on-site food preparation, including restaurants, public eating places, hospitals, hotels, or other institutions;
 - 2) Vehicular service facilities, garages, automotive repair shops;
 - 3) Car washes;
 - 4) Any other facility which may have the potential to discharge prohibited materials, similar to that produced in the above facilities, into the District system.

C. APPROVALS

- 1) The Design Engineer for the project which will incorporate one or more Interceptors shall clearly show the location of the structure on the project drawings.
 - a. Interceptors shall be located so as to be readily accessible for inspection, cleaning, and maintenance, and shall not be located near main entranceways or drive-through driveways.
 - b. The use of ladders or the removal of bulky equipment in order to inspect or service interceptors shall not be acceptable.
- 2) Depending on the complexity of the project, District may require that the Design Engineer provide a copy of the building plumbing plans for review, to confirm that the following fixtures are connected to the Interceptor:
 - a. All drains from the kitchen, food preparation and dishwashing areas;
 - b. Garbage grinders;
 - c. Wash-down area floor drains;
 - d. Car wash discharges.
 - e. All other floor drains

Sanitary fixtures such as toilets, urinals, bathroom sinks, etc. shall not be connected to the interceptor.
- 3) The size, type, and location and piping detail of each Interceptor shall be included on the project drawings, and shall be approved and inspected by the District.
- 4) Interceptors shall be no less than 1,000 gallons total capacity unless otherwise approved by the District.
- 5) At a minimum, Interceptors shall be designed to provide 30 minutes retention time at peak flow conditions.
- 6) Under-Counter Interceptors
 - a. For cases in which below ground-type grease interceptors are not feasible to install, food service establishments will be required to install adequate and approved "under-the-counter" or "in the floor" grease traps for use on individual fixtures, including pot sinks, mop sinks, pre-rinse sinks, wok

ovens, floor drains, and other potentially grease-containing drains.

- b. In such cases, units will be considered acceptable only if approved flow control fittings are provided to the grease interceptor inlet to prevent overloading of the fixture and to allow for proper interceptor operation.
 - c. Under-counter or in-the-floor interceptors will not be approved if the purpose is to avoid the expense or inconvenience of properly upgrading the sewer service to a building whose original purpose did not include activities which would require the installation of an interceptor.
- 7) Approval of an interceptor installation by the District does not in any way relieve the operator of the facility from the responsibility for, and possible penalties which may result from, a discharge of prohibited material into the District's sewer system.

13-03 MATERIALS

- A. Interceptor Material shall be precast, reinforced concrete, unless otherwise approved by the Design Engineer and the District, and shall conform to ASTM C478;
- B. The Interceptor shall consist of a monolithic base section with either a single compartment or two compartments separated by a baffled wall and a flat slab top section as required, all in accordance with the details shown on the plans. Minimum compressive strength of concrete shall be 4000 psi.
- C. Maximum allowable absorption of concrete shall be 8 percent of the dry mass. Interceptor interior walls, tables and inverts shall be a smooth surface free of voids, depressions, chips, rough edges and high spots.
- D. Pipe openings shall be provided in base section as required. Lifting holes may be provided in the base section and top for ease of handling.
- E. Joint Sealant shall be by butyl rubber ring joint, 1-inch diameter, conforming to Federal Specifications SS-S-00210, Type I. Cement mortar joints will not be acceptable, except that each joint shall be wiped inside the structure with cement mortar after assembly.
- F. Piping and tees installed in conjunction with grease traps shall either PVC or ductile iron and meet the requirements of SECTION 4: GRAVITY SEWER: MATERIALS AND GENERAL INSTALLATION of this document. Influent and effluent pipes must be a minimum of 4-inches in diameter.
- G. Manhole Frame and Cover shall be consistent with the requirements of SECTION 3: MANHOLES of this document.

H. Refer to CONSTRUCTION DETAIL No. 28.

13-04 INSTALLATION

- A. Interceptors: Each section of the Interceptor shall be handled and installed in such a manner and by such means to prevent damage. All sections damaged during handling and installation will be rejected as directed by the Engineer, Engineering Field Technician, or Industrial Wastewater Specialist, and replaced. All lifting holes shall be plugged and sealed watertight as recommended by the manufacturer.
- 1) Interceptors must be installed below grade, be level and must be placed a firm 6-inch washed stone foundation so prepared to prevent settlement and misalignment.
 - 2) Pipe openings shall either be precast or cored at the exact location to receive entering pipes.
 - a. No jack-hammered or chiseled openings shall be permitted.
 - b. If a penetration in the concrete structure has been installed in the incorrect location or elevation, the opening shall be closed with brick and mortar and a new pipe opening cored, subject to the inspection and approval by the District.
 - 3) Pipe Connections shall be made by a flexible synthetic rubber boot mechanically clamped in the opening in the concrete and to the pipe to provide a watertight seal and designed to accommodate pipe movement up to 2 inches radially or 22 degrees angularly in any direction. The synthetic rubber boot shall have a minimum wall thickness of 3/8 inch. The synthetic rubber shall conform to ASTM C-923. Bands, clamps and other accessories shall be of 316 stainless steel.
 - 4) Inlet pipe shall terminate 24 inches above the floor of the structure.
 - 5) Outlet pipe must terminate 12 inches above the floor of the structure;
 - 6) Interceptor access manholes shall be provided over the inlet and outlet. The access manholes shall extend at least to finished grade and be designed to enable visual inspection of the tees. Joint sealant must be of the specified type.
 - 7) A Vent shall be provided for dual-chambered interceptors that terminates 12-inches above the floor and extends to grade with a clean out plug. In asphalt

or concrete areas, a brass plug must be used. In grass area PVC or brass may be used.

- 8) The Baffle Wall which separates the two chambers of the interceptor shall be located a distance $\frac{2}{3}$ of the total length of the interceptor from the inlet wall.
- 9) Interceptor excavation, backfill, and compaction shall conform to the requirements for backfilling trenches, SECTION 6: TRENCH EXCAVATION AND BACKFILL, except that no backfill shall be placed around the structure until all mortar has properly set.

B, Connection to Interceptors

- 1) All drains from the kitchen, food preparation, and dishwashing areas shall be connected to the grease trap. All waste shall enter through the inlet pipe only.
 - 2) Toilets, urinals, and similar fixtures shall not waste through the grease trap.
- C. All Interceptor installations shall be inspected and approved by the District before being placed in operation. Contact the New Connections Department at 864-580-5629 to schedule inspections.

SECTION 14

WORK INVOLVING EXISTING FACILITIES

14-01 GENERAL

The purpose of this section is to address some of the conditions which may be present at existing Spartanburg Sanitary Sewer District (District) facilities and the requirement that the operation and/or function of most facilities must continue during construction, replacement, or rehabilitation. The following paragraphs are meant to be a general guideline. The District recognizes that each situation is different; however, it shall be the Contractor's responsibility to preserve and maintain the function and integrity of the District's infrastructure, using whatever means are necessary.

14-02 VEHICLE ACCESS

- A. In general, the Contractor shall maintain normal vehicle access to and from all District facilities during all work. Any road closures or other disruptions to the normal flow of traffic shall be submitted to the District for approval a minimum of 3 days prior to the requested dates. Included with this submittal shall be all applicable City, County, Dor State encroachment permits.

- B. Traffic Control
Except as otherwise specified herein, all traffic control activities shall comply with the current version of the Manual on Uniform Traffic Control Devices published by the U.S. Department of Transportation and all applicable State, County or City encroachment permits and local 911 notification requirements.

14-03 BY-PASS PUMPING

- A. During the execution of any work which may require or cause disruption of flow through a pipe, manhole, or other structure, the Contractor shall be responsible for the continuity of sanitary sewer service to each facility connected to the affected section of sewer line.

- B. The Contractor shall indicate to the District the manholes which will be involved with bypass pumping as part of the work;

- C. The District shall provide to the Contractor an estimate of the flow data for the average flows normally observed in the lines identified under item B. above, based on the area served. The District makes no warranty with regard to the accuracy of the data provided, since there are many unforeseeable conditions which may affect the flow in an active sewer line.

- D. The Contractor shall submit a plan for bypass pumping (Bypass Plan) of sewage around the work area and facilities where sewage flows must be interrupted to carry on the work.

- 1) The Bypass Plan shall include the following:
 - a. A sketch of the bypass pumping layout showing the proposed suction and discharge locations, the position of all pumps, piping, generators, etc., and the proposed piping route;
 - b. Specifications for all pumping equipment to be used on the job (including all sizing calculations, pump curves, etc.). The bypass equipment shall be adequate to handle expected peak flows with a minimum 2X margin of safety;
 - c. A list of all backup pumping equipment to be held in reserve on the job site;
 - d. A description of any specialized equipment which may be needed such as bridge piping for driveway access;
 - d. A list of all On-Call personnel who will be able to respond should a problem develop. The Contractor shall provide qualified service personnel who can reach the site within 30 minutes after a high-water or other alarm is activated;
 - 2) Electric primary pumping is acceptable, with 100% redundancy provided in the form of a diesel or other auxiliary backup equipment.
 - 3) An auto-dialer, or other automatic notification equipment shall be provided to notify the Contractor of any problems with the equipment.
- G. The Contractor shall be responsible for all electrical costs for bypass pumping, including the installation of temporary power poles, etc.
- H. The Bypass Plan shall be reviewed and approved by the District before any work is started. Such approval does not guarantee the adequacy of the pumping system. If the proposed bypass system has inadequate capacity to properly transport wastewater around the work area, the Contractor shall take whatever measures are needed to supplement the equipment including larger and/or more numerous pumps and piping.
- I. The Contractor is responsible for insuring that the operation of any mechanical bypass equipment does not violate local noise ordinances. The Contractor shall incorporate whatever noise abatement measures which are needed, including the use of "Quiet Pack" pumps, insulated enclosures, supplemental mufflers on diesel engines, etc.
- J. If, at any time during construction, effluent from the existing sewer is not fully contained by the bypass system, gravity service shall be restored, and the work

suspended until the problem is resolved to the satisfaction of District. This includes wastewater flow into trenches during excavation work. Sewer system overflows will not be tolerated. The Contractor shall be liable for any fines or cleanup costs associated with failures of the bypass pumping system, regardless of the cause or responsible party.

SECTION 15

REHABILITATION AND PROTECTION OF CONCRETE AND BRICK MANHOLES OR UNDERGROUND VAULTS

15-01 SCOPE:

This specification covers work, materials and equipment required for protecting and/or rehabilitating of concrete, brick, and masonry manholes and other underground vaults by the application of appropriate materials to eliminate infiltration, provide corrosion protection, repair voids and deteriorated surfaces and to enhance structural integrity. Procedures for surface preparation, cleaning, application and testing are described herein.

15-02 DESIGN CRITERIA

Reference Standards of the American Society of Testing of Materials (ASTM)

ASTM D638 - Tensile Properties of Plastics.

ASTM D790 - Flexural Properties of Unreinforced and Reinforced Plastics.

ASTM D695 - Compressive Properties of Rigid Plastics.

ASTM D4541 - Pull-off Strength of Coatings Using a Portable Adhesion Tester.

ASTM D2584 - Volatile Matter Content.

ASTM D2240 - Durometer Hardness, Type D.

ASTM D543 - Resistance of Plastics to Chemical Reagents.

ASTM C109 - Compressive Strength Hydraulic Cement Mortars.

ASTM C348 - Flexural Strength Hydraulic Cement Mortars.

ASTM C396 - Compressive Strength of Cement Mortars.

ACI 506.2-77 - Specifications for Materials, Proportioning, Application of Shotcrete.

ASTM C579 - Compressive Strength of Chemically Setting Silicate and Silica Chemical Resistant Mortars.

NACE - The published standards of National Association of Corrosion Engineers (NACE International), Houston, TX.

SSPC - The published standards of the Steel Structures Painting Council, Pittsburgh, PA.

15-03 SUBMITTALS

The following items shall be submitted to the Engineer for approval:

- A. Technical data sheet on each product used, including ASTM test results indicating the product conforms to and is suitable for its intended use per these specifications.
- B. Material Safety Data Sheets (MSDS) for each product used.
- C. Project-specific guidelines and recommendations.
- D. Qualifications of Applicator:
 - 1) Manufacturer certification that the Applicator has been trained and approved in the handling, mixing and application of the products to be used. As used in this document, the term “Applicator” shall be defined as the person actually performing or directing the work on the site, and who is responsible for the proper execution of all work defined in the specifications.
 - 2) Applicator must have not less than three years experience using the specified material;
 - 3) All persons actively involved in the rehabilitation or coating operation, regardless of their level of responsibility, shall have less than two year’s experience in manhole or concrete vault rehabilitation and coating.
 - 4) Certification that the equipment to be used for applying the products has been manufactured or approved by the protective coating manufacturer and that the Applicator personnel have been trained and certified for proper use of the equipment.
 - 5) Contractor shall provide five (5) recent references of indicating successful application to sewer manholes, or other underground concrete structure, of a high-build solventless epoxy coating by plural component spray application;
 - 6) Proof of any necessary federal, state or local permits or licenses necessary for the project, including all OSHA regulations.
- E. Design details for systems and equipment to be used in site and surface preparation, application and testing.
- F. Design details for systems and equipment to be used in site and surface preparation, application and testing.
- G. By-pass Pumping
 - 1) The Contractor shall indicate to the Engineer which manholes will require bypass pumping as part of the work;

- 2) The Engineer shall provide to the Contractor flow data for the average and peak (dry weather) flows normally observed in the lines identified under 7.a. above;
- 3) Refer to SECTION 14 of this document for guidelines and requirements for bypass pumping.

H. Manufacturer Qualifications

- 1) Not less than 5 years of successful experience in supplying principal materials for reconstruction of sanitary sewer manholes of waste water treatment structures;
- 2) Documentation of such experience by reference lists.

J. WARRANTY

- 1) Applicator shall warrant all work against defects in materials and workmanship for a period of ten (10) years, unless otherwise noted, from the date of final acceptance of the project.
- 2) Applicator shall, within a reasonable time after receipt of written notice thereof, repair defects in materials or workmanship which may develop during said ten (10) year period, and any damage to other work caused by such defects or the repairing of same, at his own expense and without cost to the Owner.

15-04 PRODUCTS AND MATERIALS

A. EXISTING MATERIALS

- 1) Standard Portland cement or new concrete (not quick setting high strength cement) must be well cured prior to application of the protective coating. Generally, 28 days is adequate cure time for standard Portland. If earlier application is desired, compressive or tensile strength of the concrete can be tested to determine if acceptable cure has occurred. (Note: Bond strength of the coating to the concrete surface is generally limited to the tensile strength of the concrete itself. Engineer may require Elcometer pull tests to determine suitability of concrete for coating)
- 2) Cementitious patching and repair materials should not be used unless their manufacturer provides information as to its suitability for topcoating with an epoxy coating. Project specific submittals should be provided including application, cure time and surface preparation procedures which permit optimum bond strength with the epoxy coating.

- 3) Remove existing coatings prior to application of the new protective coating. Applicator is to maintain strict adherence to applicable NACE and SSPC recommendations with regard to proper surface preparation and compatibility with existing coatings.

B. REPAIR MATERIALS

- 1) Infiltration control shall be achieved using one of the following methods:
 - a. A premixed, fast-setting, volume-stable waterproof cement plug consisting of hydraulic cement, graded silica aggregates, special plasticizing and accelerating agents may be used. It shall not contain chlorides, gypsums, plasters, iron particales, aluminum powder, or gas-forming agents or promote the corrosion of steel it may come into contact with. Set time (ASTM C-191) shall be approximately 1 minute. Ten minute compressive strength (ASTM C-109) shall be a minimum of 500 psi. Acceptable products shall be:

CEMTEC, manufactured by A.W. Cook, Hoschton, Ga.;

Quadex Quad-Plug, manufactured by Quadex, Inc., Maumelle, Arkansas,

Thoroc Plug manufactured by ChemRex, Shakopee, MN

Approved equal products;
 - b. A silicate-based liquid accelerator, field mixed with neat portland cement. The set time shall be approximately 1 minute.
 - c. The elastomeric polyurethane resin-soaked method, using dry twisted jute oakum, or resin-rod with polyurethane resin (water activated)
 - d. Chemical injection grout sealants which shall be applied according to the manufacturer's recommendations. Acceptable products shall be
 - e. AV-100 Acrylamide Gel, AV-118 Acrylic Gel, or AV-202 Multigrout Urethane Resin manufactured by Avanti International,
 - f. Prime-Flex 900 XLV, Prime-Flex Hydrogel SX, manufactured by Prime Resins, Conyers, GA
 - g. HYDRO ACTIVE Combi Grout, HYDRO ACTIVE cut, HYDRO ACTIVE Flex LV, HYDRO ACTIVE Multi-gel NF, or HYDRO ACTIVE Safeoam, manufactured by De Neef Construction Chemicals, Houston, TX

Regardless of the method (or combination of methods) which are used, the Contractor shall demonstrate that permanent elimination of all infiltration has been achieved prior to the application of additional repair, rehab or protective coatings.

- 2) Repair materials shall be used to fill voids, structurally reinforce and/or rebuild surfaces, etc. as determined necessary by the engineer and protective coating applicator. Repair materials must be compatible with the specified epoxy coating and shall be applied in accordance with the manufacturer's recommendations. The following products may be accepted and approved as compatible repair basecoat materials for epoxy topcoating for use within the specifications:
 - a. 100% solids epoxy grout specifically formulated for epoxy topcoating compatibility. The epoxy grout manufacturer shall provide instructions for trowel or spray application and for epoxy topcoating procedures.
 - b. Factory blended, rapid setting, high early strength, non-shrink repair mortar that can be trowelled or pneumatically spray applied may be approved if specifically formulated to be suitable for epoxy, urethane or polyurethane topcoating. Such repair mortars should not be used unless their manufacturer provides information as to its suitability for topcoating with an epoxy, urethane or polyurethane coating. Project specific submittals should be provided including application, cure time and surface preparation procedures which permit optimum bond strength with the epoxy, urethane or polyurethane coating.
 - c. A premixed nonshrink cement-based patching material consisting of hydraulic cement, graded silica aggregates, special plasticizing and accelerating agents, which has been formulated for vertical or overhead use. It shall not contain chlorides, gypsums, plasters, iron particles, aluminum powder, or gas-forming agents or promote the corrosion of steel it may come into contact with. Set time (ASTM C-191) shall be less than 30 minutes. One hour compressive strength (ASTM C-109) shall be a minimum of 200 psi, and the ultimate compressive strengths (ASTM C-109) shall be a minimum of 5000psi. Bond strengths (ASTM C-882) Modified shall be a minimum of 1700 psi.

C. PROTECTIVE COATING MATERIALS

- 1) Definition: As used herein, the term "Protective Coating" shall refer to the final coat of material which is applied to the interior of the manhole. This material shall be designed to protect concrete manholes and other structures from attack by the components of domestic wastewater, particularly hydrogen sulfide gas

and the resulting sulfuric acid which is generated in sewer collection and transmission systems. In cases where other than domestic wastewater is being discharged (such as chemical plant effluents), in addition to any pre-treatment requirements, the District shall require that the Design Engineer submit in the design, a proposed method of protecting the sewer system from degradation by these constituents.

2) Protective Coating Manufacturers. The District recognizes that there are a variety of technologies which have been developed to protect concrete sewer structures; however, there can be no substitute for the skill and experience of the applicator. Subject to the training, certification, and experience of the applicator listed above, the following manufacturers are approved:

- a. Raven Lining Systems, Inc., Tulsa, Oklahoma 800/324-2810 or 918/584-2810 or FAX 918/582-4311.
- b. Mainstay Composite Liner, Reading, PA, 800/356-9023 or FAX 610/582-6064.
- c. Permaform, Inc., Reading, PA, 800/356-9023 or FAX 610/582-6064.
- d. Protective Liner Systems, Lithonia, GA, 770-482-5201, FAX 770-484-1821
- e. Neopoxy International, Hayward, CA, (510) 782-1290 FAX (510) 782-1292
- f. CCI Spectrum, Inc (Spectrashield), Jacksonville, FL (904) 268-4951, FAX (904) 268-4923
- g. Sherwin-Williams Company, Protective & Marine Coatings Group, Jamestown, NC (336) 307-5048

Other products will be evaluated upon submittal; however, the decision of the District regarding equality shall be final.

C. STRUCTURAL RESTORATION

In certain instances, part of the rehabilitation requirements for a particular structure may be a partial restoration of the structural integrity of the manhole or vault. This is most-often observed in the case of brick manholes which have deteriorating mortar, or pre-cast manholes with advanced corrosion. In these cases, preferential selection shall be given to those rehabilitation technologies which are shown to provide an improvement in structural integrity, in addition to the protection from corrosion which

is common to all. District recognizes that each technology has unique characteristics which might make it the preferred method for a given structure. District reserves the right to select the technology which is most-advantageous to the District, given the overall asset management goals, and not necessarily the least-cost alternative in the short term.

15-05 PROTECTIVE COATING APPLICATION EQUIPMENT

- A. The Protective Coating Application Equipment shall be specifically designed, or approved for use by the protective coating manufacturer, for use in the application of the specified protective coating.
- B. Repair Mortar Spray Application Equipment shall be specifically designed, or approved for use by the manufacturer of the material for continuous mixing and spraying of the material.

15-06 EXECUTION

- A. ACCEPTABLE APPLICATORS
 - 1) Chemical grout applicators should be trained in the proper application and use of chemical grouts and all related equipment;
 - 2) Repair mortar applicators should be trained to properly apply the cementitious mortar according to manufacturer's recommendations.
 - 3) Protective coating must be applied by a Certified Applicator of the protective coating manufacturer and according to manufacturer specifications.
- B. EXAMINATION
 - 1) All structures to be coated shall be readily accessible to Applicator.
 - 2) Appropriate actions shall be taken to comply with local, state and federal regulatory and other applicable agencies with regard to environment, health and safety.
 - 3) Prior to the application of any concrete rehabilitative or protective coating, all infiltration must be permanently stopped by whatever means are necessary as described above. This may include the use of hydraulic cement, chemical injection grouts or other method.
 - 4) Any active wastewater flows shall be dammed, plugged or diverted as

required to ensure that the liquid flow is maintained below the surfaces to be coated. If required, flows will be totally plugged and/or diverted when coating the invert. All flows into the manhole or vaults at or above the area coated shall be plugged and/or diverted for the amount of time specified by the manufacturer or until the epoxy has set hard to the touch, whichever is less. As an option, hot air may be added to the manhole to accelerate set time of the coating.

- 5) The Contractor shall assume that structures which may be included in this project are part of the active District wastewater collection system. These structures must remain in operation continuously. However, flow may be stopped by the use of appropriately size inflatable or screw-operated plugs if this can be done intermittently or during periods of low flow. Also, the flow may be diverted through these structures by the installation of appropriate extension pipes or similar fixtures. It shall be the Contractor's responsibility to properly execute and schedule his work to permit the required rehabilitation and the proper application of the manhole coating to be achieved under the existing operating conditions of the District system. Any bypass pumping or other measures which may be required will be the responsibility of the Contractor at no additional compensation. Refer to SECTION 14 of this document for bypass pumping requirements.
- 6) Installation of the protective coating shall not commence until the concrete substrate has properly cured in accordance with the specifications of the protective coating and the substrate coating manufacturers.
- 7) Temperature of the surface to be coated should be maintained between 40 deg F and 120 deg F during application. Prior to and during application, care should be taken to avoid exposure of direct sunlight or other intense heat source to the structure being coated. Where varying surface temperatures do exist, care should be taken to apply the coating when the temperature is falling versus rising (ie. late afternoon into evening vs. morning into afternoon).

C. SURFACE PREPARATION

- 1) Applicator shall inspect all surfaces specified to receive a protective coating prior to surface preparation. Applicator shall notify Owner of any noticeable disparity in the surfaces which may interfere with the proper preparation or application of the repair mortar and protective coating.
- 2) All concrete or mortar that is not sound or has been damaged by chemical exposure shall be removed to a sound concrete surface.
- 3) All contaminants including: oils, grease, incompatible existing coatings, waxes, form release, curing compounds, efflorescence, sealers, salts, or other

contaminants shall be removed.

- 4) Surface preparation method(s) should be based upon the conditions of the substrate, service environment and the requirements of the protective coating to be applied.
- 5) All surfaces shall be repaired as required by the protective coating system in the intended service condition.
- 6) Surfaces to receive protective coating shall be cleaned and abraded to produce a sound surface with adequate profile and porosity to provide a strong bond between the protective coating and the substrate.
 - a. Generally, this can be achieved with a high pressure water cleaning using equipment capable of 5,000 psi at 4 gpm. Other methods such as high pressure water jetting (refer to NACE Standard No. 5/SSPC-SP12), abrasive blasting, shotblasting, grinding, scarifying or acid etching may also be used.
 - b. Detergent water cleaning and hot water blasting may be necessary to remove oils, grease or other hydrocarbon residues from the concrete. Whichever method(s) are used, they shall be performed in a manner that provides a uniform, sound clean neutralized surface that is not excessively damaged.
 - c. Debris resulting from surface preparation and cleaning shall be removed from the structure and not allowed to enter the wastewater flow.
 - d. Infiltration shall be stopped by using a material which is compatible with the specified repair mortar and is suitable for topcoating with the specified protective coating.
 - e. It is the contractors responsibility to test prepared surfaces after cleaning, but prior to application of the epoxy coating, to determine if a specific pH or moisture content of the concrete has been achieved if this is required according to manufacturer's recommendations.
 - f. The area between the manhole and the manhole ring and any other area that might exhibit movement or cracking due to expansion and contraction, shall be grouted with a flexible or elastomeric grout or gel. Coating of iron castings is not specifically required under this specification. However, District reserves the right to add this requirement if necessary. Additional compensation will be negotiated to cover abrasive blasting, or other surface preparation as needed.

D. APPLICATION OF REPAIR MATERIALS

- 1) Areas where structural steel, ladders, brackets or piping has been exposed (particularly wet well riser piping) shall be prepared in accordance with the manufacturer's instructions for the preparation of steel surfaces to receive the protective protective coating which will be applied to the concrete structure surfaces. All metal surface preparation, primer application, etc. required shall be performed at no additional compensation, except as provided in paragraph 14-06 C.6) f.
- 2) Certain steel structures which are no longer used (ladders, brackets, etc.), may, at the option of the Contractor and with the approval of the Owner, be removed and discarded provided any resulting holes are filled flush with the concrete surface using the rehab methods described above. The Contractor shall be responsible for disposal of all materials so removed and for the repair of any subsequent damage which may occur during or as a result of such removal. Any such work will be performed at no additional compensation.
- 3) Repair materials shall meet the specifications herein. The materials shall be trowel or spray applied utilizing proper equipment on to specified surfaces. The material thicknesses shall be as follows:
 - a. Concrete build-back material shall be of sufficient thickness to restore the structure to the original thickness, grade and contour.
 - b. Protective coating shall be applied to the thickness specified in the particular manufacturer's procedures.
 - c. If using approved cementitious repair materials, such shall be trowelled to provide a smooth surface with an average profile equivalent to coarse sandpaper to optimally receive the protective coating. No bugholes or honeycomb surfaces should remain after the final trowel procedure of the repair mortar.
 - d. The repair materials shall be permitted to cure according to manufacturer recommendations. Curing compounds should not be used unless approved for compatibility with the specified protective coating.
 - e. After abrasive blast and leak repair is performed, all surfaces shall be inspected for remaining laitance prior to protective coating application. Any evidence of remaining contamination or laitance shall be removed by additional abrasive blast, shotblast or other approved method. If repair materials are used, refer to these specifications for

surface preparation. Areas to be coated must also be prepared in accordance with these specifications after receiving a cementitious repair mortar and prior to application of the protective coating.

E. APPLICATION OF PROTECTIVE COATING

- 1) Application procedures shall conform to the recommendations of the protective coating manufacturer, including material handling, mixing, environmental controls during application, safety, and spray equipment.
- 2) The spray equipment shall be specifically designed to accurately ratio and apply the specified protective coating materials at the temperature specified by the manufacturer and shall be regularly maintained and in proper working order.
- 3) The protective coating material must be spray applied by a Certified Applicator of the protective coating manufacturer.
- 4) Airless spray application equipment approved by the coating manufacturer shall be used to apply each coat of the protective coating to avoid any potential contamination from compressed air oil which may encourage inter-coat delamination. Air assisted spray application equipment may be acceptable, especially for thinner coats (<10 mils), only if the air source is filtered to completely remove all oil and water.
- 5) If necessary, subsequent topcoating or additional coats of the protective coating should occur as soon as the basecoat becomes tack free, ideally within 12 hours but no later than 24 hours after the prior coat has been applied at unless additional prior coat surface preparation is performed. The protective coating manufacturer must be consulted for any additional-coat surface preparation guidelines if necessary.
- 6) Depending on wastewater flow levels and how long flow can be stopped, inverts may be lined with an approved 100% solids, fast setting epoxy coating, grout or cementitious material. This treatment is only approved for those surfaces which, after resumption of normal flows, will be constantly covered by a layer of flowing water. Every effort should be made to coat the entire invert with a continuous application of the approved protective coating.

15-07 TESTING AND INSPECTION

- A. During application, a wet film thickness gage, such as those available through Paul N. Gardner Company, Inc. meeting ASTM D4414 - Standard Practice for Measurement of Wet Film Thickness of Organic Coatings by Notched Gages, shall be used by the Applicator to ensure a monolithic coating and uniform thickness during application.

All results, will be verified by the Engineering Field Technician (EFT) in the field. Results shall be submitted to the EFT within 24 hours of testing.

- B. After the protective coating has set hard to the touch it shall be inspected with high-voltage holiday detection equipment. An induced holiday shall be made on to the coated concrete surface and shall serve to determine the minimum/maximum voltage to be used to test the coating for holidays at that particular area. The spark tester shall be initially set at 100 volts per 1 mil (25 microns) of film thickness applied but may be adjusted as necessary to detect the induced holiday. All detected holidays shall be marked and repaired by abrading the coating surface with grit disk paper or other hand tooling method. After abrading and cleaning, additional protective coating material can be hand applied to the repair area. All touch-up/repair procedures shall follow the protective coating manufacturer's recommendations.
- C. A final visual inspection shall be made by the Inspector and manufacturer's representative. Any deficiencies in the finished coating shall be marked and repaired according to the procedures set forth herein by Contractor.
- D. Final Vacuum Testing. After the structure has passed all testing listed above, the District may require that the structure be vacuum tested according to the procedures listed in SECTION 12-03 of this document.

SECTION 16

REHABILITATION OF SANITARY SEWER MAINS BY PIPE BURSTING

16-1 GENERAL

This specification covers the rehabilitation of existing sanitary sewers using a Pipe Bursting System or similar trenchless pipe replacement technology. Pipe bursting is a process by which the bursting unit splits and/or fractures the existing pipe while simultaneously installing a new pipe of the same or larger size into the annulus created by the forward movement of the bursting tool. Pipe Bursting is an alternative to the replacing of underground infrastructure by open cutting.

Pipe bursting work is divided into three classifications. These classifications are meant to be used as a general guideline when considering online replacement an existing pipe by pipe bursting.

Table 16:1 Pipe Bursting Project Design Classifications

Classification	Depth of Pipe	Existing Pipe Diameter	New Pipe Diameter Options	Burst Length
A – ROUTINE	< 12 ft	4 – 12 inch	Size for Size To 1 Up size 0	Up to 350 feet
B - CHALLENGING TO MODERATELY DIFFICULT	>12 ft < 18 ft	12 – 20 inch	2 Up sizes	350 – 450 ft
C - DIFFICULT TO EXTREMELY DIFFICULT	> 18 ft	20 – 36 inch	3 or more Up sizes	> 450 ft

16-2 SCOPE

- A. It is the intent of this specification to define the approved methods and materials for trenchless rehabilitation of existing sanitary sewer mains by the Pipe Bursting or similar trenchless pipe replacement methods. The work covered in this section includes the furnishing of all labor, materials, tools, equipment, and required incidentals and performing all operations in connection with the complete rehabilitation of the existing deteriorated sanitary sewer system piping.

- B. The District shall make available to qualified bidders, a copy of a video record of the pipe to be burst (“Preliminary CCTV”. Such videotape shall be warranted as an accurate reflection of the present condition of the pipe to be burst, at the time the video record was created. The Contractor shall utilize the video to determine the work effort needed to replace the existing pipe. Such work shall include the requirement for pipe bursting and any requirement for open-cut work necessary to

correct sags that currently exist within the existing pipe. As part of the preliminary work, the successful bidder shall be required to generate an up-dated CCTV record of the current condition of the pipe (“Confirmation CCTV”). Any major discrepancies between the Preliminary CCTV record and the Confirmation CCTV record shall be brought to the attention of the District and may be justification for an adjustment in scope.

C. The price per foot installed of the pipe specified shall include full compensation for furnishing all of the following:

- 1) Labor, materials, tools, equipment and back up equipment (necessary for pipe bursting), pipe;
- 2) Transportation, saw cutting, traffic control, excavation, shoring and backfilling per the manufacturers' instructions
- 3) Off-site disposal of all refuse and excess material; de-watering as necessary; bypass pumping of sewer mains and live service connection flows;
- 4) Service reconnections; replacement and modification of the manhole inverts and bottom channel to match newly installed pipe;
- 5) Pre and post CCTV inspections,
- 6) Temporary and permanent restoration of surfaces and pavement and all appurtenant work.
- 7) Compensation shall be at the actual length of pipe replaced. The length shall be measured from center of manhole to center of manhole.

16-3 REFERENCE STANDARDS

American Society for Testing Materials (ASTM), West Conshohocken, PA 14428

ASTM D 1238-99

ASTM D 1505 Standard Test Method for Density of Plastics by the Density-Gradient Technique

ASTM D790-00 Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials

ASTM D 638-99 Standard Test Method for Tensile Strength of Plastics

ASTM D1693 - 08 Standard Test Method for Environmental Stress-Cracking of Ethylene Plastic

ASTM D 3350 Standard Specification for Polyethylene Plastics Pipe and Fittings Materials

ASTM D 618	Standard Practice for Conditioning Plastics for Testing
ASTM D 2837	Standard Test Method for Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Materials or Pressure Design Basis for Thermoplastic Pipe Products
ASTM D 575	Standard Test Methods for Rubber Properties in Compression

Refer also to the applicable standards for PVC pipe and DIP in gravity and pressure applications found in other sections of this document.

16-4 QUALIFICATIONS OF THE CONTRACTOR AND QUALITY ASSURANCE

- A. The Contractor shall be certified by the pipe bursting system manufacturer as a fully trained user of the pipe bursting or similar trenchless pipe replacement system. Operation of the pipe bursting system shall be performed by trained personnel. Such training shall be conducted by a qualified representative of the pipe bursting system manufacturer. The Contractor shall provide certificates of training for any employee directly involved in the supervision or operation of the pipe bursting system.
- B. Pipe jointing shall be performed by personnel trained as follows:
 - 1) For HDPE, personnel shall be trained in the use of butt-fusion equipment and the recommended methods for new pipe connections. Personnel directly involved with installing the new pipe shall receive training in the proper methods for handling and installing the polyethylene pipe. Such training shall be conducted by a qualified representative of the fusion equipment manufacturer.
 - 2) For DIP, personnel shall be trained in the proper makeup of restrained joints, installation of polyethylene wrapping, and any other tasks which are unique to the application of DIP to the pipe bursting process and which may be different from the procedures applicable to conventional open-cut installation of DIP.
 - 3) For PVC, personnel shall be trained in the proper makeup of restrained joints, and any other tasks which are unique to the application of restrained joint PVC to the pipe bursting process and which may be different from the procedures applicable to conventional open-cut installation of PVC pipe.
 - 4) Fusible PVC is not currently approved for installation in the District system. However, the Contractor may submit evidence of successful installations of this material for consideration.
- C. The Contractor shall hold the District harmless in any legal action resulting from patent infringements which may arise from the use of a given technology.

- D. Contractor experience: To qualify for bidding for any pipe bursting project the contractor shall have a minimum of 5,000 feet of pipe bursting experience within the past 12 months from project bid date and a minimum of 10,000 feet of cumulative pipe bursting experience. Specific projects and contact details with dates projects performed must be submitted and verifiable with all bid packages.
- E. Quality Assurance: the Contractor is solely responsible for quality assurance during the length of the project. The contractor shall be responsible for any costs associated with corrective measures required to replace or repair items not meeting the quality standards specified by the District.

16-5 SUBMITTALS

The Contractor shall submit the following items for review and approval by the District in accordance with the Contract Documents. Approval of the submittals by the District shall be obtained prior to ordering pipe materials and/or the start of the pipe replacement process.

- A. Certifications of training by the pipe bursting systems manufacturer as provided in paragraph 16-4 A. above.
- B. Certifications of training by the pipe fusion equipment manufacturers that the operators have been fully trained in the use of the fusion equipment by an authorized representative of the equipment manufacturer as provided in paragraph 16-4 B. above.
- C. Performance Work Statement (PWS): The Contractor shall submit, to the District, a Performance Work Statement (PWS) at the Pre-Construction Conference, which clearly defines the CIPP product delivery in conformance with the requirements of these contract documents. The PWS shall at a minimum contain the following:
 - 1) Project schedule.
 - 2) Detailed construction procedures, and layout plans to include sequence of construction.
 - 3) Locations, sizes and construction methods for the service reconnection pits.
 - 4) Methods of construction, reconnection and restoration of existing service laterals.
 - 5) The method of modification, if required, for existing manholes.
 - 6) Detailed procedures for the installation and bedding of pipe in the launching and receiving pits.

- 7) Sewer bypass plans, methods and list of equipment to be utilized. Refer to SECTION 14 of this document for bypass guidelines and requirements.
 - 8) A Safety Plan in conformance with the Contract Documents and OSHA regulations.
- D. Manufacturer's technical data showing complete information on material composition, physical properties and dimensions of the new pipe and fittings.
 - E. Manufacturer's recommendations for transport, handling, storage, and repair of pipe and fittings shall be included.
 - F. Traffic control plans.
 - G. Contingency plans for the following potential conditions:
 - 1) Unforeseen obstruction(s) causing burst stoppage, such as unanticipated change(s) in host pipe material, repair section(s), concrete encasement(s) or cradle(s), buried or abandoned manhole(s) or changes in direction not depicted on maps provided by the District.
 - 2) Substantial surface heave which occurs due to the depth of the existing pipe vs. the amount of upsizing
 - 3) Damage to existing service connections and to the replacement pipeline's structural integrity and methods of repair.
 - 4) Damage to other existing utilities.
 - 5) Loss of and return to line and grade.
 - 6) Soil heaving or settlement.

16-6 DELIVERY STORAGE AND HANDLING OF PIPE AND MATERIALS

- A. The Contractor shall transport, handle, and store pipe and fittings as recommended by manufacturer.
- B. New pipe and fittings that are damaged before or during installation it shall be repaired or replaced, as recommended by the manufacturer or required by the District. The costs of such repair or replacement shall be borne by the Contractor and be accomplished prior to proceeding with the project.

16-7 APPROVED METHODS OF PIPE BURSTING

- A. The most commonly used methods for pipe bursting are static and impact force. Static systems are hydraulic, while impact systems generally involve a combination of pneumatic and hydraulic technology. The main difference between methods is the manner in which the force is generated and transferred to the host pipe during the bursting operation.
- B. A variant of pipe bursting, generally applicable to VCP or PVC pipe only, involves a reaming process in which the host pipe is ground, by a reaming head, into shards which are compressed into the surrounding soil by the following tool. This specification shall be understood to apply to the reaming process as a variant of pipe bursting.
- C. The pipe bursting tool shall be pulled through the sewer by a winch or rod located at the upstream manhole. The bursting unit shall pull the polyethylene or DIP pipe with it as it moves forward. The bursting head shall incorporate a shield/expander to prevent collapse of the hole ahead of the new pipe insertion. The pipe bursting unit shall be remotely controlled. Replacement pipe that is sectional shall be pulled behind the bursting head.
- D. The bursting action of the tool shall increase the external dimensions sufficiently, causing breakage of the existing pipe at the same time expanding the surrounding ground sufficiently to pull in the new pipe.
- E. Approved suppliers of pipe bursting and similar pipe replacement technologies are as follows:
 - 1) Vermeer Hammerhead Mole Pipe Bursting System
 - 2) TT. Technologies Grundocrack® (Pneumatic)
 - 3) TT. Technologies Grundoburst® (Hydraulic/Static)
 - 4) Nowak Pipe Reaming, Inc. InneReam® system
 - 5) The District may consider the pipe bursting systems from other suppliers, provided they are shown to meet all requirements herein.

16-8 PIPE MATERIALS

The Contractor shall be required to submit manufacturer's data which substantiates that the particular pipe material, specific wall thickness, joint design, and other applicable characteristics render the material approved for use in pipe bursting projects and that the

proposed SDR is suitable for the depth and conditions (soil conditions and length) with an suitable safety factor.

- A. Polyethylene Plastic Pipe shall be high-density polyethylene pipe (HDPE) and meet the applicable requirements of ASTM F714 Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter or AWWA C906, ASTM D1248 and ASTM D3350. The minimum wall thickness of the polyethylene pipe shall be as follows:
 - 1) Depth of Cover 0 - 16.0 feet minimum SDR-21
 - 2) Depth of Cover >16.0 feet minimum SDR-17
- B. Ductile Iron Pipe: Ductile Iron Pipe shall meet the requirements of AWWA C110
- C. Polyvinyl Chloride (PVC) Pipe: Polyvinyl Chloride Pipe shall be a restrained joining type such as Certa-Lok™ or Yelomine™ and conform to the requirements of ASTM D2241 and/or AWWA C900 or C905, with a DR11 rating.
- D. The Contractor shall install a new pipe sufficient in diameter to renew the sewer to the required flow capacity as specified by the District.

16-9 EXECUTION

- A. Locating Utilities. The District shall provide the Contractor with all documents relating too the location of utilities adjacent to the pipe to be replaced. The Contractor shall, prior to starting work, verify the location of all adjacent utilities. The minimum clearance from other utilities shall be approximately two feet.
- B. The Contractor shall expose all interfering and crossing utilities by spot excavating at the planar intersection of the pipe and removing the soil from around the utility. The cost of exposing these utilities shall be borne by the Contractor.
- C. The Contractor shall verify this information in the field. All additional subsurface investigations deemed necessary by the Contractor to complete the work shall be included in the Bid Proposal at no additional cost to the District. Copies of all reports and information obtained by the Contractor shall be provided to the District
- D. The minimum depth of cover over the installed pipe shall be ten times the amount of displacement from the diameter of the existing pipe or 3 feet (0.91m) from the top of the existing pipe, whichever is greater. The Contractor may, with the prior approval of the District, reduce the minimum depth of cover.
- E. A minimum amount of ground heaving may be allowed, as determined by the District, if soil conditions are not favorable and up-sizing of the pipe is required. Unless

otherwise noted in the Contract Documents, settlement or heaving of the ground surface during or after construction will not be allowed. The Contractor is solely responsible for the costs for repairing any surface heaving.

F. The Contractor shall locate all and expose all sewer service connections prior to pipe insertion to expedite reconnection. The Contractor shall exercise due diligence in excavating the existing pipe sufficiently to allow for uniform circumferential expansion of the existing pipe through the service connection pit. Upon commencement of the bursting process, pipe insertion shall be continuous and without interruption from one entry point to another. Upon completion of insertion of the new pipe, the Contractor shall expedite the reconnection of services to minimize any inconvenience to the customers.

G. Pipe Joining

1) HDPE

a. The polyethylene pipe (HDPE) shall be assembled and joined at the site using the butt-fusion method to provide a leak proof joint. All equipment and procedures shall be used in strict compliance with the manufacturer's recommendations. Fusion shall be performed by technicians certified by a manufacturer of pipe fusion equipment.

b. The Contractor shall cut out and replace defective fused joints in HDPE at no additional cost to the District. Any section of the pipe with a gash, blister, abrasion, nick, scar, or other deleterious fault greater in depth than ten percent (10%) of the wall thickness (ASTM 585), shall not be used and must be removed from the site. However, a defective area of the pipe may be cut out and the joint fused in accordance with the procedures stated above.

c. Terminal sections of pipe that are joined within the insertion pit shall be connected with a mechanical coupling (e.g. a full circle stainless repair clamp), Electro Fusion Couplings (e.g. Central Plastics or equivalent) or a non-shear restraint coupling. All connections shall be in conformance with the manufacturer's installation procedures.

2) DIP

a. Installation of restrained joints and polyethylene wrapping (if specified) shall be performed according to the pipe manufacturer's recommendations.

b. The dimensions of pipe entry pits shall be adequate to accommodate the manufacturer's maximum joint deflection angles, with a reasonable

margin of safety.

3) PVC:

- a. Installation of restrained joints shall be performed according to the pipe manufacturer's recommendations.
- b. The dimensions of pipe entry pits shall be adequate to accommodate the manufacturer's maximum joint deflection angles, with a reasonable margin of safety.

H. Bypassing Flows

The Contractor shall be responsible for continuity of sanitary sewer service to each facility connected to the section of sewer main during the execution of the work, and shall also bypass the main sewer flow around the pipe to be replaced, or into adjacent sanitary sewers, if available. Refer to SECTION 14 of this document for bypass guidelines and requirements.

I. Service Reconnection

- 1) The installed pipe shall be allowed to relax and cool according to the manufacturer's recommended amount of time, after which the Contractor shall reconnect all service connections.
- 2) Service connections shall be reconnected to the pipe by using connectors approved by the pipe manufacturer and in conformance with the specified installation procedure. Service connections shall be wrap around saddle (e.g. FERNCO or equivalent), Cast Iron w/ Gasket, T Connection (e. g. Inserta-T or equivalent or Electro Fusion (e.g. Central Plastics, Phillips Driscopipe, Plexco or equivalent). Connections to the existing service pipe shall be made using flexible couplings. All flexible couplings shall conform to ASTM C425. Joint deflection limits and lateral connections shall meet the maximums indicated in ASTM C12 and C425.
- 3) The slope of the existing lateral toward the newly installed sewer main shall be maintained at the existing percent. For reconstructed laterals, a minimum slope of one percent (1%) or as specified by the District.

J. Restoration

- 1) Restoration of Manholes
 - a. The Contractor shall restore all manholes and associated surface areas

to their original condition.

- b. If the new pipe is HDPE, prior to restoring manholes, the installed pipe shall be allowed the manufacturer's recommended amount of relaxation time, but not less than four (4) hours, prior to the sealing of the annulus or backfilling of the insertion pit. Sufficient excess length of new pipe, but not less than two (2) to four (4) inches, shall be allowed to protrude into the manhole to provide for shortening. Restraint of pipe ends shall be achieved by means of Central Plastics Electro Fusion coupling or equivalent. The electro- fusion couplings shall be slipped over pipe ends against manhole wall and fused in place. Installation of electro fusion couplings shall be done in accordance with the manufacturers recommended procedures.
- c. Restoration of the bottoms and inverts shall correspond to the requirements in Section 3 of this document.

2) Restoration of Pits

- a. The Contractor shall restore all lateral, launching pits and associated surface areas to their original condition as specified in Street Cut or Encroachment Permits.
- b. Prior to backfilling lateral and launching pits the Contractor shall ensure that the new pipe is properly supported and on the required grade. Refer to Construction Detail No. 11.

16-10 TESTING

A. CCTV Inspections

- 1) The Contractor shall perform post installation internal close-circuit television (CCTV) inspections of all installed pipe. Each reach of sewer shall have an audio description with appropriate stationing of services indicated. The data and stationing are to be on the video. All such inspections shall be performed by personnel trained in locating breaks, obstacles and service connections by CCTV. Refer to Section 12-5 of this Document
- 2) Post construction video DVDs are to be submitted to the for review along with any interim progress pay requests and prior to the final pay request. Should any portion of the inspection video be of inadequate quality or coverage, as determined by the District, the Contractor will have that portion of the CCTV work repeated at no additional expense to the District. All original video DVDs remain property of the District.

- B. The District reserves the right to require low pressure air testing as specified in SECTION 12-03 of this document. The Contractor shall be responsible for providing all test equipment including air compressor, plugs (both main line and service lateral), gauges, etc.
- C. In cases where the sewer main installed by pipe bursting has been connected to an existing manhole, the District will require that the manhole be vacuum tested.

16-11 WARRANTY

- A. The Contractor shall warrant the pipe bursting installation for a period of one (1) year. During the Contractor warranty period, any defect which may materially affect the integrity, strength, function and/or operation of the pipe, shall be repaired at the Contractor's expense.
- C. After a pipe section has been replaced by pipe bursting, and for a period of time up to one (1) year following completion of the project, the District may inspect all or portions of the new line. The specific locations will be selected at random by the District. If it is found that any of the pipe replaced by pipe bursting has developed abnormalities since the time of post-installation CCTV inspection, the abnormalities shall be repaired and/or replaced. As used in this document, the term "abnormalities" shall refer to any physical condition which negatively impacts the function of the sewer main or connected laterals, including groundwater infiltration, flat or reverse-grade condition, surface subsidence, out-of-roundness

SECTION 17

REHABILITATION OF SANITARY SEWER MAINS USING CURED-IN-PLACE PIPE

17-01 GENERAL

- A. These Specifications include the minimum requirements for the rehabilitation of sanitary sewer main pipelines by the installation of Cured-In-Place Pipe (CIPP) within the existing, deteriorated pipe.
- B. The rehabilitation of pipelines shall be done by the installation of a resin-impregnated flexible tube which, when cured, shall be continuous and tight-fitting throughout the entire length of the original pipe. The CIPP shall extend the full length of the original pipe and provide a structurally sound, jointless and water-tight new pipe within a pipe.
- C. The Contractor is responsible for proper, accurate and complete installation of the CIPP using the system selected by the Contractor.
- D. Neither the CIPP system, nor its installation, shall cause adverse effects to any of the Spartanburg Sanitary Sewer District (hereinafter referred to as the "District") processes or facilities. The use of the product shall not result in the formation or production of any detrimental compounds or by-products at the wastewater treatment plant.
- E. This specification is intended to primarily address the rehabilitation of sewer mains. Related rehabilitation needs, including problems at the service lateral connection to the main, and problems with the service lateral beyond the main, will be discussed as they relate to the primary subject of this section.

17-02 SCOPE

- A. These Specifications cover all work necessary to furnish and install, the Cured-In-Place-Pipe (CIPP). The Contractor shall provide all materials, labor, equipment, and services necessary for traffic control, bypass pumping and/or diversion of sewage flows, cleaning and television inspection of sewers to be lined, liner installation, reconnection of service connections, all quality controls, provide samples for performance of required material tests, final television inspection, testing of lined pipe system and warranty work, all as specified herein.
- B. The District shall locate and designate all manhole access points open and accessible for the work, and shall provide rights-of-access to these locations. If street must be closed to traffic because of the orientation of the sewer, the Contractor shall be

responsible for obtaining all encroachment or other permits from the governing agency.

- C. The District shall make available to qualified bidders, a copy of a video record of the pipe to be rehabilitated (“Preliminary CCTV”). Such videotape shall be warranted as an accurate reflection of the present condition of the pipe to be rehabilitated, at the time the video record was created. The Contractor shall utilize the video to determine the work effort needed to rehabilitate the existing pipe. Such work shall include the requirement for installation of CIPP and any requirement for open-cut work necessary to correct sags, protruding service connection, dropped joint, or a collapse that will prevent the CIPP installation process.
- D. As part of the preliminary work, the successful bidder shall obtain an up-dated CCTV record of the current condition of the pipe (“Confirmation CCTV”). Any major discrepancies between the Preliminary CCTV record and the Confirmation CCTV record shall be brought to the attention of the District and may be justification for an adjustment in scope. A videotape and suitable written log for each line section shall be produced and provided to the District as required below. Refer to Section 12-5 of this Document for the CCTV inspection requirements.
- E. Cleaning of Sewer Lines - The Contractor, shall remove all internal debris out of the sewer line that will interfere with the installation of CIPP, including roots and debris, and shall be responsible for proper disposal of all material removed. Unless stated otherwise, it is assumed that “proper disposal” will be the delivery of this material to the wastewater treatment plant designated by the District. Any hazardous waste material encountered during this project will be considered as a changed condition.
- F. By-passing Existing Sewage Flows - The Contractor shall provide for the flow of existing mainline and service connection effluent around the section or sections of pipe designated for CIPP installation. Service connection effluent may be temporarily plugged as provided below. The Contractor shall coordinate sewer bypass and flow interruptions with the District at least 14 days in advance and with the property owners and businesses at least 3 business days in advance. Refer to SECTION 14 of this document for bypass pumping guidelines and requirements. Compensation for by-pass pumping and all associated plans and approvals shall be included in the bid proposal.
- G. Public Notification - The Contractor shall make every effort to maintain sewer service usage throughout the duration of the project. In the event that a service connection will be out of service, the longest period of “no service” shall be 8 hours. Otherwise, the bypass requirements given above shall apply. The District shall oversee a public notification program which shall, as a minimum, require that each home or business connected to the sanitary sewer be contacted and informed of the work to be conducted, and when the sewer will be off-line.

- H. The Contractor shall be responsible for confirming the locations of all branch service connections prior to installing the CIPP. If, after the successful installation of the CIPP and the reinstatement of the sewer service lateral connections, it is determined that a problem exists at the connection of the service lateral to the main, the District may direct the Contractor to repair this problem. If performed by the Contractor, the cost for correcting problems with service connections shall be compensated at the unit price bid for Repair of Defective Service Lateral Connections.
- I. To supply any water which is required for the project, the Contractor shall contact the Customer Service Department of Spartanburg Water. After payment of applicable fees, a hydrant meter can be installed in a location convenient to the project.
- J. The Contractor shall cleanup, restore existing surface conditions and structures, and repair any of the CIPP system determined to be defective. The Contractor shall conduct installation operations and schedule cleanup in a manner to cause the least possible obstruction and inconvenience to traffic, pedestrians, businesses, and property owners or tenants.

17-03 DESIGN CRITERIA

- A. The CIPP shall be designed for a life of 50 years or greater in accordance with ASTM F1216, Appendix X.1, for “fully deteriorated gravity pipe conditions”. The minimum installed cured liner thickness shall be as follows:
 - 1) 8” sewer: 6.0 mm (0’ to 17’ deep)
 7.5 mm (17’ to 25’ deep)
 - 2) 10” sewer: 6.0 mm (0’ to 11’ deep)
 7.5 mm (11’ to 18’ deep)
 9.0 mm (18’ to 25’ deep)
 - 3) 12” sewer: 7.5 mm (0’ to 12’ deep)
 9.0 mm (12’ to 18’ deep)
 10.5 mm (18’ to 25’ deep)
 - 4) 15” sewer: 7.5 mm (0’ to 10’ deep)
 9.0 mm (10’ to 18’ deep)
 10.5 mm (14’ to 20’ deep)
 - 5) For sewer mains larger than 15” or deeper than the depths given above, the Contractor shall submit design calculations prepared by a Registered Professional Engineer for the proposed wall thickness.
 - 6) Hydraulic Capacity - Overall, the hydraulic cross-section shall be maintained

as large as possible. The CIPP shall have a minimum of the full flow capacity of the original pipe before rehabilitation. Calculated capacities may be derived using a commonly accepted roughness coefficient for the existing pipe material taking into consideration its age and condition.

B. REFERENCE STANDARDS:

ASTM F1216 Rehabilitation of Existing Pipelines and Conduits by the Inversion and Curing of a Resin-Impregnated Tube)

ASTM F1743 Rehabilitation of Existing Pipelines and Conduits by Pulled-in-Place Installation of Cured-in-Place Thermosetting Resin Pipe (CIPP)

ASTM D5813 Cured-in-Place Thermosetting Resin Sewer Pipe

ASTM D790 Test Methods for Flexural Properties of Un-reinforced and Reinforced Plastics and Electrical Insulating Materials,

ASTM D2990 Tensile, Compressive, and Flexural Creep and Creep-Rupture of Plastics

17-04 PRODUCTS

A. CURED-IN-PLACE-PIPE LINING

- 1) CIPP lining shall be one of the following products or approved equal. The products below shall adhere to all requirements specified herein and shall be modified as necessary to meet these requirements.
 - a. Invert-A-Pipe by Improved Technologies Grout
 - b. National Liner by National EnviroTech Group, LLC
 - c. Inliner by Inliner Technologies, Inc.
 - d. Insituform by Insituform Technologies, Inc.
 - e. Diamond Lining Systems by Daystar Composites, LLC
 - f. Premier-Pipe USA by J.W.M. Environmental, Inc.
- 2) The liner shall be composed of tubing material consisting of one or more layers of flexible non-woven polyester felt, with or without other additives such as fiberglass or other reinforcing additives. The felt tubing shall be impregnated with a thermosetting isothalic polyester resin and catalyst or vinyl ester and catalyst. The liner material and resin shall be completely compatible. The inside and/or outside layer of the tube shall be coated with an impermeable material compatible with the resin and fabric. The liner shall cure in the presence of water at the required temperature for the resin system. Steam-cure shall not be allowed.

- 3) Resin - The resin system shall be a corrosion resistant polyester or vinyl ester system including all required catalysts, initiators that when cured within the tube create a composite that satisfies the requirements of ASTM F1216, ASTM D5813 and ASTM F1743, the physical properties herein, and those which are to be utilized in the submitted and approved design of the CIPP for this project. The resin shall produce a CIPP that will comply with the structural and chemical resistance requirements of this specification.

B. RELATED PRODUCTS

There are a variety of products which may be used as part of the work performed at the ends of the CIPP where they penetrate manholes and where they are penetrated by service lines. These products may include cement mortar grouts, hydraulic cement, and other specialized chemical grouts for stopping infiltration. It is beyond the scope of this section to specify the particular product or material to be used in a particular application. However, only products which are specifically manufactured for use in sanitary sewer manholes are approved. Regardless of the material used, the Contractor shall be responsible for the repair of all failures during the warranty period, whether or not they are related to a product or workmanship issue.

17-05 SUBMITTALS

A. Contractors Qualifications:

- 1) The Contractor shall have a minimum of three (3) years of continuous experience installing CIPP liners in pipe of a similar size, length and configuration as contained in this project. A minimum of 150,000 linear feet of shop wet-out liner installation is required and minimum of 6 onsite wet-out installations are required as applicable to this contract.
- 2) The Contractor's personnel shall have the following experience with the process and installation method to be used on this project:
 - a. Project Manager – Shall have a minimum of 3 years managing CIPP projects for wastewater collection systems.
 - b. Superintendent - Shall have a minimum of 2 years managing CIPP projects for wastewater collection systems.
 - c. The lead personnel including the superintendent, the foreman and the lead crew personnel for the CCTV inspection, resin wet-out, the CIPP liner installation, liner curing and the robotic service reconnections must have a minimum of three (3) years of total experience with the

CIPP technology proposed for this project and must have demonstrated competency and experience to perform the scope of work contained in this project.

- 3) The name and experience of each lead individual performing work on this contract shall be submitted with the bid documents.
- B. Design: Engineering design calculations, in accordance with the Appendix of ASTM F-1216, for each length of liner to be installed including the thickness of each proposed CIPP. It will be acceptable for the Contractor to submit a design for the most severe line condition and apply that design to all of the line sections. These calculations shall be performed and certified by a qualified Professional Engineer. All calculations shall include data that conforms to the requirements of these specifications.
- C. Performance Work Statement (PWS): The Contractor shall submit, to the District, a Performance Work Statement (PWS) at the Pre-Construction Conference, which clearly defines the CIPP product delivery in conformance with the requirements of these contract documents. The PWS shall at a minimum contain the following:
- 1) Clearly indicate that the CIPP will conform to the project requirements as outlined in these specifications.
 - 2) Where the scope of work is specifically delineated in the contract documents, a detailed installation plan describing all preparation work, cleaning operations, pre-CCTV inspections, by-pass pumping, traffic control, installation procedure, method of curing, service reconnection, quality control, testing to be performed, final CCTV inspection, warranties furnished and all else necessary and appropriate for a complete CIPP liner installation. A detailed installation schedule shall be prepared, submitted and conform to the requirements of this contract.
 - 3) Contractor's description of the proposed CIPP lining technology, including a detailed plan for identifying all active service connections maintaining service during mainline installation to each home connected to the section of pipe being lined.
 - 4) A description of the CIPP materials to be furnished for the project. Materials shall be fully detailed in the submittals and conform to these specifications and/or shall conform to the pre-approved product submission.
 - 5) Proposed manufacturers technology data shall be submitted for all CIPP products and all associated technologies to be furnished. Submittals shall include information on the cured-in-place pipe intended for installation and all tools and equipment required for a complete installation. The PWS shall

identify which tools and equipment will be redundant on the job site in the event of equipment breakdown. All equipment, to be furnished for the project, including proposed back-up equipment, shall be clearly described.

- 6) The Contractor shall outline the mitigation procedure to be implemented in the event of key equipment failure during the installation process.
- 7) A detailed description of the Contractor's proposed procedures for removal of any existing blockages in the pipeline that may be encountered during the cleaning process.
- 8) CIPP REPAIR/REPLACEMENT: Occasionally, unforeseeable problems with installation will result in the need to repair or replace a defective CIPP.
 - a. The Contractor shall outline specific repair or replacement procedures for potential defects that may occur in the installed CIPP. Repair/replacement procedures shall be as recommended by the CIPP system manufacturer and shall be submitted as part of the PWS.
 - b. Defects in the installed CIPP that will not affect the operation and long term life of the product shall be identified and defined.
 - c. Repairable defects that may occur in the installed CIPP shall be specifically defined by the Contractor based on manufacturer's recommendations, including a detailed step-by-step repair procedure, resulting in a finished product meeting the requirements of the Contract.
 - d. Un-repairable defects that may occur to the CIPP shall be clearly defined by the Contractor based on the manufacturer's recommendations, including a recommended procedure for the removal and replacement of the CIPP.

D. PRODUCT SUBMITTALS

- 1) Fabric Tube – including the manufacturer and description of product components.
- 2) Flexible membrane (coating) material – including recommended repair (patching) procedure if applicable.
- 3) Raw Resin Data - including the manufacturer and description of product components.
- 4) Manufacturers' shipping, storage and handling recommendations for all

components of the CIPP System.

- 5) All MSDS sheets for all materials to be furnished for the project.
 - 6) Tube wet-out & cure method including:
 - a. A complete description of the proposed wet-out procedure for the proposed technology.
 - b. The Manufacturer's recommended cure method - for each diameter and thickness of CIPP liner to be installed. The PWS shall contain a detailed curing procedure detailing the curing medium and the method of application.
- E. SAFETY: The Contractor shall submit a proposed Safety Plan to the Owner, prior to beginning any work, identifying all competent persons. The plan shall include a description of a daily safety program for the job site and all emergency procedures to be implemented in the event of a safety incident. All work shall be conducted in accordance with the Contractor's submitted Safety Plan.
- 1) The Contractor shall conform to all work safety requirements of pertinent regulatory agencies, and shall secure the site for the working conditions in compliance with the same. The Contractor shall erect such signs and other devices as are necessary for the safety of the work site.
 - 2) The Contractor shall perform all of the Work in accordance with applicable OSHA standards. Emphasis shall be placed upon the requirements for entering confined spaces and with the equipment being utilized for pipe renewal.

17-06 EXECUTION

Prior to beginning any work, the Confirmation CCTV shall be submitted to and approved by the District, along with the PWS which will outline any preparatory work (reduction of protruding service connections, repair of offset joints, pipe bellies, etc) needed on a given section of sewer main.

- A. The Contractor shall perform and provide all necessary traffic control measures to complete the work and shall be required to obtain all applicable encroachment permits. Warning signs, barricades, and flagmen must be provided in accordance with the Manual on Uniform Traffic Control Devices, or other SCDOT, Spartanburg County, or the City of Spartanburg permitting requirements.
- B. The Contractor shall clean and televise each length of pipe to be lined as specified in Paragraph 16-02 E. above. Only personnel trained and certified in locating breaks,

obstacles and service connections by closed circuit television shall perform the inspection. The Pipeline Assessment Certification Program (PACP) administered by the National Association of Sewer Service Companies (NASSCO) or similar program shall be considered the minimum qualification for the CCTV technician. The Contractor shall provide the District a copy of the pre-cleaning and post-cleaning video and suitable log in digital format for review prior to installation of the CIPP.

D. Line Obstructions - It shall be the responsibility of the Contractor to clear the line of obstructions that will interfere with the installation and long-term performance of the CIPP.

- 1) If pre-installation inspection reveals an obstruction, misalignment, broken or collapsed section or sag that was not identified as part of the original scope of work (Preliminary CCTV) and will prohibit proper installation of the CIPP, the Contractor may be directed by the District to correct the problem(s) prior to lining by utilizing open cut repair methods. The Contractor shall be compensated for this work under a contingency pay item designated for open cut point repairs. Removal of any previously unknown obstructions shall be considered as a changed condition.
- 2) The cost of removal of obstructions that appeared on the Preliminary CCTV documentation and made available to the Contractor, prior to the bid opening, shall be compensated for on a unit price basis in accordance with the contract documents.

E. Service Connections: The Contractor shall be responsible for confirming the locations of all branch service connections prior to installing and curing the CIPP.

- 1) The Contract Documents may require that each service connection be dye tested to determine whether the connection is live or abandoned. Such dye testing may be performed by District personnel as part of the Preliminary CCTV work. If performed by the Contractor, the cost for dye testing of existing service connections shall be compensated at the unit price bid in the Proposal for Dye Testing of Existing Service Connections.
- 2) In the event the status of a service connection cannot be adequately defined, the District will make the final decision, prior to installation and curing of the liner, as to the status. Unless specifically directed otherwise by the District, all service connections should be assumed to be active and shall be reopened by the Contractor.

F. Prior to lining the main sewer, protruding service lateral connections shall be internally cut or ground down flush with the pipe wall with a robotic cutter specifically designed for this purpose, and all required point repairs shall be completed. The internal cutter shall be capable of cutting cast iron, PVC, VCP,

DIP, and Orangeburg Pipe.

- G. The Contractor shall bypass pump sewer flows around the lining work while it is being performed. Refer to SECTION 14 of this document for bypass pumping guidelines and requirements.
- H. INSTALLATION OF LINER - The CIPP Liner shall be installed and cured in the host pipe per the manufacturer's specifications as described and submitted in the PWS. CIPP installation shall be in accordance with the applicable ASTM standards with the following modification:
- 1) The wet-out tube shall be positioned in the pipeline using the method specified by the manufacturer. Care should be exercised not to damage the tube as a result of installation.
 - 2) The tube should be pulled-in or inverted through an existing manhole or approved access point and fully extend to the next designated manhole or termination point
- I. Water shall be used to invert CIPP installed via ASTM F1216 or to invert the calibration hose through CIPP installed via ASTM F1743.
- 1) Air shall not be used to invert the CIPP or calibration hoses under any circumstances, unless combined with water being used with an installation vessel.
 - 2) The water inversion of the CIPP and calibration hoses shall be accomplished by using natural water pressure (head) achieved by erecting platforms or scaffolding to an elevation determined by the Contractor, or by using a CIPP installation vessel that creates water pressure.
 - 3) The Contractor shall determine the necessary inversion heads (pressure) for each line segment. If an installation vessel is used, a pressure relief valve shall be installed on the vessel so that the necessary pressure/inversion heads are not exceeded at any time during the inversions.
 - 4) The Contractor shall submit required inversion heads for each installation as a shop drawing without delay or claim to confidentiality or product/installation privacy.
 - 5) Prior to installation and as recommended by the manufacturer remote temperature gauges or sensors shall be placed inside the host pipe to monitor the temperatures during the cure cycle. Liner and/or host pipe interface temperature shall be monitored and logged during curing of the liner.

- 4) Curing shall be accomplished by utilizing the appropriate medium in accordance with the manufacturer's recommended cure schedule. The curing source or in and output temperatures shall be monitored and logged during the cure cycles. The manufacturer's recommended cure schedule shall be used for each line segment installed, and the liner wall thickness and the existing ground conditions with regard to temperature, moisture level, and thermal conductivity of soil, per ASTM as applicable, shall be taken into account by the Contractor.

J. COOL DOWN

- 1) The Contractor shall cool the CIPP in accordance with the approved CIPP manufacturer's recommendations as described and outlined in the PWS.
- 2) Temperatures and curing data shall be monitored and recorded by the Contractor throughout the installation process to ensure that each phase of the process is achieved as approved in accordance with the CIPP System manufacturer's recommendations.

K. FINISH

- 1) The installed CIPP shall be continuous over the entire length of a sewer line section and be free from visual defects such as foreign inclusions, dry spots, pinholes, major wrinkles and de-lamination. The lining shall be impervious and free of any leakage from the pipe to the surrounding ground or from the ground to inside the lined pipe.
- 2) Any defect, which will or could affect the structural integrity or strength of the linings, shall be repaired at the Contractor's expense, in accordance with the procedures submitted under Paragraph 16-05 C. 9) above.
- 3) The beginning and end of the CIPP shall be sealed to the existing host pipe. The sealing material shall be compatible with the pipe end and shall provide a watertight seal.
- 4) If, after the successful installation of the CIPP and the reinstatement of the sewer service lateral connections, it is determined that a problem exists at the connection of the service lateral to the main, the District may direct the Contractor to repair this problem. If performed by the Contractor, the cost for correcting problems with service connections shall be compensated at the unit price bid for Repair of Defective Service Lateral Connections.
- 5) If the wall of the CIPP leaks, it shall be repaired or removed and replaced with a watertight pipe as recommended by the manufacture of the CIPP system.

- 6) Compensation shall be at the actual length of cured-in-place pipe installed. The length shall be measured from center of manhole to center of manhole. The unit price per linear foot installed shall include all materials, labor, equipment and supplies necessary for the complete CIPP liner installation. Compensation for service connection sealing shall be at the unit price bid.

L. MANHOLE CONNECTIONS AND RECONNECTIONS OF EXISTING SERVICES

- 1) A seal, consisting of a resin mixture or hydrophilic seal compatible with the installed CIPP shall be applied at manhole walls in accordance with the CIPP System manufacturer's recommendations.
- 2) Reconections of existing services shall be made after the CIPP has been installed, fully cured, and cooled down. It is the Contractor's responsibility to make sure that all active service connections are reconnected.
- 3) External reconections are to be made with a tee fitting in accordance with CIPP System manufacturer's recommendations. Saddle connections shall be seated and sealed to the new CIPP using grout or resin compatible with the CIPP.
- 4) A CCTV camera and remote cutting tool shall be used for internal reconections. The machined opening shall be at least 95 percent of the service connection opening and the bottom of both openings must match. The opening shall not be more than 100 percent of the service connection opening. The edges of the opening shall not have pipe fragments or liner fragments, which may obstruct flow or snag debris.
- 5) In the event that service reinstatements result in openings that are greater than 100 percent of the service connection opening, the Contractor shall install a CIPP type repair, sufficiently in size to completely cover the over-cut service connection. No additional compensation will be paid for the repair of over-cut service connections.
- 6) Coupons of pipe material resulting from service tap cutting shall be collected at the next manhole downstream of the pipe rehabilitation operation prior to leaving the site. Coupons may not be allowed to pass through the system.

17-07 FINAL INSPECTION AND REPORTS

- A. Following installation of the CIPP and reinstating all active service lateral connections, and completion of all manhole rehabilitation (including vacuum testing, see Section 12 of this Document), the Contractor shall conduct a final, Post-

Rehabilitation CCTV inspection of the completed work. No cleaning equipment shall be in the sewers during the Post-rehabilitation CCTV inspections. There shall be no water flowing in the pipe, so that the entire CIPP can be seen.

- B. Installation Reports shall be generated for each segment of liner installed, and shall be submitted along with the Post-Rehabilitation CCTV video. Refer to Section 12-5 of this Document for CCTV requirements.
- C. The Installation Report shall document the installation including manhole numbers, street names/sewer location, project number, date, time, temperature, curing temperature, curing time, liner thickness, etc. A sample report shall be submitted to the District for approval prior to installing any lining.

17-08 WARRANTY

- A. The materials used for the project shall be certified by the manufacturer for the specified purpose. The manufacturer shall warrant the liner and all supplied materials to be free from defects in raw materials for one (1) year from the date of installation and acceptance by the District.
- B. The Contractor shall warrant the liner installation for a period of one (1) year. During the Contractor warranty period, any defect which may materially affect the integrity, strength, function and/or operation of the pipe, shall be repaired at the Contractor's expense in accordance with procedures included in Paragraph 16-05 C. 9) above.
- C. After a pipe section has been lined and for a period of time up to one (1) year following completion of the project, the District may inspect all or portions of the lined system. The specific locations will be selected at random by the Owner and will include all sizes of CIPP from this project. If it is found that any of the CIPP has developed abnormalities since the time of " Post-Rehabilitation CCTV Inspection," the abnormalities shall be repaired and/or replaced as defined in Paragraph 16-05 C. 9). If, after inspection of a portion of the lined system under the contract, problems are found, the Owner may televise all the CIPP installed on the contract. All verified defects shall be repaired and/or replaced by the Contractor and shall be performed in accordance with Paragraph 16-05 C. 9) above and per the original specifications, all at no additional cost to the District.

SECTION 18

WARRANTY

18-01 GENERAL WARRANTY FOR ONE YEAR AFTER COMPLETION:

- 1) For a period of at least one year after the Spartanburg Sanitary Sewer District's final inspection, the Contractor shall warrant the fitness and soundness of all work done and materials and equipment put in place under the contract and neither the final certificate of payment nor any provision in the contract documents nor partial or entire occupancy of the premises by the Owner shall constitute an acceptance of work not done in accordance with the contract documents or relieve the Contractor of liability in respect to any express warranties of responsibility for faulty materials or workmanship. The Contractor shall remedy any defects in the work and pay for any damage to other work resulting therefrom, which shall appear within a period of one year from the date of final acceptance of the work unless a longer period is specified.
- 2) A second District inspection will be conducted 10 months after the date of acceptance of the project or the date of the SCDHE Final Construction Approval if applicable. The Owner or Contractor will be notified of observed defects after the "10-month" inspection is conducted. The Contractor will correct any defects prior to the expiration of the one-year warranty.
- 3) If in fulfilling the requirements of the contract or of any guarantee embraced therein or required thereby, the Contractor disturbs any work guaranteed under another contract, he shall restore such disturbed work to a condition satisfactory to the Engineer, and shall guarantee such restored work to the same extent as it was guaranteed under such other contract.
- 4) If the Contractor, after notice, fails to proceed promptly to comply with the terms of the guarantee, the Owner may have the defects corrected and the Contractor and his Surety shall be liable for all expenses incurred.
- 5) All special guarantees applicable to definite parts of the work that may be stipulated in the specifications or other papers forming a part of the Contract shall be subject to the terms of this paragraph during the first year of the life of such special guarantee.

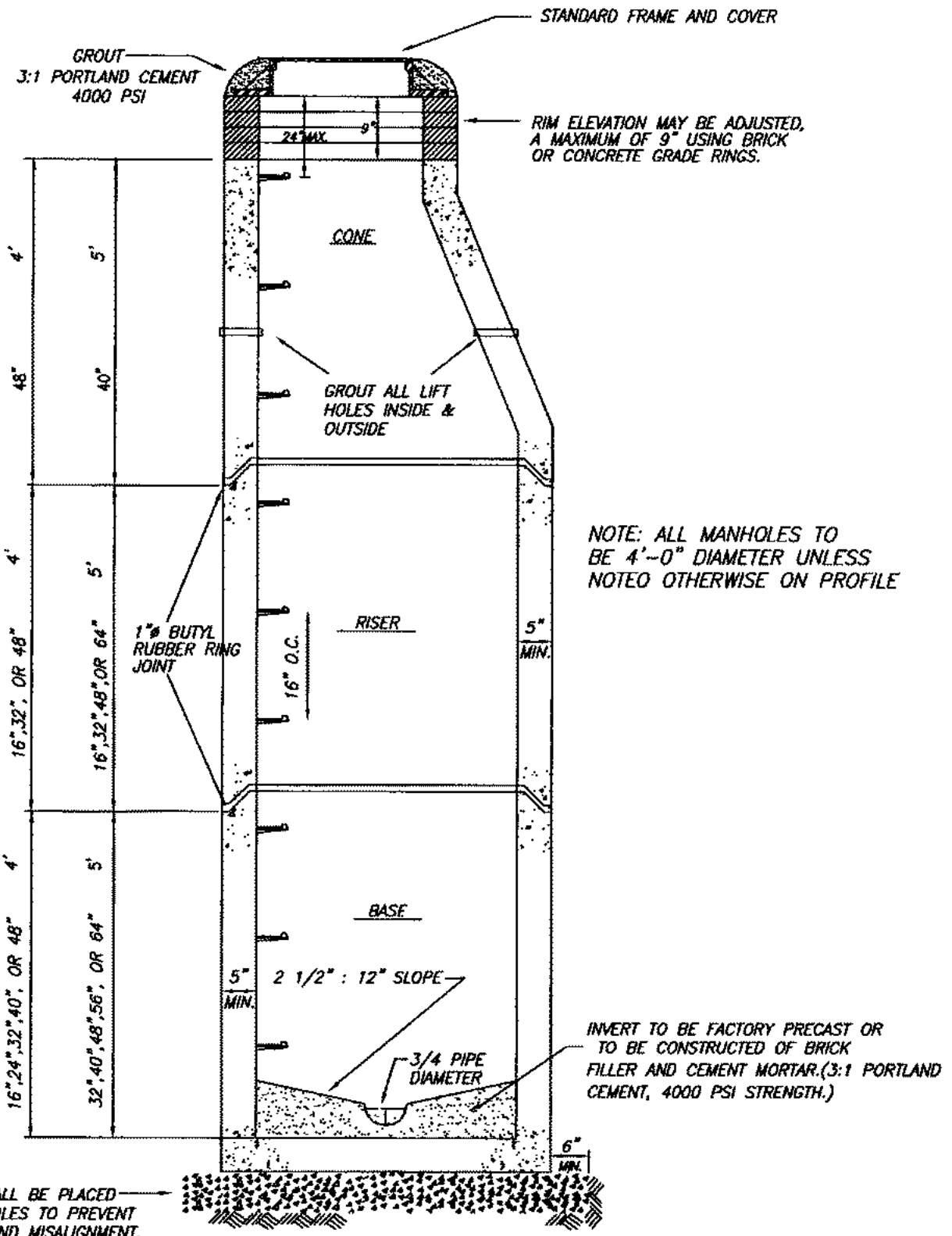
18-02 MAINTENANCE

In addition to the guarantee stipulated in the Contract, each Contractor shall fully maintain all work performed under his contract for sixty (60) days after final completion and acceptance of the work. The retained percentage of contract payments shall not be due until after the 60 days maintenance period, except that the Owner may at his discretion release such retainer earlier.

APPENDIX A

STANDARD CONSTRUCTION DETAILS

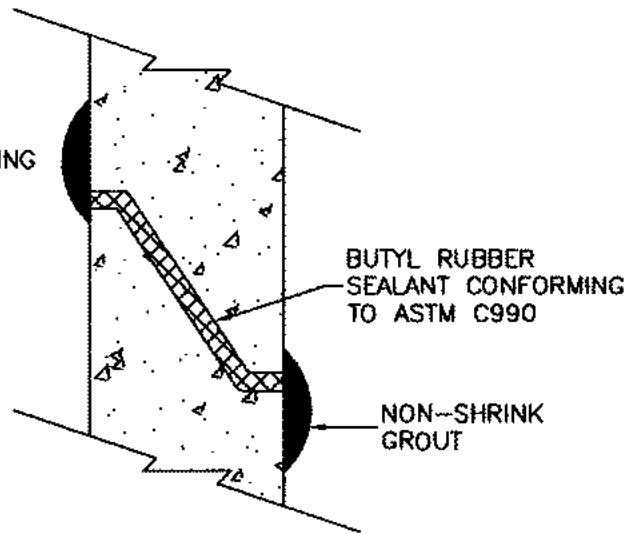
CONSTRUCTION DETAIL NO. 1



STANDARD PRECAST MANHOLE
N.T.S.

CONSTRUCTION DETAIL NO. 2

O-RING JOINTS CONFORMING
TO ASTM C443 ARE ONLY
ALLOWED WITH SPECIFIC
APPROVAL FROM SSSD
ENGINEERING DEPARTMENT

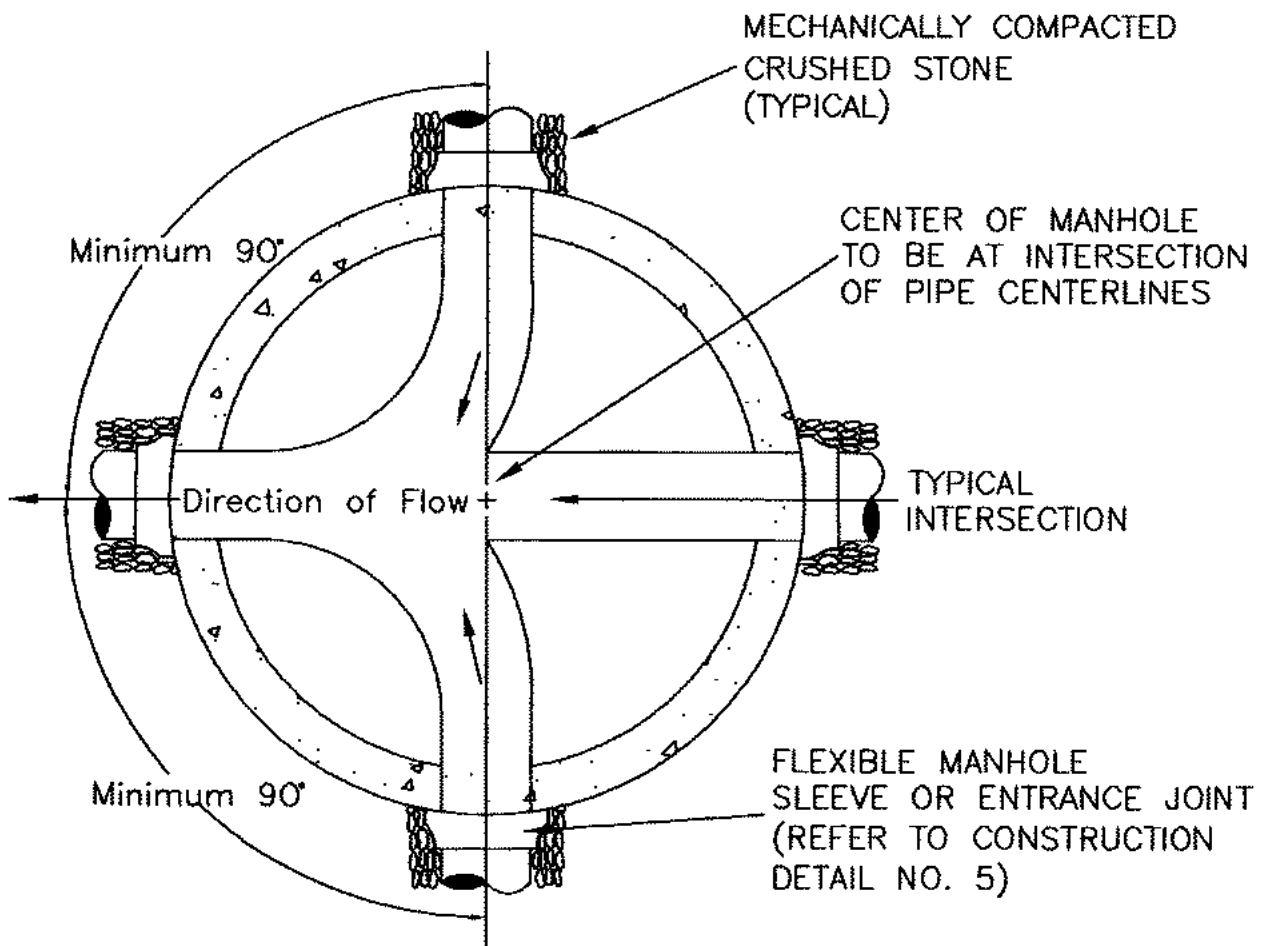


JOINT
DETAIL

STANDARD PRECAST MANHOLE JOINT DETAIL

CONSTRUCTION DETAIL NO. 3

SEWER LINES LESS THAN 12" - USE 4' ID MANHOLE
SEWER LINES 12" - 15" - USE 5' ID MANHOLE
SEWER LINES 15" - 24" - USE 6' ID MANHOLE
SEWER LINES GREATER THAN 24" - USE 8' ID MANHOLE



PLAN OF MANHOLE INVERTS
(Note: Shape All Inverts & Trowel Smooth)

CONSTRUCTION DETAIL NO. 4

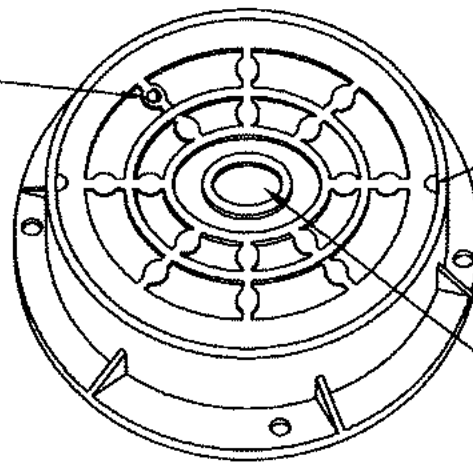
STANDARD FRAME AND COVERS
EAST JOROAN IRON WORKS #V-1384
US FOUNOARY #USF-668, KL

WATERPROOF FRAME AND COVER
US FOUNOARY #USF-668, KL-BWTL
OR APPROVED EAST JOROAN IRON WORKS BOLT-DOWN

FLAT SLAB FRAME AND COVER
US FOUNOARY #USF-1261, KL
EAST JOROAN IRON WORKS #V-1384-4

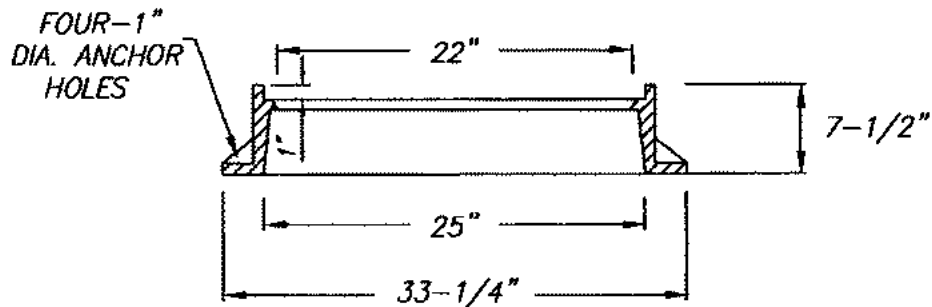
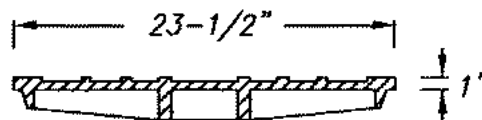
COVER TO HAVE A SINGLE, 1" DIAMETER VENT HOLE, UNLESS BOLT-DOWN COVER IS SPECIFIED, IN WHICH CASE, THE GASKET SHALL PROVIDE POSITIVE SEAL AT BOLT HOLES.

FRAME AND COVER SHALL BE CERTIFIED FOR A MINIMUM OF AASHTO H-20 LOADING



PROVIDE 2 (NON-PENETRATING) PICK HOLES

"S" OR "SANITARY SEWER" SHALL BE CAST ON THE COVER



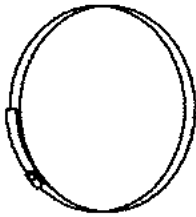
STANDARD MANHOLE
FRAME & COVER

N.T.S.

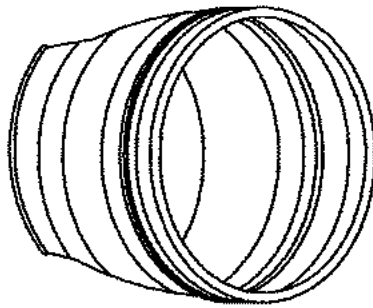
CONSTRUCTION DETAIL NO. 5

APPROVED MATERIALS

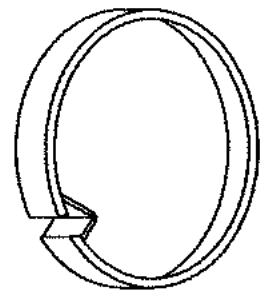
BOOTS - NPC (KOR-N-SEAL) AND PRESS-SEAL (PSX DIRECT DRIVE)



STAINLESS STEEL
PIPE CLAMP

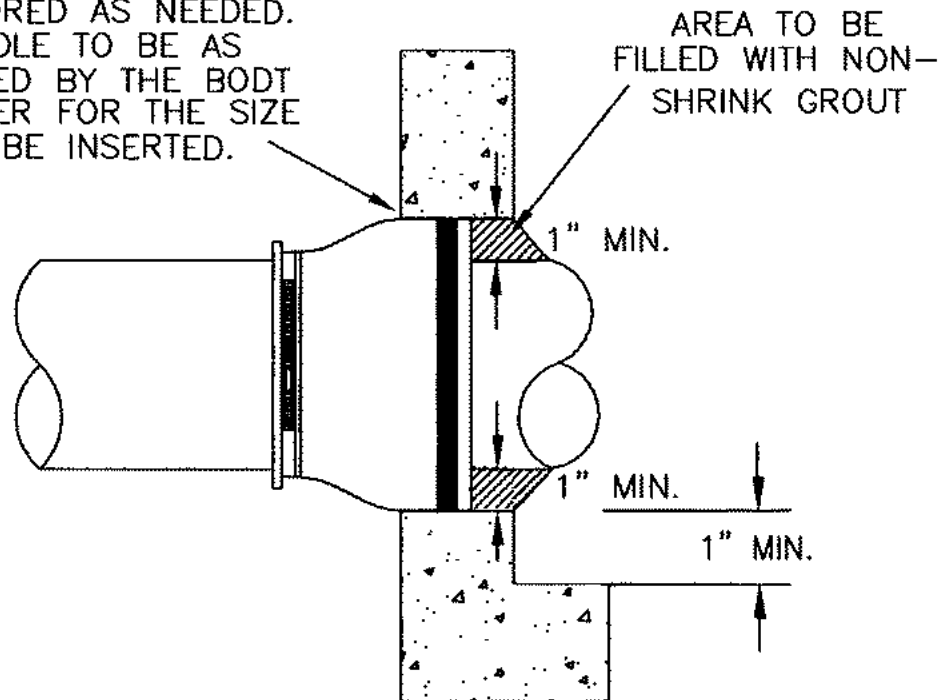


FLEXIBLE SYNTHETIC
RUBBER CONNECTOR



STAINLESS STEEL
EXPANSION RING

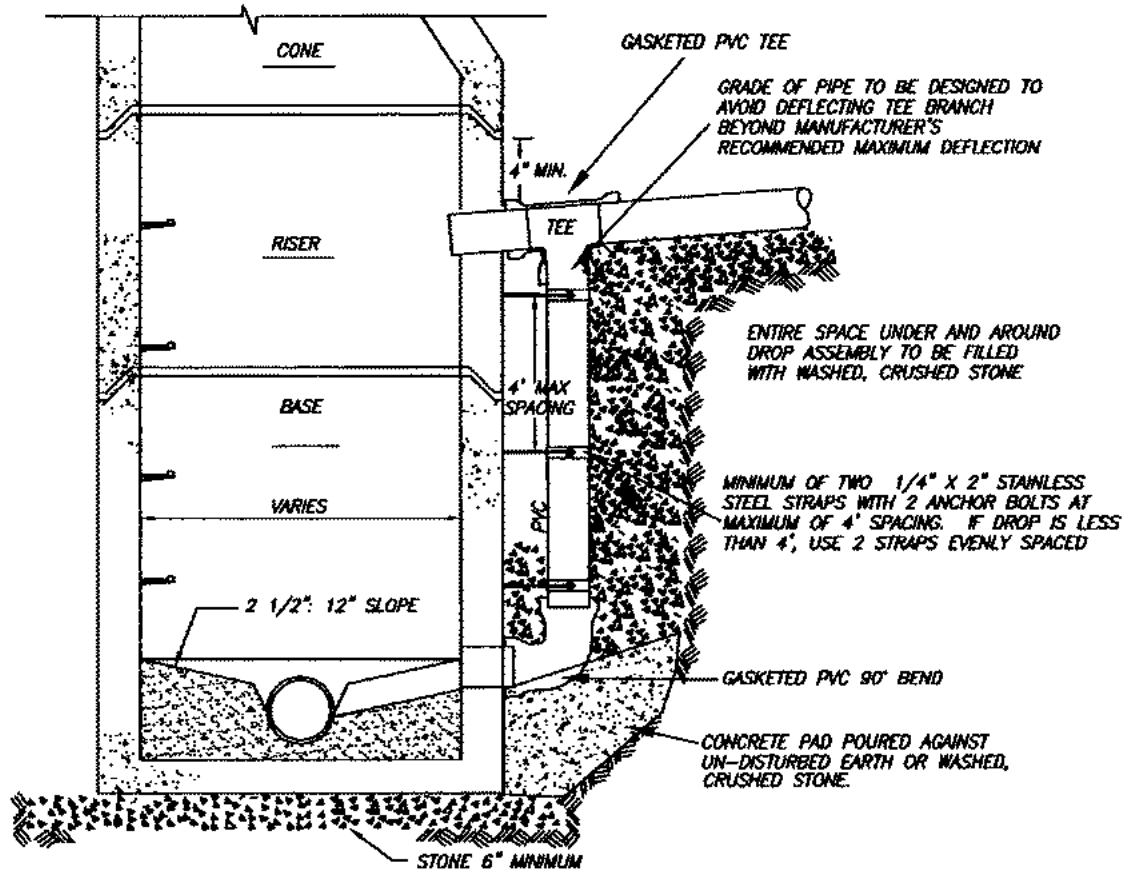
HOLE TO BE FACTORY-CORED
OR FIELD CORED AS NEEDED.
SIZE OF HOLE TO BE AS
RECOMMENDED BY THE BOOT
MANUFACTURER FOR THE SIZE
PIPE TO BE INSERTED.



MANHOLE ENTRANCE "BOOT"

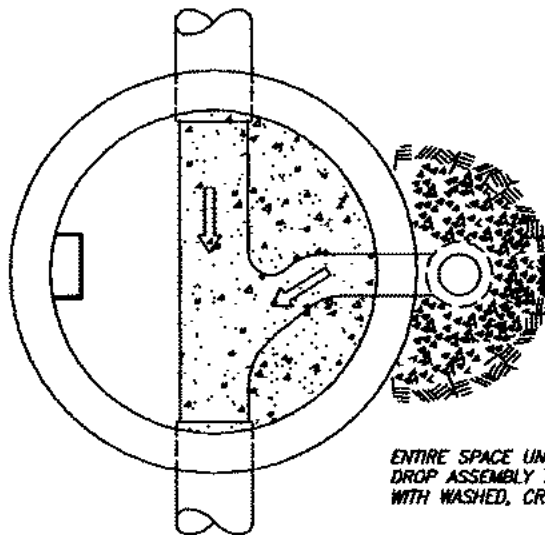
N.T.S.

CONSTRUCTION DETAIL NO. 6



NOTES:

1. CARE MUST BE TAKEN TO FORM A SMOOTH FINISHED TROUGH FROM ENTRANCE PIPES TO EXIT PIPE, AND IN CURVED MANHOLES THE TROUGH MUST BE A SMOOTH CIRCULAR ARC TANGENT TO THE INSIDE WALLS OF THE PIPES AT THEIR ENDS.
2. THE SLOPE OF THE OUTSIDE DROP TROUGH SHALL BE 1/4" PER FOOT.
3. ALL PIPE OPENINGS TO BE NO GREATER THAN 3" LARGER THAN O.D. OF PIPE.
4. OUTSIDE DROP SHALL NOT ENTER MANHOLE IN CONE SECTION.
5. MATCH DROP INFLUENT CROWN TO CROWN WITH EFFLUENT PIPE
6. AT THE DISCRETION OF THE ENGINEERING FIELD TECHNICIAN (INSPECTOR) THE LOWER PIPE MAY ENTER THE MANHOLE SLIGHTLY ABOVE THE TABLE, AND A TROUGH CONSTRUCTED TO DIRECT THE FLOW INTO THE INVERT



TYPICAL OUTSIDE DROP MANHOLE

N.T.S.

CONSTRUCTION DETAIL NO. 7

NOTES

- 1) INSIDE DROPS FOR MAIN LINES (8" AND LARGER) AND 6" SERVICE LINES ARE ONLY ALLOWED AS PART OF THE ORIGINAL SEWER DESIGN, WHEN THE DROP IS GREATER THAN 13.5' AND THE NEXT LARGER ID MANHOLE IS INSTALLED
- 2) INSIDE DROPS MAY BE INSTALLED FOR 4" AND 6" SERVICE LINES ON EXISTING MANHOLES WHEN THE DROP IS GREATER THAN 13.5' THE TEE AND DROP PIPE MUST BE SECURED AS CLOSE TO THE MANHOLE WALL AS POSSIBLE TO MINIMIZE RESTRICTION OF ACCESS.

CORE MANHOLE AND INSTALL STANDARD MANHOLE BOOT OR LINK-SEAL SIZED TO FIT AND INSTALLED WITH EXPANSION BOLTS ACCESSIBLE FROM INSIDE THE MANHOLE

FILL EXCAVATED AREA WITH STONE

RIM ELEVATION MAY BE ADJUSTED, A MAXIMUM OF 9" USING BRICK OR CONCRETE GRADE RINGS.

NOTE: INSIDE DROP SHALL BE CONSTRUCTED TO POSITION THE DROP PIPE AS CLOSE TO THE MANHOLE WALL AS POSSIBLE

GASKETED PVC TEE WITH PUSH-IN PLUG TRIMMED TO CREATE DAM, BUT ALLOW ACCESS FOR RODDING TOOLS

STAINLESS STEEL STRAPS WITH 2 ANCHOR BOLTS AT 4' SPACING MAX.

45° BEND ROTATE TO FLOW

BUILD TROUGH

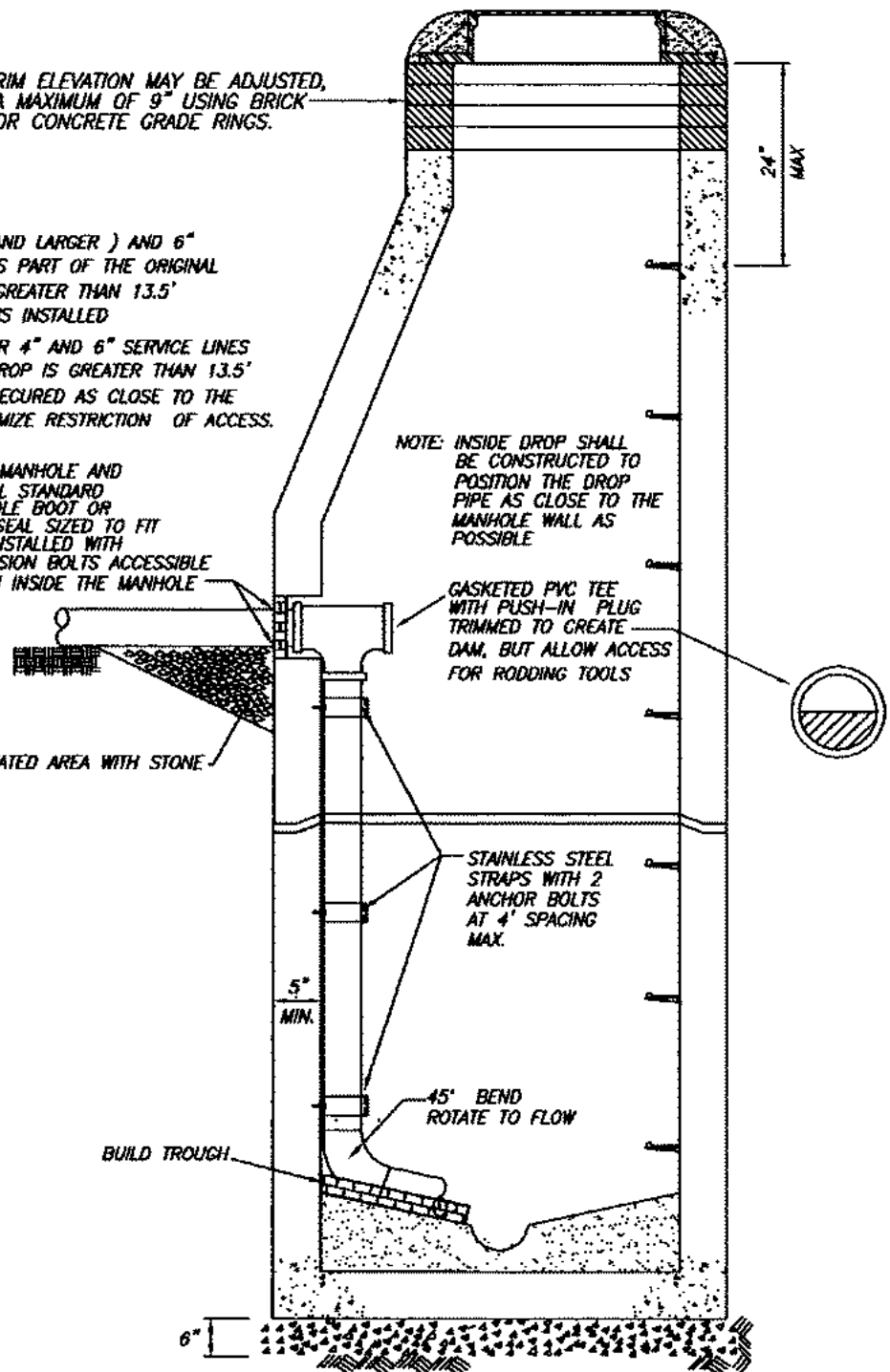
5° MIN.

24" MAX

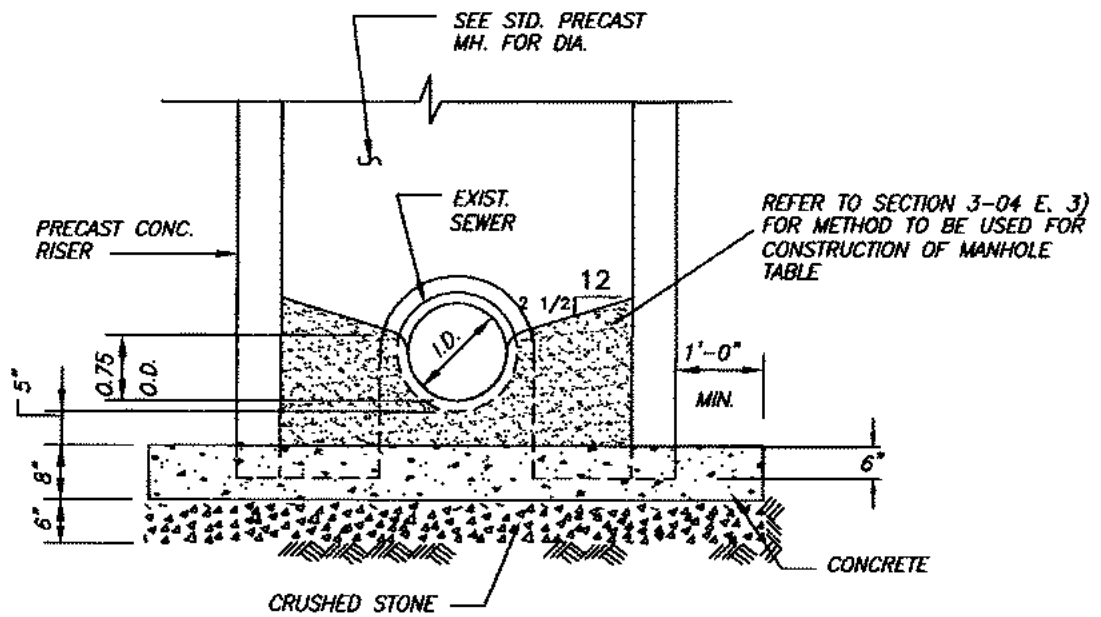
6"

TYPICAL INSIDE DROP MANHOLE

N.T.S.



CONSTRUCTION DETAIL NO. 8



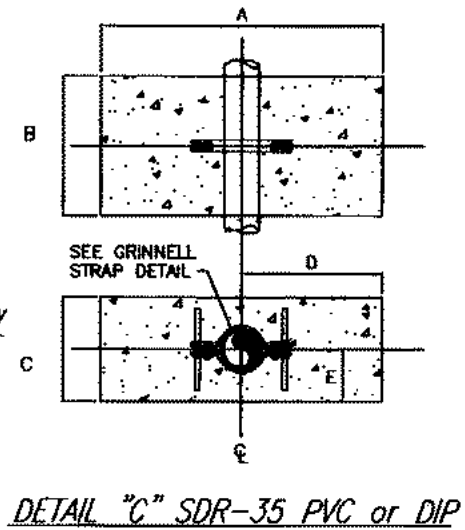
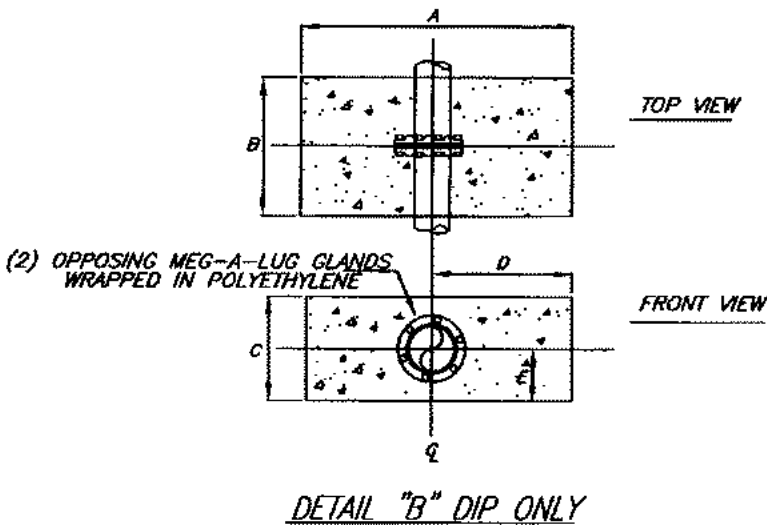
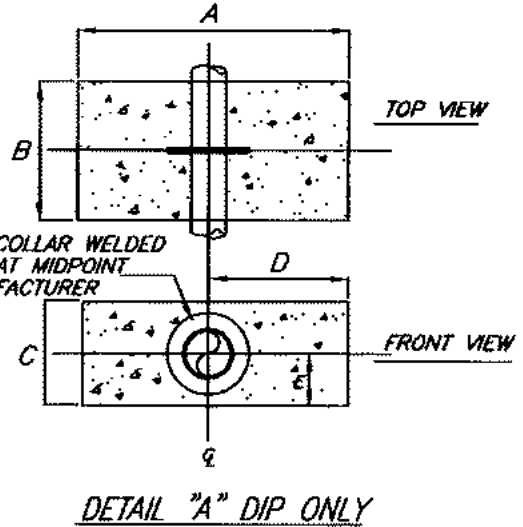
PRECAST MANHOLE (DOGHOUSE)
OVER EXISTING SEWER

N.T.S.

CONSTRUCTION DETAIL NO. 9

NOTES

- 1) DIMENSIONS OF CONCRETE COLLARS BASED ON 2000 P.S.F. SOIL BEARING.
- 2) SPECIFICATIONS OF MEGA-LUGS SHALL CONFORM TO THE PIPE MANUFACTURERS SUPPLIED SHOP DRAWINGS, WHICH SHALL INDICATE A THRUST RATING NOT LESS THAN THAT INCLUDED IN THE CHART BELOW.
THRUST COLLARS SHALL CONFORM TO THE PIPE MANUFACTURER'S SUPPLIED SHOP DRAWINGS WHICH SHALL INDICATE A THRUST RATING NOT LESS THAN THAT INCLUDED IN THE CHART BELOW.
- 3) DIMENSIONS OF WELDED STEEL OR DUCTILE IRON
- 4) CONCRETE SHALL HAVE A COMPRESSIVE STRENGTH OF 3,000 P.S.I. AT 28 DAYS. "HIGH EARLY" CONCRETE SHALL BE USED.
- 5) SOIL CONDITIONS SHALL BE VERIFIED BY THE S.W.S. INSPECTOR PRIOR TO CONSTRUCTION.
- 6) FOR 3" PIPE USE 4" DIAMETER THRUST RATING.



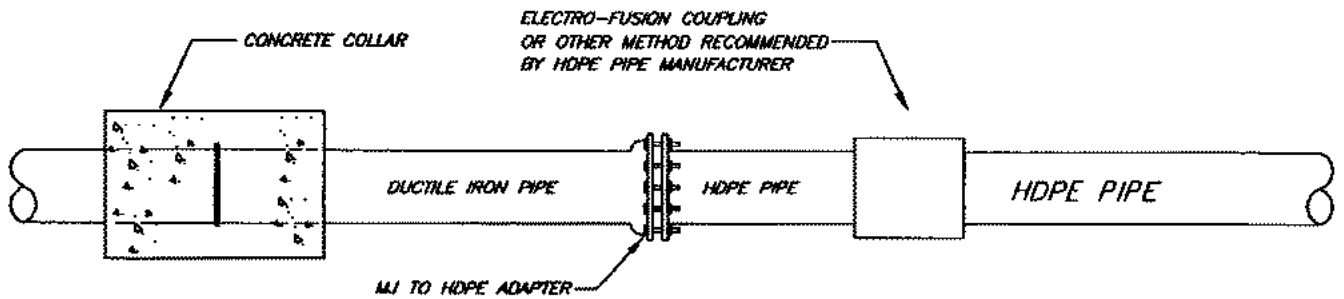
PIPE SIZE	A	B	C	D	E	CY.	WELDED THRUST COLLAR MINIMUM RATING
4"	3'-0"	2'-0"	1'-6"	1'-6"	0'-8"	0.33	4,500 lbs
6"	4'-0"	2'-0"	1'-6"	2'-0"	0'-9"	0.44	9,300 lbs
8"	4'-6"	2'-0"	2'-0"	2'-3"	1'-0"	0.67	16,000 lbs
12"	6'-0"	2'-0"	3'-0"	3'-0"	1'-6"	1.33	34,000 lbs
16"	6'-6"	2'-0"	4'-6"	3'-3"	2'-3"	2.17	59,000 lbs

TYPICAL CONCRETE COLLAR DETAIL

Detail "A" and "B" Apply to DIP in Gravity and Pressure Applications

Detail "C" Applies to SDR-35 PVC and DIP in Gravity Applications ONLY

CONSTRUCTION DETAIL NO. 10



NOTE:

*INSTALLATIONS OF THE TYPE SHOWN ABOVE
MUST BE DESIGNED BY A LICENSED ENGINEER AND MUST
INCLUDE CONSIDERATION FOR THE FOLLOWING CONDITIONS:*

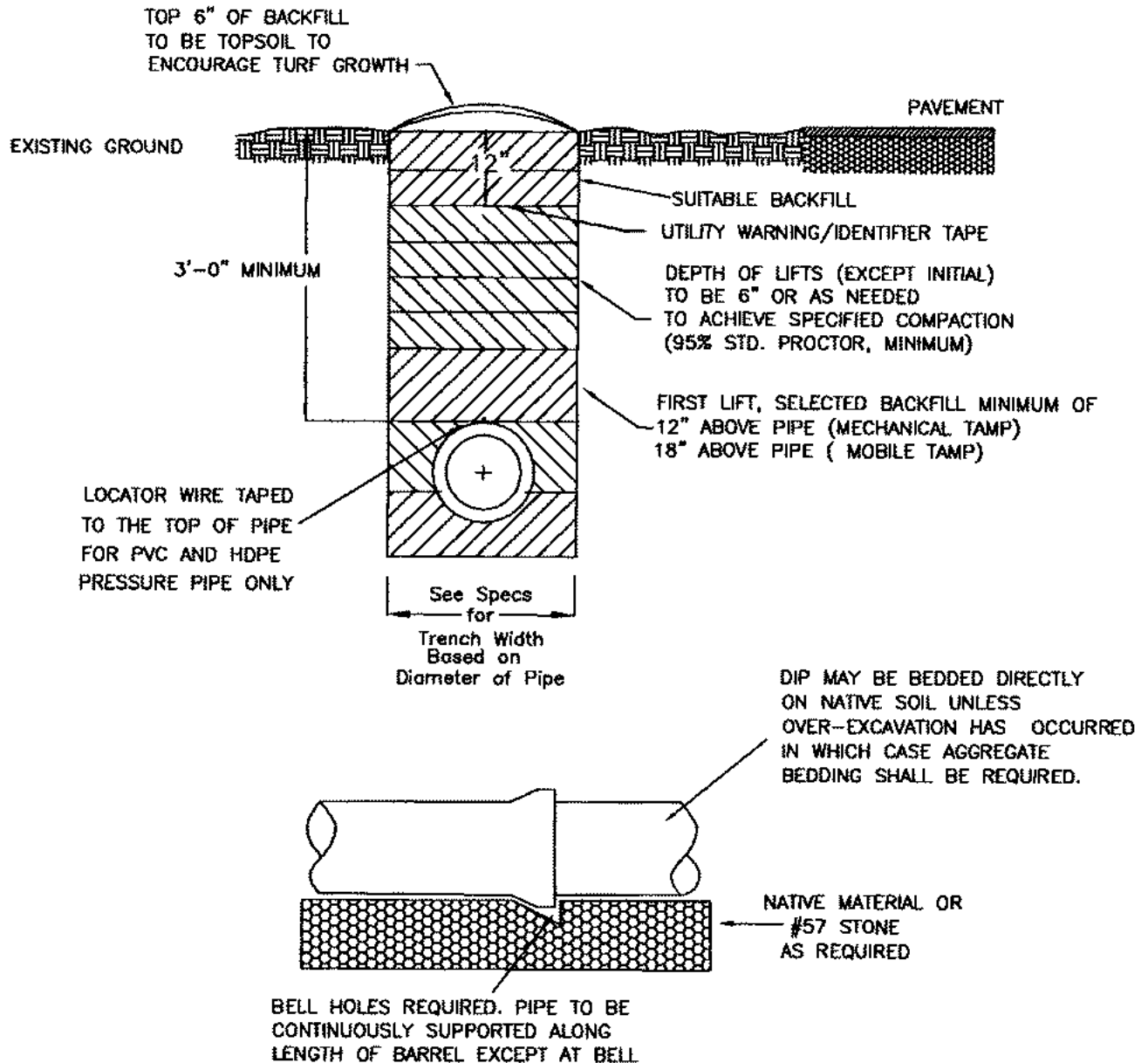
- SOIL TYPE*
- PIPE SIZE AND TYPE*
- EXCAVATION DEPTH*
- TEST PRESSURE*
- OPERATING PRESSURE*

*THE DESIGN MUST BE SUBMITTED TO THE SPARTANBURG
WATER ENGINEERING DEPT FOR APPROVAL.*

DIP TO HDPE TRANSITION

N.T.S.

CONSTRUCTION DETAIL NO. 11

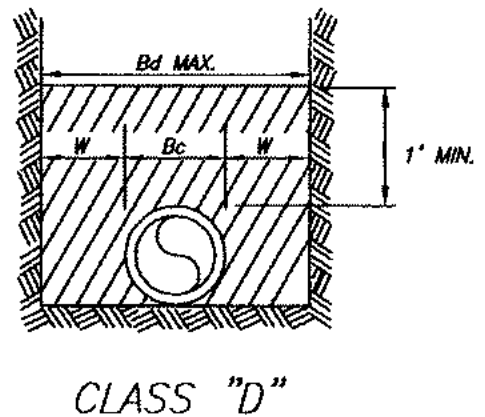
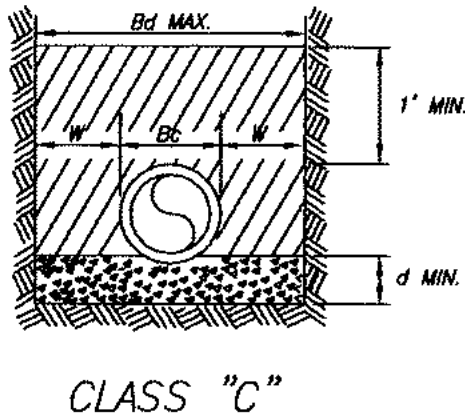
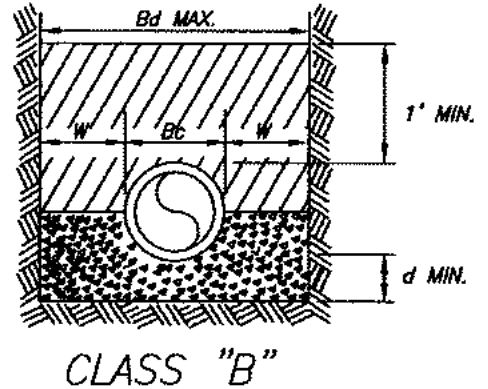


TYPICAL TRENCHING DETAIL

CONSTRUCTION DETAIL NO. 12

NOTES:

1. DITCH WIDTH NOT TO EXCEED B_d 2' OVER TOP OF THE PIPE.
2. PIPE SIZE 8" TO 30" DESIGN BASED ON (B_d MAX. DITCH WIDTH) NOT USING TRENCH BOX.
3. ALL (GRAVITY) PVC PIPE TO BE INSTALLED IN CLASS "B" BEDDING, UNLESS OTHERWISE NOTED.

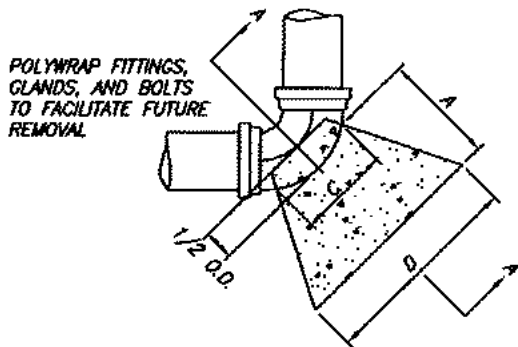


IMPROVED DITCH BEDDING DIMENSIONS FOR CLASS "B", "C" & "D"				
PIPE SIZE I.D.	B_c OUT DIA.	W MOL. WORK SPACE	B_d MAX. DITCH WIDTH	d DEPTH OF BEDDING UNDER PIPE
8"	10"	8"	2'3"	4"
10"	12"	9"	2'6"	4"
12"	14"	9"	2'9"	4"
15"	18"	10"	3'0"	4"
18"	22"	10"	3'6"	8"
21"	24"	9"	3'6"	6"
24"	27"	10"	4'0"	9"
27"	32"	10"	4'6"	9"
30"	36"	9"	4'6"	9"

IMPROVED DITCH BEDDING DETAIL

N.T.S.

CONSTRUCTION DETAIL NO. 13



SECTION A-A

MINIMUM DIMENSIONS FOR CONCRETE BLOCKING

BEND	SIZE	VOLUME				CY
		A	B	C	D	
11 1/4°	6"	1'-0"	2'-0"	4"	1'-0"	0.05
	8"	1'-0"	2'-0"	5"	1'-0"	0.05
	12"	1'-0"	2'-0"	7"	1'-0"	0.05
	16"	1'-0"	2'-0"	1'-0"	2'-0"	0.22
	20"	2'-0"	3'-0"	1'-3"	2'-0"	0.32
22 1/2°	6"	1'-0"	2'-0"	6"	1'-0"	0.05
	8"	1'-0"	2'-0"	7"	1'-0"	0.05
	12"	1'-0"	2'-0"	10"	2'-0"	0.11
	16"	2'-0"	4'-0"	1'-0"	2'-0"	0.37
	20"	2'-0"	4'-0"	1'-3"	3'-0"	0.58
45°	6"	1'-0"	2'-0"	6"	1'-0"	0.05
	8"	1'-0"	2'-0"	7"	2'-0"	0.10
	12"	2'-0"	3'-0"	11"	3'-0"	0.44
	16"	3'-0"	5'-0"	1'-0"	3'-0"	1.00
	20"	4'-0"	6'-0"	1'-3"	4'-0"	2.15
90°	6"	1'-0"	2'-0"	1'-0"	2'-0"	0.11
	8"	2'-0"	3'-0"	1'-2"	2'-6"	0.37
	12"	2'-0"	4'-0"	2'-0"	4'-0"	0.84
	16"	4'-0"	6'-0"	2'-2"	4'-9"	2.84
	20"	4'-0"	7'-0"	2'-8"	6'-4"	4.51
TEES & PLUGS	6"	1'-0"	2'-0"	10"	1'-6"	0.08
	8"	1'-9"	2'-6"	1'-1"	2'-0"	0.23
	12"	2'-6"	3'-9"	1'-7"	3'-0"	0.75
	16"	3'-0"	5'-0"	2'-2"	4'-0"	1.59
	20"	4'-0"	6'-0"	2'-8"	5'-0"	3.21

FOR 3" & 4" PIPE, USE 6" SIZES

DESIGN DATA:

- DIMENSIONS OF THRUST BLOCK IN FEET BASED ON 2000 POUNDS PER SQUARE FOOT SOIL BEARING PRESSURE AND 200 POUNDS PER SQUARE INCH TEST PRESSURE. ACTUAL INSIDE DIAMETER OF DUCTILE IRON PIPE, CLASS 51 USED AS STANDARD.
- CONCRETE SHALL HAVE A COMPRESSIVE STRENGTH OF 3000 P.S.I. AT 28 DAYS. HIGH EARLY CONCRETE SHALL BE USED.

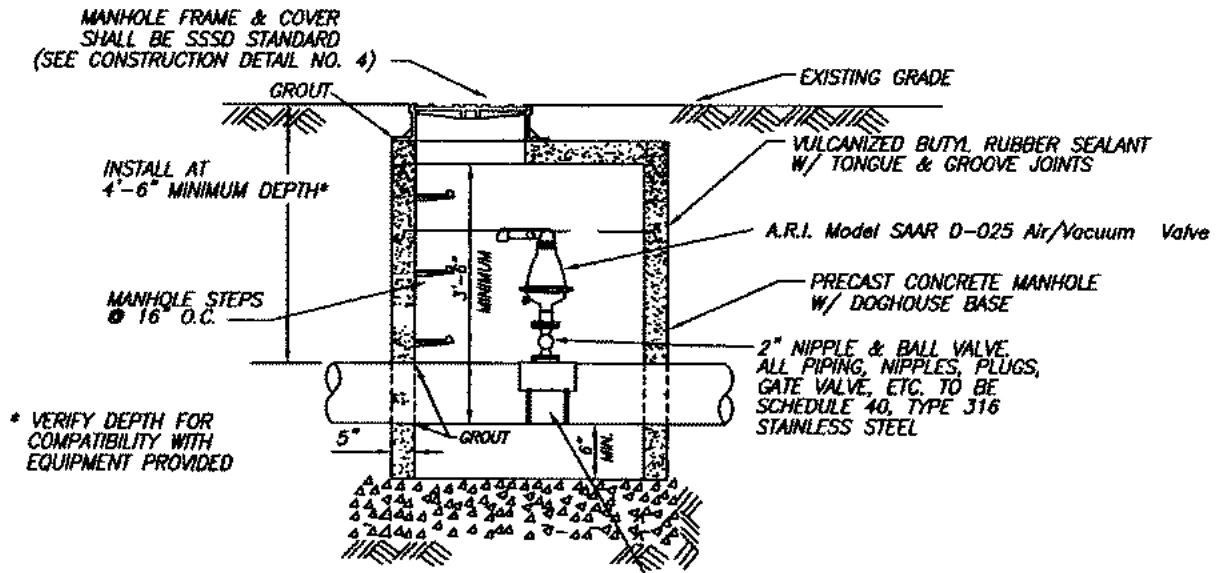
NOTE:

SOIL CONDITIONS SHALL BE VERIFIED BY THE S.S.S.D. INSPECTOR BEFORE DESIGN IS IMPLEMENTED.

CONCRETE THRUST BLOCK DETAIL

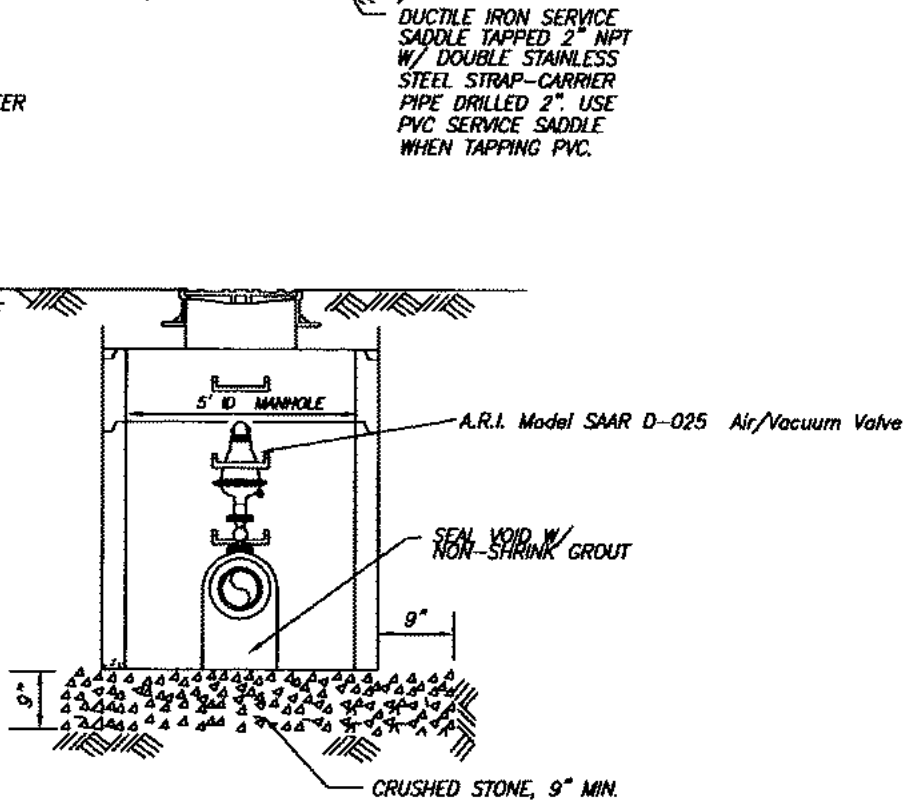
N.T.S.

CONSTRUCTION DETAIL NO. 14



IN SOME CASES, THE DESIGN ENGINEER MAY SUBMIT AN ALTERNATE DESIGN WHICH INCORPORATES A REMOTE MOUNTED AIR/VACUUM VALVE WHICH IS CONNECTED TO THE FORCE MAIN BY AN APPROPRIATELY-SIZED PIPING ARRANGEMENT, COMPLETE WITH ISOLATION VALVES AND VAULT.

ANY ALTERNATE DESIGN SHALL COMPLY WITH ALL REQUIREMENTS OF SCDHEC R.61-67 AND SHALL BE SUBMITTED TO THE ENGINEERING DEPARTMENT FOR APPROVAL.



SEWER FORCE MAIN AIR/VACUUM VALVE AND MANHOLE

N.T.S.

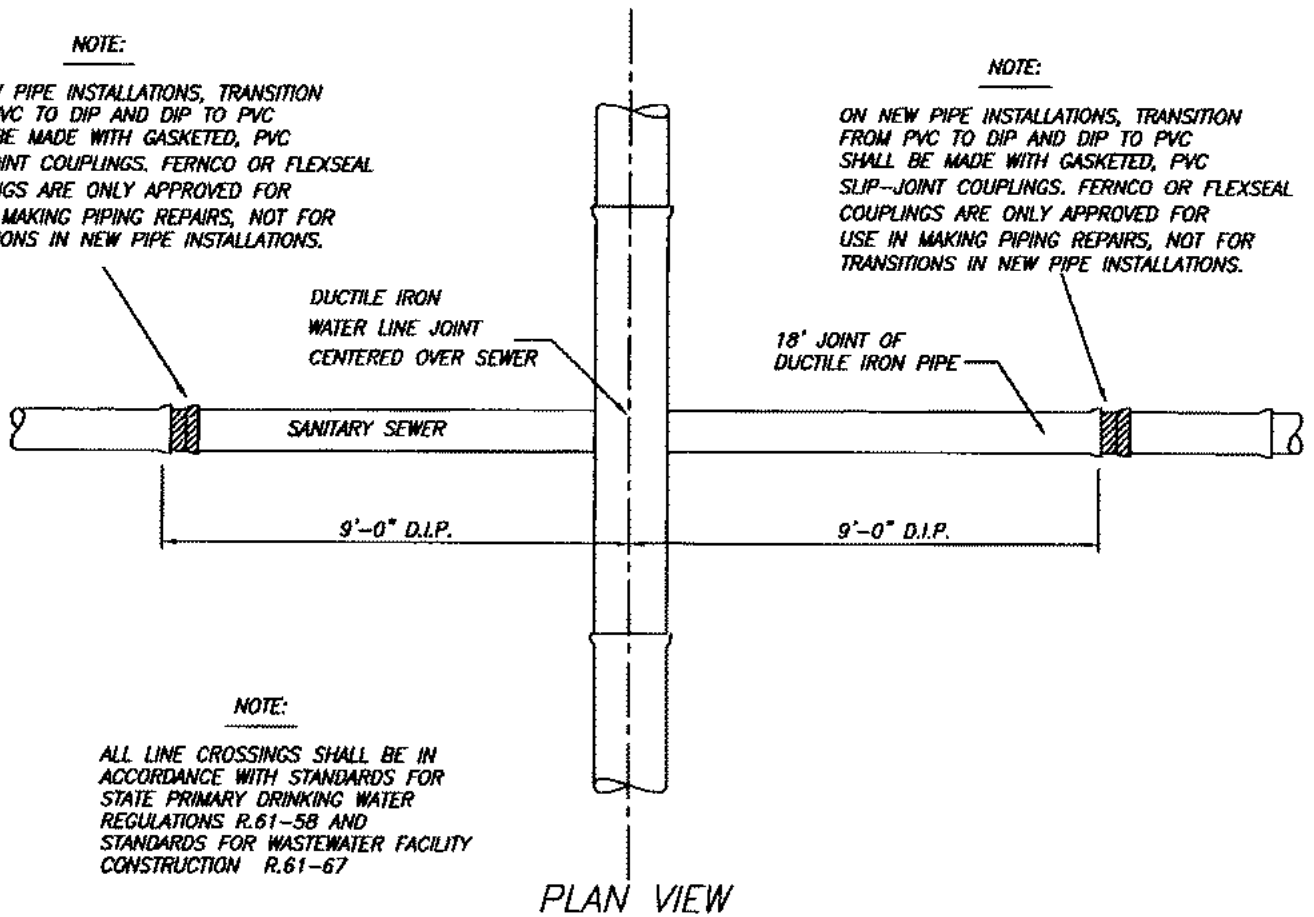
CONSTRUCTION DETAIL NO. 15

NOTE:

ON NEW PIPE INSTALLATIONS, TRANSITION FROM PVC TO DIP AND DIP TO PVC SHALL BE MADE WITH GASKETED, PVC SLIP-JOINT COUPLINGS. FERNCO OR FLEXSEAL COUPLINGS ARE ONLY APPROVED FOR USE IN MAKING PIPING REPAIRS, NOT FOR TRANSITIONS IN NEW PIPE INSTALLATIONS.

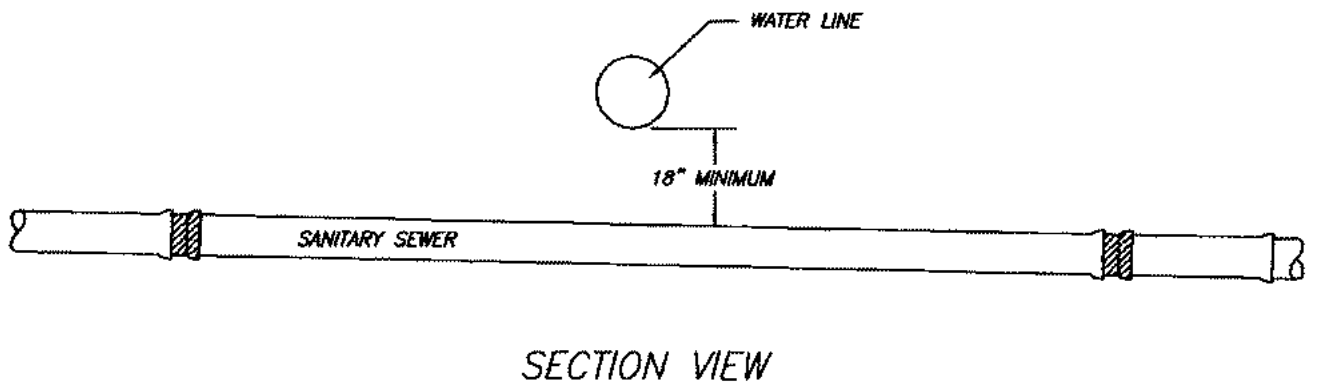
NOTE:

ON NEW PIPE INSTALLATIONS, TRANSITION FROM PVC TO DIP AND DIP TO PVC SHALL BE MADE WITH GASKETED, PVC SLIP-JOINT COUPLINGS. FERNCO OR FLEXSEAL COUPLINGS ARE ONLY APPROVED FOR USE IN MAKING PIPING REPAIRS, NOT FOR TRANSITIONS IN NEW PIPE INSTALLATIONS.



NOTE:

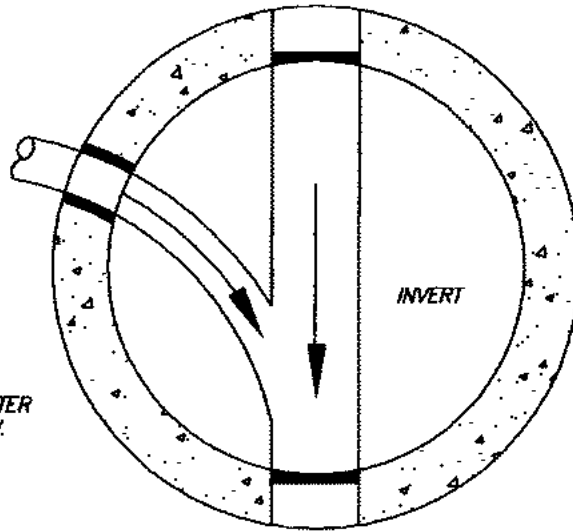
ALL LINE CROSSINGS SHALL BE IN ACCORDANCE WITH STANDARDS FOR STATE PRIMARY DRINKING WATER REGULATIONS R.61-58 AND STANDARDS FOR WASTEWATER FACILITY CONSTRUCTION R.61-67



SANITARY SEWER AND WATER LINE/ STORM DRAIN CROSSING DETAIL

N.T.S.

CONSTRUCTION DETAIL NO. 16

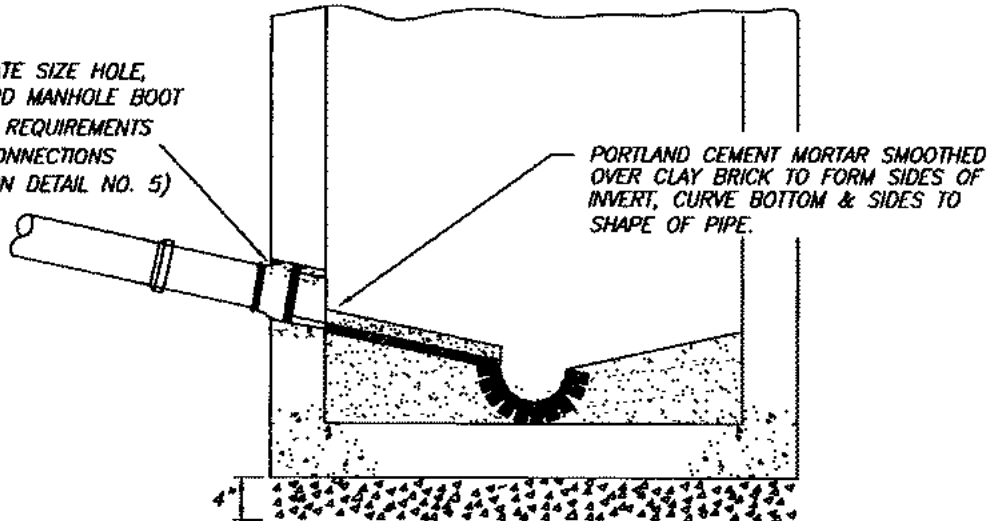


NOTE:

SERVICE LINE MUST ENTER
MANHOLE AT ANGLE NO GREATER
THAN 90° DIRECTION OF FLOW.

PLAN

CORE APPROPRIATE SIZE HOLE,
INSTALL STANDARD MANHOLE BOOT
AND FINISH PER REQUIREMENTS
FOR MAINLINE CONNECTIONS
(SEE CONSTRUCTION DETAIL NO. 5)



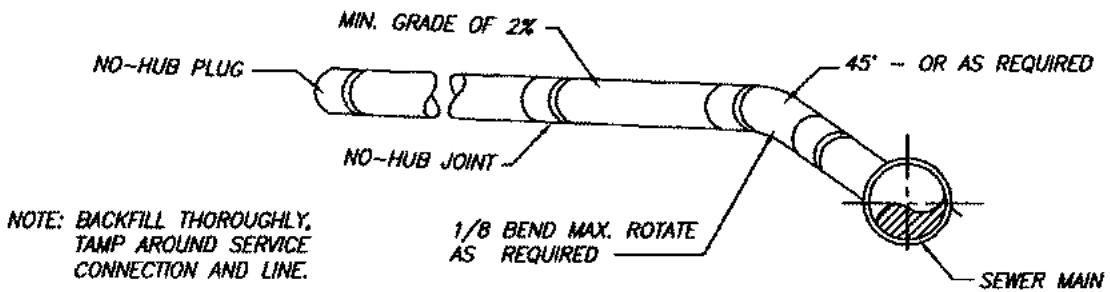
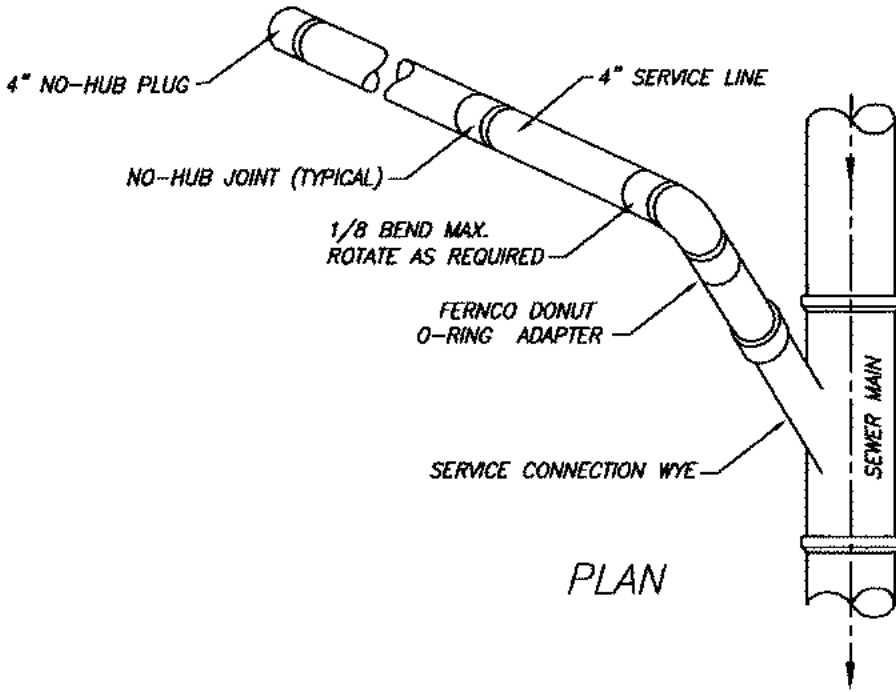
IF SLOPE OF TABLE IS LESS THAN 2 1/2" PER FT.,
THEN THE INVERT OF THE SERVICE LINE SHALL
ENTER MANHOLE 6" ABOVE TABLE AND A SERVICE
INVERT SHALL BE FORMED ON THE TABLE. OTHERWISE,
THE SERVICE SHALL ENTER AT TOP OF TABLE.

SECTION

SERVICE LINE TAP TO MANHOLE
(FOR SERVICE LINES 6" OR SMALLER)

N.T.S.

CONSTRUCTION DETAIL NO. 17

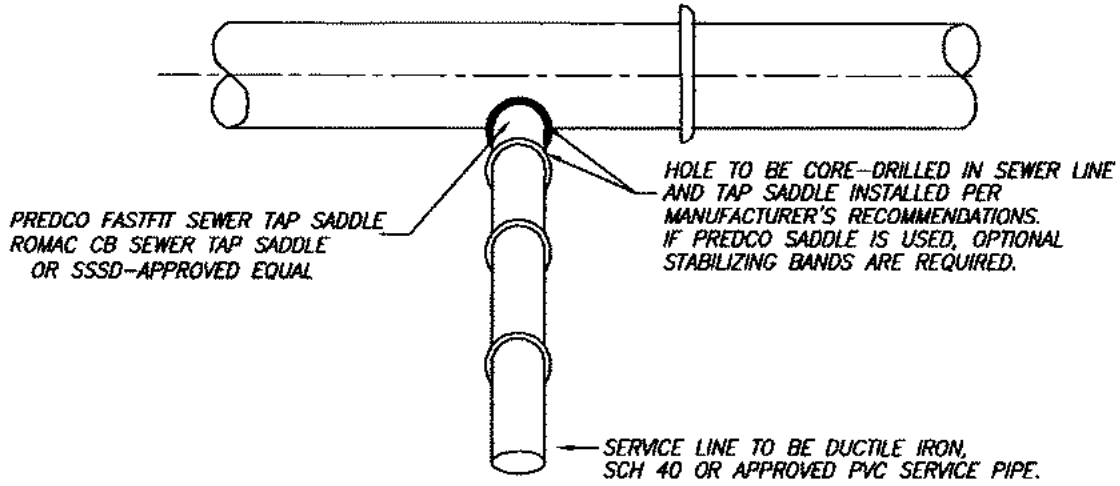


SECTION

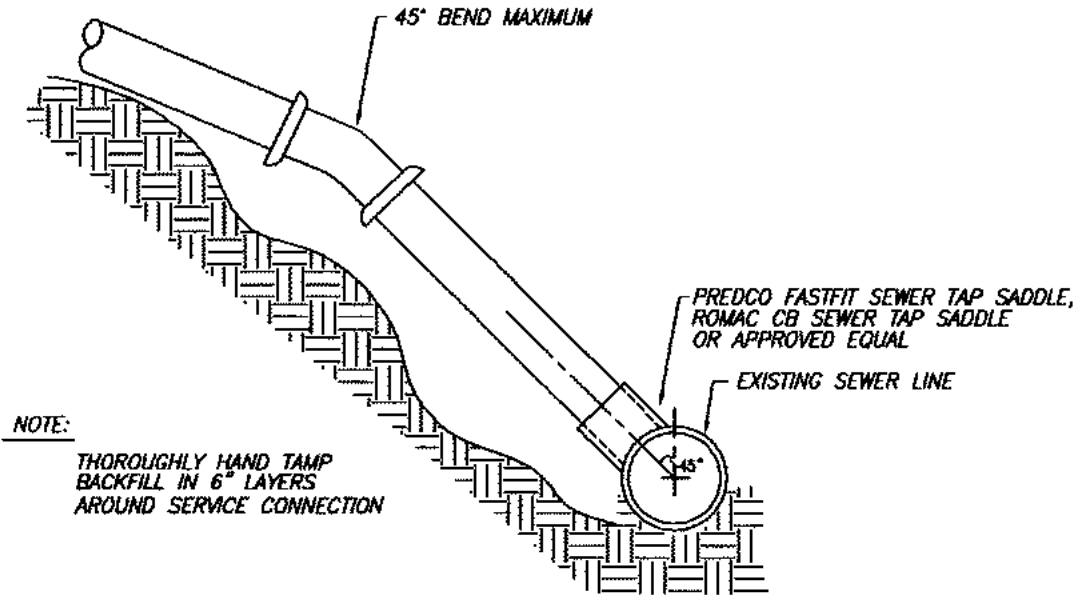
TYPICAL SEWER SERVICE CONNECTION

N.T.S.

CONSTRUCTION DETAIL NO. 19



PLAN

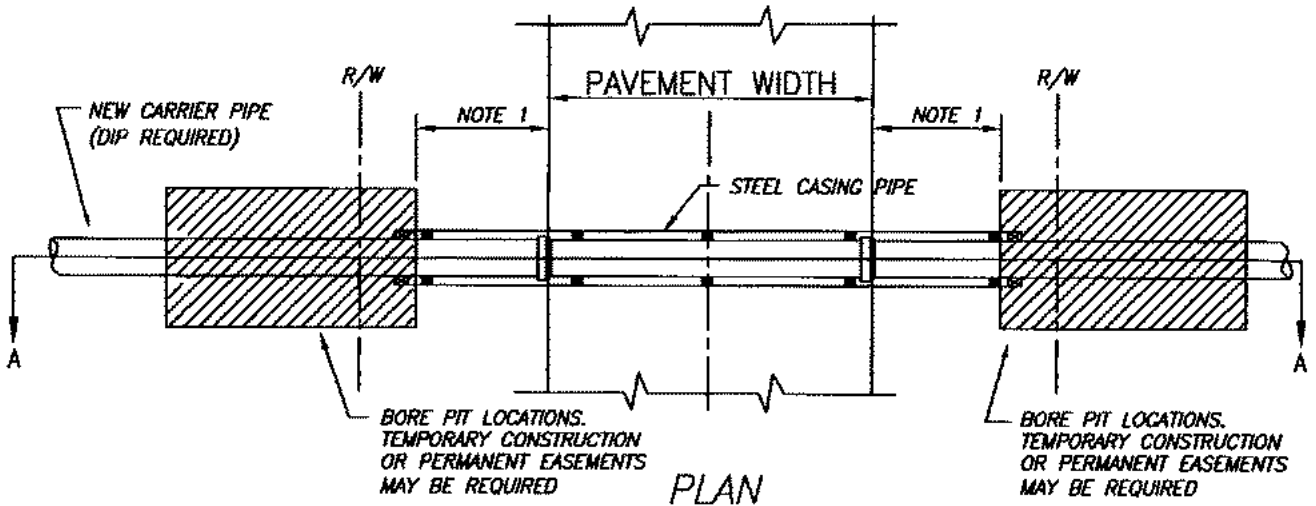


SECTION

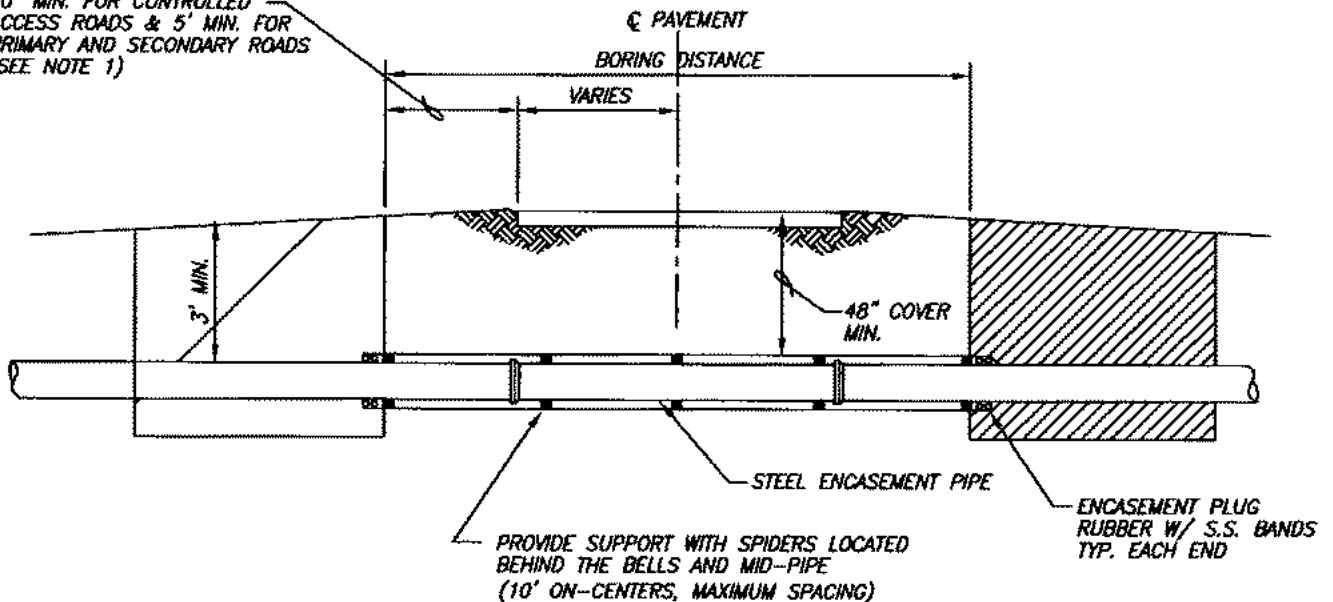
SERVICE LINE TAP
TO EXISTING SEWER LINE

N.T.S.

CONSTRUCTION DETAIL NO. 20



30" MIN. FOR CONTROLLED ACCESS ROADS & 5' MIN. FOR PRIMARY AND SECONDARY ROADS (SEE NOTE 1)



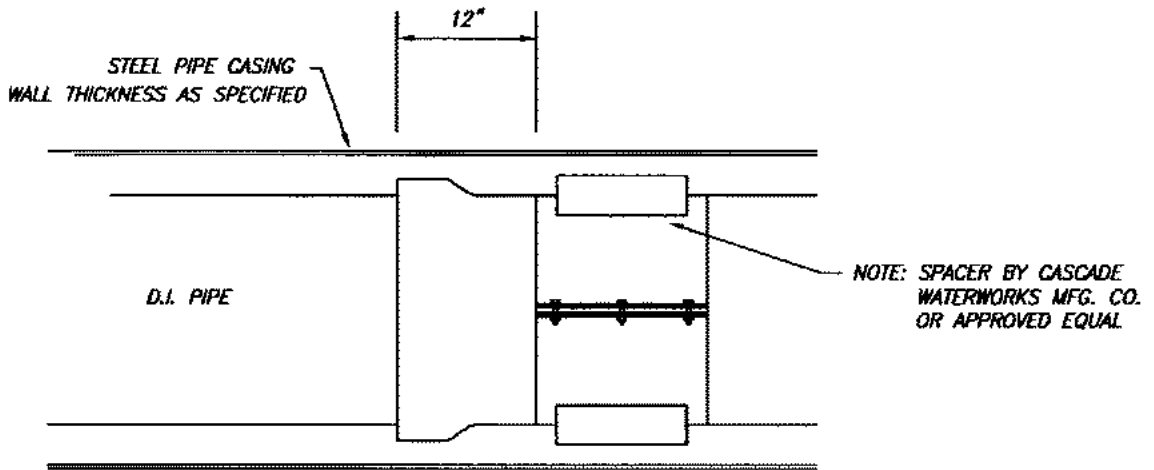
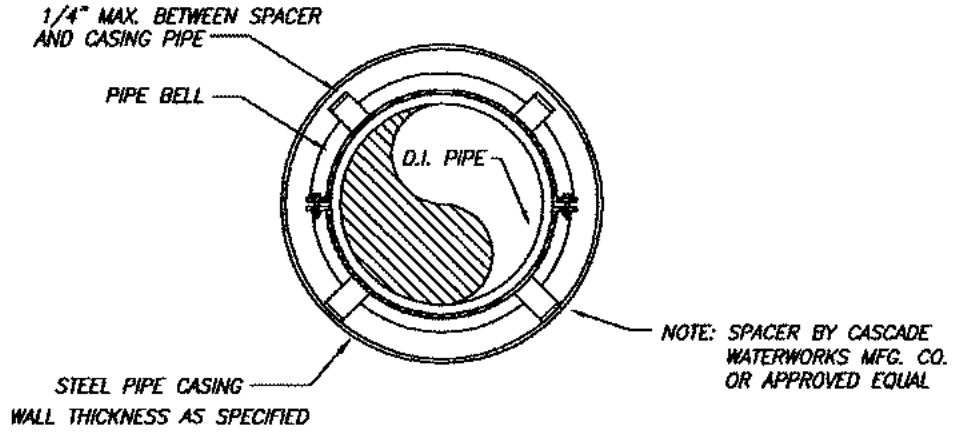
NOTES:

1. THE NEAR EDGE OF THE PIT CAN BE NO CLOSER TO THE EDGE OF THE TRAVELWAY THAN ITS DEPTH BELOW THE SURFACE OF THE TRAVELWAY UNLESS BULKHEADED.
2. ALL PIPE WITHIN AND TO 5' OUTSIDE THE CASING TO BE D.I.P.
3. ALL PIPING IN CASING SHALL UTILIZE LOCKING GASKETS SUPPLIED BY THE PIPE MANUFACTURER.

CASING PIPE BORE AND JACK DETAIL

NTS

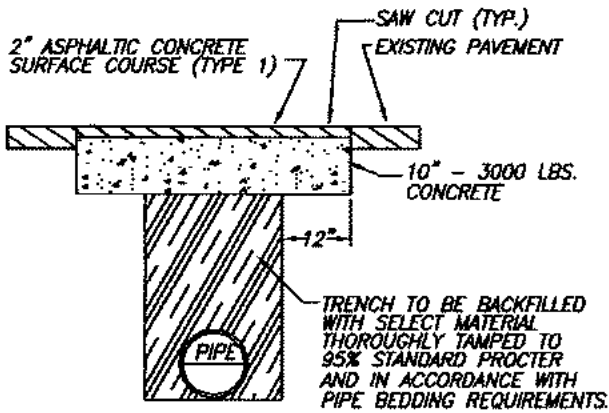
CONSTRUCTION DETAIL NO. 21



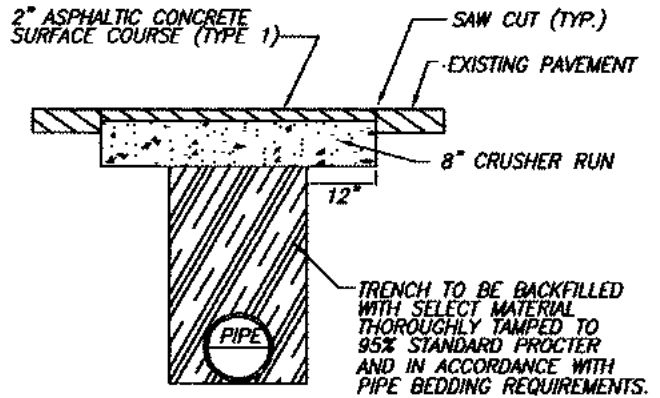
CARRIER PIPE INSTALLATION IN CASING

N.T.S.

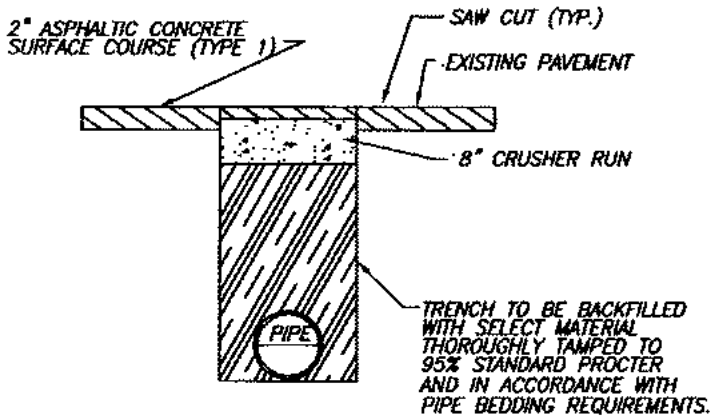
CONSTRUCTION DETAIL NO. 23



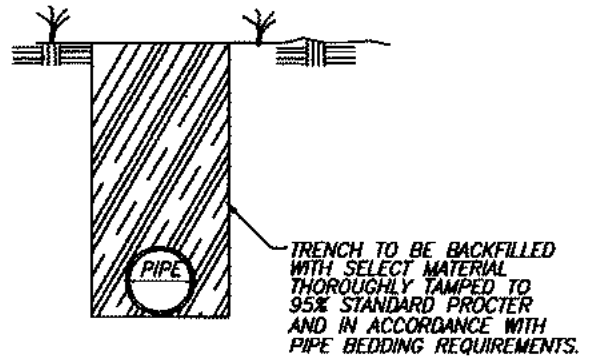
HIGH VOLUME



LOW VOLUME



DRIVEWAYS

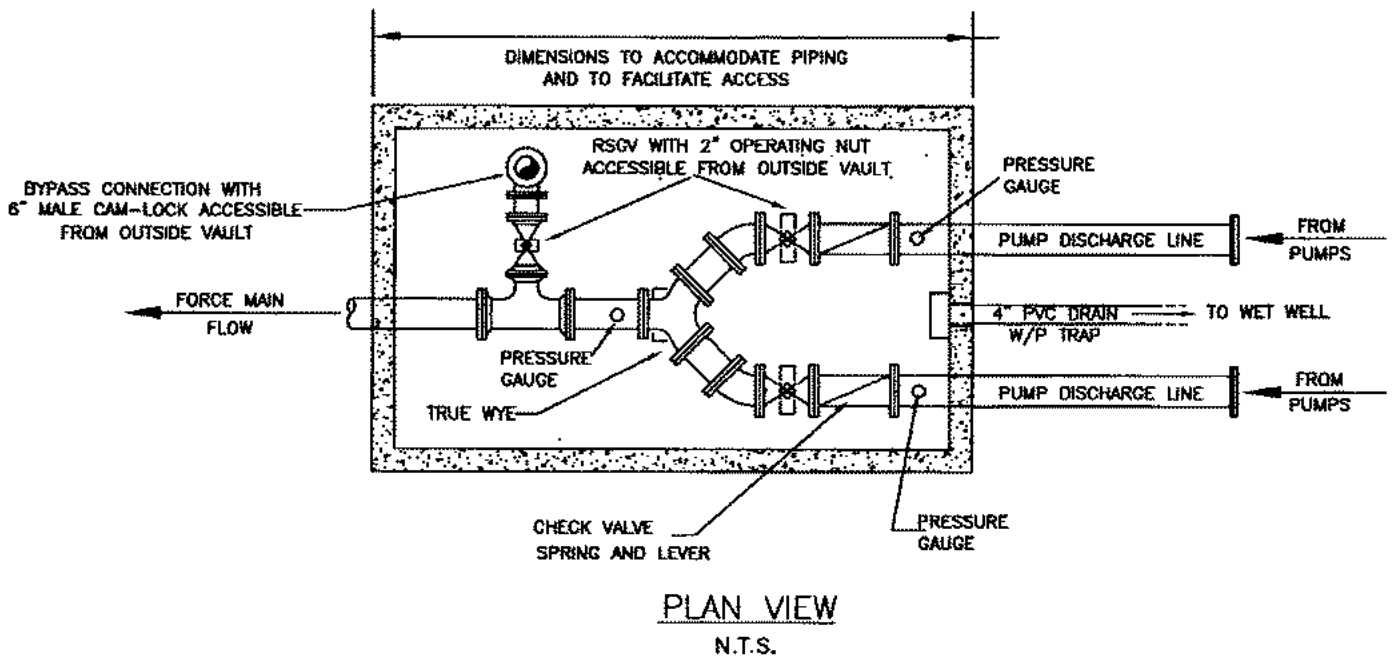
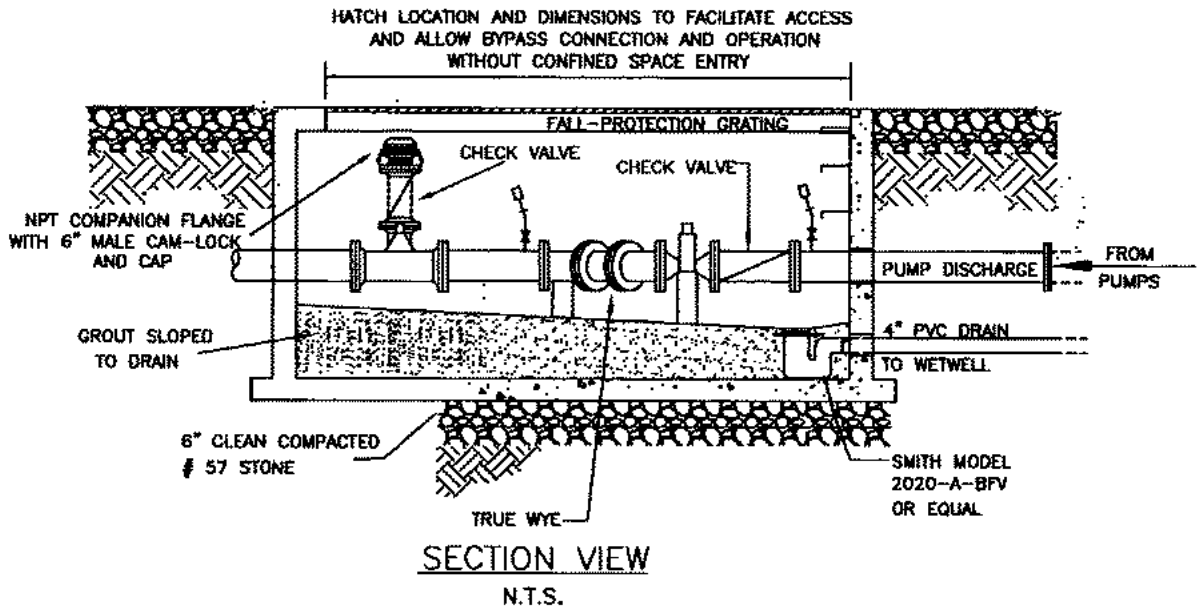


TYPICAL TRENCH

TYPICAL PAVEMENT REPAIR DETAILS

N.T.S.

CONSTRUCTION DETAIL NO. 24



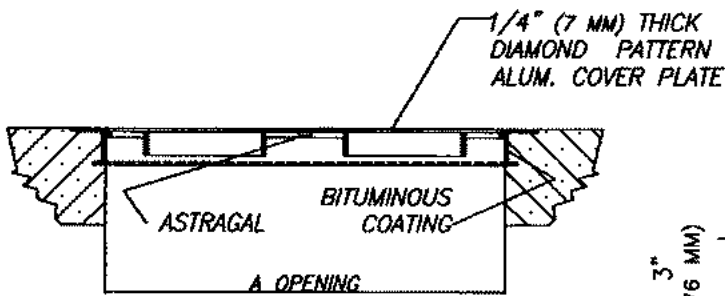
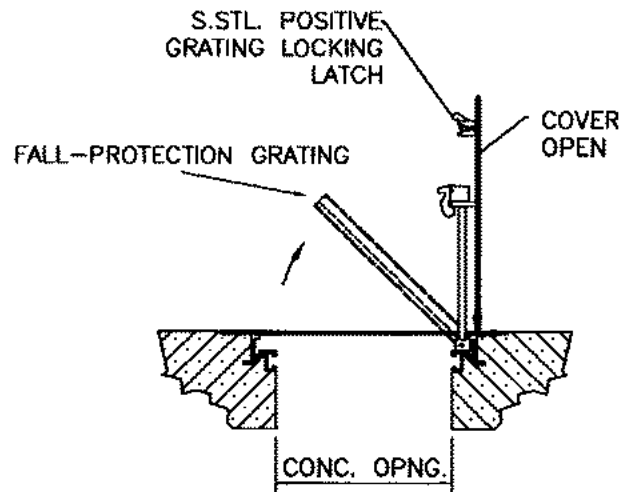
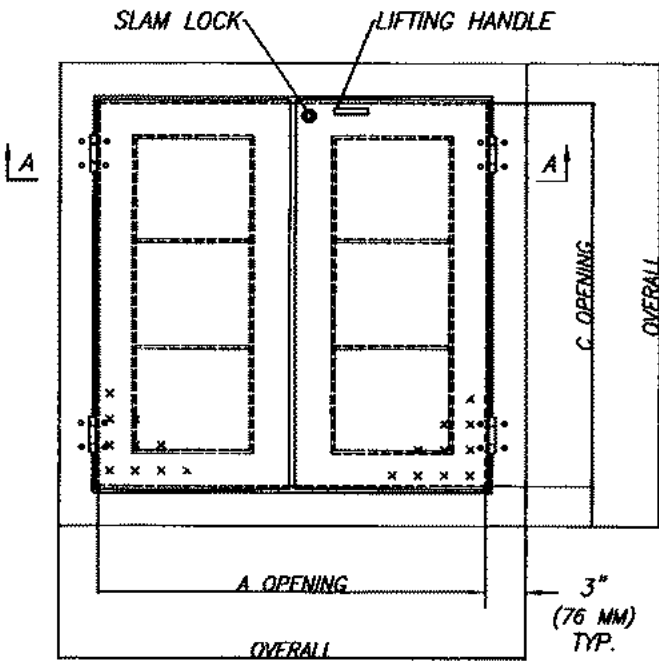
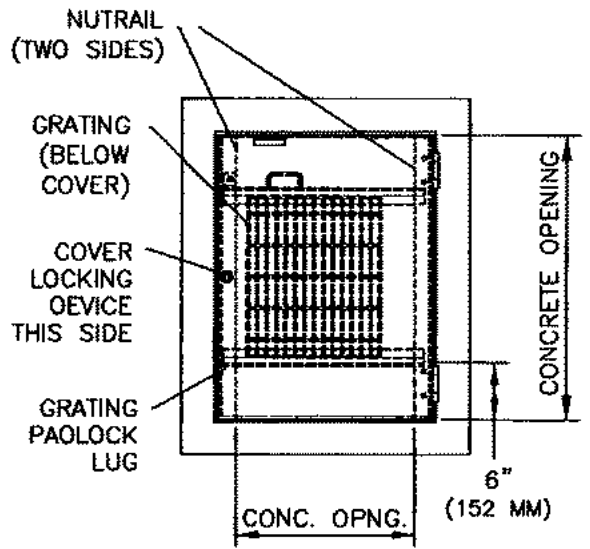
SUBMERSIBLE PUMP STATION VALVE VAULT WITH BYPASS CONNECTION (FOR SUCTION-LIFT STATIONS, SEE NOTE BELOW)

NOTE: DEPENDING ON THE PUMP STATION MANUFACTURER, SUCTION LIFT PUMP STATIONS MAY HAVE SOME OR ALL OF THE VALVES AND PIPING LOCATED ABOVE GROUND, AS PART OF THE PUMP PACKAGE WITHIN THE ENCLOSURE. HOWEVER, THE BYPASS CONNECTION AND ASSOCIATED VALVE(S) SHALL BE LOCATED WITHIN A SEPARATE VAULT, THE LAYOUT OF WHICH SHALL BE SIMILAR TO THAT SHOWN ABOVE. THE ENGINEER SHALL SUBMIT THE VALVE VAULT AND/OR BYPASS CONNECTION ARRANGEMENT TO THE ENGINEERING DEPARTMENT FOR APPROVAL.

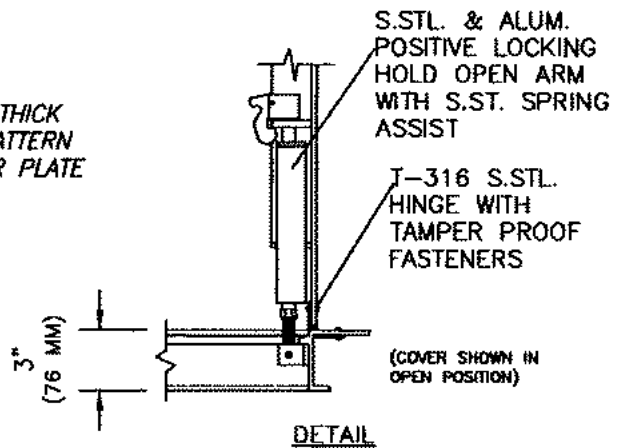
CONSTRUCTION DETAIL NO. 25

STANDARD FEATURES:

- AUTO-LOCK T-316 STAINLESS STEEL HOLD OPEN ARM WITH RELEASE HANDLE
- T-316 STAINLESS STEEL HINGES AND ATTACHING HARDWARE
- T-316 STAINLESS STEEL SLAM LOCK WITH REMOVABLE KEY
- STAINLESS STEEL COMPRESSION SPRING ASSIST
- BUILT-IN NEOPRENE CUSHION/GASKET
- NON-OZONE DEPLETING BITUMINOUS COATING
- DOUBLE LEAF CONSTRUCTION
- 300 LBS. PER SQ. FT. LOAD RATING (1464 KG. PER SQ. METER LOAD RATING)
- EXTRUDED ALUMINUM FRAME
- RECESSED LIFTING HANDLE
- ALUMINUM FALL-PROTECTION GRATING
- LIFETIME GUARANTEE
- AS MANUFACTURED BY HALLIDAY, BILCO, US FOUNDRY, OR APPROVED EQUAL.



SECTION A-A



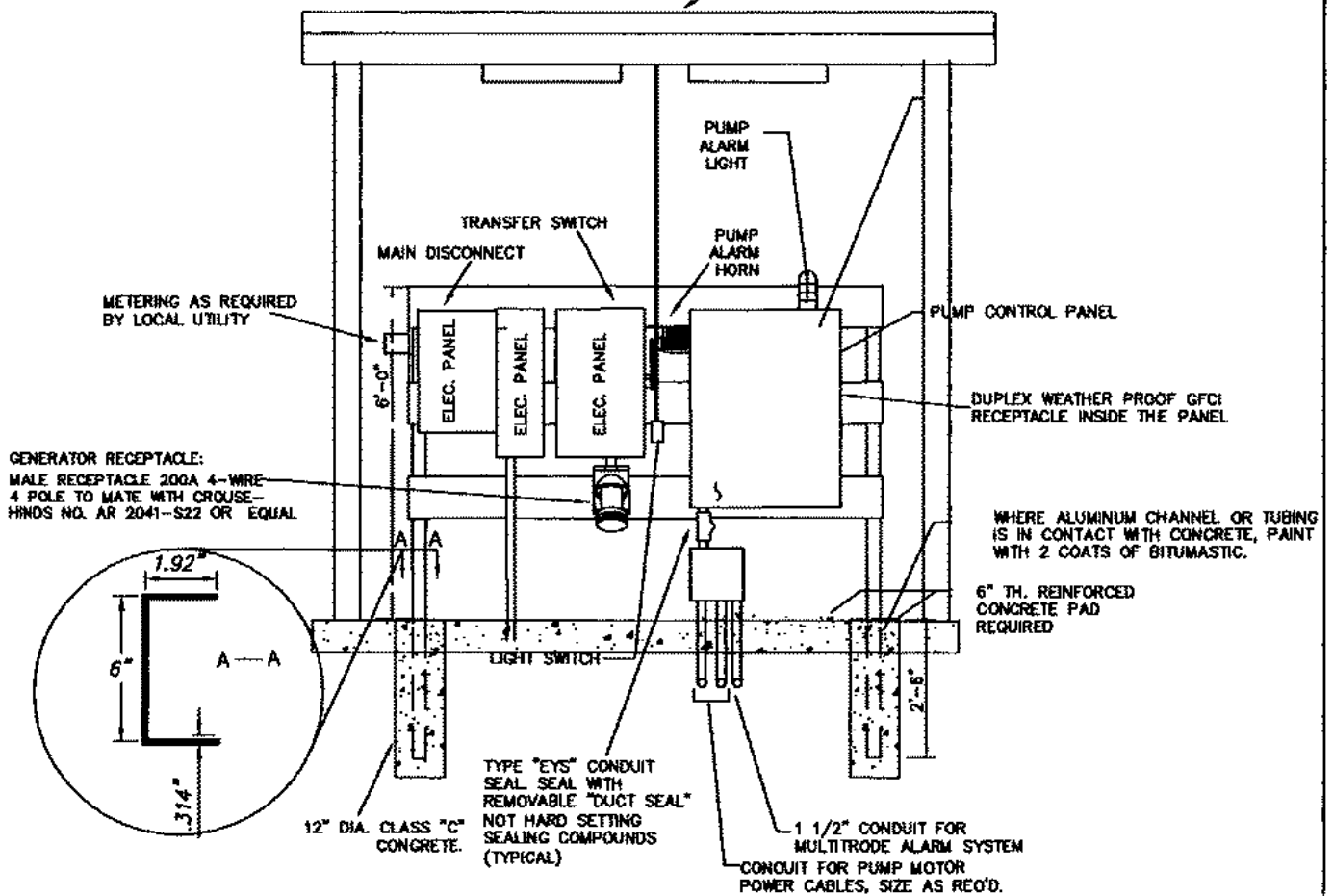
HATCH WITH FALL-PROTECTION GRATING

CONSTRUCTION DETAIL NO. 27

CONTROL CANOPY COVER SHALL BE BY GREER AWNING AND SIDING, 864-877-7722 OR APPROVED EQUAL. THE CANOPY SHALL HAVE A PITCHED ROOF WITH 8' x 14' OUTSIDE DIMENSIONS AND 8' CLEAR HEIGHT AND BE CONSTRUCTED OF THE FOLLOWING MATERIALS:

- 1) 4" x 4" SUPPORT POSTS (14 GAUGE STEEL TUBING WITH WELDED STEEL PLATES ANCHORED TO CONCRETE PADS WITH 3/4" x 5" STUD ANCHORS);
- 2) SUPPORT BEAMS (14 GAUGE STEEL TUBING WITH WELDED UPRIGHTS); 2" x 2"
- 3) 1-1/8" WIDE x 3-1/2" HIGH BOS RAFTERS (0.040 GAUGE ALUMINUM SHEET SPACED A MAXIMUM OF 2' ON CENTER);
- 4) AND 20 GAUGE STEP DOWN ALUMINUM SHEET ROOFING WITH 2" CORRUGATIONS & FASTENED TO RAFTERS WITH STAINLESS STEEL SCREWS. ALL STEEL MATERIALS SHALL BE PRIMED AND PAINTED WITH INDUSTRIAL GRADE ENAMEL PAINT.
- 5) ALL ALUMINUM MATERIALS SHALL HAVE INDUSTRIAL GRADE BAKED ENAMEL PAINT. CONTRACTOR SHALL SUBMIT COLOR CHARTS FOR OWNER SELECTION. CANOPY STRUCTURE SHALL BE DESIGNED FOR A MINIMUM 70 MPH WIND LOAD AND 25 LBS/SF INCLUDE (2) 4' FLUORESCENT LIGHTS UNDER THE SHED CANOPY OPERATED BY A WEATHER-PROOF TOGGLE SWITCH.

AWNING WITH FLORESCENT LIGHTS

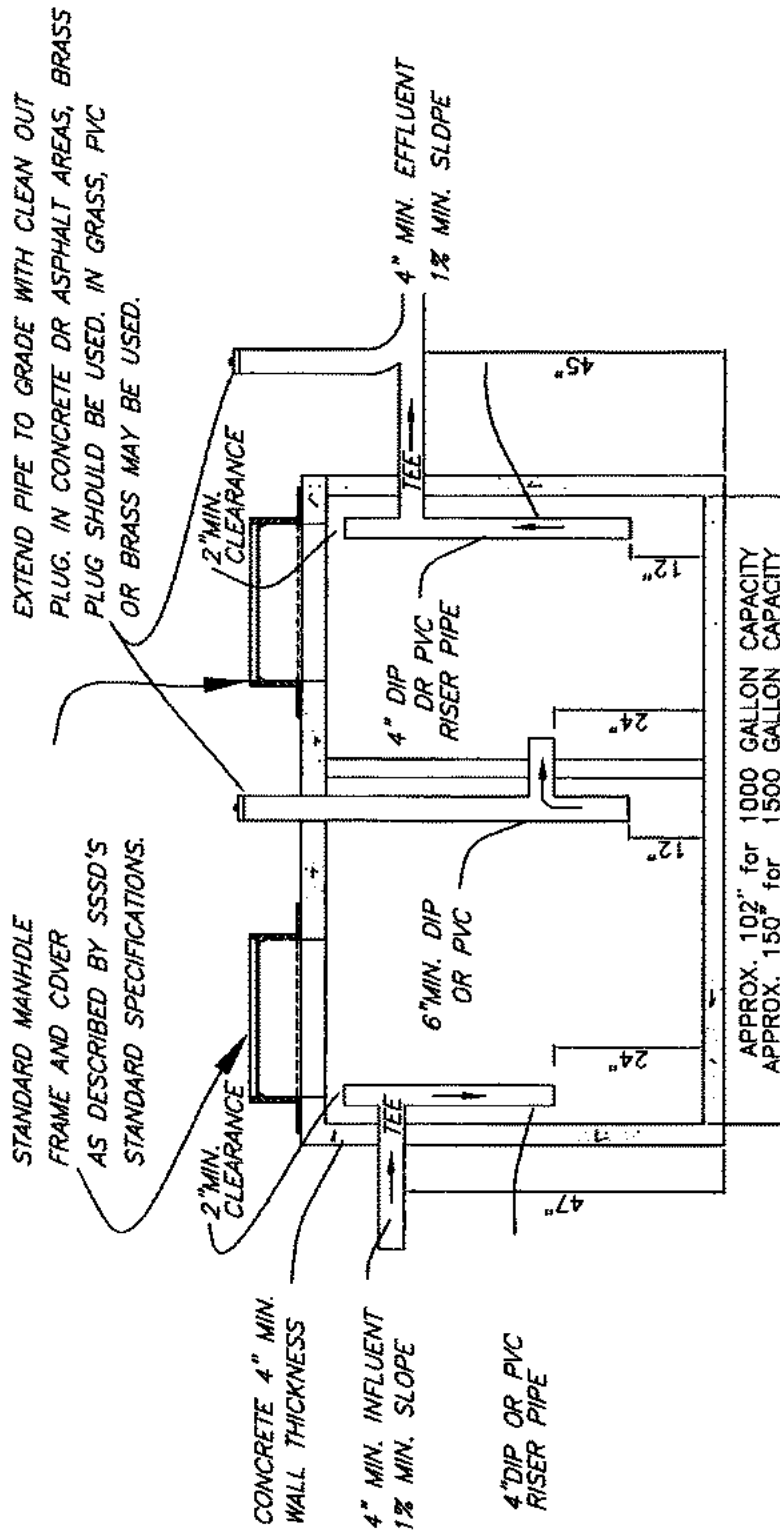


CONTROL PANEL RACK TO BE FABRICATED FROM 6" STANDARD ALUMINUM CHANNEL (SEE CROSS-SECTION DIMENSION) WITH CROSSMEMBERS NOTCHED AND BOLTED TO UPRIGHTS WITH 316 STAINLESS STEEL FASTENERS. NUMBER AND SPACING OF CROSSMEMBERS SHALL BE AS NEEDED TO PROVIDE MOUNTING FOR ALL NECESSARY PANELS, DISCONNECTS AND OTHER HARDWARE. ENGINEER SHALL CONFIRM THAT RACK DESIGN, MOUNTING, AND CONCRETE FOUNDATION IS ADEQUATE FOR EXPECTED WIND LOADING AND WEIGHT OF COMPONENTS. AT ENGINEER'S DISCRETION, RACK MAY BE SUPPORTED ON SLAB WITH PROPERLY GUSSETED PADS WELDED TO THE BOTTOM OF THE UPRIGHTS AND ANCHORED TO SLAB WITH HILTI ADHESIVE ANCHORS.

DUPLEX PUMP STATION ELECTRICAL PANEL, RACK, AND AWNING DETAIL

N.T.S.

CONSTRUCTION DETAIL NO. 28



SECTION

1. THE INVERT OF THE INLET PIPE SHALL NOT BE LESS THAN 2" ABOVE THE INVERT OF THE OUTLET PIPE.
2. BAFFLE WALL SHALL BE LOCATED 2/3 THE DISTANCE FROM THE INLET SIDE AND 1/3 THE DISTANCE FROM THE OUTLET SIDE
3. THE DEPTH LENGTH DIMENSIONS SHOWN ARE FOR STANDARD 1000 GAL. OR 1500 GAL. PRE CAST TANK . THE EXACT SIZE AND TYPE OF EACH INTERCEPTOR SHALL BE APPROVED BY THE SSSD.
4. ALL PIPING SHALL BE DUCTILE IRON, OR SDR35 OR SCHEDULE 40 PVC.
5. USE BUTYL RUBBER TO SEAL BETWEEN SECTIONS AND TOP AND USE NON-SHRINK GROUT AT ALL PENETRATIONS.
6. LOCATE RISER UNDER MANHOLE COVER TO ENABLE VISUAL INSPECTION OF RISER PIPE.
7. CLEANING SHALL BE PERFORMED AS NECESSARY TO ASSURE PROPER FUNCTIONING OF THE GREASE TRAP. WASTE MATERIAL REMOVED FROM GREASE TRAP SHALL BE DISPOSED OF PROPERLY; I.E.: NOT INTO SANITARY SEWER.
8. TWO-CHAMBER GREASE TRAP IS SHOWN; SINGLE CHAMBER UNIT IS SIMILAR AND MAY ALSO BE AN APPROVED OPTION.

TWO-CHAMBER GREASE TRAP (INTERCEPTOR)



Developers Manual

July 2005

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 - C. Sewer Line Extension Policy
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 - A. Project Submittal
- IV. WATER PROJECT DESIGN AND PERMITTING
 - A. Available Design Options
 - B. SWS Design Process
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- V. SWS-SSSD ADMINISTRATIVE REQUIREMENTS
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 - C. Right of Way and Easement Agreements
- VI. SWS-SSSD CONSTRUCTION AND INSPECTION, ACCEPTANCE AND RELEASE OF TAPS
 - A. Pre-construction Conference
 - B. General Construction Requirements
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 - D. Inspection and Acceptance
 - E. Release of Project for Sale of Taps
- VII. SERVICE CONNECTIONS
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B. Water or Sewer DRP Projects

IX. APPENDICES

Appendix A – Standard SSSD Ownership Agreement

Appendix B – Standard SWS Water Main Extension Agreement

Appendix C – Standard SWS and SSSD Right-of-Way Agreements

Appendix D – Sewer Service Connection Legend



Our Mission is to Provide Quality Water and Wastewater Services to Our Customers.

- We believe the safety of our employees, environment and customers is imperative to our mission.
- We will manage costs efficiently to keep rates competitive.
- We will promote diversity within the company and with outside vendors.
- We will respond to our customers needs in a timely and courteous manner.

I. INTRODUCTION

Established in 1929 as the Spartanburg Metropolitan District, the Spartanburg Sanitary Sewer District (SSSD) now serves, at the time of this publication, a customer base of over 34,000 accounts in a 211 square mile service area centralized in Spartanburg County.

The Spartanburg Water System (SWS) originally chartered in 1887 as the Spartanburg Water Works Co., now serves, at the time of this publication, over 180,000 customers in Spartanburg, Union and Cherokee Counties.

The purpose of this manual is to provide, in concise form, a guidance document for individuals or businesses considering residential and commercial development within the SWS-SSSD jurisdictional areas. For current maps of the SWS and SSSD service area, please visit our web site, www.sws-sssd.org, and click on "About The Company".

All water and sewer design must be completed by an engineer licensed to practice engineering in the state of South Carolina. All water and sewer construction must be completed by utility contractors licensed in South Carolina and approved by the SWS/SSSD.

Upon completion and final acceptance by the SWS/SSSD of all facilities constructed under the following policies and guidelines, said facilities shall become the property of the SWS or the SSSD and the SWS/SSSD shall be responsible for their operation and maintenance. However, for a period of one year from the date of final acceptance of the facility, the contractor shall be responsible for any repairs needed that result from improper or inadequate construction practices.

For questions or submittals please use the addresses and phone numbers below:

SWS-SSSD / Engineering physical address:

175 N. Liberty Street
Spartanburg, SC 29302,

SWS-SSSD / Engineering mailing address:

P. O. Box 251
Spartanburg, SC 29304,

Phone Number: (864) 585-9142

Fax Number: (864) 596-4930

II. SWS/SSSD EXTENSION POLICIES

A. Purpose

The purpose of the following policies is to establish the methods to be used in the extensions of the water and sewer systems.

B. Water Main Extensions

The developer is responsible for 100% of the cost to install the water distribution system within the development.

However, if the property to be developed fronts a road where there is not a water main or where the existing water main is inadequately sized (typically smaller than 6-inch), the SWS will share in the cost to extend the water main along the existing road. The developer will bear the full cost to extend the water main to the development with SWS reimbursing the developer upon project completion and acceptance.

Below are the policies describing the SWS's cost sharing for the extension of water mains inside and outside the City of Spartanburg.

1. Water Line Extension Policy

The SWS shall prepare an estimate of the construction cost of the proposed water main to be extended along the existing road to the entrance of the Subdivision.

- a. If a water main needs to be oversized for anticipated future system needs (not within the development), all of the costs associated with the oversized portion shall be incurred by the SWS based upon the SWS's estimate.
- b. **Within** the City of Spartanburg limits, SWS agrees to share in the cost based upon \$800 per sub-divided lot up to 100% of the aforesaid total estimated cost for the project. **Outside** the City of Spartanburg limits, SWS agrees to share in the cost based upon \$800 per subdivided lot up to 50% of the aforesaid total estimated cost.
- c. The SWS and the developer shall execute a water main extension agreement that will detail the costs and amount of reimbursement.

- d. The number of lots will be based upon the plat that is provided to and approved by Spartanburg County Planning, a copy of which will be delivered to SWS.
- e. The SWS reimbursement shall be paid upon project completion and acceptance of all of the lines within the development. In order to receive the SWS's reimbursement, the developer must submit a letter requesting the reimbursement and documentation of the actual costs incurred by the developer for the water main installation to reach the development.

C. Sewer Line Extensions

The developer shall incur the total cost for sewer line extensions to serve new developments. However, if the development meets the District's criteria established in item b. in the Sewer Line Extension Policy below, the District will share in the construction cost of the gravity sewer line extension from the existing sewer line to the boundary of the development. The developer shall be responsible for all costs associated with the sewer collection system within the development.

1. Sewer Line Extension Policy

- a. The extension is defined as that portion of the project that is from the District's existing sewer line to the boundary of the development site. The District will not share in the cost of the sewer line construction within the development. In addition, the developer will be required to locate the sewer line at a point most readily accessible to all contiguous drainage areas
- b. The District will reimburse up to 50% of the construction cost of the sewer line extension, provided the drainage basin will yield capacity fees greater than 50% of the cost of the extension. In addition, the development itself must generate sufficient capacity fees to generate 25% of the cost of the extension for projects costing up to \$250,000. For extensions exceeding \$250,000, development must generate at least 35% of project costs from capacity fees to be able to utilize the drainage basin policy.
- c. If a sewer line needs to be oversized for anticipated future system needs (not within the development), all of the costs associated with the oversized portion shall be incurred by the SSSD based upon the SSSD estimate.

- d. This policy will apply towards commercial as well as residential developments.
- e. The SSSD reimbursement shall be paid upon project completion and the release of the project for the sale of taps. In order to receive the SSSD reimbursement, the developer must request the reimbursement in writing.

III. SEWER PROJECT DESIGN AND PERMITTING

SSSD has delegated review program (DRP) status with SCDHEC. This program facilitates a quicker permitting process at the State level by delegating the majority of the project review responsibilities to the local entity. Usually, the design and permit for construction are prepared under the DRP process; however, if desired by the developer, a construction permit for a sewer line may be applied for directly to DHEC provided all the requirements and guidelines of this permit process are followed. Due to the great infrequency of applying for a construction permit directly through DHEC, the instructions below apply to the DRP process.

The design of any sewer facility that is to be owned and maintained by the SSSD, shall be completed by a South Carolina Licensed Professional Engineer. Upon receipt of the preliminary review package, one of the staff engineers will be assigned to manage the project until its completion and the release of taps. If the overall project includes a water distribution system, the same engineer will be assigned to manage the water project as well.

A. Project Submittal

1. Preliminary Project Review

The SSSD has found through experience that most submittals usually require at least some minor revision. Therefore, the SSSD offers that developers have their engineers submit a preliminary project package in an attempt to avoid unnecessary waste of materials. The District has standard specifications which include all sewer detail drawings (approved April 1998) on file with SCDHEC and encourage all developers to utilize this specification. Copies are available on request.

The following are the items that should be included in a preliminary project package:

- a. 2 sets of construction plans on plan/profile paper;
- b. 1 SCDHEC construction permit application (not necessarily executed);
- c. 1 copy of the location map on 8½ x 11" paper; and
- d. 1 copy of the design notes and calculations.
- e. 1 electronic copy of the overall plan view of the project

The SSSD shall review the package and return any requested revisions to the consulting engineer. At this time, the SSSD shall also prepare and submit the Council of Governments (COG) application. After the consulting engineer has completed the revisions, the project submittal package can be prepared and forwarded to the SSSD.

2. Project Review and Submittal

The final project submittal package should include the following items:

- a. 4 sets of construction plans on plan/profile paper at minimum scale and stamped by registered professional engineer (2 copies for SSSD's use and review and 2 copies for SCDHEC);
- b. 3 copies of each off site right-of-way plat;
- c. 3 copies of the fully executed SCDHEC construction permit application (1 original and 2 copies);
- d. 3 copies of the location map;
- e. 3 copies of the design notes and calculations, signed and stamped by the design engineer; and
- f. A check in the amount of \$75.00 made payable to SCDHEC Bureau of Finance.
- g. 1 copy of each approved county road and/or state highway encroachment permit issued for the project or a copy of the submitted application.

With the above package and the certification from the COG in hand, the SSSD will submit the package to SCDHEC on behalf of the developer. Provided that DHEC has not requested any revisions to the DRP package, SCDHEC will issue a "Permit to Construct". The Developer or his designated representative shall then contact the SSSD Engineer to schedule a pre-construction conference 72 hours prior to construction.

3. Minimum Sewer Plan Requirements

The following standards shall be required for sewer line construction drawings that are submitted to SSSD:

SITE PLAN

- ❑ Plan view of the entire site at not greater than 1"=200' scale, showing the entire sewer system
- ❑ 24" x 36" or smaller sheet size
- ❑ Show tie-in to the existing system; include name of existing lines and upstream and downstream rim and invert elevations, contact Engineering Department for record drawing information on the tie-in point
- ❑ Label all manholes, air release valves on force mains and pump stations
- ❑ Show limits of wetlands, floodplains and steep slopes
- ❑ Show project phasing
- ❑ North arrow
- ❑ Spartanburg County GIS grid number where the project is located
- ❑ Names of adjacent property owners, if applicable
- ❑ Location map, max scale 1"=1000', north arrow
- ❑ Index of sheets
- ❑ Title block
 - Names, mailing addresses and telephone numbers of the owner of the property, the land developer, the engineer or consultant and the applicant
 - Name of the development
 - Tax map number of the property
 - Scale
 - Date (also include revision dates)
- ❑ Legend for all symbols
- ❑ Engineer's stamp

PLAN AND PROFILE SHEETS

- ❑ 24" x 36" or smaller sheet size
- ❑ North arrow, scale (max. 1"=50' horizontal and 1"=10' vertical)
- ❑ Date (also include revision dates)
- ❑ Provide plan and profile of the entire system complete to tie-in to the existing system.
- ❑ SSSD encourages but does not require, that the plan and profile be on the same sheet for the section of the line shown.
- ❑ Engineer's stamp

The **plan** view shall at a minimum show:

- ❑ Street names with R/W limits
- ❑ Lot lines and number

- ❑ Easements labeled and dimensioned
- ❑ Manholes and/or forcemain air release valves with stationing for specifying location
- ❑ Pipe layout
- ❑ Bearings on all lines. Flow angle or bearings shall also be provided at the tie-in of the proposed system to the existing system
- ❑ Any known conflicting utilities
- ❑ Storm drainage location
- ❑ Sewer service locations for all lots and buildings. A service location form for field use is included in Appendix D. Contact SSSD for an AutoCAD block to be used on the plan view.
- ❑ Stream crossings identified
- ❑ Aerial crossings identified
- ❑ Pipe anchorage locations identified
- ❑ Fittings, air release valves, thrust blocking and all other necessary information for force mains

The **profile** view shall at a minimum show (denote assumed elevation):

- ❑ Constructed grade
- ❑ Stationing to match with the plan view
- ❑ Manholes with the following information:
 - Stations
 - Types of manholes (i.e. drop manhole)
 - Rim elevations (as-built)
 - Invert elevations (as-built)
- ❑ Pipes with the following data:
 - Length
 - Diameter
 - Type of pipe
 - Slope of pipe in %
- ❑ Any known conflicting utilities
- ❑ Storm drainage crossing the sewer lines
- ❑ Stream crossings identified
- ❑ Aerial crossings identified
- ❑ Fittings, air release valves, thrust blocking and all other necessary information for forcemains

Pump Station Plans

Provide the following information/details for pump stations:

- A vertical and horizontal cross-section of each pump station shall at a minimum include:
 - Influent line elevation and location
 - High water alarm elevation
 - Lead, lag pump-on elevations and pump-off elevation
 - Wetwell diameter, bottom, ground and top elevations
 - Location of pumps, guide brackets, chain hooks, and lifting chains
 - Location and elevation of discharge piping
 - Location and dimensions of wetwell entrance
 - Location of control panel

- A site plan of the pump station site at a minimum shall include:
 - Identification of the fenced or secure locked building/enclosure
 - Identification of a weather durable sign with a 24-hour emergency telephone number
 - Location of wetwell, valve pit, and control panel
 - Generator (if specified) or generator hook-up location
 - Identification of an all-weather access road

IV. WATER PROJECT DESIGN AND PERMITTING

A. Available Design Options

The SWS provides water distribution system design services free of charge based on a first come, first served basis. An uncomplicated subdivision or commercial layout can be completed within 45 to 60 days of receipt of the electronic plat from the developer or his representative. Should this period, not be acceptable, the developer may retain the services of a South Carolina licensed professional engineer to design the project and SWS provide review services and assist with the applicable SCDHEC permitting process.

In order to obtain this service from the SWS, the developer or his representative shall submit one copy of the project layout plat previously provided to the Spartanburg County Planning Commission, and a copy of the drawing in digital form via a computer diskette or e-mail using AutoCAD R14 or higher. **Submittal of the preliminary plat to the County does not initiate this service at SWS.** This layout plat should include lot, road, sanitary and storm sewer layout so that the water line design may take potential conflicts into consideration. If the overall project includes a sewer collection system, the same engineer will be assigned to manage the sewer project as well.

B. SWS Design Process

Upon receiving the electronic version of the project layout plat from the developer, the SWS Engineering Department will begin the design process, which includes survey for utility conflicts, hydrant flow testing, hydraulic calculations, preparation of construction drawings, and obtaining permits. As previously stated, the design, drawings and permits can normally be delivered in 45 to 60 days.

Once the construction drawings have been completed and the Water Main Extension Agreement (Refer to Section V) executed, the SWS will forward two sets of construction drawings, any road permits, and a copy of the Agreement to the developer. It is at this point that the developer or his representative should contact the SWS Engineer to set up a pre-construction conference.

C. Consulting Engineer Design Process

The design of any water line that is to be owned and maintained by the SWS shall be completed by a South Carolina Licensed Professional Engineer. Like SSSD, SWS has delegated review status with SCDHEC and will provide design review and permitting assistance for projects designed

by a consultant engineer. Upon request by the Developer, SWS will conduct the necessary flow tests and provide the information to the Design Engineer.

1. Preliminary Project Review

The SWS has found through experience that most submittals usually require at least minor revisions. Therefore, the SWS proposes that developers have their engineers submit a preliminary project package in an effort to avoid unnecessary effort.

The following are the items that should be included in a preliminary project package:

- a. 2 sets of construction plans (minimum scale allowed is 1" = 100');
- b. 1 SCDHEC construction permit application (not necessarily executed);
- c. 1 copy of the location map on 8 ½" x 11" paper;
- d. 1 copy of the design notes, calculations and hydraulic model.

2. Project Review

The SWS shall review the package and return it to the consulting engineer should any revision(s) be required. After the consulting engineer has completed the revision(s), the project submittal package can be prepared and forwarded to the SCDHEC. The project submittal package should include the following items:

- a. 4 sets of construction plans at minimum scale and stamped by registered professional engineer; (2 copies for SWS's use and review and 2 copies for SCDHEC);
- b. 3 copies of each off site right-of-way plat, if applicable;
- c. 3 copies of the fully executed SCDHEC construction permit application (1 original and 2 copies);
- d. 3 copies of the location map; and
- e. 3 copies of the design notes and calculations and hydraulic model, stamped and signed by the design engineer
- f. A check in the amount of \$75.00 made payable to SCDHEC

Bureau of Finance

- g. 1 copy of each approved county road and/or state highway encroachment permit issued for the project or a copy of the submitted application.

With the above package in hand, SWS will submit the entire package to SCDHEC on behalf of the developers. Provided that SCDHEC has not requested any revisions to the DRP package, SCDHEC will issue a "Permit to Construct". The Developer or his designated representative shall then contact the SWS Engineer to schedule a pre-construction conference 72 hours prior to the start of construction.

3. Minimum Water Plan Requirements

The following standard shall be required for water line construction drawings that are submitted to SWS:

- Plan not greater than 1"=100' scale, showing the entire water System
- Show match lines as appropriate
- Show project phasing
- North arrow and scale
- Stationing of tees, hydrants, valves, plugs and size or material changes and reducers
- Index of sheets
- Title block
 - Names, mailing addresses and telephone numbers of the owner of the property, the land developer, the engineer or consultant and the applicant
 - Name of the development
 - Scale
 - Date (also include revision dates)
- Street names with R/W limits
- Lot lines and number
- Easements labeled and dimensioned
- Pipe layout, material and size (diameter)
- Show sewer and storm drainage layout, if applicable
- Stream crossings identified and detailed if needed
- Aerial crossings identified
- Fittings, thrust blocking, blow-off taps and all other necessary information relating to water lines
- Show tie-in to the existing system with details
- Show limits of wetlands, floodplains and steep slopes
- Project notes consistent with SWS standard specifications
- Appropriate details consistent with SWS standard

specification

- Jumper connection detail if existing line has meter services beyond valve
- Hydrant detail showing main 6' off of curb with hydrant towards curb.

V. WATER AND SEWER ADMINISTRATIVE REQUIREMENTS

A. Sewer System Ownership Agreements

During the review and preparation of the permitting package, SSSD will prepare the Ownership Agreement (See Appendix A) and forward it to the developer for execution. This document is the legal agreement that explains the terms and conditions under which the sewer project will be constructed and turns the ownership of the new facilities to SSSD for future operation and maintenance. It is within this document that the SSSD establishes the amount of reimbursement should the project meet the criteria for the District's Sewer Line Extension Policy. (See Section II D.) Once executed, the developer shall return the agreement to the SSSD for presentation to the District's Commission. Please note that this agreement must be properly executed, witnessed and returned to SSSD prior to beginning construction.

Usually, the entire preparation and execution of the Ownership Agreement can be completed prior to receiving a Permit to Construct from DHEC.

B. Water Main Extension Agreements

1. SWS Designed Project

The Extension Agreement will be prepared by SWS after completion of the construction drawings (See Appendix B) explaining the terms and conditions under which the water line project will be constructed and turned over to the SWS. It is within this document that the Water System will establish the means of reimbursement should the project meet the criteria for the Water System's Line Extension Policy. (See Section II D.) Once it is prepared, the agreement will be forwarded to the developer for execution. Once executed, the developer shall return the agreement to the SWS for presentation to the Water System's Commission. Please note that this agreement must be properly executed, witnessed and returned to SWS prior to the distribution of construction drawings.

2. Consulting Engineer Designed Project

Once the package has been submitted to DHEC, the SWS will prepare the Water Main Extension Agreement (See Appendix B) and forward to the developer for execution. Once executed, the developer shall forward the Agreement to the SWS for presentation to the Commissioners of Public Works. Please note that this

Agreement must be properly executed, witnessed and returned to SWS prior to beginning construction.

C. Right of Way and Easement Agreements

Prior to any off-site construction taking place, the applicable right of way and easement agreement must be prepared, properly executed and delivered to SWS-SSSD for recordation. Prior to the release of the project for the sale of taps, any and all on-site right of way and easement instruments must be prepared, properly executed and delivered to SWS-SSSD for recordation. **NO TAPS WILL BE ISSUED** prior to any outstanding right of way issue being resolved.

In order to prepare the standard right of way and easement agreement, surveyed plat(s) and the title opinion of the property on which the right of way traverses must be in hand.

1. Plats

A formal surveyed plat prepared, signed and crimped by a South Carolina licensed surveyor is required for each off-site and on-site right of way. **A copy of the final subdivision plat may be used for the on-site right of way plat.**

All right of way plats for sewer lines must contain somewhere on it the following language:

Notice: The area included in the Sanitary Sewer Right-of-way shall not be filled over, filled in, or cut down in any manner which would cause the raising or lowering of the ground grade level beyond the elevation(s) which exist at the time of the conveyance of the right-of-way and no building(s) or structure(s) of any kind either temporary or permanent, shall at any time be placed or constructed within the area of the Sanitary Sewer right-of-way shown. The District shall clear and grub the entire width of the right-of-way and easement along its entire length as shown.

All right of way plats for water lines must contain somewhere on it the following language:

Notice: The area included in the Water System Right-of-way shall not be filled over, filled in, or cut down in any manner which would cause the raising or lowering of the ground grade level beyond the elevation(s) which exist at the time of the conveyance of the right-of-way and no building(s) or structure(s) of any kind either temporary or

permanent, shall at any time be placed or constructed within the area of the Water System right-of-way shown. The Water System shall clear and grub the entire width of the right-of-way and easement along its entire length as shown.

2. Title Search Information

The developer should have his / her own attorney conduct a title search on any right-of-way plats in accordance with the following procedure:

- a. Mortgages: (List mortgagor, mortgagee, amount secured, date of execution, date of recording, place of recording, any assignments and the mailing address of the holder of the mortgage. If none, so state);
- b. Lis Pendens: (List parties and the date and place of filing. If none, so state);
- c. Judgments: (List judgment holder, amount and date and place of filing. If none, so state);
- d. Federal and/or State tax liens: (List taxing entity, taxpayer, amount, date and place of filing. If none, so state);
- e. Mechanics liens: (List);
- f. Other Exceptions: (List any other exceptions from your certification that affect the property over, under and through which the right-of-way and easement runs such as other easements, restrictions, encroachments, adverse conveyances, assessments or charges, violation of any restrictions or governmental requirements, etc.);
- g. Spartanburg County property taxes have been paid through the year (list year). Taxes for (list year) in the amount of (insert amount) are now due and owing. (If none, so state);
and
- h. The real property over, under and through which the right-of-way and easement runs is described as follows: (Insert complete legal descriptions, making reference to any current plats that describe the property and giving derivation clause for title transfer to present owner). Example derivation clause:

The property over which said right-of-way and easement crosses is that property conveyed to the Grantor(s) herein by deed of _____ (insert name of Grantor(s)), dated _____ (insert date of deed), recorded _____ (insert date recorded), in Deed Book _____ (insert deed book volume), page _____ (insert page number of first page of deed), Office of the Register of Deeds for Spartanburg County.

While the above format does not have to be followed precisely, all information should be included in the attorney's title opinion. When the attorney delivers his title opinion to the SWS-SSSD, it should be dated as of the date of the opinion. Once the title search has been completed, the SWS-SSSD project manager shall prepare the right-of-way agreement(s) and forward the agreement(s) to the developer for execution. See Appendix C for the standard right-of-way agreement.

Any and all off site right of way and easement documents must be drafted, executed and returned to the District prior to any construction taking place on the property. If the right-of-way is across property owned by the developer, the right-of-way agreement does not need to be executed prior to construction, but it shall be executed prior to releasing the project for the sale of service taps. Developers should understand that rights-of-ways and easements will be executed and recorded prior to conveying any lots from the subdivision.

Once the SWS-SSSD receives the executed right-of-way agreements, the agreements will be reviewed both for proper form and execution. If approved, they will be recorded in the Office of the Registrar of Deeds. The SWS-SSSD will not be responsible for updating the title examination at the time of recording and will not be responsible for checking for mortgage subordination and releases.

VI. WATER AND SEWER CONSTRUCTION AND INSPECTION, ACCEPTANCE AND RELEASE OF TAPS

A. Pre-construction Conference

When the SCDHEC permit to construct and all other applicable permits have been issued, the ownership or extension agreement has been executed and returned, and any off-site right of ways and easements executed and delivered to the SWS-SSSD, the Developer or his designated representative shall then contact the SWS-SSSD engineer to schedule a pre-construction conference at least 72 hours in advance of the start of construction.

The following personnel are required to attend the conference:

- a. SWS-SSSD Project Manager / Staff Engineer;
- b. SWS-SSSD Inspector;
- c. Design engineer; and
- d. Contractor and any Sub-contractors.

For water and sewer DRP projects, the design engineer shall provide three sets of plans stamped "**Issued for Construction,**" prior to the conference. These plans shall not deviate from the plans submitted to and permitted by SCDHEC. Also, the design engineer shall provide the project cut sheets and any applicable shop drawings prior to starting construction.

At the Pre-Construction Conference, general construction requirements and SWS-SSSD standards will be reviewed. All applicable permits will be reviewed and distributed if necessary. Any right of way issues will be discussed.

B. General Construction Requirements

The following are general construction requirements.

1. The contractor shall notify the Engineering Department at least two full working days in advance of beginning construction;
2. The contractor shall notify the Engineering Department by 8:30 a.m. each day if work will not be done due to inclement weather or any other reason;
3. Working hours are from 8:00 a.m. to 5:00 p.m. with one hour for lunch. Overtime work requests must be made to the Engineering Department by noon of the day such work is

anticipated. Overtime work will not be authorized if the Contractor is not on the job site and working by 8:30 a.m. of the day overtime is anticipated.

4. The contractor shall notify the Engineering Department of the date and time of delivery of materials to the job site for inspection.
5. All work on State Highways shall conform to the SCDOT encroachment permit and the latest issue of the SCDOT Traffic Control Manual. The contractor shall notify SCDOT 24 hours before beginning work on State Highway right-of-way. Failure to comply with the permit may result in the job shutdown and any expenses incurred by SWS-SSSD to comply with requirements will be charged to the Contractor.
6. The contractor shall have the following on the job site before work commences:
 - a. necessary permits (i.e., highway, railroad, etc.);
 - b. rights-of-way plats; and
 - c. approved plans and shop drawings.
 - d. necessary equipment, in working order, and materials for job
7. The contractor shall have a foreman or designated replacement fluent in the English language on the job site at all times. Work shall be suspended in the absence of the foreman or his replacement.

C. Construction Procedures

The SWS-SSSD's standard specifications shall be followed for all construction, in addition:

1. All applicable safety precautions shall comply with OSHA standards with particular emphasis to ditch safety. Trench jacks, boxes, hard hats, etc. shall be required. Safety precautions shall remain in effect throughout pipeline laying and backfilling.
2. The contractor shall have all conflicting utilities located before pipe laying begins.
3. Centerline stakes, right-of-way stakes and easement or property lines must be placed by surveyor before the work is started.

This staking work is at the expense of the developer or the Contractor. The contractor shall have offset hubs placed and cut sheets prepared before sewer pipe laying begins. The SWS-SSSD inspector shall be provided with copies of all cut sheets for his / her approval before pipe laying begins. The contractor shall maintain all offset hubs in serviceable condition until the project is complete and the inspector makes a final punch list.

4. Rights-of-way shall be cleared in accordance with rights-of-way plats. Complete width of permanent rights-of-way shall be cleared; only those trees whose entire trunk is within the rights-of-way shall be cut. All clearing and grubbing shall be completed prior to pipe laying. All vehicular access to right-of-way that crosses private property shall be by written permission of the property owner with copy of same provided to SWS-SSSD Inspector.
5. For water distribution systems all roads, right-of-ways or easements must be graded within 0.2 of final grade. Where curbs and gutters are to be used, either the curb and gutter on at least one side of the road must be installed prior to beginning any work concerning the water main construction or the roadway must be at final sub-grade elevation with centerline station clearly marked. In this case, Developer agrees, that if the sub-grade elevation is changed after installation of water line or if the road location itself is changed, the line may have to be removed and re-laid at the Developers sole expense.
6. All materials and appurtenance shall be in accordance with the SSSD or SWS Standard Specifications, latest edition.
7. If blasting is required, it must be performed by a licensed person and a copy of the blasting permit given to the SSSD Inspector prior to blasting.
8. The contractor shall record sewer service connection locations with the following measurements:
 - a. distance from downstream manhole;
 - b. distance from "wye" / main to end of service line; and
 - c. depth of end of service.

All service lines shall be backfilled and plugged prior to air testing. Ends of services shall be marked with a pipe marker which shall extend above ground level and should remain intact

until the plumber makes the connection. A copy of the District's service stub information form is attached as Appendix D.

D. Inspection and Acceptance

Prior to accepting the project into the SSSD or SWS system, the following minimum requirements must be completed to the satisfaction of SWS-SSSD.

1. All sewer and water lines must pass the required tests as outlined in the SSSD or SWS standard Specifications. SWS-SSSD Inspector must be present for all testing.
2. All lines shall have passed all applicable air, deflection, hydrostatic, vacuum, drawdown and bacteriological tests;
3. All necessary paving completed;
4. Ring and covers reset if disturbed or set to different elevations as required by the inspector;
5. All test taps plugged and all open holes properly backfilled and compacted;
6. All hydrants plumb and properly operating;
7. All valve boxes set to grade and centered over valve operating unit
8. Any compaction/concrete test successfully completed;
9. All rights-of-way and clean-up items complete;

E. Release of Project for Sale of Taps

Upon successful completion of the items listed below, the District will draft a letter of project acceptance to SCDHEC. When the final construction approval is issued by SCDHEC, the District will release the project for the sale of taps and concurrently notify the Spartanburg County Planning Office.

1. Consulting engineer provides SWS-SSSD a copy of project construction certification letter to SCDHEC and requests SCDHEC final inspection, if an inspection is conducted, the SWS-SSSD Project Manager, Inspector, Contractor and Design Engineer shall attend.

2. On-site right of way and easement document(s) is executed and provided to the District.
3. Record Drawings are submitted and approved and electronic copy of record drawings is received.
4. Electronic copy of the subdivision Final Plat is received.

VII. SERVICE CONNECTION APPLICATION AND FEES

A. General

Any customer desiring water or sewer service is required to make application for service and pay all applicable fees and/or charges at the time application is made.

B. Water Service Connections

Once the appropriate fees have been paid, all water service connections 5/8-inch through 2-inch in size will be installed by the SWS. For all irrigation service connections, all commercial/industrial meters and any water meter 1-inch or larger, a cross connection prevention device may have to be installed by the customer in accordance with the SWS Cross Connection Control Manual. This manual is available upon request. No service connections will be made by the SWS prior to payment of the appropriate fees.

1. Water Service Fees/Charges

Customers applying for a new water service connection are subject to one or more of the following fees:

- a. **Connection fee:** This is the cost associated with the materials and labor required to actually make the service connection.
- b. **Capacity Fee:** These fees are a method of partially financing new facilities required to maintain adequate treatment and storage facilities as well as transmission mains to the distribution system. As the present capacity of the system is "bought up", revenues in the form of capacity fees must be generated to offset the cost of future capital improvements. Therefore, capacity fees are directly related to water usage.
- c. **Privilege Fees:** Previously, in certain circumstances, water mains were extended by individuals/developers and Commission policy allowed privilege charges to be collected by the individuals/developers for new connections. Thus, prior to installing a service connection, privilege charges had to be paid in full to the developer and correspondence acknowledging payment of privilege charges signed and forwarded to the Spartanburg Water System. In conjunction with the implementation of capacity fees on April 1, 1988,

these privilege charges are now collected in addition to the capacity fee, if applicable.

- d. **Participation Fee:** This fee applies to any water main in which the SWS has a financial investment. If the fee is collected prior to the construction of the new water main, the fee shall be \$1,200 for extensions outside the city limits or \$800 for extensions inside the city limits. If the fee is collected after construction has begun on a new water main, the fee shall be \$1,500 and \$1000, respectively.
- e. Call the SWS-SSSD Customer Service New Services Department at (864)-582-6375 for applicable fees, pricing and rates. Current water usage rates also are posted on our web site, www.sws-sssd.org, click on "Customer Service".

C. Sewer Service Connections

Once the appropriate fees have been paid, all sewer service connections shall be made by the applicant's licensed plumber. All sewer service connections must be made in accordance with the District's standard, copies of which can be made available upon request. No service connection shall be made prior to payment of the appropriate fees.

Connection to an installed sewer service connection or "stub out" will not require an inspection; however, the applicant is responsible for notifying Customer Service when the connection is made. It is the plumber's responsibility to make certain that the service line has sufficient slope to flow into the sewer line at the time the connection is made. New service connections on existing active sewer lines and manholes must be inspected prior to backfilling. In this situation, no discharge shall be allowed through the service connection until inspection has been conducted and subsequently, the service connection has been approved.

1. Sewer Service Fees/Charges

Customers applying for a new sewer service connection are subject to one or more of the following fees:

- a. **Application Processing/Inspection Fee:** The cost associated with SWS-SSSD processing the application and making an inspection of the service connection. This fee is \$35.00.
- b. **Capacity Fee:** Sewer capacity fees exist for basically the same reason as water capacity fees; except, that instead of partially financing water treatment plants and transmission

mains, sewer capacity fees partially finance wastewater treatment facilities and sewer system extensions in areas of substantial growth. Capacity fees are based on the anticipated discharge volume; and explanation of how that volume is calculated is in item 2. below.

- c. **Privilege Fees:** Previously, in certain circumstances sewer lines were extended by individuals / developers, and Commission policy allowed privilege charges to be collected by the individuals / developers. Thus, prior to installing a service connection, these charges were required to be paid in full and letters of confirmation signed and forwarded to the Spartanburg Sanitary Sewer District. These privilege charges shall be collected in addition to the capacity fee, if applicable. In conjunction with the implementation of capacity fees on April 1, 1988, these privilege charges are now collected in addition to the capacity fee, if applicable.
- d. Call the SWS-SSSD Customer Service New Services Department at (864)-582-6375 for applicable fees, pricing and rates . Current sewer discharge rates also are posted on our web site, www.sws-sssd.org, click on “Customer Service”.

2. Calculation of Wastewater Discharge Volume

The wastewater discharge volume to be used for calculating capacity fees shall be determined as follows:

- a. **Residential and Commercial Connections:** The wastewater discharge volume from residential and commercial customers shall be calculated using SCDHEC's “Standard for Wastewater Facility Construction: R.61-67 Appendix A”
- b. **Industrial Connections:** The volume of discharge from industrial connections will be calculated using historical data from similar manufacturing processes plus a unit contributory loading of 25 gallons per day per employee.

Developer Checklist for SWS Designed Projects

- _____ Contact SWS-SSSD about utility availability (585-9142)
- _____ SWS Designed Water Distribution System– Submit electronic copy of subdivision plat or site plat to Engineering Department and request water distribution system design (icann@sws-sssd.org)
- _____ Receive, execute and return SWS Water Line Extension Agreement
- _____ Receive plans and permit application package from SWS
- _____ Submit road encroachment permit applications to appropriate agency
- _____ Forward copy of road encroachment permit to SWS-SSSD
- _____ Schedule pre-construction conference
- _____ Upon Construction Completion submit to SWS-SSSD
 - final subdivision plat for mapping
 - final subdivision plat for on-site right of ways and applicable title information, if applicable
 - receive, execute and return on-site right of way document, if applicable

Developers Checklist for Water or Sewer DRP Projects

- _____ Contact SWS-SSSD about utility availability (585-9142)
- _____ Hire engineer/surveyor to design project
- _____ DRP Water or Sewer Project – Submit preliminary package (SWS-SSSD P.O. Box 251 Spartanburg, SC 29304)
 - 2 sets of construction plans on plan/profile paper
 - 1 SCDHEC construction permit application (not necessarily executed)
 - 1 copy of the location map on 8½ x 11" paper
 - 1 copy of the design notes and calculations, and hydraulic model if applicable
 - 1 electronic copy of the overall plan view of the project
- _____ Receive review comments
- _____ Submit road encroachment permit applications to appropriate agency
- _____ Forward copy of road encroachment permit to SWS-SSSD
- _____ DRP Water or Sewer Projects – Submit final package
 - 4 sets of construction plans on plan/profile paper at minimum scale and stamped by registered professional engineer (2 copies for SSSD's use and review and 2 copies for SCDHEC);
 - 3 copies of each off site right-of-way plat;
 - 3 copies of the fully executed SCDHEC construction permit application (1 original and 2 copies);
 - 3 copies of the project location map;

DRP Water or Sewer Project - Submit final package (cont.)

- 3 copies of the design notes and calculations, and hydraulic model signed and stamped by the design engineer
- A check in the amount of \$75.00 made payable to SCDHEC Bureau of Finance.
- 1 copy of each approved county road and/or state highway encroachment permit issued for the project or a copy of the submitted application.

_____ Receive, execute and return SSSD Ownership Agreement or SWS Water Line Extension Agreement

_____ Submit Title Information on all off site right of ways

_____ Receive, acquire and return all off site right of way agreements

_____ Receive SCDHEC construction permit

_____ Schedule pre-construction conference

_____ Upon Construction Completion submit to SWS-SSSD

- record drawings
- final subdivision plat for mapping
- final subdivision plat for on-site right of ways and applicable title information, if applicable
- receive, executed and return on-site right of way document, if applicable
- Copy of Engineer's certification letter to SCDHEC

STATE OF SOUTH CAROLINA)
)
COUNTY OF SPARTANBURG) **OWNERSHIP AGREEMENT**

THIS OWNERSHIP AGREEMENT, made and entered into this ____ day of _____, 2005, by and between _____, hereinafter referred to as the “Owner”, and the Spartanburg Sanitary Sewer District, hereinafter referred to as the “District”.

WITNESSETH:

WHEREAS, the Owner proposes to construct approximately _____ gravity sewer line, hereinafter referred to as the “Sewer Line”, in order to provide sewer services to _____ located _____, and

WHEREAS, the District is agreeable to allowing the construction of the Sewer Line and assuming the ownership and operation of the Sewer Line upon the following terms and conditions:

NOW, THEREFORE,

For and in consideration of the benefits inuring to the parties hereto, the Owner and the District do hereby agree as follows:

1. The Owner, at its sole cost and expense, shall construct and install the Sewer Line according to the plans and specifications entitled “_____”, dated _____, prepared by _____, and hereinafter referred to as the “Plans and Specifications.” A sketch of the designated project is attached as “Exhibit A” for information purposes only. The Owner shall also furnish, at its sole cost and expense, a right-of-way and easement twelve and one-half feet on either side of the Sewer Line. The Owner will execute a right-of-way agreement, hereinafter “Right-of-Way”, similar in form to

the document attached hereto as Exhibit B. The Owner shall provide an attorney's Opinion in a form satisfactory to the District which will verify ownership of the property subject to the Right-of-Way.

2. Upon completion of the Sewer Line, acceptance by the District, and prior to any wastewater being discharged into the Sewer Line or any tap permits being issued, the ownership of the Sewer Line shall be automatically vested in the District.

3. The Owner shall submit copies of the complete Plans and Specifications for the Sewer Line and Right-of-Way and Easement plats to the District. The District will submit the Plans and Specifications to the South Carolina Department of Health and Environmental Control (SCDHEC) for its approval and prepare the Right-of-Way and Easement instrument similar in form to the document attached hereto as Exhibit B. The District will record the Right-of-Way with the Register of Deed's Office. No construction shall commence until such Plans and Specifications have been approved by the District and SCDHEC and the off site Right-of-Way has been recorded.

4. The Sewer Line shall be constructed and installed in accordance with the Plans and Specifications at the Owner's sole expense. The Owner shall contact the District to schedule a pre-construction conference prior to the commencement of construction and the District shall have the right to make such inspections as it may deem necessary. The construction and installation shall conform to the requirements and specifications of the District. The general contractor who shall build the Sewer Line shall be approved by the District prior to his employment by the Owner. The Owner shall turn over and transfer to the District any and all payments to construct a discharge from any state or federal regulatory authority.

5. Upon installation, approval of installation, and acceptance by the District, ownership of the Sewer Line shall automatically vest in the District, its successors and assigns forever, but Owner

will execute any documents or instruments required in order to convey title. The Owner does hereby represent and warrant that it is the lawful owner of the Sewer Line and all appurtenances pertaining thereto, and that upon completion of construction, the Sewer Line conveyed hereby will be free and clear of any and all encumbrances, and further represents and warrants that the undersigned Owner has good right and title to sell and convey the same and will warrant and forever defend the same against all claims.

6. Prior to transfer of the Sewer Line, the Owner will provide the District with an electronic version in DFX format of the (1) "As Built" drawing with all bearings based upon True North and manhole invert elevations based on USGS datum and (2) the project final plat.

7. Upon transfer of the Sewer Line to the District, the District will receive and treat wastewater carried through the Sewer Line and the District will assume full responsibility thereafter for the operation, maintenance and repair of the Sewer Line, together with all appurtenances installed in connection therewith.

8. The Owner shall indemnify and hold the District harmless from and against any and all loss, liability, damage, injury and expense (including, without limitation, attorneys' fees) which the District may suffer or sustain as a result of or arising out of a breach of any term of this Ownership Agreement, the construction of the Sewer Line, or any other matters contemplated by this Transfer of Ownership Agreement

9. No connection of any type will be permitted by the Owner to be made to the Sewer Line, or any extensions thereto, without a written permit issued by the District to make such connection.

10. The District shall have the right and privilege to extend or expand the Sewer Line.

11. The Owner shall limit the flow from the ____ (Project Name) _____ to a maximum of _____ gallons per day (gpd) of domestic wastewater only.

12. Prior to connection to the Sewer Line, the Owner or individual making application for sewer service shall pay the District's capacity fee in effect at the time of application as based on residential equivalent units (REU); one REU equals 400 gpd.

13. If the Owner does not begin construction of the Sewer Line within one year of the date of this Transfer of Ownership Agreement, it shall become null and void; however, this Transfer of Ownership Agreement may be extended an additional six months by the District's Commission upon written request from the Owner.

14. The Owner acknowledges and agrees that the District does not accept any ownership, operation or maintenance responsibilities for any service lines between a structure and the Sewer Line.

15. The Owner shall repair any damage or remove any debris from the manholes and pipeline if such damage or debris occurs as a result of continuing construction, such as, but not limited to, grading or paving operations, after acceptance of the sewer line by the District and final construction approval issued by SCDHEC.

16. The Owner warrants that it is in a position to and is fully capable of complying with all of the terms and conditions contained herein and that it is not bound by any agreements or other encumbrances, recorded or unrecorded, which may adversely affect compliance with this Transfer of Ownership Agreement.

17. The terms and conditions of this Transfer of Ownership Agreement shall be subject to all statutes, rules, policies and regulations governing the operation of the District in all matters under its jurisdiction and control, as now in effect or as shall become effective, and the same are incorporated herein by reference.

To the foregoing, the Owner does hereby bind itself and its successors and assigns and the

District does hereby bind itself and its successors and assigns.

IN WITNESS WHEREOF, the parties hereto have hereunto set their hands and seals the day and year first above written.

Signed, Sealed and Delivered

OWNER

By: _____(SEAL)
Its: _____

SPARTANBURG SANITARY SEWER
DISTRICT (SEAL)

By: _____(SEAL)
Graham W. Rich, P.E.
General Manager

By: _____(SEAL)
Newton Pressley
Secretary-Treasurer

STATE OF SOUTH CAROLINA)
) TRANSFER OF OWNERSHIP AGREEMENT FOR
COUNTY OF SPARTANBURG) WATER MAINS OUTSIDE THE CITY

THIS OWNERSHIP AGREEMENT, made and entered into this ____ day of _____, 2005, by and between _____, hereinafter referred to as the "Owner", and The Commissioner of Public Works of the City of Spartanburg, South Carolina, hereinafter referred to as the "Commission".

WITNESSETH:

WHEREAS, the Owner proposes to construct _____ LF of ____-inch diameter water mains, hereinafter referred to as the "water main" in order to serve _____ located _____; and

WHEREAS, the Commission is agreeable to allowing the construction of the water main and assuming the ownership and operation of the water main and provide water service upon the following terms and conditions:

NOW, THEREFORE,

For and in consideration of the benefits inuring to the parties hereto, the Owner and the Commission do hereby agree as follows:

1. The Owner, at its sole cost and expense, shall construct and install the water main in and along the streets and/or private right of way as more particularly shown on a plat entitled _____, by _____ dated _____, a copy of which is attached hereto as Exhibit A. The Owner shall also furnish, at its sole cost and expense, a right-of-way and easement sufficient to allow ingress and egress for maintenance and repair if any portion of the water main is to be constructed outside of a public right of way. In such event, the Owner will execute a right-of-way agreement, hereinafter "Right-of-Way",

similar in form to the document attached hereto as Exhibit B. The Owner shall provide an attorney's Opinion in a form satisfactory to the Commission which will verify ownership of the property subject to the right of way.

2. Upon submission of the executed Right-of-Way, the Commission will record the Right-of-Way at the Register of Deed's Office. No construction shall commence until the Right-of-Way has been recorded.

3. The water main shall be constructed and installed at the Owner's sole expense. The Owner shall notify the Commission of commencement of construction and the Commission shall have the right to make such inspections as it may deem necessary. The construction and installation shall conform to the requirements and specifications of the Commission. The general contractor who shall build the water main shall be approved by the Commission prior to his employment by the Owner.

4. Upon installation, approval of installation, and acceptance by the Commission, ownership of the water main shall automatically vest in the Commission, its successors and assigns forever, but Owner will execute any documents or instruments required in order to convey title. The Owner does hereby represent and warrant that upon completion of construction, it will be the lawful owner of the water main and all appurtenances pertaining thereto, and the water main will be free and clear of any and all encumbrances, and further represents and warrants that the undersigned Owner has good right and title to sell and convey the same and will warrant and forever defend the same against all claims.

5. The Owner will comply with the following terms, provisions and conditions:

(a) The Owner agrees to furnish the Commission with one (1) complete sets of drawings or plats and an electronic version of the same plat in DXF format with all bearings to be based upon true north to scale showing the proposed development, proposed building lots, building

layout (if available), streets and other data. Such plat shall be made by a registered engineer or registered land surveyor. If approval is required by the Spartanburg County Planning and Development Commission, such drawings or plats shall be certified by that Commission as meeting its regulations as amended to date.

(b) The Commission agrees to analyze the proposed project and determine the location, type and size of material to be used in connection with the water main installation. The project will include the extension of the proposed water mains from the nearest existing water main having a carrying capacity adequate to meet the requirements of the proposed development.

(c) All water mains are to be laid only in regularly defined and graded publicly maintained street right of way or other public right of way to be accepted for public maintenance, as shown on the drawings submitted under Paragraph (a) above, or in easements granted to the Commission by the appropriate landowner(s), as defined in paragraph 1 above. The Owner agrees to construct curbing on one side of the proposed road prior to the installation of the water main except where curbing is installed on top of and whose bearing surface is the paved roadway or where the roadway is shown to have no curbing installed. If no curbing will be installed, the roadway shall be within two-tenths ($2/10$) foot of final subgrade elevation prior to water main installation.

(d) The Owner is responsible for insuring, at his sole expense, that all excavated areas which require Commission personnel to enter comply with applicable trench safety standards of OSHA.

(e) All materials used and methods of installation of water mains shall fully comply with the standards of the American Water Works Association and the standards and specifications of the Commission. The Owner assumes full responsibility for ensuring that fire protection and fire hydrant spacing in the development shall comply with the requirements and specifications of the

Spartanburg County Ordinance #278, Section 603, as adopted from the Standard Fire Protection Code applicable to all buildings other than single or two (duplex) family dwellings.

(f) The Owner shall install size and type of pipe as specified on the drawings. Ductile iron pipe, pressure class 350, is required for 3-inch diameter to 16-inch diameter, and pressure class 250 is required for pipe larger than 16-inches in diameter. The Owner may, at his option, install PVC pipe in residential areas only, and only upon prior approval of the Commission. PVC pipe shall conform to AWWA C-900, 200 psi for 4-inch diameter and larger. The Owner shall not be allowed to install PVC pipe in *any* load bearing areas.

(g) The Owner will replace all paved street cuts along the route of the water main ditch in accordance with requirements of the South Carolina Department of Highways and Public Transportation and/or the County of Spartanburg and will be solely responsible for any ditch or paving settlement along the water mains in the project for a period of one (1) year from the completion and acceptance of the installation by the Commission. Any repairs shall be performed within seventy-two (72) hours following notice by the Commission to Owner and shall be made to the complete satisfaction of the South Carolina Department of Highways and Public Transportation and/or the County of Spartanburg and the Commission.

(h) The Owner will advise the Commission at least seventy two (72) hours in advance of the date the contractor desires to commence installation.

(i) This installation and *all* associated work must be completed within *one (1) year* from the date of this Agreement or this Agreement becomes null and void, unless an extension is requested in writing by the Owner and approved by the Commission.

(j) Should any adjustment or relocation of water main be necessary due to grade changes made by the Owner after the initial installation, the Owner agrees to be liable for all costs related to such adjustment and relocation. Such adjustments and relocation shall be monitored and

observed by the Commission. The Commission reserves the right at its sole discretion to make the adjustment or relocation and invoice Owner for all costs. The Owner agrees to pay such cost immediately upon receipt.

6. Prior to transfer of the water main, the Owner will provide the Commission with an electronic version in DFX format of the project final plat with all bearings based upon true north and elevations based on USGS datum.

7. Upon transfer of the water main to the Commission, the Commission will furnish water through the water main and the Commission will assume full responsibility thereafter for the operation, maintenance and repair of the water main, together with all appurtenances installed in connection therewith subject to the payment of all water charges.

8. No connection of any type will be permitted by the Owner to be made to the water main or any extensions thereto, without a written permit issued by the Commission to make such connection.

9. The Commission shall have the right and privilege at its sole discretion to extend or expand the water main.

10. Prior to connection to the water main, the Owner or individual making application for water service shall pay the Commission's tap application fee(s) in effect at the time of application. The Owner shall not be allowed to collect any payback charges for the extension of water service from the above described water main.

11. A separate tap, service line and meter is required for each house, mobile home, building, swimming pool or other separate structure on the parcel to be served. The Commission will not install any water services, meters or meter boxes in the Development until the Owner has placed the Commission provided white flag marker six (6) inches inside the sidewalk area showing the location and grade of each meter box.

12. The Owner acknowledges and agrees that the Commission does not accept any ownership, operation or maintenance responsibilities for any service lines between a structure and the water meter.

13. Should any required adjustment or relocation of water main service lines, meters, meter boxes and hydrants be necessary after the initial installation due to changes requested by the Owner, the Owner agrees to pay for all costs related to such adjustment and relocation. The Commission will make adjustments and invoice the amount of such costs, which invoice Owner agrees to pay immediately upon receipt.

14. The Owner shall indemnify and hold the Commission harmless from and against any and all loss, liability, damage, injury and expense (including, without limitation, attorneys' fees) which the Commission may suffer or sustain as a result of or arising out of a breach of any term of this Ownership Agreement, the construction of the water main, or any other matters contemplated by this Agreement.

15. The Owner warrants that he is in a position to and is fully capable of complying with all of the terms and conditions contained herein and that he is not bound by any agreements or other encumbrances, recorded or unrecorded, which may adversely affect compliance with this Agreement.

16. The terms and conditions of this Agreement shall be subject to all statutes, rules, policies and regulations governing the operation of the Commission in all matters under its jurisdiction and control, as now in effect or as shall become effective, and the same are incorporated herein by reference.

To the foregoing, the Owner does hereby bind himself and his successors and assigns and the Commission does hereby bind itself and its successors and assigns.

IN WITNESS WHEREOF, the parties hereto have hereunto set their hands and seals the day and year first above written.

Signed, Sealed and Delivered

OWNER

By:

_____ (SEAL)

Its: _____

COMMISSION OF PUBLIC WORKS
OF THE CITY OF SPARTANBURG,
SOUTH CAROLINA

By:

_____ (SEAL)

Graham W. Rich, P.E.
General Manager

Attest:

_____ (SEAL)

Newton Pressley
Secretary-Treasurer

of the said pipe or lines or any appurtenances or any of them and with the right to do all necessary excavation, installation, construction and maintenance work. Said right is also granted to install or permit to be installed individual sewer service line or lines within said right-of-way.

The Grantor(s) covenant(s) and agree(s) for herself and her heirs and assigns, which covenant shall be a covenant running with the land over which said right-of-way and easement is granted, that (1) grantor(s) will not do or permit to be done on the strip of land hereinabove described any excavating, blasting, use of explosives or other usage of the said strip of land which would damage or tend to damage or injure or obstruct said underground and/or aboveground sewer pipe line or lines or interrupt or interfere with the normal and usual service or operation of said sewer pipe line or lines; (2) the area included in the right-of-way hereby granted shall not be filled over, filled in or cut down in any manner which would cause the raising or lowering of the ground grade level beyond the elevation or elevations which exist at the time of completion of construction of the underground and/or above ground sewer pipe line or lines in said right-of-way; and (3) no building or buildings or structure or structures of any kind, either temporary or permanent, shall at any time be placed or constructed within the area embraced within the right-of-way hereby granted.

TO HAVE AND TO HOLD all singular the right-of-way and easement hereinabove granted unto the Spartanburg Sanitary Sewer District, its successors and assigns forever.

IN WITNESS WHEREOF the undersigned has caused this right-of-way and easement to be executed this the ____ day of _____, 2005.

In the Presence of

name

(1ST Witness Signature)

_____(SEAL)

(2nd Witness Signature)

**STATE OF SOUTH CAROLINA)
)
COUNTY OF SPARTANBURG)**

PROBATE

PERSONALLY appeared before me _____
(1st Witness Name - Typed or Printed)

and made oath that (s)he saw the within named _____, sign, seal, and as _____ act

and deed deliver the within written Right-of-Way and Easement, and that (s)he, with

_____ witnessed the execution thereof.
(2nd Witness Name - Typed or Printed)

(1st Witness Signature)

SWORN TO before me this the _____ day of _____, 2005

_____(SEAL)
Notary Public for South Carolina

My Commission Expires _____

STATE OF SOUTH CAROLINA)
)
COUNTY OF SPARTANBURG)

RIGHT-OF-WAY AND EASEMENT

KNOW ALL MEN BY THESE PRESENTS that the undersigned,
_____, for and in consideration of the sum of
_____ Dollar(s) in hand paid to the undersigned at and before
the sealing of these presents by The Commissioners of Public Works of the City of
Spartanburg, South Carolina, (receipt of which is hereby acknowledged) has granted,
bargained, sold and released, and by these presents does grant, bargain, sell and release to
The Commissioners of Public Works of the City of Spartanburg, South Carolina, their
successors and assigns forever:

A PERPETUAL RIGHT-OF-WAY & EASEMENT, 20 feet in, over, upon, under and
across, certain property owned by the Grantor(s) herein located in the County of Spartanburg,
State of South Carolina.

SAID RIGHT-OF-WAY & EASEMENT is shown on a plat made for the
Spartanburg Water System by _____, Registered Land Surveyor(s), dated
_____, a copy of which is attached hereto and made a part hereof as Exhibit A.

For a more full and particular description, reference is hereby specifically made to the
above referenced plat and records thereof.

Together with the right to locate, install, repair, maintain and remove water meters at
locations adjacent to, but outside, the designated limits of said right-of-way and easement.

Said right-of-way and easement is granted for the purpose of enabling the
Commissioners of Public Works of the City of Spartanburg, South Carolina (1) to install,
construct, maintain, operate, renew, replace and repair an underground water pipeline or
pipelines within said right-of-way, together with any and all appurtenances used or useful in
connection therewith, including, but not limited to, service lines, meters, meter boxes,
including tailpiece on customer's side of meter and hydrants; (2) to install, construct, operate,

maintain, repair and replace any service lines, meters, meter boxes, including tailpieces on customer's side of meter and hydrants within said right-of-way or meters located at positions outside of said right-of-way in connection with providing water service to the property; (3) to exercise the right at any and all times to enter upon said strip of land included in said right-of-way and easement for any purpose in connection with the installation, construction, maintenance, operation, renewal, enlargement, replacement or repairing of said water pipeline or pipelines, service lines, meters, meter boxes, including tailpiece on customer's side of meter, and hydrants and all other appurtenances in connection therewith, with the right to do any and all necessary excavation, construction, and maintenance work in connection with said installations.

Grantor(s) covenant(s) and agree(s) *for itself and its* heirs and assigns, which covenant shall run with the land and with the right-of-way and easement hereby granted, that (1) *(s)he/they/it* will not, nor will *(s)he/they/it* permit any excavating or other activities or uses of said strip of land which would damage or tend to damage or injure or obstruct water lines installed in said right-of-way or service lines or the other appurtenances installed in connection with said installations or which may in any way interrupt or interfere with the normal and usual service of said installations; (2) *(s)he/they/it* will not construct or permit the construction of any building or structures within said right-of-way; (3) *(s)he/they/it* will not and will not permit anything to be done that will in any way interfere with or obstruct the operation, maintenance, renewal, enlargement, replacement, or repairing of said water lines, service lines, meters, meter boxes, including tailpiece on customer's side of meter, and hydrants or other appurtenances, or interrupt or interfere with the usual and normal service and operation of the installations; and (4) *(s)he/they/it* will not change nor permit the changing of the ground level within the limits of said right-of-way as it exists upon the completion of construction of the water pipeline being installed by The Commissioners of Public Works of the City of

Spartanburg, South Carolina.

The word "grantor" herein and pronouns relating to grantor shall include all genders, the singular and plural, and persons or corporations.

TO HAVE AND TO HOLD all and singular the said right-of-way and easement hereby granted to The Commissioners of Public Works of the City of Spartanburg, South Carolina, their successors and assigns forever, and the grantor does hereby bind the grantor and the grantor's heirs, executors, administrators, successors and assigns to warrant and forever defend all and singular the said premises unto the grantee and the grantee's successors and assigns against the grantor and the grantor's heirs and successors, and against every person whosoever lawfully claiming or to claim the same or any part thereof.

WITNESS the grantor's hand and seal at Spartanburg, South Carolina, this the ____ day of _____, 2005.

WITNESSES

(1st Witness Signature)

(2nd Witness Signature)

NAME

By: _____ (SEAL)

Its: _____

STATE OF SOUTH CAROLINA)
)
COUNTY OF SPARTANBURG)

PROBATE

PERSONALLY appeared before me _____
(1st Witness Name - Typed or Printed)

and made oath that (s)he saw the within _____, sign,

seal, and as _____ act and deed deliver the within written Right-of-Way and Easement, and

that (s)he, with _____ witnessed the execution thereof.
(2nd Witness Name - Typed or Printed)

(1st Witness Signature)

SWORN TO before me this the _____ day of _____, 2005

_____(SEAL)
Notary Public for South Carolina

My Commission Expires _____

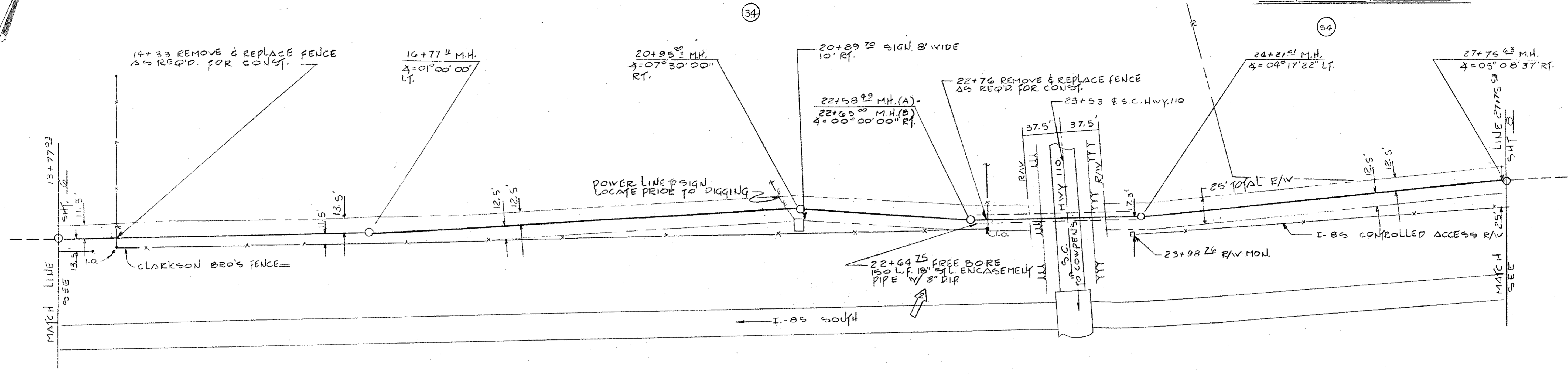
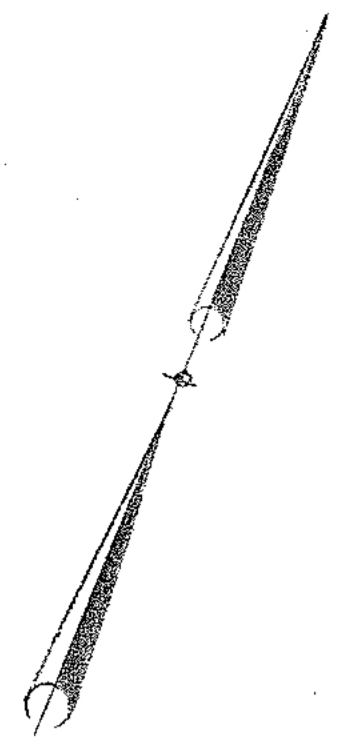
SANITARY SEWER TAP LOCATIONS

LOT NUMBER	SEWER LINE IDENTIFICATION	TAP STATION	DOWNSTREAM MH STA. & NO.	DISTANCE TO DOWNSTREAM MH	LENGTH OF TAP	DIRECTION OF TAP	DEPTH OF TAP AT END	SPECIAL NOTES:
LOT 237	SEWER LINE 'A'	3+33.14	3+33.14-MH NO. 3	- 0 -	27.00'	LEFT	4.00'	TAP OUT OF 3+33.14-MH NO. 3
LOT 238	SEWER LINE 'A'	4+18.14	3+33.14-MH NO. 3	85.00'	27.00'	LEFT	4.00'	
LOT 239	SEWER LINE 'A'	4+81.14	3+33.14-MH NO. 3	148.00'	27.00'	LEFT	4.00'	
LOT 240	SEWER LINE 'A'	5+58.14	3+33.14-MH NO. 3	225.00'	27.00'	LEFT	4.00'	
LOT 241	SEWER LINE 'A'	7+71.31	5+91.31-MH NO. 4	180.00'	53.00'	LEFT	7.00'	
LOT 242	SEWER LINE 'A'	9+23.61	7+88.61-MH NO. 5	135.00'	27.00'	LEFT	6.00'	
LOT 243	SEWER LINE 'A'	10+03.61	7+88.61-MH NO. 5	215.00'	27.00'	LEFT	7.00'	
LOT 244	SEWER LINE 'A'	10+64.76	10+51.76-MH NO. 6	13.00'	27.00'	LEFT	7.00'	
LOT 245	SEWER LINE 'A'	11+36.76	10+51.76-MH NO. 6	85.00'	27.00'	LEFT	7.00'	
LOT 246	SEWER LINE 'A'	12+07.76	10+51.76-MH NO. 6	156.00'	27.00'	LEFT	6.00'	
LOT 247	SEWER LINE 'A'	12+84.76	10+51.76-MH NO. 6	233.00'	13.00'	LEFT	6.00'	
LOT 248	SEWER LINE 'A'	13+56.76	10+51.76-MH NO. 6	305.00'	13.00'	LEFT	6.00'	
LOT 249	SEWER LINE 'A'	17+46.17	17+46.17-MH NO. 8	- 0 -	66.00'	STRAIGHT	7.00'	TAP OUT OF 17+46.17-MH NO. 8
LOT 250	SEWER LINE 'A'	17+46.17	17+46.17-MH NO. 8	- 0 -	66.00'	RIGHT	7.00'	TAP OUT OF 17+46.17-MH NO. 8
LOT 251	SEWER LINE 'A'	17+29.46	14+46.46-MH NO. 7	283.00'	40.00'	RIGHT	6.00'	
LOT 252	SEWER LINE 'A'	16+59.46	14+46.46-MH NO. 7	213.00'	40.00'	RIGHT	6.00'	
LOT 253	SEWER LINE 'A'	15+81.46	14+46.46-MH NO. 7	135.00'	40.00'	RIGHT	6.00'	
LOT 254	SEWER LINE 'A'	15+14.46	14+46.46-MH NO. 7	68.00'	40.00'	RIGHT	6.00'	
LOT 255	SEWER LINE 'A'	14+46.46	14+46.46-MH NO. 7	- 0 -	27.00'	RIGHT	4.00'	
LOT 256	SEWER LINE 'A'	13+89.76	10+51.76-MH NO. 6	338.00'	40.00'	RIGHT	6.00'	
LOT 257	SEWER LINE 'A'	13+14.76	10+51.76-MH NO. 6	263.00'	40.00'	RIGHT	6.00'	
LOT 258	SEWER LINE 'A'	12+33.76	10+51.76-MH NO. 6	182.00'	40.00'	RIGHT	6.00'	
LOT 259	SEWER LINE 'A'	11+56.76	10+51.76-MH NO. 6	105.00'	40.00'	RIGHT	6.00'	
LOT 260	SEWER LINE 'A'	10+69.76	10+51.76-MH NO. 6	18.00'	27.00'	RIGHT	7.00'	
LOT 261	SEWER LINE 'A'	9+88.61	7+88.61-MH NO. 5	200.00'	27.00'	RIGHT	6.00'	
LOT 262	SEWER LINE 'A'	9+13.61	7+88.61-MH NO. 5	125.00'	40.00'	RIGHT	6.00'	
LOT 263	SEWER LINE 'A'	8+48.61	7+88.61-MH NO. 5	60.00'	27.00'	RIGHT	6.00'	
LOT 264	SEWER LINE 'A'	7+88.61	7+88.61-MH NO. 5	- 0 -	27.00'	RIGHT	7.00'	TAP OUT OF 7+88.61-MH NO. 5
LOT 265	SEWER LINE 'A'	7+73.31	5+91.31-MH NO. 4	182.00'	66.00'	RIGHT	7.00'	
LOT 324	SEWER LINE 'A'	7+51.31	5+91.31-MH NO. 4	160.00'	66.00'	RIGHT	6.00'	
LOT 325	SEWER LINE 'A'	7+01.31	5+91.31-MH NO. 4	110.00'	40.00'	RIGHT	6.00'	
LOT 326	SEWER LINE 'A'	6+41.31	5+91.31-MH NO. 4	50.00'	40.00'	RIGHT	4.00'	
LOT 327	SEWER LINE 'A'	5+91.31	5+91.31-MH NO. 4	- 0 -	27.00'	RIGHT	4.00'	TAP OUT OF 6+41.31-MH NO. 4
LOT 345	SEWER LINE 'A'	5+28.14	3+33.14-MH NO. 3	195.00'	27.00'	RIGHT	3.00'	
LOT 346	SEWER LINE 'A'	4+68.14	3+33.14-MH NO. 3	135.00'	40.00'	RIGHT	3.00'	
LOT 347	SEWER LINE 'A'	3+78.14	3+33.14-MH NO. 3	45.00'	27.00'	RIGHT	4.00'	
LOT 348	SEWER LINE 'A'	3+13.74	1+83.74-MH NO. 2	130.00'	27.00'	RIGHT	6.00'	

NOTE: THE LOCATION AND DEPTH OF ALL SANITARY SEWER STUBS SHOWN HEREON AND LISTED ON THIS CHART WERE MADE BY THE SANITARY SEWER CONTRACTOR AND HAS BEEN SHOWN AS A CONVENIENCE. NO VERIFICATION OF THESE LOCATIONS AND DEPTHS MADE BY THIS FIRM.

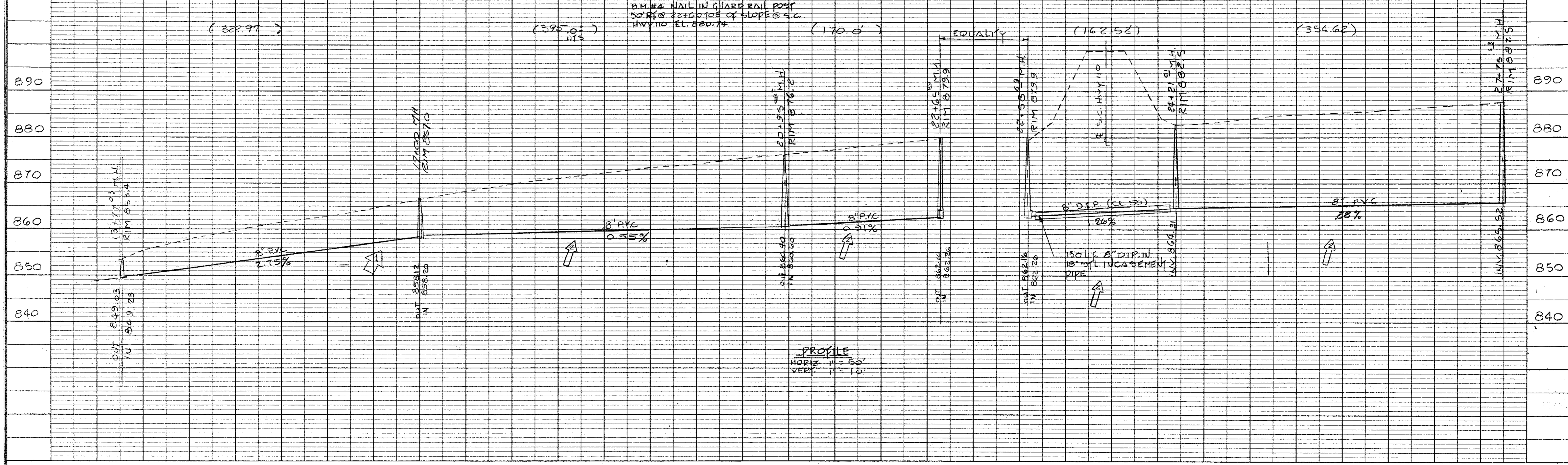
CLARKSON BROTHERS INC.

MOUNTAIN VIEW BAPTIST CHURCH



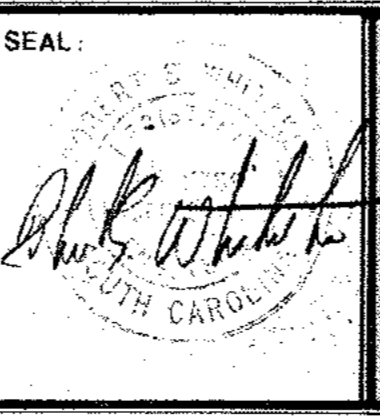
PLAN
1" = 50'

13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28



REVISIONS				
LOCATION	DESCRIPTION	DATE	BY	APP
1	REVISED M.H. TO 17'00"	5-26-88	RSV	
2	REVISED LINE SIZE TO 8"	7-1-88	LM	

APPROVALS				
PROJECT ENGR.	DESIGNED BY	DRAWN BY	CHECKED BY	APPROVED BY
RSV	RSV	MER	RAL	RSV



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 803-576-6810

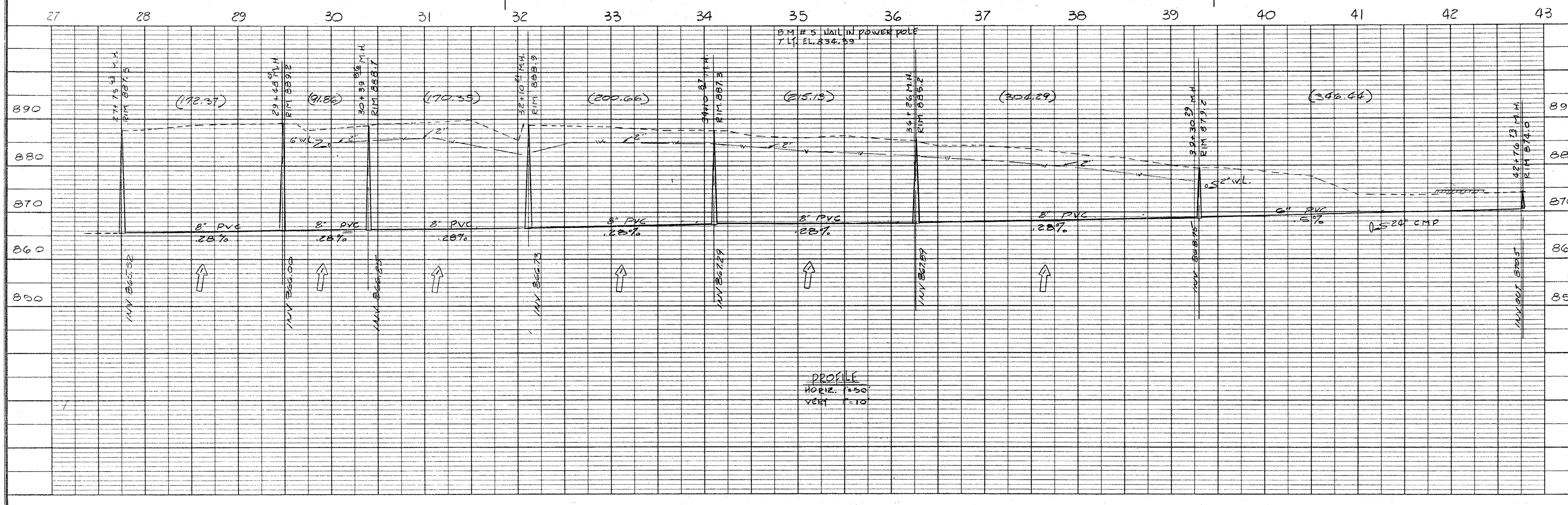
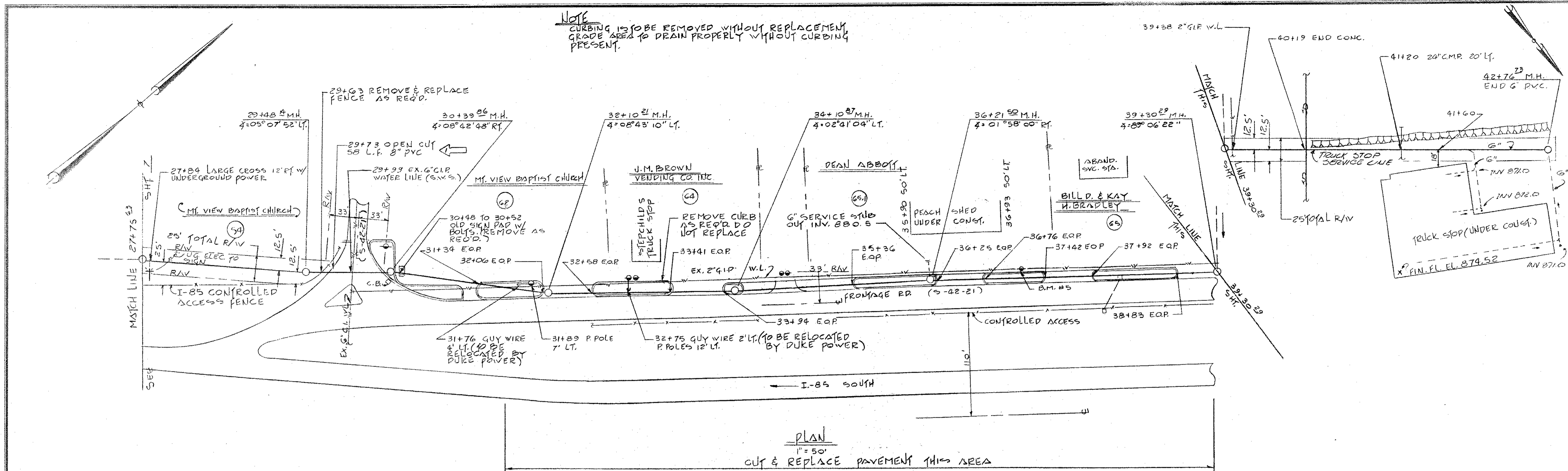
PROJECT
TOWN of COWPENS
 S.C. HWY. 110
SEWER SYSTEM ADDITIONS

SHEET TITLE
GRAVITY SEWER

SCALE: AS NOTED DATE: MAR. 1988

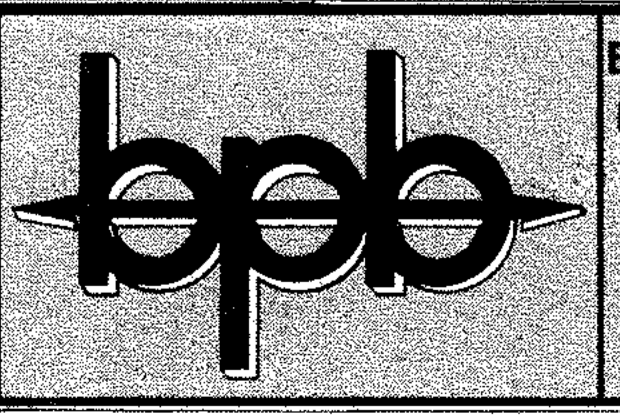
SHEET 7 OF 10
 REF. 85140
 N.B. NO.
 FILE NO.

NOTE
 CURBING IS TO BE REMOVED WITHOUT REPLACEMENT,
 GRADE AREA TO DRAIN PROPERLY WITHOUT CURBING
 PRESENT.



REVISIONS					
LOCATION	DESCRIPTION	DATE	BY	APP	LOCATION
1	Revised Line Size To 8"	7-1-88	LTA		

APPROVALS					
PROJECT ENGR.	DATE	BY	APP	PROJECT ENGR.	DATE
RSW				RSW	
DESIGNED BY				MRR	
DRAWN BY				RAL	
CHECKED BY				RSW	



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PROJECT
TOWN of COWPENS
 S.C. HWY. 110
SEWER SYSTEM ADDITIONS

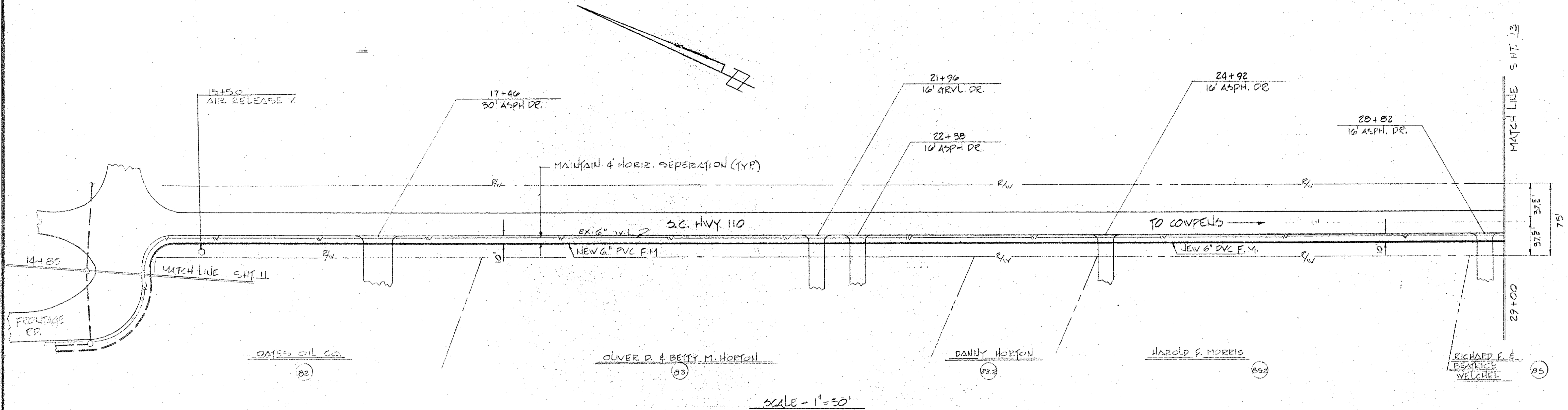
SHEET TITLE
GRAVITY SEWER

SCALE: AS NOTED DATE: MAR 1988

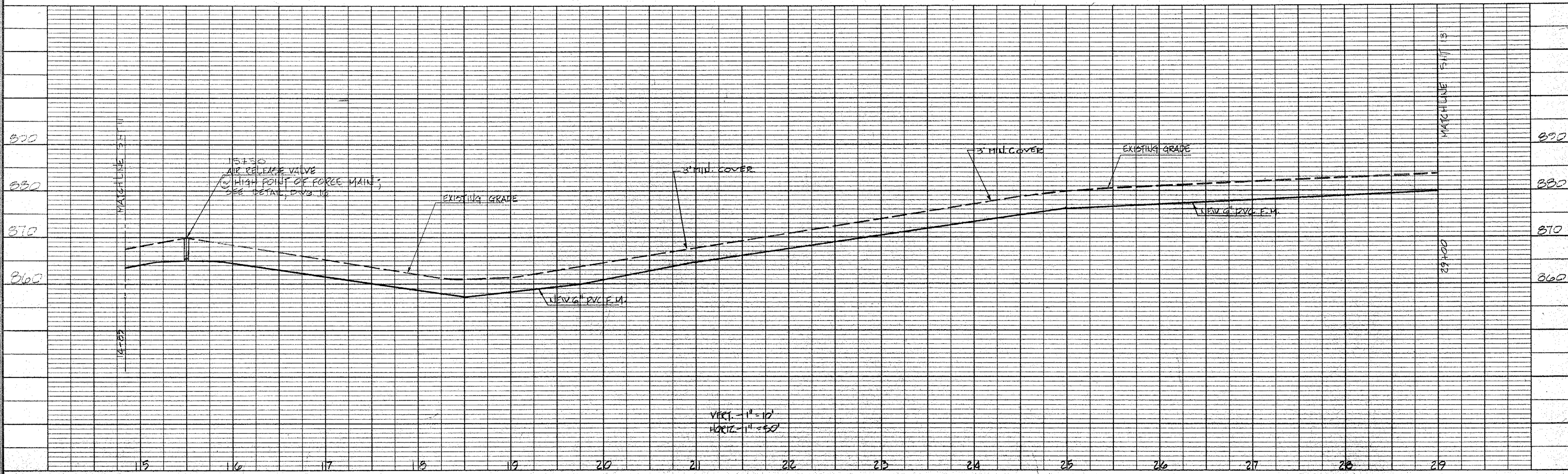
SHEET 8 OF 16
 REF: 88140
 N.B. NO. FILE NO.

NOTES

1). ALL BENDS TO BE BLOCKED (TYP.)

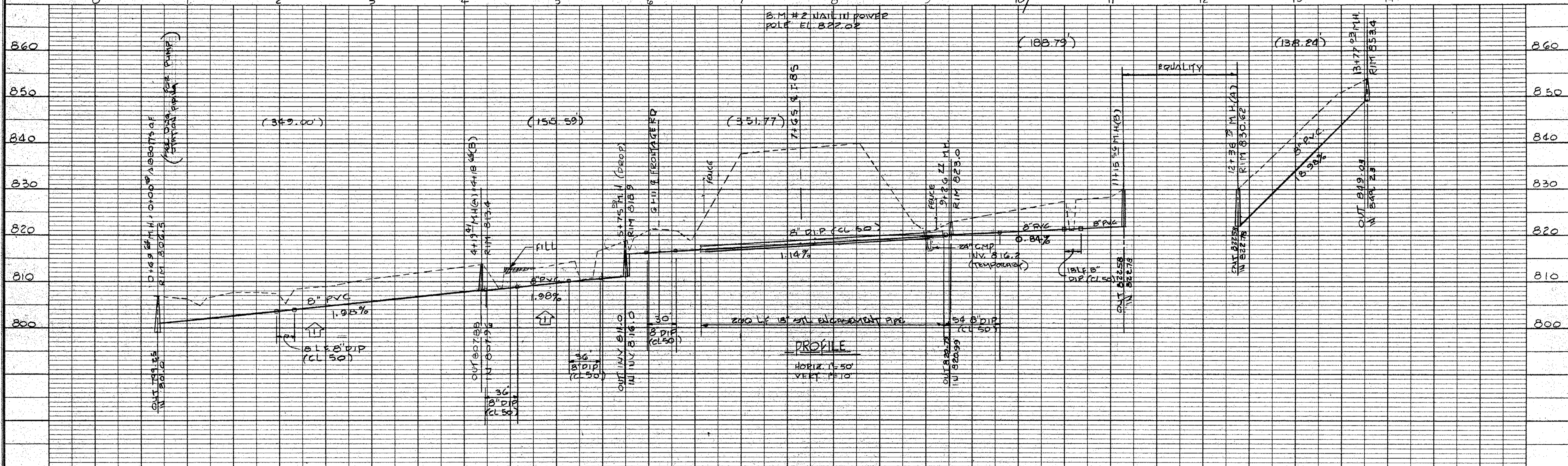
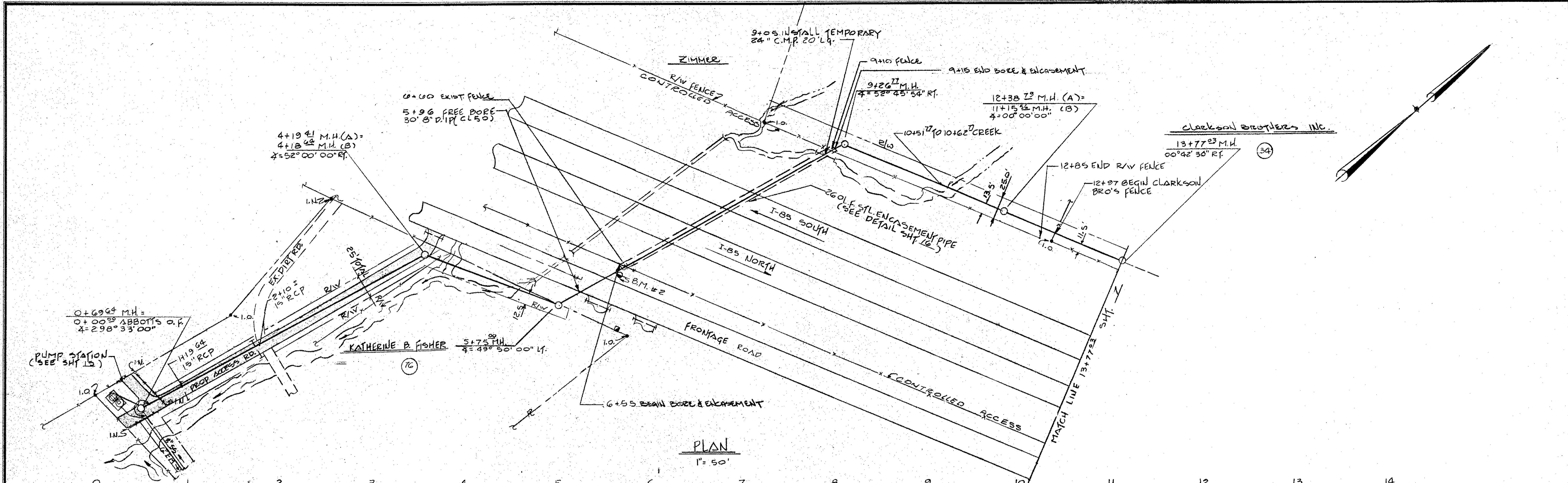


SCALE - 1" = 50'



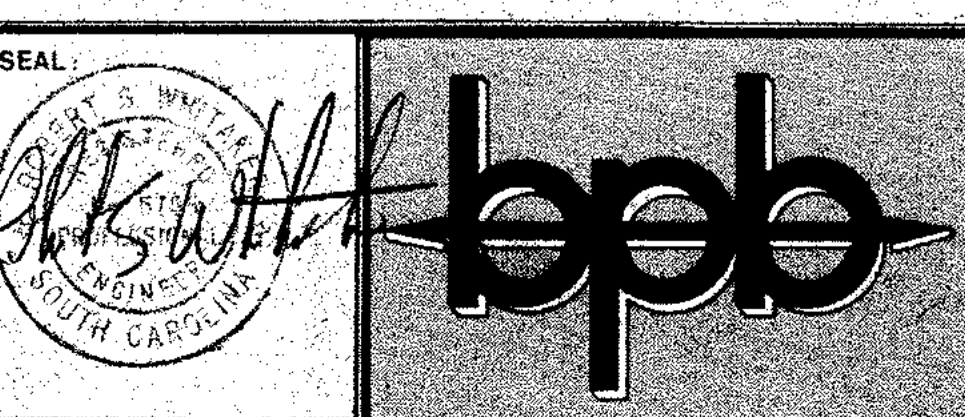
VERT. = 1" = 10'
HORIZ. = 1" = 50'

REVISIONS				APPROVALS				SEAL	PROJECT		SHEET TITLE		SHEET	
LOCATION	DESCRIPTION	DATE	BY	APP	LOCATION	DESCRIPTION	DATE	BY	APP	TOWN of COWPENS S.C. HWY. 110 SEWER SYSTEM ADDITIONS		FORCE MAIN		SHEET 12
														OF 16
														REF. 88140
														N.B NO
														FILE NO.



REVISIONS			
LOCATION	DESCRIPTION	DATE	BY
1	DELETE M.H. 1436 2L		
2	REALIGN SEWER CHANGE GRADE 7/6% LTH RSW		

APPROVALS			
PROJECT ENGR	DESIGNED BY	DRAWN BY	CHECKED BY
RSW	RSW	MRR	RAL
			RSW



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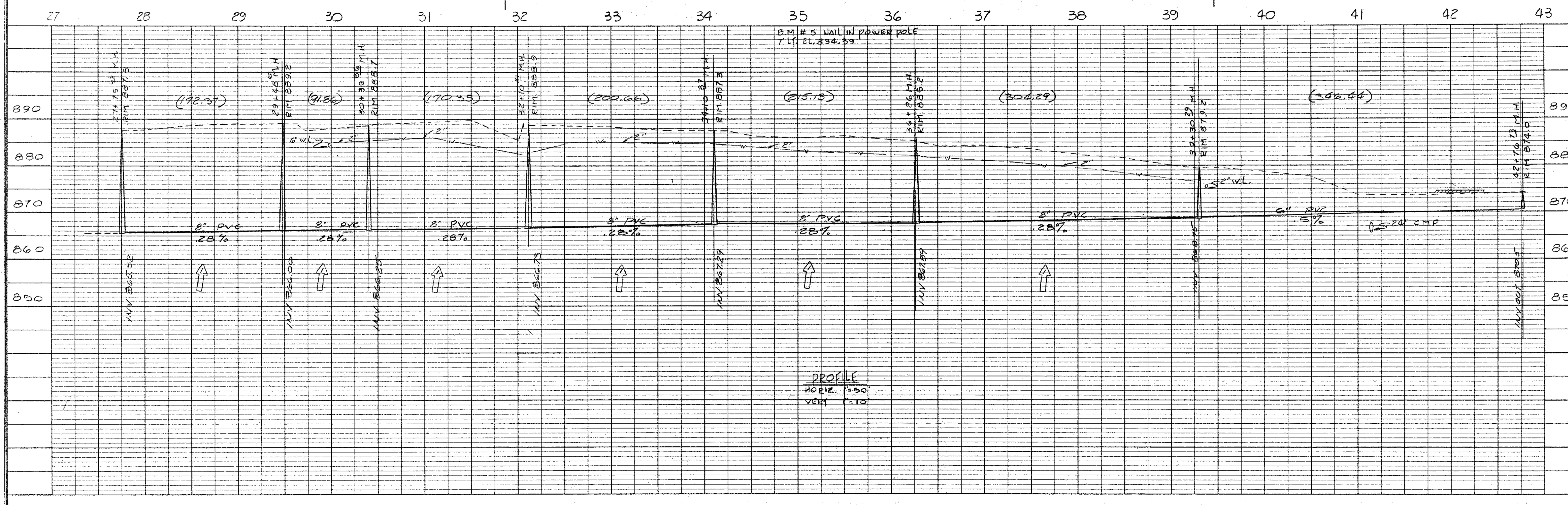
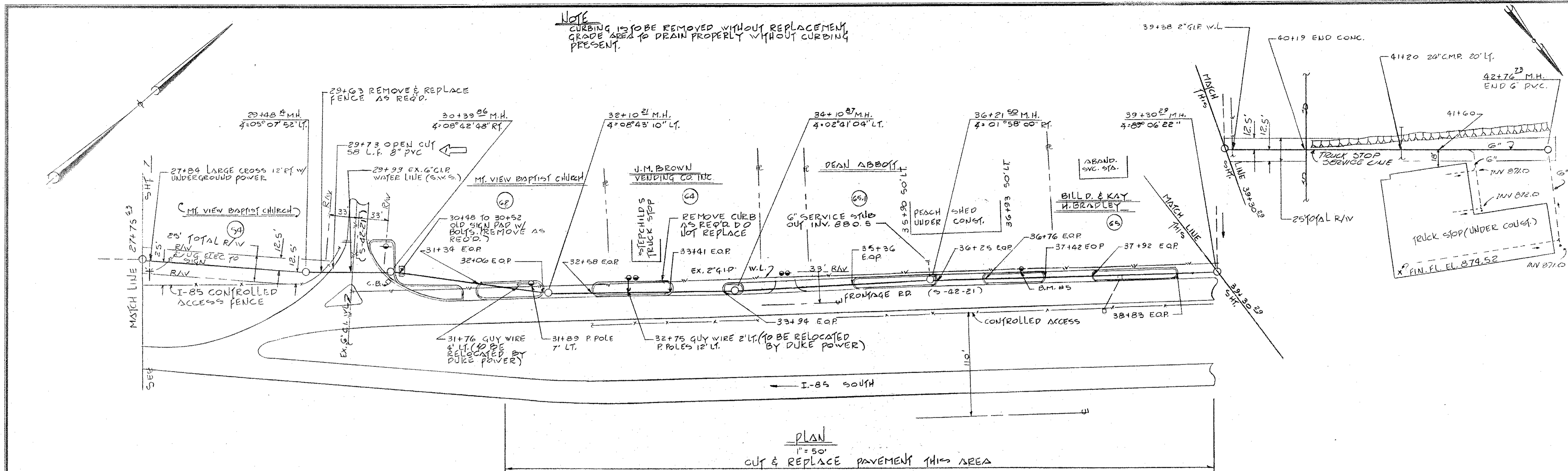
PROJECT
TOWN of COWPENS
S.C. HWY. 110
SEWER SYSTEM ADDITIONS

SHEET TITLE
GRAVITY SEWER

SCALE: AS NOTED
DATE: MAR. 1988

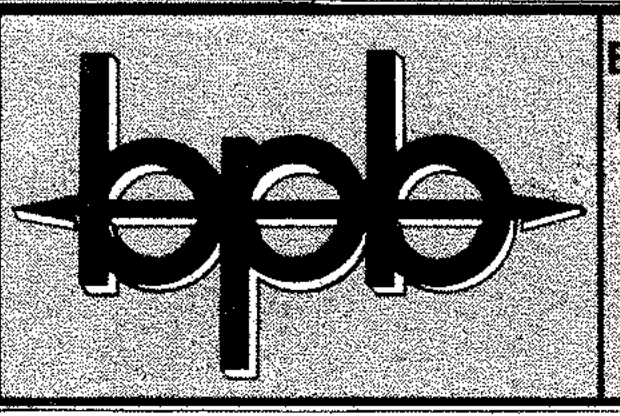
SHEET 6
DF 16
REF. 88140
N.B. NO.
FILE NO.

NOTE
 CURBING IS TO BE REMOVED WITHOUT REPLACEMENT,
 GRADE AREA TO DRAIN PROPERLY WITHOUT CURBING
 PRESENT.



REVISIONS					
LOCATION	DESCRIPTION	DATE	BY	APP	LOCATION
1	Revised Line Size To 8"	7-1-88	LTA		

APPROVALS					
PROJECT ENGR.	DATE	BY	APP	PROJECT ENGR.	DATE
RSW				RSW	
DESIGNED BY				MRR	
DRAWN BY				RAL	
CHECKED BY				RSW	
APPROVED BY					



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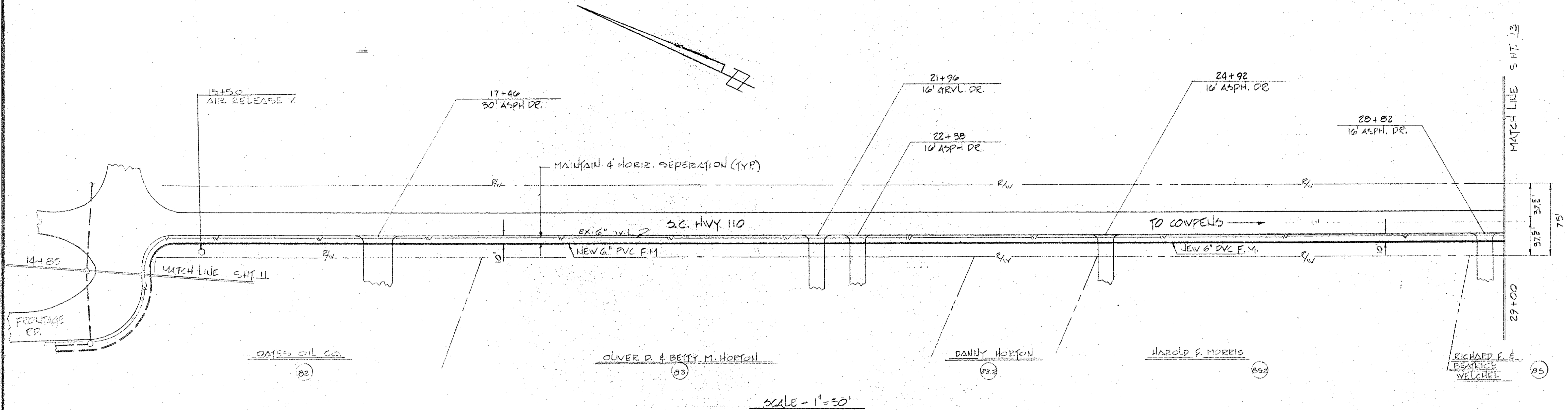
PROJECT
TOWN of COWPENS
 S.C. HWY. 110
SEWER SYSTEM ADDITIONS

SHEET TITLE	
GRAVITY SEWER	
SCALE: AS NOTED	DATE: MAR 1988

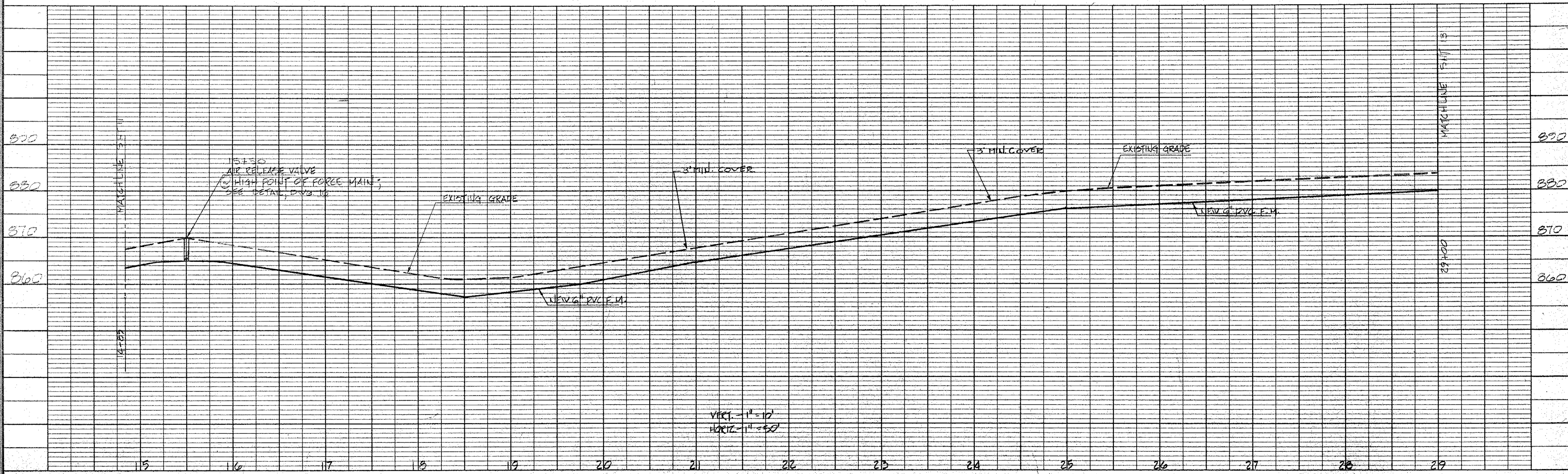
SHEET 8
 OF 16
 REF. 88140
 N.B. NO.
 FILE NO.

NOTES

1). ALL BENDS TO BE BLOCKED (TYP.)



SCALE - 1" = 50'

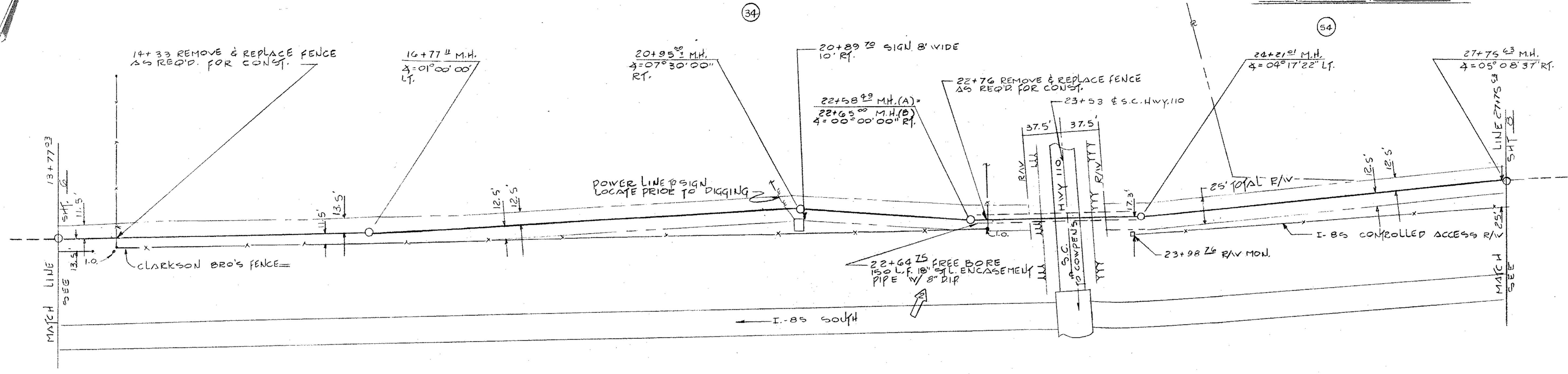
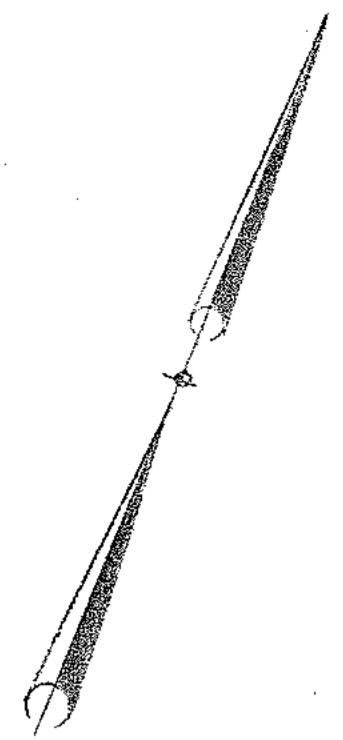


VERT. = 1" = 10'
HORIZ. = 1" = 50'

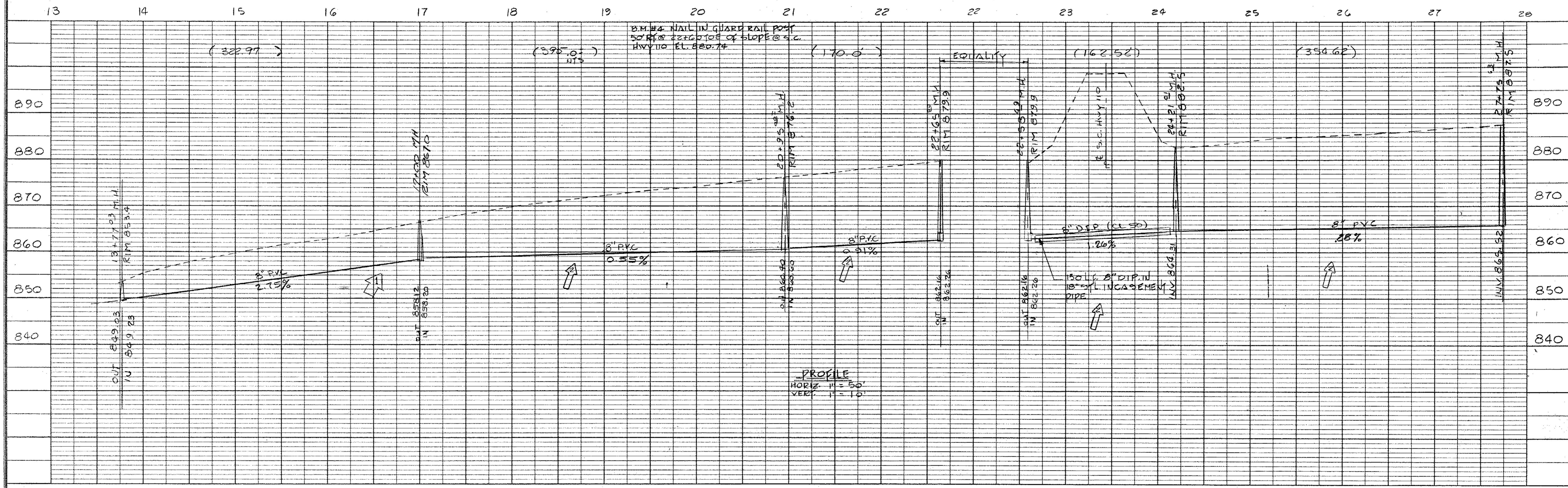
REVISIONS				APPROVALS				PROJECT		SHEET TITLE	
LOCATION	DESCRIPTION	DATE	BY	APP.	LOCATION	DESCRIPTION	DATE	BY	APP.	PROJECT	SHEET TITLE
										TOWN of COWPENS S.C. HWY. 110 SEWER SYSTEM ADDITIONS	FORCE MAIN

CLARKSON BROTHERS INC.

MOUNTAIN VIEW BAPTIST CHURCH

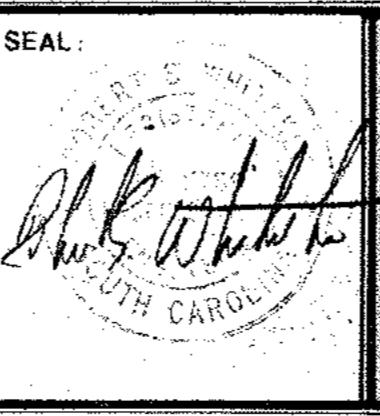


PLAN
1" = 50'



REVISIONS				
LOCATION	DESCRIPTION	DATE	BY	APP
1	REVISED M.H. TO 17" DIA	5-26-88	RSV	
2	REVISED LINE SIZE TO 8"	7-1-88	LM	

APPROVALS				
PROJECT ENGR.	DESIGNED BY	DRAWN BY	CHECKED BY	APPROVED BY
RSV	RSV	MER	RAL	RSV



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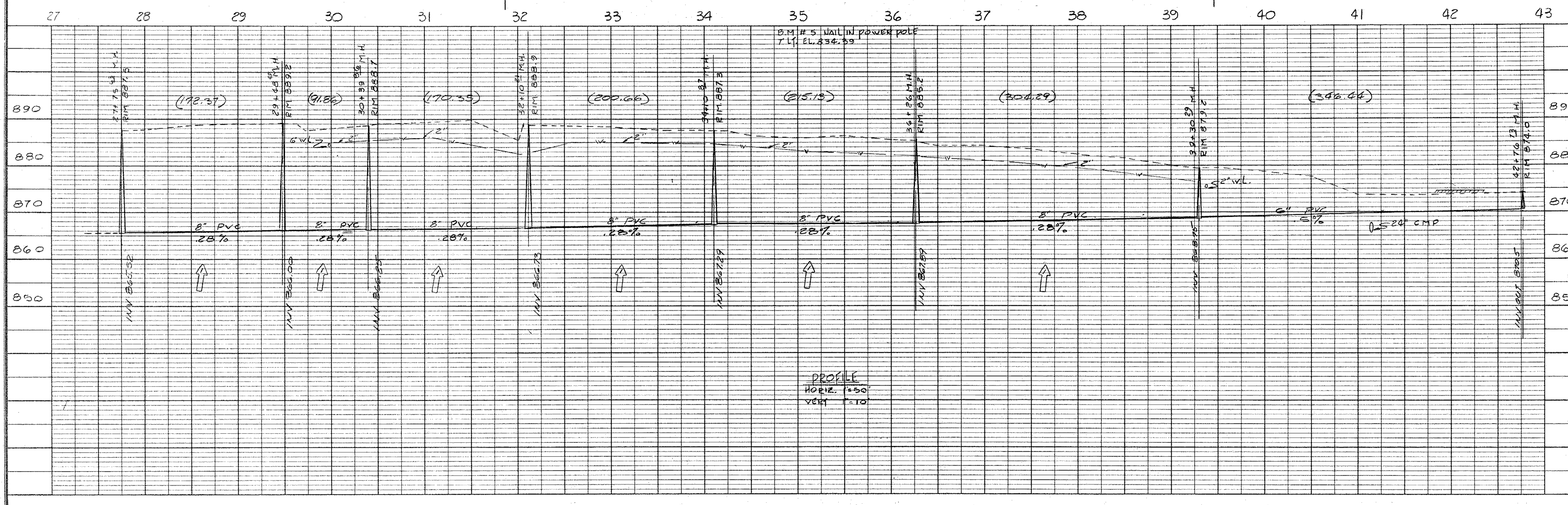
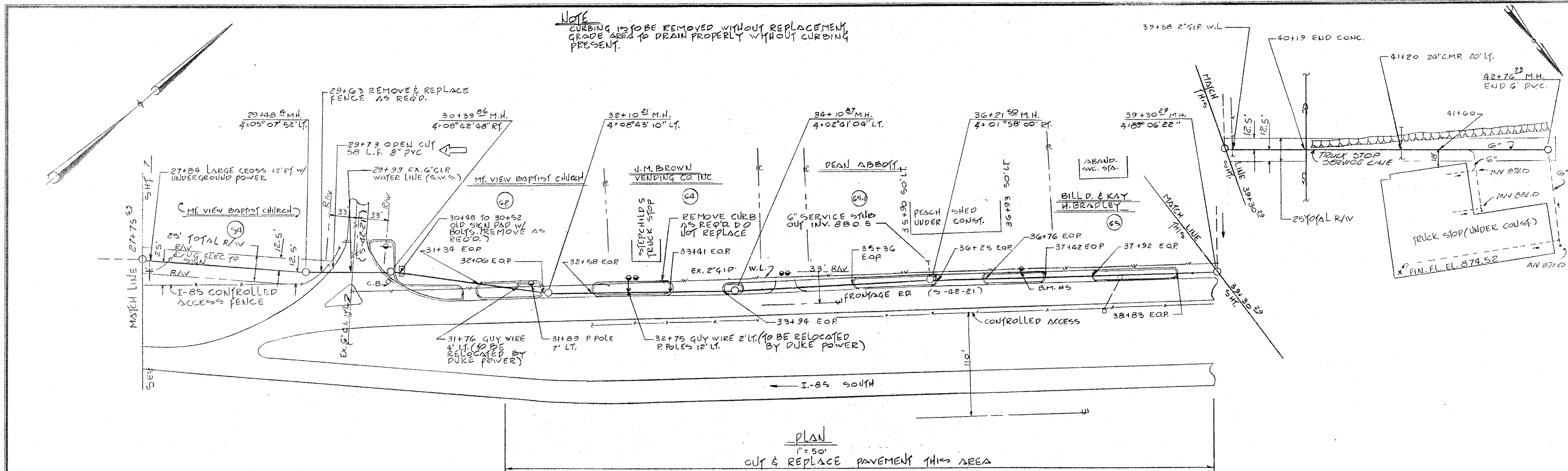
PROJECT
TOWN of COWPENS
 S.C. HWY. 110
SEWER SYSTEM ADDITIONS

SHEET TITLE
GRAVITY SEWER

SCALE: AS NOTED DATE: MAR. 1988

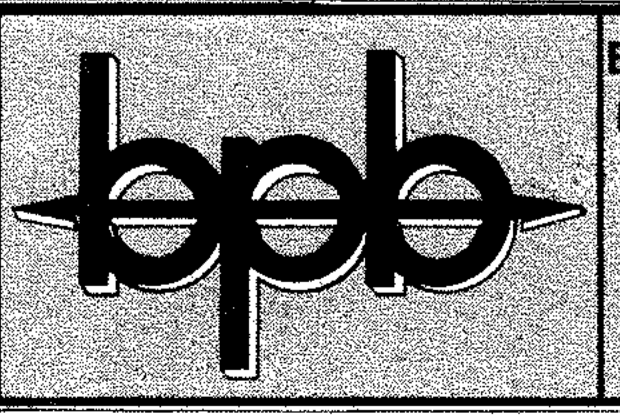
SHEET 7 OF 10
 REF. 85140
 N.B. NO.
 FILE NO.

NOTE
 CURBING IS TO BE REMOVED WITHOUT REPLACEMENT,
 GRADE AREA TO DRAIN PROPERLY WITHOUT CURBING
 PRESENT.



REVISIONS					
LOCATION	DESCRIPTION	DATE	BY	APP	LOCATION
1	Revised Line Size To 8"	7-1-88	LTA		

APPROVALS					
PROJECT ENGR.	DATE	BY	APP	PROJECT ENGR.	DATE
RSW				RSW	
DESIGNED BY				MRR	
DRAWN BY				RAL	
CHECKED BY				RSW	
APPROVED BY					



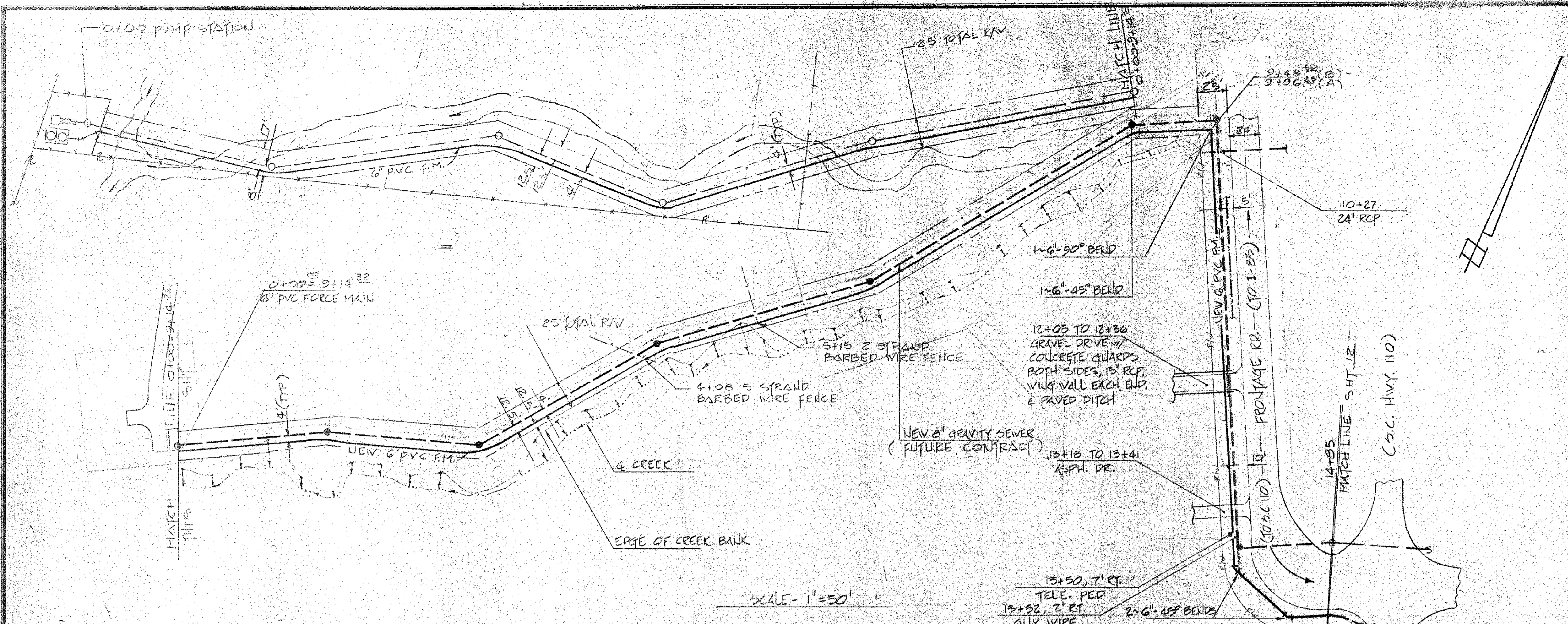
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PROJECT
TOWN of COWPENS
 S.C. HWY. 110
SEWER SYSTEM ADDITIONS

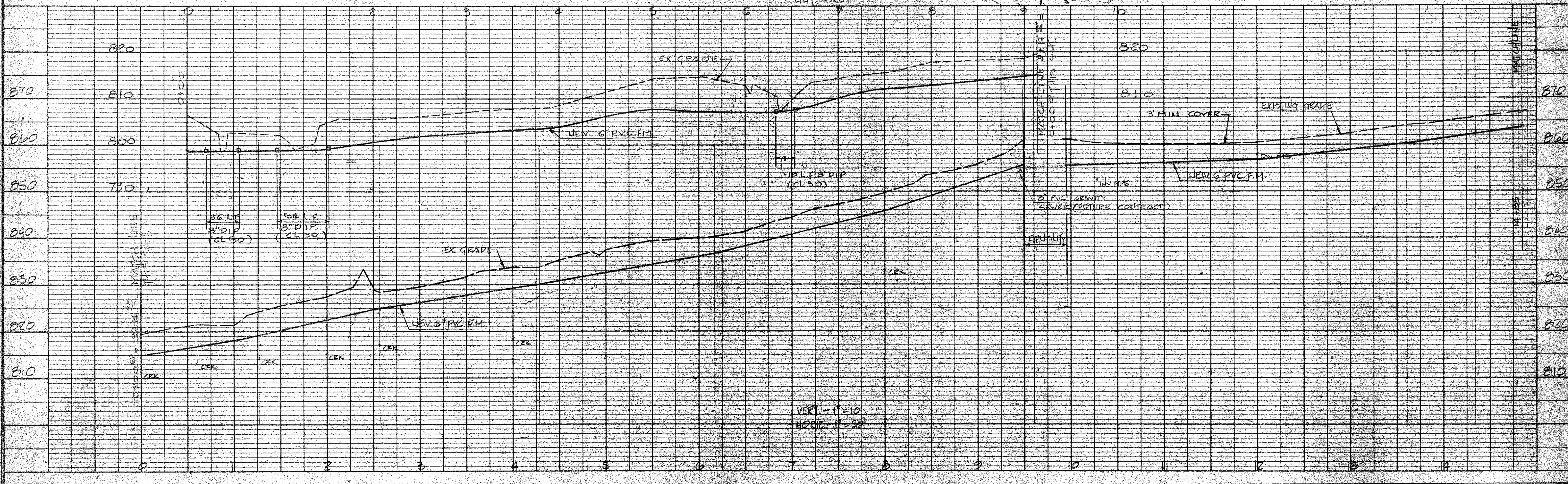
SHEET TITLE
GRAVITY SEWER

SCALE: AS NOTED DATE: MAR 1988

SHEET 8 OF 16
 REF: 88140
 N.B. NO. FILE NO.



- NOTES**
- 1) ALL BENDS TO BE BLOCKED (TYP)
 - 2) DISTANCE BETWEEN FORCE MAIN & GRAVITY SEWER TO BE AS REQUIRED FOR PROPER INSTALLATION.
 - 3) ALL WORK ALONG FRONTAGE ROAD AND S.C. HWY. 110 TO BE INSTALLED WITHIN RIGHT-OF-WAY LIMITS
 - 4) 3" MIN COVER ON 6" PVC FORCE MAIN
 - 5) ALL FENCING TO BE REMOVED & REPLACED AS REQ'D.



REVISIONS			
LOCATION	DESCRIPTION	DATE	BY APP

APPROVALS			
PROJECT ENGR	DATE	BY	APP
RSW			
DESIGNED BY		FPC	
DRAWN BY		FPC	
CHECKED BY		CND	
APPROVED BY		RSW	

SEAL

bpb

B. F. BARBER & ASSOCIATES, INC.
ENGINEERS-SURVEYORS-PLANNERS

PROJECT

TOWN of COWPENS
S.C. HWY. 110
SEWER SYSTEM ADDITIONS

SHEET TITLE

FORCE MAIN

SCALE: AS SHOWN

DATE: MAR. 1968

SHEET 11 OF 10

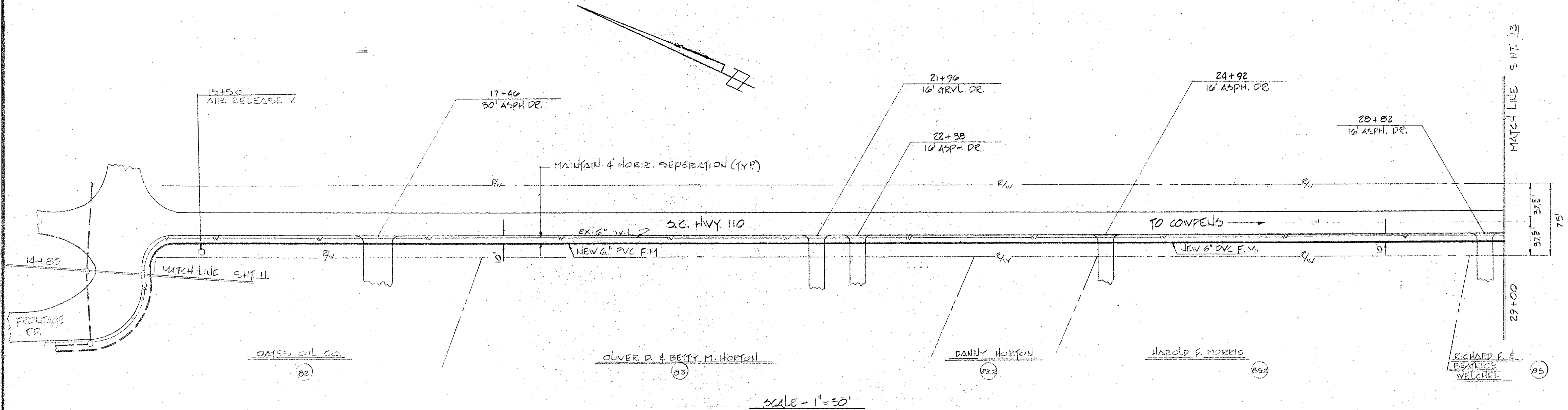
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N.B. NO.

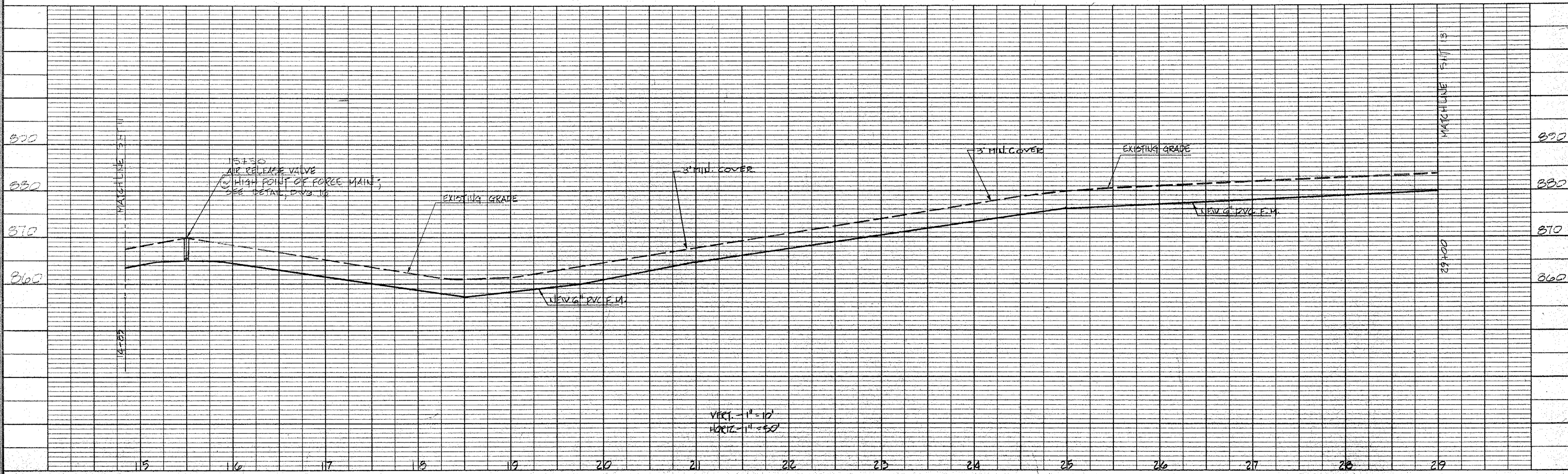
FILE NO.

NOTES

1). ALL BENDS TO BE BLOCKED (TYP.)



SCALE - 1" = 50'



REVISIONS				APPROVALS				PROJECT		SHEET TITLE	
LOCATION	DESCRIPTION	DATE	BY	APP	LOCATION	DESCRIPTION	DATE	BY	APP	PROJECT	SHEET TITLE
										TOWN of COWPENS S.C. HWY. 110 SEWER SYSTEM ADDITIONS	FORCE MAIN