COLUMBIA COUNTY, FLORIDA
BOARD OF COUNTY COMMISSIONERS

INVITATION TO BID
BID NO. 2023-12
ELLISVILLE WATER MAIN EXTENSION

Notice is hereby given that sealed bids will be received in the Columbia County Manager's office until **3:30 P.M.** on **January 16, 2024** for Columbia County Project No. **2023-12**. This office is located on the second floor of the Courthouse Annex at 135 Hernando Avenue, Room 203 Lake City FL 32055.

ELLISVILLE WATER MAIN EXTENSION

Project Description: The project consists of extending the existing potable water transmission system in Ellisville, FL, at US Highway 41/441 and SE Bailey Street, and connecting to the existing Fort White Water Treatment Plant (WTP) at 172 SW Holstein Avenue in Fort White, FL. The proposed extension consists of ±52,300 linear feet of 12-inch HDPE water main, including several horizontal directional drill (HDD) road crossings and wetland area crossings. The project also includes on-site improvements at both the Ellisville WTP and the Fort White WTP, as well as one Chlorine Booster Station located at 3303 SW County Road 18 in Fort White, FL.

The Bid Forms and Construction specifications may be obtained from the County's web site at http://www.columbiacountyfla.com/PurchasingBids.asp. Deadline for questions regarding construction plans, specifications, and/or bid documents must be received before **5:00 P.M.** on **January 12, 2024.**

The successful bidder may be required to furnish the County Manager with a 5% bid bond with submittal, and if selected, furnish the County Manager with a performance bond and proof of liability insurance prior to commencing work.

A Non-Mandatory pre-bid will be held on site January 9, 2024 at 10:00 AM., at 2379 SE Giles Martin Ave. Please contact Steve Roberts for any questions regarding the pre-bid at 386) 466-9431.

The Columbia County Commission reserves the right to reject any or all bids and to add to the contract or delete from the contract to stay within their funding capabilities.

COLUMBIA COUNTY BOARD OF COUNTY COMMISSIONERS
PROJECT NUMBER 2023-12
Ellisville Water Main Extension

ELLISVILLE WATER MAIN EXTENSION
COLUMBIA COUNTY, FLORIDA

PROJECT MANUAL
VOLUME 1

COLUMBIA COUNTY BOARD OF COUNTY COMMISSIONERS
PROJECT NUMBER 2023-12
Ellisville Water Main Extension

NOTICE TO CONTRACTORS

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Company Name: _____

PROJECT NAME: Ellisville Water Main Extension
COLUMBIA COUNTY BID NO: 2023-12

TABLE 1
CONTRACTOR BID FORM

Pay Item	Pay Item Description	Notes *	Bid Quantity	Unit	Unit Price	Extended Price
CONTRACTOR-FURNISHED ITEMS (CONTRACTOR TO FURNISH AND INSTALL):						
1	Mobilization		1	LS	$	$
2	Maintenance of Traffic	*A*	1	LS	$	$
3	Erosion Control	*B*	1	LS	$	$
4	Disinfection and Testing	*C*	1	LS	$	$
5	12" HDPE Pipe, PE4710, DR-13.5	*D*	9,800	LF	$	$
6	HDD 12" HDPE Pipe, PE4710, DR-11	*D,E*	3,500	LF	$	$
7	12" DIP Pipe, FLG, Class 50		20	LF	$	$
8	12" DIP Pipe, MJ, Class 50	*F*	300	LF	$	$
9	10" DIP Pipe, MJ, Class 50	*F*	10	LF	$	$
10	8" DIP Pipe, MJ, Class 50	*F*	20	LF	$	$
11	8" DIP Pipe, FLG, Class 50		40	LF	$	$
12	6" DIP Pipe, FLG, Class 50		20	LF	$	$
13	12" DI 90 Bend Fitting, FLG, C153	*G*	2	EA	$	$
14	12" DI 90 Bend Fitting, MJ, C153	*G*	7	EA	$	$
15	12" DI 45 Bend Fitting, MJ, C153	*G*	9	EA	$	$
16	12" x 12" DI Tee Fitting, MJ, C153	*G*	5	EA	$	$
17	12" x 10" DI Tee Fitting, MJ, C153	*G*	1	EA	$	$
18	12" x 8" DI Tee Fitting, MJ, C153	*G*	1	EA	$	$
19	6" DI 90 Bend Fitting, FLG, C153	*G*	2	EA	$	$
20	6" DI 90 Bend Fitting, MJ, C153	*G*	1	EA	$	$
21	6" x 6" DI Tee Fitting, MJ, C153	*G*	1	EA	$	$
22	12" x 8" DI Reducer Fitting, FLG, C153	*G*	2	EA	$	$
23	12" x 8" DI Reducer Fitting, MJ, C153	*G*	2	EA	$	$
24	12" x 6" DI Reducer Fitting, FLG, C153	*G*	1	EA	$	$
25	Dry Barrel Hydrant, 5-1/4" Barrel, MJ, Yellow		9	EA	$	$
26	Hydrant Accessories	*H*	9	EA	$	$
27	12" Gate Valve, Resilient Wedge, NRS, MJ	*J*	25	EA	$	$
28	10" Gate Valve, Resilient Wedge, NRS, MJ	*J*	1	EA	$	$
29	8" Gate Valve, Resilient Wedge, NRS, MJ	*J*	3	EA	$	$
30	6" Gate Valve, Resilient Wedge, NRS, FLG	*J*	2	EA	$	$
31	2" Combination Air Release Valve (ARV), NPT	*K*	9	EA	$	$
32	12" x 2" Tapping Saddle		9	EA	$	$
33	6" Pressure Control Altitude Valve, FLG	*L*	1	EA	$	$
34	8" Ultrasonic Flowmeter, Tube, FLG		2	EA	$	$
35	12" Ultrasonic Flowmeter, Clamp-On	*M*	1	EA	$	$
36	8" Static Mixer, 3-Element, FLG		1	EA	$	$
37	10'L x 12'W x 9'H Prefab Concrete Building	*N*	1	EA	$	$
38	Chlorine Feed System, Analyzers & Controls	*P*	1	LS	$	$
39	20 kW Generator and Diesel Fuel System	*Q*	1	LS	$	$
40	Web-Based Monitoring System		1	LS	$	$
41	6' Chain Link Security Fence	*R*	190	LF	$	$
42	10' Limerock Drive		120	SY	$	$
43	Chlorine Booster Station Sitework	*S*	1	LS	$	$
44	Asphalt Restoration	*T*	1	LS	$	$
45	Concrete Restoration		1	LS	$	$
46	Seed and Mulch, Bahia		1	LS	$	$

Company Name: _____

PROJECT NAME: Ellisville Water Main Extension
COLUMBIA COUNTY BID NO: 2023-12

TABLE 1 (continued)
CONTRACTOR BID FORM

Pay Item	Pay Item Description	Notes *	Bid Quantity	Unit	Unit Price	Extended Price
OWNER-FURNISHED ITEMS (CONTRACTOR TO INSTALL ONLY):						
47	12" HDPE Pipe, PE4710, DR-13.5 (50' lengths)	*U,D*	37,800	LF	$	$
48	HDD 12" HDPE Pipe, PE4710, DR-11 (50' lengths)	*U,D,E*	1,200	LF	$	$
49	12" DI 90 Bend Fitting, MJ, C153	*U,G*	6	EA	$	$
50	12" DI 45 Bend Fitting, MJ, C153	*U,G*	2	EA	$	$
51	Dry Barrel Hydrant, 5-1/4" Barrel, MJ, Yellow	*U*	20	EA	$	$
52	Hydrant Accessories	*U,H*	20	EA	$	$
53	12" Gate Valve, Resilient Wedge, NRS, MJ	*U,J*	20	EA	$	$
54	2" Combination Air Release Valve (ARV), NPT	*U,K*	8	EA	$	$
55	12" x 2" Tapping Saddle	*U*	8	EA	$	$
					TOTAL CONTRACTOR BID:	**$**

* *Table 1 Notes :*

A. *Item includes all elements required for the temporary traffic control (TTC) plan, construction stakeout, and temporary centerline delineation and stop bars placed at all non-working times.*

B. *Item includes synthetic bales, staked silt fence and other items necessary to minimize erosion and to prevent sediment transport to inlets, culverts, and/or directly beyond the Project limits.*

C. *Item includes all requirements of AWWA, ASTM and FDEP.*

D. *Item includes all joint fusions, all MJ adapters (with stiffener inserts), trace wire, warning tape and temporary sample taps. Owner-furnished quantity includes piping only. Refer also to Table 2 - Supplemental Materials by Owner.*

E. *Item includes all horizontal directional drill (HDD) installation; no casing required.*

F. *Item includes all joint accessories and polyethylene (PE) pipe encasement.*

G. *Item includes all joint accessories and PE encasement. Owner-furnished quantity includes fitting only. Refer also to Table 2 - Supplemental Materials by Owner.*

H. *Item includes hydrant tee, 6" branch main, 6" gate valve, valve box assembly, all joint accessories, PE encasement and RPM marker. Refer also to Table 2 - Supplemental Materials by Owner.*

J. *Item includes all joint accessories and valve box assemblies for buried installations.*

K. *Item includes tapping saddle and precast concrete vault. Owner-furnished quantity includes valve only.*

L. *Item includes 1" hydraulic sensing line to ground storage tanks.*

M. *Item includes remote display, all electrical accessories and precast concrete doghouse vault.*

N. *Item includes concrete foundation slab, doors with hardware, HVAC systems with louvers, plumbing, electrical and lightning protection.*

P. *Item includes injection quill, analyzer probes, chemical piping and precast concrete vaults.*

Q. *Item includes equipment pads, protective bollards, automatic transfer switch with controls, and all fuel piping with accessories.*

R. *Item includes 12'-wide double swing gate.*

S. *Item includes clearing, grading, grassing, sidewalk, equipment pads and miscellaneous yard piping.*

T. *Item includes asphalt millings for open-cut drives where millings pre-exist.*

U. *Owner-Furnished (Install Only) items have been pre-purchased by the Owner and are intended for use on this Project. These materials are stored at the Ellisville WTP site: 2379 SE Giles Martin Ave, Lk City, FL. Contractor shall be responsible for all other elements of work related to these items to complete the Project requirements, including loading and transporting the materials to the Project site and installing the materials. Refer also to Table 2 - Supplemental Materials by Owner. NOTE: For Contractor-furnished items, Contractor shall coordinate with Owner to provide the same manufacturers/models of Owner-furnished materials, including hydrants, valves and valve boxes.*

Company Name: _____

PROJECT NAME: Ellisville Water Main Extension
COLUMBIA COUNTY BID NO: 2023-12

TABLE 2
SUPPLEMENTAL MATERIALS BY OWNER

Item	Item Description	Notes *	Quantity	Unit
PIPING ACCESSORIES:				
1	12" HDPE MJ Adapter, DR-13.5, with Stiffener Insert	*A,B*	100	EA
2	12" MJ Accessory Pack	*A,B*	100	EA
3	10 AWG Tracer Wire, HDPE, 30 mil, 500' Roll	*A,B*	75	EA
4	3" Buried Warning Tape, PE, 1000' Roll	*A,B*	40	EA
VALVE ACCESSORIES:				
5	18" x 24" Valve Box, Heavy Duty, with "WATER" Lid	*A,B*	40	EA
HYDRANT ACCESSORIES:				
6	12" x 6" DI Hydrant Tee, MJ, C153	*A,C*	20	EA
7	6" Gate Valve, Resilient Wedge, NRS, MJ	*A,C*	20	EA
8	6" Megalug Restraint, MJ	*A,C*	40	EA
9	6" MJ Accessory Pack	*A,C*	40	EA
10	6" DIP Pipe, MJ, C151	*A,C*	390	LF

* *Table 2 Notes:*

A. *These supplemental materials have been pre-purchased by the Owner and are intended for use on this Project. These materials are stored at the Ellisville WTP site: 2379 SE Giles Martin Ave, Lk City, FL. Contractor shall be responsible for all other elements of work related to these items to complete the Project requirements, including loading, transporting and installing the materials at the Project site.*

B. *The unit prices for installing these Owner-furnished supplemental materials are not itemized in Table 1 - Bid Form. They are incorporated within and across multiple pay items on Table 1.*

C. *These items are included under Hydrant Accessories per Pay Item 52 of Table 1 - Bid Form. This quantity breakdown of Owner-furnished components are provided for the Bidder's convenience in estimating installation costs.*

Company Name: _____

COLUMBIA COUNTY BOARD OF COUNTY COMMISSIONERS

PROJECT NUMBER 2023-12

Ellisville Water Main Extension

Company Name: **(SEAL)**

_____

Authorized Company Representative:

_____

Printed Name **Signature**

Attested By:

_____

Printed Name **Signature**

Total Bid Amount:

_____

Date:

_____

In submitting this Bid, Bidder represents that:

Bidder has examined and carefully studied the Bidding Documents, the other related data identified in the Bidding Documents, and the following Addenda, receipt of which is hereby acknowledged.

Addendum No.	Addendum Date
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Bidder has visited the Site and become familiar with and is satisfied as to the general, local and Site conditions that may affect cost, progress, and performance of the Work.

Bidder is familiar with and is satisfied as to all federal, state and local Laws and Regulations that may affect cost, progress and performance of the Work.

Bidder has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site (except Underground Facilities) which have been identified in SC-4.02, and (2) reports and drawings of Hazardous Environmental Conditions that have been identified in SC-4.06.

Bidder has obtained and carefully studied (or accepts the consequences for not doing so) all additional or supplementary examinations, investigations, explorations, tests, studies and data concerning conditions (surface, subsurface and Underground Facilities) at or contiguous to the Site which may affect cost, progress, or performance of the Work or which relate to any aspect of the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, including applying the specific means, methods, techniques, sequences, and procedures of construction expressly required by the Bidding Documents to be employed by Bidder, and safety precautions and programs incident thereto.

Bidder does not consider that any further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of this Bid for performance of the Work at the price(s) bid and within the times and in accordance with the other terms and conditions of the Bidding Documents.

Bidder is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents.

Bidder has correlated the information known to Bidder, information and observations obtained from visits to the Site, reports and drawings identified in the Bidding Documents, and all additional examinations, investigations, explorations, tests, studies, and data with the Bidding Documents.

Bidder has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and the written resolution thereof by Engineer is acceptable to Bidder.

The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance of the Work for which this Bid is submitted.

Bidder will submit written evidence of its authority to do business in the state where the Project is located not later than the date of its execution of the Agreement.

Bidder further represents that:

this Bid is genuine and not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any agreement or rules of any group, association, organization or corporation.

Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid;

Bidder has not solicited or induced any individual or entity to refrain from bidding; and

Bidder has not sought by collusion to obtain for itself any advantage over any other Bidder or over Owner.

COLUMBIA COUNTY BOARD OF COUNTY COMMISSIONERS
PROJECT NUMBER 2023-12
Ellisville Water Main Extension

General Requirements

I. General.

Project Description: The project consists of extending the existing potable water transmission system in Ellisville, FL, at US Highway 41/441 and SE Bailey Street, and connecting to the existing Fort White Water Treatment Plant (WTP) at 172 SW Holstein Avenue in Fort White, FL. The proposed extension consists of ±52,300 linear feet of 12-inch HDPE water main, including several horizontal directional drill (HDD) road crossings and wetland area crossings. The project also includes on-site improvements at both the Ellisville WTP and the Fort White WTP, as well as one Chlorine Booster Station located at 3303 SW County Road 18 in Fort White, FL.

II. Contract Time

The contract time shall be **270 calendar days** from the date of contract execution. The contractor will be required to return executed contract to Columbia County Purchasing Director and Chad Williams, Columbia County Engineer, within 14 days of Board approval. Time can be extended by mutual agreement of both parties. Liquidated damages shall be based on FDOT specifications. No work is allowed on Saturdays, Sundays, and/or County designated holidays.

Bidder accepts the provisions of the Agreement as to liquidated damages in the event of failure to complete the Work within the Contract Time. Columbia County utilizes the Florida Department of Transportation's current edition of Standard Specifications for Road and Bridge Construction to establish the daily amounts.

Contractor shall provide a construction schedule with the bid package detailing time frames/lines showing how the project will be constructed. The schedule will be taken into consideration in the bid review process and bids submitted without the schedule could be reason for a bid to not receive full consideration.

III. Construction and Materials

All construction methods and materials shall conform to the requirements of the latest edition of the Florida Department of Transportation Design Standards and Florida Department of Transportation Standard Specifications for Road and Bridge Construction, and all information in provided Bid Document Package

V. Maintenance of Traffic

Contractor shall provide Maintenance of Traffic and it shall conform to the requirements of the latest edition of the Florida Department of Transportation Design Standards.

Flagging will be required and only one traffic lane may be closed between the hours of **8:30 A.M. to 4:30 P.M**. only. All construction signage shall be provided by the contractor.

VI. Compensation

Payment shall be made on a monthly basis on work completed with 5% retainage. Contractor invoice! shall include Columbia County Invoice Cover Sheet (see attached).

COLUMBIA COUNTY BOARD OF COUNTY COMMISSIONERS
PROJECT NUMBER 2023-12
Ellisville Water Main Extension

Purchasing Department – General Instructions to Bidders

These instructions will bind bidders and conditions herein set forth, except as specifically qualified in special bid and contract terms issued with any individual bid.

1. The following criteria are used in determining low responsible bidder:

    A. The ability, capacity and skill of bidder to perform required service.
    B. Whether the bidder can perform service promptly or within specified time.
    C. The character, integrity, reputation, judgment, experience and efficiency of bidder.
    D. The performance of previous contracts with Columbia County.
    E. The suitability of equipment or material or county use.
    F. The ability of bidder to provide future maintenance

2. Payment Terms are net (30) unless otherwise specified. Favorable terms, discounts, may be offered and will be considered in determining low bids if they are deemed by Purchasing Department to be advantageous to the County.

3. All bids should be tabulated, totaled and checked for accuracy. All blanks on Bid Proposal sheet shall be filled in and unit price will prevail in case of errors.

4. All requested information shall be included in the envelope. All desired information must be included for your bid to receive full consideration.

5. If anything on the bid request is not clear, you should contact the Purchasing Director immediately.

6. A bidders list is available at the Purchasing Office.

7. Quote all prices F.O.B. our warehouse or as specified in bid documents.

8. Each proposal shall be clearly marked on the outside of the envelope including Fed Ex, UPS or other delivery service envelopes, as a sealed bid. The name of the item being bid shall be shown on the outside in full.

9. No responsibility shall attach to any County representative or employee for the premature opening of bids not properly addressed or identified.

10. If only one (1) bid is received, the bid may be rejected and re-advertised or excepted if determined to be in the counties best interest.

11. Bids received late will not be accepted, and the County will not be responsible for late mail delivery.

12. Telephone and facsimile bids will not be acceptable in formal bid openings (sealed bids).
    Should a bid be misplaced by the County and found later, it will be considered. Any bidder may request and shall receive a receipt showing the day and time any bid is delivered to the appropriate office of the County from the personnel thereof.

13. Bids requiring bid bonds will not be accepted if bond is not enclosed. Cash or certified check will be accepted in lieu of bond except on construction projects where cost exceeds $40,000.

14. All bidders must be recognized dealers in the materials or equipment specified and is qualified to advise in their application or use. A bidder at any time requested must satisfy the Purchasing Office and the County Manager that he has the requisite organization, capital, plant, stock ability and experience to satisfactorily execute the contract in accordance with the provisions of the contract in which he is interested.

15. Any alterations, erasures, additions, or admissions of required information or any changes to specifications or bidding schedule are done at the risk of the bidder. Any bid will be rejected that has a substantial variation, that is; a variation that affects price, quantity, and quality or delivery date (when delivery is required by a specific time).

16. When requested, samples will be furnished to the County free of expense, properly marked for identification and accompanied by a list where there is more than one (1) sample. The County reserves the right to mutilate or destroy any sample submitted whenever it may be to the best interest of the County to do so for the purpose of testing.

17. The County will reject any material, supplies or equipment that did not meet the specifications, even though the bidder lists the trade names or names of such material on the bid or price quotation form.

18. The unauthorized use of patented articles is done entirely at the risk of the successful bidder.

19. The ESTIMATED QUANTITY given in the specifications or advertisements is for the purpose of bidding only. The County may purchase more or less than the estimated quantity and the vendor must not assume that such estimated quantity is part of the contract.

20. Only the latest model equipment as evidenced by the manufacture's current published literature will be considered. Obsolete models of equipment not in production will not be acceptable. The equipment shall be composed of new parts and materials. Any unit containing used parts or having seen any service other than the necessary tests will be rejected. In addition to the equipment specifically called for in the specification, all equipment catalogued by the manufacturer as standard or required by the State of Florida shall be furnished with the equipment. Where required by the State of Florida Motor Vehicle Code, vehicles shall be inspected and bear the latest inspection sticker of the Florida Department of Revenue.

21. Prospective bidders are required to examine the location of the proposed work or delivery and determine, in their own way, the difficulties, which are likely to be encountered in the prosecution of the same.

22. All materials, equipment and supplies shall be subject to rigid inspection, under the immediate supervision of the Purchasing Department, its designee and /or the department to which they are delivered. If defective material, equipment, or supplies are discovered, the contractor, Upon being instructed by the Purchasing Department or designee, shall remove, or make good such material, equipment, or supplies without extra compensation. It is expressly understood and agreed that the inspection of materials by the County will in no way lessen the responsibility of the Contractor release him from his obligation to perform and deliver to the County Sound and satisfactory materials, equipment, or supplies. The Contractor agrees to pay the costs of all tests upon defective material, equipment, or supplies or allow the costs to be deducted from any monies due him from the County.

23. Unless otherwise specified by the Purchasing Department all materials, supplies, or equipment quoted herein must be delivered within thirty (30) days from the day of notification or exceptions noted on bid sheets.

24. A contract will not be awarded to any corporation, firm, or individual who is, from any cause, in arrears to the County or who has failed in former contracts with the County to perform work satisfactorily, either to the character of the work, the fulfillment or guarantee, or the time consumed in completing the work.

25. Reasonable grounds for supposing that any bidder is interested in more than one proposal for the same item will be considered sufficient cause for rejection of all proposals in which he is interested.

26. Submitting a proposal when the bidder intends to sublet the contract may be a cause for rejection of bids or cancellation of the contract by the County Manager.

27. Unless otherwise specified the County reserves the right to award each items separately or on a lump sum basis whichever is in the best interest of the County.

28. The County reserves the right to reject any and/or all quotations, to waive any minor discrepancies in the bids for all bidders equally, quotations, or specifications, when deemed to be in the best interest of the County and also to purchase any part, all or none of the materials, supplies, or equipment specified.

29. Failure of the bidder to sign the bid or have the signature of an authorized representative or agent on the bid proposal in the space provided will be cause for rejection of the bid. Signature must be written in ink. Typewritten or printed signatures will not be acceptable.

30. Any bidder may withdraw his bid at any time before the time set for the opening of the bids. No bid may be withdrawn in the thirty- (30) day period after bids are opened.

31. It is mutually understood and agreed that if at any time the Purchasing Department or designee shall be of the opinion that the contract or any part thereof is unnecessarily delayed or that the rate of progress or delivery is unsatisfactory, or that the contractor is willfully violating any of the conditions or covenants of the agreement, or executing the same in bad faith, the Purchasing Department or his designee shall have the power to notify the aforesaid contractor of the nature of the complaint. Notification shall constitute delivery of notice, or letter to address given in the proposal. If after three (3) working days of notification the conditions are not corrected to the satisfaction of the Purchasing Director, he shall thereupon have the power to take whatever action he may deem necessary to complete the work or delivery herein described, or any part thereof, and the expense thereof, so charged, shall be deducted from any paid by the County out of such monies as may become due to the said contractor, under and by virtue of this agreement. In case such expense shall exceed the last said sum, then and in that event, the bondsman or the contractor, his executors, administrators, successors, or assigns, shall pay the amounts of such excess to the County on notice made by the Purchasing Department or his designee of the excess due.

32. If the bidder proposes to furnish any item of foreign make or product, he shall write “foreign” together with the name of the originating country opposite such item on a proposal.

33. Any complaint from bidders relative to the invitation to bid or attached specifications shall be made prior to the time of opening bids; otherwise, the bidder waives any such complaint.

34. Contracts may be cancelled by the County with or without cause on thirty- (30) days advance written notice.

35. All contractors submitting bids for road projects in excess of $250,000 must be pre- qualified with the Florida Department of Transportation and shall provide proof of such qualification upon request.

36. Any bidder affected adversely by an intended decision with respect to the award of any bid, shall file with the Purchasing Department for Columbia County, a written notice of intent to file a protest not later than seventy-two (72) hours (excluding Saturdays, Sundays and legal holidays), after the posting of the bid tabulation. Protest procedures may be obtained in the Purchasing Department.

37. A person or affiliate who has been placed on the convicted vendor's list following a conviction for a public

entity crime may not submit a bid on a contract to provide any goods or services to Columbia County, may not submit a bid on a contract with Columbia County for the construction or repair of a public building or public work, may not submit bids on leases of real property to Columbia County, may not be awarded or perform work as a contractor, supplier, subcontractor, or consultant under a contract with Columbia County, and may not transact business with Columbia County for a period of 36 months from the date of being placed on the convicted vendor list.

38. Vendor/Contractor shall utilize the U.S. Department of Homeland Security's E-Verify system, in accordance with the terms governing use of the system, to confirm the employment eligibility of;

    A. all persons employed by the Vendor/Contractor during the term of the Contract to perform employment duties within Florida; and

    B. all persons, including subcontractors, assigned by the Vendor/Contractor to perform work is pursuant to the contract with the County.

39. Contractor shall register online at http://www.columbiacountyfla.com/PurchasingBids.asp for this specific project. All addendums are delivered via email through this website, and it is the contractor's responsibility to ensure all addendums are used in the bid submittal.

40. Any existing materials demolished within county right of way may be retained by Columbia County.

NFPS
PO BOX 3823
LAKE CITY, FL 32056
PHONE (386) 752-4675
FAX (386) 752-4674
www.nfps.net

ELLISVILLE WATER MAIN EXTENSION
COLUMBIA COUNTY, FLORIDA

PROJECT MANUAL
(VOLUME 2 OF 2)

Ricky L. Hendrix, PE
FL Registration No. 45239
Date: _____

TABLE OF CONTENTS

SECTION 099000 - PAINTING AND COATING....4
SECTION 260000 - ELECTRICAL GENERAL....38
SECTION 260010 - ELECTRICAL CODES AND STANDARDS....52
SECTION 260511 - REINFORCED CONCRETE FOUNDATIONS FOR ELECTRICAL EQUIPMENT....54
SECTION 260519 - LOW-VOLTAGE POWER CONDUCTORS AND CABLES....58
SECTION 260526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS....63
SECTION 260529 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS....70
SECTION 260533 - RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS....76
SECTION 260550 - EXCAVATION AND BACKFILL....88
SECTION 260553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS....90
SECTION 262416 - PANELBOARDS....103
SECTION 262726 - WIRING DEVICES....113
SECTION 262813 - FUSES....119
SECTION 262816 - ENCLOSED SWITCHES AND CIRCUIT BREAKERS....123
SECTION 263213 STANDBY ENGINE GENERATORS....128
SECTION 263600 - TRANSFER SWITCHES....145
SECTION 264113 - LIGHTNING PROTECTION FOR STRUCTURES....154
SECTION 265119 - LED INTERIOR LIGHTING....159
SECTION 269000 - INSTRUMENTATION AND CONTROLS....166
SECTION 310513 - SOILS FOR EARTHWORK....192
SECTION 311000 - SITE CLEARING....196
SECTION 312213 - ROUGH GRADING....200
SECTION 312316 - EXCAVATION....207
SECTION 312316.13 - TRENCHING....210
SECTION 330505.31 - HYDROSTATIC TESTING....216

SECTION 330507.13 - UTILITY DIRECTIONAL DRILLING 219

SECTION 330509.33 - THRUST RESTRAINT FOR UTILITY PIPING 229

SECTION 330533 – HIGH DENSITY POLYETHYLENE (HDPE) PIPE, FITTINGS & JOINING 235

SECTION 330597 - IDENTIFICATION FOR UTILITIES PIPING 246

SECTION 331413 - PUBLIC WATER UTILITY DISTRIBUTION PIPING 248

SECTION 331416 - SITE WATER UTILITY DISTRIBUTION PIPING 257

SECTION 331419 - VALVES AND HYDRANTS FOR WATER UTILITY SERVICE 267

SECTION 331900 - WATER UTILITY METERING EQUIPMENT 273

SECTION 099000 - PAINTING AND COATING

PART 1 - GENERAL

1.1 GENERAL INTENT

A. A. The intent of this Specifications is to provide the material and workmanship necessary to produce complete protection of the surfaces to be coated for Columbia County. This includes all surface preparation, pre-treatment, coating application, touch-up of factory coated surfaces, protection of surfaces not to be coated, clean-up, and appurtenant work, all in accordance with the requirements of the Contract Documents. Throughout this specification “ENGINEER” refers to North Florida Professional Services or Contract Manager. And “OWNER” refers to Columbia County.

1.2 PURPOSE

A. The purpose of this Specification is to generally outline the work contemplated for the painting and protective coating work performed for Columbia County, including Contract Operations, Capital Improvement Projects, and Developer Contributed Assets as defined under Scope below; together with the General Conditions, Special Provisions and all other Technical Specifications included herewith. All paints and materials used on interior tank or treatment unit surfaces shall conform to AWWA and/or Florida Department of Environmental Protection (FDEP) regulations as they may apply to potable water or wastewater service. The manufacturer furnishing the coating material may be required to furnish certification to the ENGINEER/OWNER that the materials meet these provisions.

1.3 DESCRIPTION

A. The extent of painting work is shown on the project drawings, contracts and schedules, and as specified herein.

B. The work includes painting and finishing of interior and exterior exposed items and surfaces throughout the project, except as otherwise specified or shown on the drawings.

1. Surface preparation, priming and coats of paint specified are in addition to shop-priming and surface treatment specified under other sections of the work.

C. The work includes field painting of exposed bare and covered pipes and ducts including color coding, and of hangers, exposed steel and iron work, tanks, vessels, and primed metal surfaces of equipment installed under the mechanical and electrical work, except as otherwise indicated.

D. Paint all exposed surfaces normally painted in the execution of a building project whether or not

colors are designated in "schedules". Where items or surfaces are not specifically mentioned, or are not specifically excluded from the painting work, paint these the same as adjacent similar materials or areas. If color or finish is not designated, the OWNER will select these from standard colors available for the materials systems specified.

1.4 PAINTING NOT INCLUDED

A. The following categories of work are not included as part of the field-applied finish work, unless otherwise noted on the drawings or in the Contract Documents.

1. Shop Priming: Unless otherwise specified, shop priming of ferrous metal items is included under the various sections for structural steel, miscellaneous metal, metal fabrications, hollow metal work, and similar items. Also, for fabricated components such as shop-fabricated or factory-built mechanical and electrical equipment or accessories.

2. Pre-Finished Items: Unless otherwise shown or specified, do not include painting when factory-finishing or installer finishing is specified for such items as, but not limited to, finished electrical equipment including light fixtures, switchgear and distribution cabinets.

3. Concealed Surfaces: Unless otherwise shown or specified, painting is not required on surfaces such as walls or ceilings in concealed areas and generally inaccessible areas. Painting of galvanized work that will be concealed in the completed work is not required. Do not paint structural steel to be encased in concrete, nor structural steel specified not to be painted under Division S. Except for touch-up as specified in Part 3, painting of shop primed structural steel and ferrous metals that will be concealed in the completed work is not required.

4. Finished Metal Surfaces: Metal surfaces of anodized aluminum, stainless steel, chromium plating, copper, bronze and similar finished materials will not require finish painting, unless otherwise specified.

5. Operating and Machined Parts and Labels: Moving parts of operating units, mechanical and electrical parts, such as valve and damper operators, machined surfaces, grease fittings, linkages, sinkages, sensing devices, motor and fan shafts will not require finish painting unless otherwise specified.

   a. Do not paint over any code-requiring labels, such as Underwriter’s Laboratories and Factory Mutual, or any equipment identification, performance rating, name, or nomenclature plates.

6. Other Surfaces: Do not apply to glass, manhole frames and covers, aluminum platform gratings, stair treads, door thresholds, concrete wearing surfaces, or other walking surfaces unless otherwise specified.

1.5 CODES, STANDARDS AND REGULATIONS

A. The work herein specified shall be performed in a legally acceptable manner, and it shall be the responsibility of the CONTRACTOR to obtain any and all licenses, permits, and legal approvals required to perform the work specified.

B. All material and work covered by this specification shall comply with all currently approved or accepted provisions of applicable codes and standards published by the following organizations:

ANSI - American National Standards Institute 11 West 42nd
New York, NY 10036
212-642-4900

API - American Petroleum Institute
1220 L Street N.W.
Washington, DC 20005
202-682-8000

ASTM - American Society for Testing andMaterials 100 Barr Harbor Dr.
West Conshohocken, PA. 19428 610-832-9500

AWS - American Welding Society
550 N.W. LeJeune Rd.
Miami, FL 33126
305-443-9353

AWWA - American Water Works Association

6666 West Quincy Avenue
Denver, CO. 80235
303-794-7711

FM Factory Mutual Research
1151 Boston-Providence Turnpike
Norwood, MA 02062
617-762-4300

NACE - National Association of Corrosion Engineers
PO Box 218340
Houston, TX 77218 1440
South Creek Dr.
Houston, TX. 77084-4906
713-492-0535

NEMA - National Electrical Manufacturer's Association
2101 L Street N.W. Ste. 300
Washington, DC 20037

202-457-8400

NFPA - National Fire Protection Association
1 Battery march Park
Quincy, MA 02269-9101
617-770-3000

OSHA - Occupational Safety and Health Act
U.S. Department of Labor
Occupational Safety & Health Administration 8040
Peters Rd. Bldg. H-100
Fort Lauderdale, FL 33324
954-424-0242

SAE Society of Automotive Engineers 400
Commonwealth Dr.
Warrendale PA. 15096-0001
412-776-4841

SSPC - Steel Structures Painting Council
40 24th Street
Pittsburgh, PA 15222
412-281-2331

SSPWC - Standard Specifications for Public Works Construction
Building News, Inc.
3055 Overland Avenue Los
Angeles, CA 90034 310-
202-7775

UBC Uniform Building Code Published
by ICBO

UL Underwriters Laboratories Inc.
333Psingsten Rd. Northbrook
IL. 67062
312-273-4255

C. The CONTRACTOR shall comply with all applicable Federal, state, and local laws and ordinances.

1.6 ACCEPTABLE COATING MANUFACTURERS

A. Except as otherwise indicated herein, materials specified are from the catalog of the Kop-Coat, Inc. listed below. Materials by other manufacturers approved by the Engineer are acceptable provided that they are established to the satisfaction of the ENGINEER as being compatible with and of equal quality to the coatings of the company listed. The CONTRACTOR shall provide satisfactory documentation from the firm manufacturing the proposed material that the material meets the specified requirements and is equivalent or better than the listed materials in the following properties:

1. Quality
2. Durability
3. Resistance to abrasion and physical damage
4. Life expectancy
5. Ability to recoat in future
6. Solids content by volume
7. Dry film thickness per coat
8. Compatibility with other coatings
9. Suitability for the intended service
10. Resistance to chemical attack
11. Temperature limitations in service and during application
12. Type and quality of recommended undercoats and topcoats
13. Ease of application
14. Ease of repairing damaged areas
15. Stability of colors

B. The cost of all testing and analyzing of the proposed substitute materials that may be required by the ENGINEER, shall be paid by the CONTRACTOR. If the proposed substitution requires changes in the contract work, the CONTRACTOR shall bear all such costs involved and the costs of allied trades affected by the substitution. These substitutions for other manufacturers must be made and approved prior to the bid date opening.

C. Material Sources: Kop-Coat Inc. is the standard of quality for the industrial coating materials specified in this Section. Where paint numbers are listed, it is to show the type and quality of coatings

that are required. For convenience of reference, this specification includes product designations for coatings and coating colors as manufactured by the Kop-Coat Inc., St. Louis, MO. 800-547-2468. Other acceptable manufacturers are, Keeler and Long, Watertown, CT. 203-274-6701, and Tnemec Co., Kansas City, MO. 816-483-3400 , and Porter International, Louisville, Ky. 502- 588-9769. Proposed substitute materials must be shown to satisfy the material descriptions and to equal or exceed the properties of the listed materials as required above in Paragraph 1-06 A.

1.7 SUBMITTALS

A. Coating Materials List: The CONTRACTOR shall provide six (6) copies of a coating materials list which indicates the manufacturer and the coating number, keyed to the coating schedule herein, for approval of the ENGINEER. The submittals shall be made sufficiently in advance of the coating operations to allow ample time for checking, correcting, resubmitting and rechecking.

B. Paint Manufacturer's Information: For each paint system to be used, the CONTRACTOR shall submit the following listed data prior to beginning painting operations.

1. Paint manufacturer's data sheet for each product used.
2. Paint manufacturer's instructions and recommendations on surface preparation and application.
3. Colors available for each product (where applicable).
4. Compatibility of shop and field applied coatings (where applicable).
5. Material safety data sheet for each product used.

C. Samples and Manufacturer's Certificate: Provide all submittals, including the following, as specified in Division 1.

1. Submit manufacturer's standard color chart for color selection.
2. Submit specimens, approximately 8 by 10 inches in size, for custom mixed colors for approval, not including color coding colors.
3. Where equipment is customarily shipped with a standard finish, submit samples of the proposed color and finish for approval prior to shipping.
4. Furnish affidavits from the manufacturer certifying that materials furnished conform to the requirements specified and that paint products have been checked for compatibility.
5. Submit a supplementary schedule of paint products with mil thickness, and solids by volume, including all paint applied in the shop and in the field. Provide a schedule that is in accordance with the recommendations of the paint manufacturer.
6. Furnish affidavits from the manufacturer certifying that coatings in immersion service contain no water-soluble solvents or corrosion inhibitive (active) pigments with slight water solubility.

1.8 DELIVERY AND STORAGE

A. Deliver all coating materials to the job site in original, new and unbroken, sealed packages and containers bearing manufacturer's name and label, and the following information, all of which shall be plainly legible at the time of use:

1. Name or title of material.
2. Fed. Spec. number, if applicable.
3. Manufacturer’s stock number and date of manufacturer.
4. Manufacturer’s formula or specification number.
5. Manufacturer’s batch number.
6. Manufacturer’s name.
7. Contents by volume, for major pigment and vehicle constituents.
8. Thinning instructions.
9. Application instructions.
10. Color name and number.
11. Expiration date.

B. Store paint materials and painting tools and equipment, including solvents and cleaning materials, in a well ventilated, dry area and away from high heat. Do not store in building or structure being painted, nor leave overnight therein. Follow manufacturer’s recommendations for the safe storage of paints and solvents. CONTRACTOR shall store materials in compliance with all local, state, and federal regulations.

1.9 QUALITY ASSURANCE

A. Inspection by the ENGINEER, or the waiver of inspection of any particular portion of the work, shall not relieve the CONTRACTOR of his responsibility to perform the work in accordance with these Specifications.

B. Inspection Devices: The CONTRACTOR shall furnish, until final acceptance of the work, inspection devices in good working condition for the detection of holidays, measurement of surface profile, and measurement of dry film thicknesses of the protective coatings. Surface preparation comparison visual standards, profile and dry film thickness devices shall be made available for the ENGINEER’s use at all times while coating is being done. The CONTRACTOR shall provide the services of a trained operator of the holiday detection devices until the final acceptance of such coatings. Holiday detection devices shall be operated only in the presence of the ENGINEER.

C. Surface Cleanliness: Preparation of metallic surfaces shall be based upon comparison with SSPC-VIS 1 (ASTM D2200), and as described herein. The CONTRACTOR shall furnish the photographic standards. To facilitate inspection, the CONTRACTOR shall, on the first day of abrasive blasting operations, abrasive blast metal panels to the standards specified. Plates shall measure a minimum of 8.5 inches by 11 inches. Panels meeting the requirements of the Specifications shall be initiated by the CONTRACTOR and the OWNER's representative and coated with a clear non-yellowing finish. One of these panels shall be prepared for each type of abrasive blasting and shall be used as a comparison standard throughout the project. The CONTRACTOR shall provide SSPC-VIS 1 Surface Preparation Standards for use during the abrasive blasting operations.

D. Surface Profile: The blast abrasive shall be suitable to achieve the blast profile as required for the coating system used. The CONTRACTOR shall furnish for the ENGINEER's use, a Keane-Tator Surface Comparator No. 372 or approved equal.

E. Film Thickness Testing: On ferrous metals, the dry film coating thickness shall be measured in accordance with the SSPC "Paint Application Specification No. 2" (SSPC-PA2), using a magnetic-type dry film thickness gauge such as Mikrotest Model FM, Elcometer Model 111/1EZ, Positector 2000 or approved equal. Each coat shall be tested for the correct thickness. No measurements shall be made until at least eight (8) hours after application of the coating. On non-ferrous metals and other substrates, the coating thicknesses shall be measured at the time of application using a wet film gauge.

F. Holiday Testing: The CONTRACTOR shall holiday test all coated ferrous surfaces inside a steel reservoir, or other surfaces which will be submerged in water or other liquids, or surfaces which are enclosed in a vapor space in such structures. Areas which contain holidays shall be marked and repaired or recoated in accordance with the coating manufacturer's printed instructions and then retested.

1. Coatings With Thickness Exceeding 20 Mils: For surfaces having a total dry film coating thickness exceeding 20 mils: Pulse-type holiday detector such as Tinker & Rasor Model AP-W, D.E. Stearns Co. Model 14/20, or approved equal shall be used. The unit shall be adjusted to operate at the voltage required to cause a spark jump across an air gap equal to twice the specified coating thickness.

2. Coatings With Thickness of 20 Mils or Less: For surfaces having a total dry film coating thickness of 20 mils or less: Tinker & Rasor Model M-1 non-destructive type holiday detector, K-D Bird Dog or approved equal shall be used. The unit shall operate at less than 75-volts. For thicknesses between 10 and 20 mils, a non-sudsing type wetting agent, such as Kodak Photo-Flo, or equal shall be added to the water prior to wetting the detector sponge.

1.10 MANUFACTURER'S REPRESENTATIVE

A. The CONTRACTOR shall require the protective coating manufacturer to furnish a qualified technical representative to visit the project site for technical support and as may be necessary to resolve field problems attributable or associated with the manufacturer's products furnished under

this contract or the application thereof.

1.11 SAFETY AND HEALTH REQUIREMENTS

A. General: The CONTRACTOR shall provide and require use of personal protective and safety equipment for persons working in or about the project site, in accordance with requirements of OSHA Safety and Health Standards for Construction (29CFR 1910, 1915, and 1926) its revisions, and all other applicable regulations. The CONTRACTOR shall also comply with the coating manufacturer's printed instructions, appropriate technical bulletins, manuals, and material safety data sheets in the handling of potentially hazardous or harmful materials.

B. Head and Face Protection and Respiratory Devices: The CONTRACTOR shall require all persons to wear protective helmets while in the vicinity of the work. In additions, workers engaged in or near the work during sandblasting shall wear eye and face protection devices and air purifying, half-mask or mouthpiece respirators with appropriate filters. Barrier creams shall be used on any exposed areas of skin.

C. Ventilation: Where ventilation is used to control hazardous exposure, all equipment shall be explosion proof. Forced air ventilation shall be provided to reduce the concentration of air contaminants to the degree such that a hazard does not exist and to assist in the proper curing of coatings applied in a confined area. Air circulation and exhausting of solvent vapors shall be continued until coatings have fully cured.

D. Sound Levels: Whenever the occupational noise exposure exceeds maximum allowable sound levels permitted under OSHA regulations, the CONTRACTOR shall provide and require the use of approved hearing protection devices.

E. Illumination: Adequate illumination shall be provided while work is in progress, including explosion-proof lights and electrical equipment. Whenever required by the ENGINEER, the CONTRACTOR shall provide additional illumination to cover all areas to be inspected. The level of illumination for inspection purposes shall be determined by the ENGINEER.

F. Temporary Access: All temporary ladders and scaffolding shall conform to applicable safety requirements. Scaffolding shall be erected where requested by the ENGINEER to facilitate inspection and shall be moved by the CONTRACTOR to locations as requested by the ENGINEER.

G. Cloths and cotton waste that might constitute a fire hazard shall be placed in fire resistant closed metal containers until removed from the project site or destroyed at the end of each workday.

1.12 WARRANTY

A. All work covered under the Contract shall be guaranteed against defective workmanship and

materials for a period of one (1) year after completion and acceptance of the work. A first anniversary inspection will be scheduled by the CONTRACTOR during the eleventh (11th) month following acceptance of the work. A report shall be furnished to the OWNER describing the condition of the paint system and other work covered under the Contract. Tank draining shall be coordinated with the OWNER. Any latent defects found during this inspection shall be promptly repaired by the CONTRACTOR at no additional cost to the OWNER. Any location where coats of paint have peeled off, bubbled or cracked, and any location where rusting is evident, shall be considered a failure of the paint system. The CONTRACTOR shall make repairs at all points where failures are observed by removing the deteriorated coating, cleaning the surfaces and recoating with the same paint system. Any such repair work shall be completed by the CONTRACTOR within thirty (30) days after written notice of such defects unless otherwise negotiated.

B. Failure on the part of the CONTRACTOR to schedule this warranty inspection will not relieve him of warranty responsibility and any defects found by the OWNER after the normal warranty period will be assumed to have occurred during the one (1) year while the warranty was in effect.

PART 2 - PRODUCTS AND COATING SYSTEMS

2.1 GENERAL

A. Definitions: The term "paint", "coatings", or "finishes" as used herein, shall include surface treatments, emulsions, enamels, paints, epoxy resins, and all other protective coatings, excepting galvanizing or anodizing, whether used as a pre-treatment, primer, intermediate coat, or finish coat. The term "DFT" means minimum dry film thickness.

B. Compatibility: In any coating system, only compatible materials from a single manufacturer shall be used in the work. Particular attention shall be directed to compatibility of primers and finish coats. If necessary, subject to the approval of the ENGINEER, a barrier coat shall be applied between all existing prime coats and subsequent field coats to insure compatibility.

2.2 COLORS AND FINISHES

A. All colors and shades of colors for all coats of paint shall be as selected or specified. Paint colors, surface treatment, gloss, and finishes, are indicated or specified in the "schedules" of the contract documents. Color and gloss not indicated or specified will be selected by the OWNER.

B. Each coat shall be of a slightly different shade, as directed by the ENGINEER, to facilitate inspection of surface coverage of each coat. Finish colors shall be as selected from the manufacturer’s standard color samples or shall be customer mixed to match color samples furnished by the ENGINEER. Final acceptance of colors will be from samples applied on the job.

C. Color Pigments: Pure, non-fading, applicable types to suit the substrates and service indicated.

D. Paint Coordination: Review other sections of these specifications in which prime paints are to be

provided to ensure compatibility of total coatings system for various substrates. Furnish information to manufacturers, fabricators, suppliers and others where necessary on the characteristics of the finish materials to be used, to ensure compatible prime coats of use. Provide barrier coats over incompatible primers or remove and re-prime as required.

E. Color Coding: All exposed piping in structures, aboveground or in pipe trenches, shall be color code painted in strict accordance with the color code chart presented in Paragraph 3-15 of this section. All colors shall be as specified or as selected by the OWNER.

2.3 UNDERCOATS AND THINNERS

A. Undercoats: Provide undercoat paint produced by the same manufacturer as the finish coats.

B. Thinners: Use only thinners approved by the paint manufacturer and use only within recommended limits.

2.4 INDUSTRIAL COATING SYSTEMS

A. The CONTRACTOR shall use coating materials suitable for the intended use and recommended by their manufacturer for the intended service.

B. Protective Coating Materials: Products shall be standard coatings produced by recognized manufacturers regularly engaged in production of such materials for application on essentially identical facilities to those proposed in this project. Where requested, the CONTRACTOR shall provide the ENGINEER with the names of not less than ten (10) successful applications of the proposed manufacturer's products, which have been proven over a three (3) year period of time, demonstrating compliance with this specification requirement.

C. System 1 - Alkyd Enamel: High quality gloss or semi-gloss, long oil alkyd finish with a minimum solids content of 57% by volume. Primer as recommended by manufacturer.

1. Painting New Construction

a. Prime coat except wood surfaces (DFT=3.0 mils) Kop-Coat 622-LCF Primer.

b. Prime coat for wood surfaces (DFT = 1.5 mils) Kop-Coat Rustarmor 500 enamel thinned 15% with Kop-Coat 4000 Thinner.

c. Finish coats, two (Total DFT = 3.0 mils) Kop-Coat Rustarmor 500 Enamel.

d. Total system DFT except wood surfaces = 6.0 mils Total system DFT for wood surfaces = 4.5 mils

2. Repainting Existing Surfaces

a. The cleaned steel is to be hand brushed twice with (DFT = 4.0 mils) Kop- Coat 622-LCF Primer. Completely work the primer into all the irregular surface faces of the steel.

b. Finish coats, two (total DFT = 3.0 mils) Kop-Coat Rustarmor 500 Enamel.

c. Total millage shall be at least 7.0 mils.

D. System 2 - Silicone Alkyd Enamel: High quality gloss alkyd, medium long oil alkyd finish. Minimum solids content of 48% by volume. Prime coat to be as recommended by manufacturer.

1. Painting New Construction

a. Prime coat (DFT = 3.0 mils) Kop-Coat 622-LCF Primer.

b. Finish coats, two (Total DFT = 3.0 mils) Kop-Coat Sub-SiI B

c. Total system DFT = 6.0 mils.

2. Repainting Existing Surfaces

a. The cleaned steel is to be hand brushed twice with (DFT = 4.0 mils) Kop- Coat 622-LCF Primer.

b. Finish coats, two (Total DFT = 3.0 mils) Kop-Coat 1515 Silicone Alkyd.

c. Total millage shall be at least 7.0 mils.

E. System 3 - High Build Epoxy: High build polyamide epoxy coating, resistant to splash, spillage and fumes of dilute acids, bases and salts, and with high resistance to weathering. Coating material shall have a minimum solids content of 56% by volume. Prime coat to be a rust inhibitive epoxy primer as recommended by manufacturer.

1. Prime coat (DFT = 1.5 mils) Kop-Coat 294 Epoxy Primer.

2. Finish coats, two (Total DFT = 10.0 mils) Kop-Coat Hi-Gard Epoxy Coating.

3. Total system DFT = 11.5 mils.

F. System 4 Acrylic Latex (High Sheen): Single component, water based acrylic latex with a fungicide additive and minimum solids content of 35% by volume. Prime coat to be as recommended by manufacturer.

1. Prime coat (DFT = 2.0 mils) as recommended by manufacturer, if needed.

2. Finish coats, two (Total DFT = 3.0 mils) Kop-Coat 620 Acrylic Emulsion.

3. Total system DFT = 5.0 mils (with prime coat). 3.0 mils (without prime coat).

G. System 5 - Acrylic, Concrete and Masonry (Flat): High molecular weight acrylic coating material with a minimum solids content of 41% by volume. Prime coat shall be an acrylic filler and sealer for concrete surfaces.

1. Painting New Construction

a. Prime coat (filler/sealer) Kop-Coat Concrete and Masonry Filler.

b. Finish coats, two (Total DFT = 3.0 mils) Kop-Coat 600 Interior-Exterior Acrylic Emulsion.

c. Total system DFT = 3.0 mils.

2. Repainting Existing Surfaces

a. Spot prime if needed with Kop-Coat Concrete and Masonry Filler to insure a consistent total finish appearance.

b. Finish coats, two (Total DFT 3.0 mils) Kop-Coat 600 Interior-Exterior Acrylic Emulsion.

c. Total millage shall be at least 3.0 mils.

H. System 6 - Coal Tar Epoxy, Steel: High build, 2-component amine or polyamide cured coal tar epoxy, solids content of at least 74% by volume, suitable for long term immersion in wastewater and for coating of buried surfaces, and conforming to or exceeding Corps of Engineers Specification C-200, or SSPC Paint 16. Prime coats are for use as a shop primer only. Prime coat shall be omitted when both surface preparation and coating are to be performed in the field.

1. Prime coat (DFT = 1.5 mils) Kop-Coat 654 Epoxy Primer.

2. Finish coats, two (Total DFT = 20.0 mils) Kop-Coat Bitumastic No. 300-M.

Note: Time between coats is critical and maximum times as stated by the manufacturer must not be exceeded.

3. Total system DFT = 21.5 mils (with prime coat). 20.0 mils (without prime coat).

Notes: a. Spot sandblast to SSPC-SP1O all areas damaged during erection, or areas not precoated before application of coating.

b. All edges, nuts, bolts, lap joints, weld seams and the roof rim angle shall receive one brush-applied coat prior to the application of the complete spray coat.

I. System 7 - Coal Tar Epoxy, Concrete: High build, 2-component amine or polyamide cured coal tar epoxy, solids content of at least 74% by volume, suitable for long term immersion in wastewater and for coating of buried surfaces and conforming to or exceeding Corps. of Engineers Specification C-200, or SSPC Paint 16. Filler compound shall be a 2-component epoxy material used to fill voids and provide a suitable surface for the application of the coal tar epoxy. Filler is worked into the concrete surface with a wide blade putty knife or a squeegee.

1. First coat - Kop-Coat Bitumastic No. 300-M, thinned 33 percent with Thinner 2000 and apply at the rate of 200-300 sq. ft. per gallon. Allow not more than 24 hours before applying additional coats at the normal, unthinned rate.

2. Finish coats, two (Total DFT = 20.0 mils) Kop-Coat Bitumastic No. 300-M.

Note: Time between coats is critical and maximum times as stated by the manufacturer must not be exceeded.

3. Total system DFT = 20.0 mils.

J. System 8-PoIyamide Cured Epoxy for Steel or Concrete Potable Water Storage Tanks or Treatment Units: High build polyamide cured epoxy coating with solids contents of at least 56% by volume and a finish coat color of white. The material shall be capable of achieving at least 5 mils dry film thickness per coat. The epoxy coating material shall be suitable for long-term immersion service in potable water. The materials used shall appear on the latest published list of approved coatings for use in potable water issued by the Florida Department of Environmental Protection. Submit a written certification that the proposed materials meet the above regulatory agency standards and policies. Apply the material with a primer if recommended by the coating manufacturer. Thinners and additives shall also be in compliance with this paragraph.

1. Steel Tanks or Treatment Units

a. First coat (DFT=5.0 mils) Kop-Coat Hi-Gard Epoxy. See notes (1), (2) and (3)

b. Finish coat (DFT = 5.0 mils) Kop-Coat Hi-Gard Epoxy

c. Total system DFT = 10.0 mils

Notes:

(1) All sharp edges, weld burrs, weld spatter and surface irregularities shall be ground smooth before applying coating.

(2) Touch-up coating to be done for areas damaged during erection, or areas not pre-coated. Spot sandblast to SSPC-SP1O before application ofcoating.

(3) All edges, nuts, bolts, lap joints, weld seams and the roof rim angle shall receive one brush-applied coat prior to the application of the complete spray coat.

2. Concrete Tanks or Treatment Units

a. First coat (DFT = 4.0 mils) Kop-Coat Hi-Gard Epoxy thinned 20% with Kop-Coat 2,000 Thinner.

b. Finish coat (DFT = 6.0 mils) Kop-Coat Hi-Gard Epoxy.

c. Total system DFT = 10.0 mils.

3. Curing Period: Prior to immersion, subject the completed system to at least 7 days of curing time with the substrate temperature at a minimum of 70 degrees F, or 10 days at a minimum of 60 degrees F. More curing time or a higher temperature shall be provided if recommended by the manufacturer. If the environmental conditions do not provide the necessary minimum temperature, use heated air to provide the necessary heat for curing. Other combinations of curing time and temperature may be used if the coating manufacturer presents satisfactory documentation and test results to substantiate that the degree of curing is equal or greater than curing for 7 days at 70 degrees F.

K. System 9 - Polyurethane: High gloss, 2 - component aliphatic polyurethane for use on steel, fiberglass and PVC. Coating material shall have a minimum solids content of 56% by volume. Prep surface as recommended by manufacture. Product is not recommended for interior building surfaces or continuous immersion.

1. Prime coat (DFT = 3.0 mils) Hi-GARD Epoxy

2. Finish coats, two (total DFT=3.0 mils) Kop-Coat 1122 BRS Linear Polyurethane

3. Total system = 6.0 mils minimum

PART 3 - EXECUTION

3.2 STORAGE, MIXING AND THINNING OF MATERIALS

A. Manufacturer's Recommendations: Unless otherwise specified herein, the coating manufacturer's printed recommendations and instructions for thinning, mixing, handling, applying, and protecting its coating materials, for preparation of surfaces for coating, and for all other procedures relative to coating shall be strictly observed. No substitutes or other deviations will be permitted without written permission of the ENGINEER. The CONTRACTOR shall supply the ENGINEER with copies of each manufacturer's instructions in accordance with the requirements of Paragraph 1-07, "SUBMITTALS".

B. All protective coating materials shall be used within the manufacturer's recommended shelf life.

C. Storage and mixing of paint or other coating materials shall be performed only in those areas designated by the ENGINEER.

3.3 PREPARATION FOR COATING

A. General: All surfaces to receive protective coatings shall be cleaned as specified herein prior to application of said coatings. The CONTRACTOR shall examine all surfaces to be coated, and shall correct all surface defects before application of any coating material. All marred or abraded spots on shop-primed and on factory-finished surfaces shall receive touch-up restoration prior to any coating application. Do not paint over dirt, rust, scale, oil, grease, moisture, scuffed surfaces or other foreign material or in conditions otherwise detrimental to the formation of a durable paint bond and film.

B. Protection of Surfaces Not to be Coated: Surfaces which are not to receive protective coatings shall be protected during surface preparation, cleaning, and coating operations. All hardware, lighting fixtures, switch plates, machined surfaces, couplings, shafts, bearings, nameplates on machinery and other surfaces not to be painted shall be removed, masked or otherwise protected. Drop cloths shall be provided to prevent coating materials from falling on or marring adjacent surfaces. The working parts of all mechanical and electrical equipment shall be protected from damage during surface preparation and coating operations. Openings in motors shall be masked to prevent entry of coating or other materials.

C. Protection of Adjacent Work and Areas: Care shall be exercised not to damage adjacent work during blast cleaning operations. Spray painting shall be conducted under carefully controlled conditions.

The CONTRACTOR shall be fully responsible for and shall promptly repair to the satisfaction of the OWNER any and all damage to adjacent work or adjoining property occurring from blast cleaning or coating operations.

D. Protection of Painted Surfaces: Cleaning and coating shall be so programmed that dust and other contaminants from the cleaning process will not fall on wet, newly-coated surfaces.

3.4 SURFACE PREPARATION STANDARDS

A. The following referenced surface preparation specifications of the Steel Structures Painting Council shall form a part of this Specification:

1. Solvent Cleaning (SSPC-SP1): The method for removing all visible oil, grease, soil, drawing and cutting compounds, and other soluble contaminants from steel surfaces through the use of solvent, vapor, emulsion, alkaline, and/or steam.

2. Hand Tool Cleaning (SSPC-SP2): The method for removing all loose mill scale, loose rust, loose paint, and other loose detrimental foreign matter through the use of non-power hand tools.

3. Power Tool Cleaning (SSPC-SP3): The method for removing all loose mill scale, loose rust, loose paint, and other loose detrimental foreign matter through the use of power assisted hand tools.

4. White Metal Blast Cleaning (SSPC-SPS): The method of preparing steel surfaces which, when viewed without magnification, shall be free of all visible oil, grease, dirt, dust, mill scale, rust, and paint.

5. Commercial Blast Cleaning (SSPC-SP6): The method of preparing steel surfaces which, when viewed without magnification, shall be free of all visible oil, grease, dirt, dust, mill scale, rust, and paint. Evenly dispersed very light shadows, streaks, and discolorations caused by stains of rust, mill scale, and previously applied paint may remain on no more than 33% of the surface.

6. Brush-off Blast Cleaning (SSPC-SP7): The method of preparing steel surfaces which, when viewed without magnification, shall be free of all visible oil, grease, dirt, dust, loose mill scale, loose rust, and loose paint. Tightly adherent mill scale, rust, and paint may remain on the surface.

7. Near-White Blast Cleaning (SSPC-SP1O): The method of preparing steel surfaces which, when viewed without magnification, shall be free of all visible oil, grease, dirt, dust, mill scale, rust, and paint. Evenly dispersed very light shadows, streaks, and discolorations caused

by stains of rust, mill scale, and previously applied paint may remain on no more than 5% of the surface.

3.5 SURFACE PREPARATION

A. General: Perform preparation and cleaning procedures in strict accordance with the paint manufacturer's instructions and as herein specified, for each particular substrate condition.

1. Remove all hardware, hardware accessories, machined surfaces, plates, lighting fixtures, and similar items in place and not to be finish-painted, or provide surface-applied protection prior to surface preparation and painting operations. Remove, if necessary, for the complete painting of the items and adjacent surfaces. Following completion of painting of each space or area, reinstall the removed items by workmen skilled in the trades involved.

2. Clean surfaces to be painted before applying paint or surface treatments. Remove oil and grease prior to mechanical cleaning. Program the cleaning and painting so that contaminants from the cleaning process will not fall onto wet, newly painted surfaces. Remove mildew in accordance with the paint manufacturer's recommendations.

3.6 NEW FERROUS METAL SURFACE PREPARATION (UNGALVANIZED)

A. The minimum abrasive blasting surface preparation shall be as specified in the coating system schedules included at the end of this section. Where there is a conflict between these Specifications and the coating manufacturer's printed recommendations for the intended service, the higher degree of cleaning shall apply.

B. Workmanship for metal surface preparation shall be in conformance with the current SSPC Standards and this section. Blast cleaned surfaces shall match the standard samples available from the National Association of Corrosion Engineers (NACE) Standard TM-01-70.

C. All oil, grease, welding fluxes and other surface contaminants shall be removed by alkaline cleaning per SSPC-SP1 prior to blast cleaning.

D. All sharp edges shall be rounded or chamfered and all burrs, surface defects and weld splatter shall be ground smooth prior to blast cleaning.

E. The type and size of abrasive shall be selected to produce a surface profile that meets the coating manufacturer's recommendation for the particular coating and service conditions. CONTRACTOR shall submit data and samples for approval on abrasives to be used on the Project. Abrasives that are used shall be designed for the specific purpose of blast cleaning. Abrasives shall be free of contaminants and chlorides. Ordinary builder's sand shall not be considered to be approved abrasive material. ENGINEER will periodically sample abrasives used at the job site for comparison with approved submitted materials.

F. The abrasive shall not be reused unless otherwise approved by the ENGINEER. For automated shop blasting systems, clean oil and moisture-free abrasives shall be maintained.

G. The CONTRACTOR shall comply with the applicable federal, state, and local air pollution control regulations for blast cleaning.

H. Compressed air for air blast cleaning shall be supplied at adequate pressure from well-maintained compressors equipped with oil/moisture separators which remove all contaminants.

I. Surfaces shall be cleaned of all dust and residual particles of the cleaning operation by dry air blast cleaning, vacuuming or other approved method prior to painting.

J. Enclosed areas and other areas where dust settling is a problem shall be vacuum cleaned and wiped with a tack cloth.

K. Damaged or defective coating shall be removed by the specified blast cleaning to meet the clean surface requirements before recoating.

L. If the specified abrasive blast cleaning will damage adjacent work, the area to be cleaned is less than 100 square feet, and the coated surface will not be submerged in service, the SSPC-SP2, Hand Tool Cleaning, or SSPC-SP3, Power Tool Cleaning, will be permitted.

M. Shop applied coatings of unknown composition shall be completely removed before the specified coatings are applied. Valves, castings, ductile iron pipe, and fabricated pipe or equipment shall be examined for the presence of shop-applied temporary coatings. Temporary coatings shall be completely removed by Solvent Cleaning per SSPC-SP1 before the abrasive blast cleaning work has been started.

N. Shop primed equipment shall be alkaline cleaned in the field before finish coats are APPLIED

3.7 FERROUS METAL SURFACE PREPARATION (GALVANIZED)

A. All installation and erection caused blemishes to galvanized surfaces shall be touched up in accordance with ASTM A780 prior to coating.

B. Galvanized ferrous metal shall be alkaline cleaned per SSPC-SP1 to remove oil, grease, and other contaminants detrimental to adhesion of the protective coating system to be used.

C. Surfaces shall be pretreated with Kop-Coat 40 Passivator, one coat 0.4 mil DFT, prior to finish coating, in accordance with the printed recommendations of the coating manufacturer.

3.8 SURFACE PREPARATION OF FERROUS SURFACES WITH EXISTING COATINGS, EXCLUDING STEEL TANK OR TREATMENT UNIT INTERIORS (IN ADDITION TO REQUIREMENTS IN PARAGRAPHS 3-05 AND 3-06).

A. General: All grease, oil, heavy chalk, dirt, or other contaminants shall be removed by solvent or detergent cleaning prior to abrasive blast cleaning. The CONTRACTOR shall determine the generic type of the existing coatings by laboratory testing, at no additional cost to the OWNER.

B. Abrasive Blast Cleaning: The CONTRACTOR shall provide the degree of cleaning specified in the coating system schedule for the entire surface to be coated. If the degree of cleaning is not specified in the schedule, deteriorated coatings shall be removed by abrasive blast cleaning to SSPC-SP6, Commercial Blast Cleaning. Areas of tightly adhering coatings shall be cleaned to SSPC-SP7, Brush-Off Blast Cleaning, with the remaining thickness of existing coating not to exceed 3 mils.

C. Incompatible Coatings: If coatings to be applied are not compatible with existing coatings, the CONTRACTOR shall apply intermediate coatings per the paint manufacturer's recommendation for the specified abrasive blast cleaning. A small trial application shall be conducted for compatibility prior to painting large areas.

D. Unknown Coatings: Coatings of unknown composition shall be completely removed prior to application of new coatings.

3.9 SURFACE PREPARATION FOR REPAINTING EXISTING STEEL

A. The entire structure is to be completely pressure washed at 3,000 to 5,000 psi with potable water.

B. All areas shall be cleaned/sandblasted to the surface preparation standards as specified herein, or superceded by the bid form.

C. All cleaned areas are to be primed the same workday that they are cleaned and blasted.

3.10 PRESSURE WASH CLEANING FOR REPAINTING EXISTING CONCRETE

A. The entire structure is to be pressure washed at 3,000 to 5,000 psi with a solution of 50% water and bleach to yield a mixture with a minimum concentration of 2-1/2% sodium hypochlorite.

B. The entire structure is to be completely rinsed by pressure washing at 3,000 to 5,000 psi with potable water.

3.11 CONCRETE AND CONCRETE BLOCK MASONRY SURFACE PREPARATION

A. Surface preparation shall not begin until at least 30 days after the concrete has been placed.

B. All efflorescence, chalk, dust, dirt, oil and grease shall be removed by Detergent Cleaning per SSPC-SP1 before abrasive blast cleaning.

C. Concrete, concrete block masonry surfaces, previously painted concrete and masonry and deteriorated concrete and masonry surfaces to be coated shall be abrasive blast cleaned to remove laitance, paint, deteriorated concrete, and roughen the entire surface equivalent to the surface of the No. 80 grit flint sandpaper. Concrete shall have a consistent, even texture (void free) and shall be patched where needed.

D. Determine the alkalinity and moisture content of the surfaces to be painted by performing appropriate tests. If the surfaces are found to be sufficiently alkaline to cause blistering and burning of the finish paint, correct this condition before application of paint. Do not paint over surfaces where the moisture content exceeds that permitted in the manufacturer's printed directions.

E. If acid etching is required by the coating application instructions, the treatment shall be made after sandblasting. After acid etching, rinse surfaces with clean water to neutralize the acid and test the Ph. The pH shall be between 7.0 and 8.0.

F. Surfaces shall be clean and dry and as recommended by the coating manufacturer before coating is started.

G. Unless required for proper adhesion, surfaces shall be dry prior to coating. The presence of moisture shall be determined with a moisture detection device such as Delmhors Model DB, or approved equal.

3.12 PLASTIC, FIBERGLASS AND NONFERROUS METALS SURFACE PREPARATION

A. Plastic and Fiberglass surfaces shall be sanded or Brush Off Blast Cleaned, SSPC-SP7, prior to solvent cleaning with a chemical compatible with the coating system primer. If blast cleaned, use 60-80 mesh abrasive.

B. Non-ferrous metal surfaces shall be Solvent Cleaned, SSPC-SP1, followed by sanding or Brush Off Blast Cleaning, SSPC-SP7.

C. All surfaces shall be clean and dry prior to coating application.

3.13 WOOD SURFACE PREPARATION

A. Clean wood surfaces to be painted of all dust, dirt, grease, oil, or other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Sandpaper smooth those finished surfaces exposed to view, with either manual or mechanical means, as applicable, and dust off. Scrape and clean small, dry, seasoned knots and apply a thin coat of white shellac or other recommended knot sealer, before application of the priming coat. After priming, fill holes and imperfections in finish surfaces with putty or plastic woodfiller. Sandpaper smooth when dried and dust off.

B. Prime or seal wood required to be job-painted immediately upon delivery to job. Prime edges, ends, faces, undersides, and backsides of such wood.

3.14 WORKMANSHIP

A. Skilled craftsmen and experienced supervision shall be used on all work.

B. Clean drop cloths shall be used. All damage to surfaces resulting from the work hereunder shall be leaned, repaired, and refinished to the complete satisfaction of the ENGINEER, at no cost to the OWNER.

C. All coatings shall be applied under dry and dust-free conditions. Coating shall be done in a workmanlike manner so as to produce an even film of uniform thickness. Edges, corners, crevices, and joints shall receive special attention to insure that they have been thoroughly cleaned and that they receive an adequate thickness of coating material. The finished surfaces shall be free from runs, drops, ridges, waves, laps, alligatoring, brush marks, and variations in color, texture, and finish. The hiding shall be so complete that the addition of another coat would not increase the hiding. Special attention shall be given to insure that edges, corners, crevices, welds, and similar areas receive a film thickness equivalent to adjacent areas, and installations shall be protected by the use of drop cloths or other approved precautionary measures.

3.15 SHOP COATING REQUIREMENTS

A. All items of equipment, or parts of equipment which are not submerged in service, shall be shop primed and then finish coated in the field after installation with the specified or approved color. The methods, materials, application, equipment and all other details of shop painting shall comply with these Specifications. If the shop primer requires top- coating within a specified period of time, the equipment shall be finish coated in the shop and then touch-up painted after installation.

B. All items of equipment, or parts and surfaces of equipment which are submerged when in service, with the exception of pumps and valves shall have all surface preparation and coating work performed in the field.

C. The interior surfaces of steel water reservoirs shall have all surface preparation and coating work performed in the field.

D. For certain pieces of equipment it may be undesirable or impractical to apply finish coatings in the field. Such equipment may include engine generator sets, equipment such as electrical control panels, switch-gear or main control boards, submerged parts of the pumps, ferrous metal passages in valves, or other items where it is not possible to obtain the specified quality in the field. Such equipment shall be shop primed and finish coated in the field with the identical material after installation. The CONTRACTOR shall require the manufacturer of each such piece of equipment to certify as part of its shop drawings that the surface preparation is in accordance with these Specifications. The coating material data sheet shall be submitted with the shop drawings for the equipment.

E. For certain small pieces of equipment the manufacturer may have a standard coating system which is suitable for the intended service conditions. In such cases, the final determination of suitability will be made during review of the shop drawing submittals. Equipment of this type generally includes only indoor equipment such as instruments, small compressors, and chemical metering pumps.

F. Shop painted surfaces shall be protected during shipment and handling by suitable provisions including padding, blocking, and the use of canvas or nylon slings. Primed surfaces shall not be exposed to the weather for more than 6 months before finish coating, or less time if recommended by the coating manufacturer.

G. Damage to shop-applied coatings shall be repaired in accordance with this section and the coating manufacturer's printed instructions prior to finishpainting.

H. The CONTRACTOR shall make certain that the shop primers and field topcoats are compatible and meet the requirements of this section. Copies of applicable coating manufacturer’s data sheets shall be submitted with equipment shop drawings.

3.16 APPLICATION OFCOATINGS

A. The application of protective coatings to steel substrates shall be in accordance with "Paint Application Specification No. 1", (SSPC-A-1), Steel Structures Painting Council.

B. Cleaned surfaces and all coats shall be inspected prior to each succeeding coat. The CONTRACTOR shall schedule such inspection with the ENGINEER inadvance.

C. Blast cleaned ferrous metal surfaces shall be painted before any rusting or other deterioration of the surface occurs. Blast cleaning shall be limited to only those surfaces that can be painted in the same working day.

D. Coatings shall be prepared, mixed and applied in accordance with the manufacturer’s instructions

and recommendations, and these Specifications. If directions differ, the most stringent requirements shall be followed.

E. Store materials not in actual use in tightly covered containers. Maintain containers used in storage, mixing and application of paint in a clean condition, free of foreign materials and residue.

F. Stir materials before application to produce a mixture of uniform density, and stir as required during the application of the materials. Do not stir surface film into the coating materials. Remove the film, and if necessary, strain the material before using.

G. Special attention shall be given to edges, angles, weld seams, flanges, nuts and bolts, and other places where insufficient film thicknesses are likely to be present. Use stripe (brushed or gloved) painting for these areas.

H. Finish coats, including touch-up and damage repair coats shall be applied in a manner which will present a uniform texture and color matched appearance.

1. Job Conditions: The following job conditions will be strictly enforced during the application of coatings for the project.

    1. Apply water-base coatings only when the temperature of surfaces to be painted and the surrounding air temperatures are between 50 degrees F and 90 degrees F unless otherwise permitted by the paint manufacturer's printed instructions.

    2. Apply solvent-thinned coatings only when the temperature of surfaces to be painted and the surrounding air temperatures are between 45 degrees F and 95 degrees F unless otherwise permitted by the paint manufacturer's printed instructions.

    3. Do not apply paint in dust or smoke laden atmosphere, high winds, rain, fog or mist; or when the relative humidity exceeds 85%; or to damp or wet surfaces; unless otherwise permitted by the paint manufacturer's printed instructions.

    4. Do not apply coatings when the temperature is less than 5 degrees F above the dewpoint. Dewpoint shall be determined by use of a sling psychrometer in conjunction with U.S. Weather Bureau psychometric tables.

    5. Do not apply coatings when the outside air temperature is expected to drop below 45 degrees F or less than 5 degrees F above the dewpoint, within 8 hours after application of the coating.

    6. Painting may be continued during inclement weather only if the areas and surfaces to be painted are enclosed and heated within the temperature limits specified by the paint manufacturer during application and drying periods.

J. The finish coat on all work shall be applied after all concrete, masonry, and equipment installation is complete and the work areas are clean and dust-free.

K. General Considerations:

1. Apply paint as specified and in accordance with the manufacturer's directions. Use brushes for applying first coat on wood and on metals other than steel and sheet metal and items fabricated from steel and sheet metal. For other coats on wood, metal and other substrates, use applicators and techniques best suited for the type of material being applied.

2. Apply additional coats when undercoats, stains or other conditions show through the final coat of paint, until the paint film is of uniform finish, color and appearance. ensure that all surfaces, including edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.

3. Paint surfaces behind movable equipment the same as similar exposed surfaces. Paint surfaces behind permanently fixed equipment with prime coat only before final installation of equipment.

4. Paint interior surfaces of ducts, where visible through registers or grilles, with a flat, non-specular black paint.

5. Paint the back sides of removable or hinged covers to match the exposed surfaces.

6. Finish exterior doors on tops, bottoms and side edges the same as the exterior faces, unless otherwise indicated or specified.

7. Sand lightly between each succeeding enamel coat.

8. Omit the field prime coat on shop-primed surfaces and touch up painted metal surfaces which are not to be finished painted and which will not be exposed to view in the completed work. Do not omit primer on metal surfaces specified to be finish coated or on metal surfaces that will be exposed to view in the completed work.

L. Scheduled Painting:

1. Apply the first coat material to surfaces that have been cleaned, pretreated or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.

2. Allow sufficient time between successive coatings to permit proper drying. Do not recoat until

paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and the application of another coat of paint does not cause lifting or loss of adhesion of the undercoat.

M. Minimum Coating Thickness: Apply each material at not less than the manufacturer's recommended spreading rate, to establish a total dry film thickness as specified or, if not specified, as recommended by coating manufacturer.

N. Mechanical and Electrical Work: Painting of mechanical and electrical work is limited to those items exposed in mechanical equipment rooms and in occupied spaces, and on the outside or exterior of buildings or structures:

1. Mechanical items to be painted include, but are not limited to, the following:

a. Piping, valves, pipe hangers, and supports.

b. Pumps

c. Tanks

d. Duct work, insulation

e. Motors, mechanical equipment, and supports

f. Accessory items

2. Electrical items to be painted include, but are not limited to, the following:

a. Conduit and fittings

b. Switchgear

O. Prime Coats: Apply a prime coat to material, equipment and surfaces which are required to be painted or finished, and which have not been prime coated by others. Clean and prime unprimed ferrous metals as soon as possible after delivery of the metals to the job site. Recoat primed and sealed surfaces where there is evidence of suction spots or /unsealed areas in first coat, to assure a finish coat with no burn-through or other defects due to insufficient sealing.

P. Stipple Enamel Finish: Roll and redistribute paint to an even and fine texture. Leave no evidence of rolling such as laps, irregularity in texture, skid marks, or other surfaces imperfections.

Q. Pigmented, Opaque Finishes: Completely cover to provide an opaque, smooth surface of uniform finish, color, appearance and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness or other surface imperfections will not be acceptable.

R. Completed Work: Match approved samples for color, texture and coverage. Remove,

refinish or repaint work not in compliance with specified requirements.

3.17 CURING OF COATINGS

A. The CONTRACTOR shall provide curing conditions in accordance with the conditions recommended by the coating material manufacturer or by these Specifications, whichever is the more stringent requirement, prior to placing the completed coating system into service.

B. Forced Air Ventilation of Steel Reservoirs and Enclosed Hydraulic Structures: Forced air ventilation is required for the application and curing of coatings on the interior surfaces of steel reservoirs and enclosed hydraulic structures. During curing periods, continuously exhaust air from a manhole in the lowest shell ring or in the case of an enclosed hydraulic structure, from the lowest level of the structure using portable ducting. After all interior coating operations have been completed, provide a final curing period for a minimum of 10 days, during which time the forced air ventilation system shall operate continuously. For additional requirements, refer to the specific written instructions of the manufacturer for the coating system being applied.

3.18 COLOR CODING

A. All exposed piping shall be color coded. After the finish coat has been applied, label each line with stenciled legends identifying the nature of the pipe contents and the direction of flow. This stenciled identification shall appear in one or more places in the line as deemed necessary by the ENGINEER. Stencil legends shall be white for all pipe except white color-coded pipe, which shall have black legends. Labels shall occur a minimum of every 15 feet of straight piping and at all bends. Minimum stencil size shall be two-inch letters for 4-inch and larger diameter piping and one-inch letters for 2-inch to 3-1/2-inch diameter piping. Piping 1-1/2-inch diameter and smaller shall be identified using plastic wrap-around pipe markers.

B. Items to be coded but not specifically mentioned shall be coated in a color selected by the ENGINEER or OWNER.

C. All paints/coatings used in potable water contact areas must have AWWA and EPA classification and approvals.

D. All requirements of the Occupational Safety and Health Act (OSHA) concerning color coding and safety markings shall be considered part of these Specifications unless specifically excluded.

E. Any paint/coating requirements/specifications not specifically addressed in the foregoing shall be decided upon as required by the ENGINEER.

F. Every valve or connection, where it may be possible for a worker to be exposed to a hazardous substance, shall be labeled per General Industry Safety Orders, Article 112, OSHA Occupational Safety and Health Standards 29CFR1910.

Color Code Chart

APPLICATION	COLOR
	Orange - Kop-Coat OSHA Safety Orange #J498
Water Lines/Piping	
Raw Settled or Clarified Finished or Potable Reuse Water	Olive Green - Kop-Coat OSHA Safety Green #2383 Aqua - Kop-Coat Marine Green #7333 Dark Blue - Kop-Coat OSHA Safety Blue A#183 Pantone Purple 522C - Kop-Coat OSHA Safety
Chemical Lines/Piping	
Alum or Sodium Aluminate Ammonia Carbon Slurry Chlorine (Gas/Solution) Fluoride Methanol	Orange - Kop-Coat OSHA Safety Orange #J498 White - Kop-Coat #0800 Black - Kop-Coat #C900 Yellow - Kop-Coat OSHA Safety Yellow #625 Light Blue w/Red Band - Kop-Coat Dawn Blue #8155 with 6 " bands of Kop-Coat OSHA Safety Red #0508 Red w/Yellow Band - Kop-Coat OSHA Safety Red #0508 with 6" bands of Kop-Coat OSHA Safety Yellow #S625
Lime Slurry Odophos Sulfuric Acid or Sulfur Dioxide	Light Green — Kop-Coat Eye-Rest Green #2369 Violet — Kop-coat OSHA Safety Purple #S585 Light Green w/Yellow Band, Kop-Coat Eye-Rest Green #2369 with 6" bands of Kop-Coat OSHA Safety Yellow #S625

3.19 COATING SYSTEM SCHEDULES

A. COATING SYSTEM SCHEDULE, FERROUS METAL - NOT GALVANIZED (FM):

Schedule No.	Item	Surface Prep.	System No.
FM-1	All exposed surfaces outdoors, exposed to normal industrial exposure	Commercial Blast Cleaning, SSPC-SP6	Urethane #9
FM-2	All exposed surfaces indoors and outdoors, exposed to moderate and severe industrial exposure	Commercial Blast Cleaning, SSPC-SP6	(2b) Urethane #9
FM-3	Surfaces in Chlorination room, chlorine gas exposure	Commercial Blast Cleaning, SSPC-SP6	(3) High Build Epoxy
FM-4	Surfaces submerged or intermittently submerged in potable water, including all surfaces lower than 2' above high water level and all surfaces inside enclosed hydraulic structures, tanks and treatment units, and all surfaces of valves, couplings and pumps	Near White Metal Blast Cleaning, SSPC- SP10	(3) or (8) High Build Epoxy
FM-5	Surfaces submerged or intermittently submerged in wastewater, including all surfaces lower than 2' above high water level and all surfaces inside enclosed hydraulic structures, tanks and treatment units and all surfaces of valves, couplings and pumps	Near White Metal Blast Cleaning, SSPC- SP10	(6) Coal Tar Epoxy or (3) High Build Epoxy (if color desired)
FM-6	Buried surfaces that are not specified to be coated elsewhere	Near White Metal Blast Cleaning, SSPC- SP10	(6) Coal Tar Epoxy
FM-7	Indoor architectural sheet metal, flashings, door frames, and exposed ducts	Commercial Blast Cleaning, SSPC-SP6	(1) Alkyd Enamel
FM-8	Surfaces of indoor equipment	Commercial Blast Cleaning, SSPC-SP6	(1) Alkyd Enamel

B. COATING SYSTEM SCHEDULE, FERROUS METAL - GALVANIZED (FMG):

All galvanized surfaces except for the following items shall be coated unless required by other Sections: (1) Floor gratings and frames, (2) Handrails, (3) Stair treads, (4) Chain link fencing and appurtenances.

Schedule No.	Item	Surface Prep.	System No.
FMG-1	All exposed surfaces indoors and outdoors, except those included below	Solvent Cleaning per Paragraph 3-06	(1) Alkyd Enamel
FMG-2	All exposed surfaces indoors and outdoors, including surfaces in chlorinator room and chlorine storage room, except those included below	Solvent Cleaning per Paragraph 3-06	(3) or (8) High Build Epoxy
FMG-3	Surfaces buried or submerged in wastewater	Solvent Cleaning per Paragraph 3-06 or Brush Off Grade Blast Cleaning SSPC-SP7	(6) Coal Tar Epoxy
FMG-4	Indoor architectural sheet metal, flashings, doors, frames, and exposed ducts	Solvent Cleaning per Paragraph 3-06	(1) Alkyd Enamel

C. COATING SYSTEM SCHEDULE, STEEL DIGESTER FLOATING COVERS AND DIGESTER GASHOLDERS (SD):

Schedule No.	Item	Surface Prep.	System No.
SD-1	All ferrous surfaces submerged in water or sludge, including rim plate	White Metal Blast Cleaning, SSPC-SPS	(6) Coal Tar Epoxy
SD-2	All ferrous surfaces exposed to digester gas	White Metal Blast Cleaning, SSPC-SPS	(6) Coal Tar Epoxy
SD-3	All interior ferrous surfaces of gasholder shell, including top angle	White Metal Blast Cleaning, SSPC-SPS	(6) Coal Tar Epoxy
SD-4	Exposed, outdoors	Commercial Blast Cleaning, SSPC-SP6	(2) Silicone Alkyd Enamel or Urethane

D. COATING SYSTEM SCHEDULE, NON-FERROUS METAL, PLASTIC, FIBERGLASS (NFM):

Where isolated non-ferrous parts are associated with equipment or piping, the CONTRACTOR shall use the coating system for the adjacent connected surfaces. Do not coat handrails, gratings, frames or hatches. Only primers recommended by the coating manufacturer shall be used.

Schedule No.	Item	Surface Prep.	System No.
NFM-1	All exposed surfaces indoors and outdoors, except those included below	Solvent Cleaning per Paragraph 3-09	(1) Alkyd Enamel
NFM-2	Chlorination room and chlorine storage room	Solvent Cleaning per Paragraph 3-09	(3) or (8) High Build Epoxy
NFM-3	Polyvinyl chloride plastic piping, and fiberglass surfaces, indoor and outdoors, or in structures not submerged	Solvent Cleaning per Paragraph 3-09	(4) Acrylic Latex

E. COATING SYSTEM SCHEDULE – CONCRETE AND CONCRETE BLOCK MASONRY (C):

Schedule No.	Item	Surface Prep.	System No.
C-1	Exposed, indoors and outdoors, as indicated on the plans	Per Paragraph 3-09	(5b) Acrylic-Concrete Repainting
C-2	Submerged in wastewater as indicated on the plans	Per Paragraph 3-10	(7) Coal Tar Epoxy-Concrete
C-3	Interior surfaces of sewer manholes, including sidewalls, bottom, and metal appurtenances, for manholes and L/S's indicated on the plans	Per Paragraph 3-10	See Specification 09950

F. COATING SYSTEM SCHEDULE - WOOD (W):

Schedule No.	Item	Surface Prep.	System No.
W-1	Exposed, indoors and outdoors, as indicated on the plans	Per Paragraph 2-12	(1) Alkyd Enamel
W-2	Exposed, indoors and outdoors, as indicated on the plans	Per Paragraph 3-12	(4) Acrylic Latex

3.1 CLEAN-UP AND PROTECTION

A. Clean Up: During the progress of the work, remove from the site all discarded paint materials, rubbish, cans and rags at the end of each workday. Upon completion of painting work, clean window glass and other paint-spattered surfaces located on site and off site. Remove spattered paint by proper methods of washing and scraping, using care not to scratch or otherwise damage finished surfaces.

B. Protection: Protect work of other trades located on site and off site, whether to be painted or not, against damage by painting and finishing work. Correct any damage by cleaning, repairing or replacing, and repainting.

1. Provide "Wet Paint" signs, as required, to protect newly painted finishes. Remove temporary protective wrappings provided by others for protection of their work after completion of painting operations.

2. At the completion of work of other trades, touch up and restore all damaged or defaced painted surfaces.

3.2 APPEARANCE AND INSPECTION

A. All painting shall be accomplished in a workmanlike manner and shall be free of unsightly sags, runs, bubbles, drips, waves, laps, alligatoring, unnecessary brush marks and overspray or other physical defects and shall be uniform in color.

B. The CONTRACTOR shall provide all rigging, scaffolding and other equipment necessary for a satisfactory inspection of a complete paint system and acceptance by the ENGINEER/OWNER.

C. Inspection shall be conducted by an inspector selected by the ENGINEER/OWNER in the presence of the OWNER’s representative and the CONTRACTOR or his representative. Provisions for calibrated and functional test equipment is the responsibility of the CONTRACTOR.

D. The paint film shall be free of pinholes and holidays as determined by the use of an approved holiday detector as defined in Paragraph 1-09 of this Section.

E. The paint film shall be randomly checked for dry film thickness as stipulated in the "Coating System" sections of these specifications. Thicknesses shall be checked with a properly calibrated and approved magnetic gauge as defined in Paragraph 1-09 of this Section.

3.3 REPAIR OF DEFECTS IN PAINT

A. Any defects discovered during inspection, such as low film millage, holidays or pinholes, shall be repaired with the same materials as used for the original finish coat(s). Excessive low millage could require extra full coat(s) of paint.

B. A final inspection will be conducted by the ENGINEER/OWNER or his representative after any necessary repairs and prior to final acceptance of the job.

3.4 DISINFECTION OF POTABLE WATER STORAGE TANKS

A. Description: This paragraph specifies disinfection procedures for potable water storage tanks.

B. Quality Assurance: The following documents are a part of this section as specified and modified. In case of conflict between the requirements of this paragraph and those of the listed documents, the requirements of this paragraph shall prevail.

Reference	Title
AWWA D105, latest revision	Disinfection of Water Storage Facilities

C. Information to be Provided: Affidavit of Compliance as described in AWWA D105.

D. After the tank has been painted and the interior surfaces have thoroughly dried, the CONTRACTOR shall remove all visible dirt and contaminating materials. The interior of the tank shall be disinfected in accordance with Chlorination Method 2 of AWWA D105. The CONTRACTOR shall furnish all of the chlorine required.

E. The CONTRACTOR shall be responsible for obtaining proper disinfection as determined by bacteriological testing. Samples for bacterial analyses will be taken and analyzed by the OWNER. Two consecutive samples are required to pass the bacteriological tests for the tank to comply with these disinfection requirements.

F. Water for filling the tank after the initial disinfection will be provided by the OWNER. If

bacteriological testing shows the presence of coliform bacteria, the tank shall be redisinfected. The CONTRACTOR shall pay the OWNER for water required to fill the tank after the first filling at currently approved General Service water rates for the OWNER.

END OF SECTION 099000

SECTION 260000 - ELECTRICAL GENERAL

PART 2 - GENERAL

2.1 Work

1. The work covered by this division consists of providing all labor, equipment and materials and performing all operations necessary for the installation of the electrical work as herein called for and shown on the drawings.

2.2 Related Documents

1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.

2. This is a Basic Electrical Requirements Section. Provisions of this section apply to work of all Division 26 Sections.

3. Review all other contract documents to be aware of conditions affecting work herein.

4. Definitions:

    a. Provide: Furnish, install, and test, complete and ready for intended use.

    b. Furnish: Supply and deliver to project site, ready for subsequent requirements.

    c. Install: Operations at project site, including unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, test complete ready for intended use, and similar requirements.

2.3 Permits and Fees

1. Contractor shall obtain all necessary permits, meters, and inspections required for his work and Contractor shall pay all fees and charges incidental thereto.

2.4 Verification of Owner's Data

1. Prior to commencing work the Contractor shall satisfy himself as to the accuracy of all data indicated on the Drawings and/or provided by the Owner. Should the Contractor discover any inaccuracies, errors, or omissions in the data, he shall immediately notify the Engineer. Commencement of work by the Contractor shall be held as an acceptance of the data by him after which time the Contractor has no claim against the Owner resulting from alleged errors, omissions or inaccuracies of the said data.

2.5 Delivery and Storage of Materials

1. Materials delivered to site shall be inspected for damage, unloaded, and stored with a minimum of handling. All material shall be stored to provide protection from the weather and accidental damage.

2.6 Scope

1. Extent of work is indicated in the Drawings, Schedules, and Specifications. Singular references shall not be construed as requiring only one device if multiple devices are shown on the Drawings or are required for proper system operation.

2.7 Field Measurements and Coordination

1. The intent of the Drawings and Specifications is to obtain a complete and satisfactory installation. Separate divisional Drawings and Specifications shall not relieve the Contractor from full compliance of work indicated on any of the Drawings or in any Section of the Specifications. Report conflicts prior to start of work.

2. Verify all field dimensions and locations of equipment to insure close, neat fit with other trades' work. Make use of all Contract Documents and approved shop drawings to verify exact dimension and locations. Do not scale electrical drawings, rely on dimensions shown on architectural or structural drawings.

3. Coordinate work in this Division in proper sequence to ensure that the total work is completed within Contract time schedule and with minimum cutting and patching.

4. Locate all equipment, materials, and apparatus symmetrical with architectural elements. Install to exact height and locations when shown on architectural drawings. When locations are shown only on electrical drawings, be guided by architectural details and conditions existing at job and correlate this work with that of others.

5. Install work as required to fit structure, avoid obstructions, and retain clearance, headroom, openings and passageways. Cut no structural members without written approval from Engineer or Architect.

6. Carefully examine any existing conditions, piping, and premises. Compare Drawings with existing conditions. Report any observed discrepancies. It shall be the Contractor's responsibility to properly coordinate the work and to identify problems in a timely manner. Written instructions will be issued by the Engineer to resolve discrepancies.

7. Because of the small scale of the Drawings, it is not possible to indicate all offsets and fittings or to locate every accessory. Drawings are essentially diagrammatic. Study carefully the sizes and locations of structural members, wall and partition locations, trusses, and room dimensions and take actual measurements on the job. Locate material, equipment and accessories with sufficient space for installing and servicing. Contractor is responsible for accuracy of his measurements and shall not order materials or perform work without verification. No extra compensation will be allowed because field measurements vary from the dimensions on the Drawings. If field measurements show that equipment or material will not fit, the Engineer shall be consulted. Remove and relocate, without additional compensation, any item that is installed and is later found to encroach on space assigned to another use.

2.8 Guarantee

1. Owner reserves the right to make emergency repairs as required to keep equipment in operation without voiding Contractor's Guarantee Bond nor relieving Contractor of his responsibilities during guarantee period.

2. The Contractor shall guarantee labor, materials and equipment for a period of one (1) year from Substantial Completion, or from Owner's occupancy, whichever is earlier. Contractor shall make good any defects and shall include all necessary adjustments to and replacement of defective items without expense to the Owner.

2.9 Action and Informational Submittals

1. Shop drawings, product literature, and other action and informational submittals will only be reviewed if they are submitted in full accordance with the General and Supplementary Conditions and Division 1 and the following.

    a. Submittals shall be properly organized in accordance with the approved submittal control log.

    b. Submittals for each individual specification section shall contain all the equipment, materials, etc. required for that particular specification section. Multiple submittals for a single specification section are not allowed (exception: Shop Drawings may be separate from Product Data submittals). Incomplete submittals will be returned as Rejected.

    c. Submittals shall not include items from more than one specification section in the same submittal package unless approved in the submittal control log.

    d. Submittals shall be properly identified by a cover sheet showing the project name, Architect and Engineer names, submittal control number, specification section, a list of products or item names with model numbers in the order they appear in the package, and spaces for approval stamps. A sample cover sheet is included at the end of this section.

    e. Submittals shall have been reviewed and approved by the General Contractor (or Prime Contractor). Evidence of this review and approval shall be an "Approved" stamp with a signature and date on the cover sheet.

    f. Submittals that include a series of fixtures or devices (such as lighting fixtures) shall be organized by the fixture number and be marked accordingly. Each fixture must include all items associated with that fixture regardless of whether or not those items are used on other fixtures.

    g. The electrical design shown on the drawings supports the mechanical equipment basis of design specifications at the time of design. If mechanical equipment is submitted with different electrical requirements, it is the responsibility of the electrical contractor to coordinate with the mechanical contractor and resolve all required electrical design changes (wire and conduit size, breaker size, type of disconnect or overload protection, point(s) of connection, etc.) and clearly show the new electrical design on the electrical submittal(s) with a written statement that this change will be provided at no additional cost. Electrical submittals made with no written reference to the actual mechanical equipment being supplied will be presumed to work with the electrical design. Any corrections required will be at no additional cost.

    h. Submittals shall be in searchable PDF format and not a scanned copy.

i. Submittals shall ONLY contain relevant product data. Circle, highlight or otherwise identify all items relevant to the project. Remove or strikeout irrelevant product data.

2. If the shop drawings show variation from the requirements of contract because of standard shop practice or other reasons, the Contractor shall make specific mention of such variation in writing in his letter of transmittal and on the submittal cover sheet in order that, if acceptable, Contractor will not be relieved of the responsibility for executing the work in accordance with the contract.

3. Review of shop drawings, product literature, catalog data, or schedules shall not relieve the Contractor from responsibility for deviations from contract drawings or specifications, unless he has in writing called to the attention of the Architect/Engineer each such deviation in writing at the time of submission, nor shall it relieve him from responsibility for errors of any sort in shop drawings, product literature, catalog data, or schedules. Any feature or function specified but not mentioned in the submittal shall be assumed to be included per the specification.

4. Submit shop drawings as called for in other sections after award of the contract and before any material is ordered or fabricated. Shop drawings shall consist of plans, sections, elevations and details to scale (not smaller than 1/4" per foot), with dimensions clearly showing the installation. Direct copies of small scale project drawings issued to the Contractor are not acceptable. Drawings shall take into account equipment furnished under other sections and shall show space allotted for it. Include construction details and materials.

2.10 Test Reports and Verification Submittals

1. Submit test reports, certifications and verification letters as called for in other sections. Contractor shall coordinate the required testing and documentation of system performance such that sufficient time exists to prepare the reports, submit the reports, review the reports and take corrective action within the scheduled contract time.

2.11 O&M Data Submittals

1. Submit Operation and Maintenance data as called for in other sections. See Section 3 of this specification.

PART 3 - PRODUCTS

3.1 Products

1. All materials shall be new or Owner-supplied reused as shown on the drawings, the best of their respective kinds, suitable for the conditions and duties imposed on them at the building and shall be of reputable manufacturers. The description, characteristics, and requirements of materials to be used shall be in accordance with qualifying conditions established in the following sections.

3.2 Equipment and Materials

1. Shall be new and the most suitable grade for the purpose intended. Equipment furnished under this division shall be the product of a manufacturer regularly engaged in the manufacture of such items for a period of three years. Where practical, all of the components shall be products of a single manufacturer in order to provide proper coordination and responsibility. Where required, Contractor shall furnish proof of installation of similar units or equipment.

2. Each item of equipment shall bear a name plate showing the manufacturer's name, trade name, model number, serial number, ratings and other information necessary to fully identify it. This plate shall be permanently mounted in a prominent location and shall not be concealed, insulated or painted.

3. All materials and equipment shall be UL Certified, UL Listed, UL Labeled, UL Recognized, or UL Classified. The UL label shall be attached to the equipment or product.

4. The equipment shall be essentially the standard product of a manufacturer regularly engaged in the production of such equipment and shall be a product of the manufacturer's latest design.

5. A service organization with personnel and spare parts shall be available within two hours for each type of equipment furnished.

6. Install in accordance with manufacturer's recommendations. Place in service by a factory trained representative where required.

7. Materials and equipment are specified herein by a single or by multiple manufacturers to indicate quality, material and type of construction desired. Manufacturer's products shown on the Drawings have been used as basis for design; it shall be the Contractor's responsibility to ascertain that alternate manufacturer's products meet detailed specifications and that size and arrangement of equipment are suitable for installation.

8. Catalog numbers and model numbers indicated in the Drawings and Specifications are used as a guide in the selection of the equipment and are only listed for the Contractor's convenience. The Contractor shall determine the actual model numbers for ordering equipment and materials in accordance with the written description of each item and with the intent of the Drawings and Specifications.

3.3 Requests for Substitution

1. Where a particular system, product or material is specified by name, consider it as standard basis for bidding, and base proposal on the particular system, product or material specified.

2. Requests by Contractor for substitution will be considered only when reasonable, timely, fully documented, and qualifying under one or more of the following circumstances.

    a. Required product cannot be supplied in time for compliance with Contract time requirements.

    b. Required product is not acceptable to governing authority, or determined to be non-compatible, or cannot be properly coordinated, warranted or insured, or has other recognized disability as certified by Contractor.

    c. Substantial cost advantage is offered Owner after deducting offsetting disadvantages including delays, additional compensation for redesign, investigation, evaluation and other necessary services and similar considerations.

3. All requests for substitution shall contain a "Comparison Schedule" and clearly and specifically indicate any and all differences or omissions between the product specified as the basis of design

and the product proposed for substitution. Differences shall include but shall not be limited to data as follows for both the specified and substituted products:

a. Principal of operation

b. Materials of construction or finishes

c. Thickness of gauge of materials

d. Weight of item

e. Deleted features or items

f. Added features or items

g. Changes in other work caused by the substitution

h. Performance curves

4. If the approved substitution contains differences or omissions not specifically called to the attention of the Architect/Engineer, the Owner reserves the right to require equal or similar features to be added to the substituted products (or to have the substituted products replaced) at the Contractor's expense.

3.4 Prior Approval

1. Prior approval shall be required for any manufacturer other than those listed for all specified items in the Drawings and Specifications. Submit all requests for approval of the alternate manufacturer’s products two weeks prior to bid opening. Approval will be in the form of an Addendum to the Specifications and Drawings. Clearly indicate all differences between the specified and proposed product following the guidelines for “Request for Substitution” herein. This requirement may be waived if, in the opinion of the engineer, it is in the best interest of the Owner. Submittals received after the award of the bid for equipment that has not been Prior Approved are subject to immediate rejection.

PART 4 - EXECUTION

4.1 Workmanship

1. All materials and equipment shall be installed and completed in a first-class workmanlike manner and in accordance with the best modern methods and practice. Any materials installed which do not present an orderly and reasonably neat and/or workmanlike appearance, or do not allow adequate space for maintenance, shall be removed and replaced when so directed by the Architect/Engineer.

4.2 Coordination

1. The Contractor shall be responsible for full coordination of the electrical systems with shop drawings of the building construction so the proper openings and sleeves or supports etc., are provided for conduit, devices, or other equipment passing through slabs or walls.

2. Any supports required for the installation of any electrical equipment, fixtures or conduit shall be provided by the Contractor. Where there are no architectural/structural elements available, the Contractor shall construct support structures as required. For example, an exterior panelboard may require embedded concrete support posts and galvanized unistruts.

3. It shall be the Contractor's responsibility to see that all equipment that may require maintenance and operation are made easily accessible, regardless of the diagrammatic location shown on the Drawings.

4. All connections to fixtures and equipment shown on the Drawings shall be considered diagrammatic unless otherwise indicated by a specific detail on the Drawings. The actual connections shall be made to fully suit the requirements of each case and adequately provide for servicing.

5. The Contractor shall protect equipment and fixtures at all times during storage and construction. He shall replace all equipment and fixtures which are damaged as a result of inadequate protection.

6. Prior to starting and during progress of work, examine work and materials installed by others as they apply to work in this division. Report conditions which will prevent satisfactory installation.

7. Start of work will be construed as acceptance of suitability of work of others.

4.3 Work Required for Equipment Furnished by Other Divisions

1. Provide raceway boxes, fittings, devices and conductors for the electrical power to equipment furnished and installed in the other Divisions.

2. Make connections for the electrical power to equipment furnished and installed in other Divisions.

3. Verify voltage, phase, and current requirements for all equipment being supplied by other divisions. Any modifications shall be incorporated into the electrical submittals with references to any modification and reason. The electrical system is designed around the specified equipment. Any change in the equipment shall be coordinated so that the proper electrical installation is obtained. In addition, if the supplied equipment has higher minimum circuit ampacity that the equipment specified, the contractor shall call the modification to the Engineer’s attention and make necessary conduit, wire, circuit breaker and equipment changes to accommodate the higher ampacity requirements.

4. Any change from the specified equipment requirements shall be the responsibility of the contractor.

5. The electrical contractor shall meet with the Divisions 21-25 contractors and fully coordinate locations of mechanical equipment, duct work and piping to ensure that proper working clearance as required in the NEC is obtained. Any conflict shall be reported to the Engineer in writing prior to the installation of any of the equipment. Refer to additional requirements for planning drawings.

6. Coordinate exact locations and electrical rough-in requirements with other Divisions prior to installation to ensure proper clearances and code requirements are met.

4.4 Related Work

1. All Division 1 Sections apply to all Division 26 Sections.

2. Coordinate for all cutting and patching. Contractor shall review all cutting and patching required prior to bidding and shall coordinate installation.

3. Perform the following as part of Division 26 work complying with the requirements of Division 3 Concrete.

    a. Curbs, foundations and pads for electrical equipment.

    b. Encasement of electrical work.

    c. Underground structural concrete to accommodate electrical work.

    d. Rough grouting in and around electrical work.

    e. Patching concrete cut to accommodate electrical work.

4. Refer to Division 4 Masonry for:

    a. Patching openings to accommodate electrical work.

5. Refer to Division 5 Metals for:

    a. Supports for electrical work.

    b. Framing openings for electrical equipment.

6. Refer to Division 6 Wood for:

    a. Supports for electrical work.

    b. Framing openings for electrical equipment.

7. Refer to Division 07 Thermal and Moisture Protection for:

    a. Installation of all supports for electrical work.

    b. Caulking and waterproofing of all wall and roof mounted electrical work.

    c. Perform the following as part of Division 26 work complying with Division 7 requirements:

        1) Fire barrier penetration seals.

        2) Caulking and related shielding around ducts and pipes for sound isolation and attenuation.

8. Refer to Division 8 Doors & Windows for:

a. Installation of all access doors for electrical work.

9. Refer to Division 9 Finishes for:

a. Painting exposed conduit and equipment.

b. Painting structural metal and concrete for electrical work.

c. Painting access panels.

d. Colors shall be selected by the Architect for all painting of exposed electrical work unless specified herein.

10. Perform the following as part of Division 26 work.

a. Touch up painting of factory finishes.

11. Division 21 Fire Protection

a. Contractor shall coordinate the exact electrical requirements of all fire protection equipment being provided. Where action and informational submittals are required, this coordination shall be accomplished prior to making the submittals. The electrical design shown on the drawings supports the fire protection equipment basis of design. If fire protection equipment is submitted with different electrical requirements, it is the responsibility of the Contractor to resolve all required electrical design changes (wire and conduit size, type of disconnect or overload protection, point(s) of connection, etc.) and clearly show the new electrical design on the fire protection submittal with a written statement that this design will be provided at no additional cost. Fire protection submittals made with no written reference to the electrical design will be presumed to work with the electrical design. Any corrections required will be at no additional cost.

b. Contractor shall provide disconnect switches, starters, and contactors for fire protection equipment under Division 26 unless specifically noted as being furnished as part of fire protection equipment.

c. Contractor shall provide all power wiring, raceway and devices, and make final electrical connections to all fire protection equipment, switches, starters, contactors, controllers, and similar equipment.

12. Division 22 Plumbing

a. Contractor shall coordinate the exact electrical requirements of all plumbing equipment being provided. Where action and informational submittals are required, this coordination shall be accomplished prior to making the submittals. The electrical design shown on the drawings supports the plumbing equipment basis of design. If plumbing equipment is submitted with different electrical requirements, it is the responsibility of the Contractor to resolve all required electrical design changes (wire and conduit size, type of disconnect or overload protection, point(s) of connection, etc.) and clearly show the new electrical design on the plumbing submittal with a written statement that this design will be provided at no additional

cost. Plumbing submittals made with no written reference to the electrical design will be presumed to work with the electrical design. Any corrections required will be at no additional cost.

b. Contractor shall provide disconnect switches, starters, and contactors for plumbing equipment under Division 26 unless specifically noted as being furnished as part of plumbing equipment.

c. Contractor shall provide all power wiring, raceway and devices, and make final electrical connections to all plumbing equipment, switches, starters, contactors, controllers, and similar equipment.

13. Division 33 Sitework

a. Specific requirements for excavation and backfill for underground conduit are contained in Section 260550.

14. The following is part of Division 26 work.

a. Underground electrical utilities.

B. Construction Electrical Utilities

1. Provide all temporary wiring for power and light required for construction purposes and remove such temporary wiring when use is no longer required.

C. Service Coordination

1. Prior to commencing any work, coordinate with utility/service provider to ensure proper services are available to project when needed.

4.5 Interruption of Service

1. Before any equipment is shut down for disconnecting or tie-ins, arrangements shall be made with the Architect/Engineer and this work shall be done at the time best suited to the Owner. This will typically be on weekends and/or holidays and/or after normal working hours. Services shall be restored the same day unless prior arrangements are made. All overtime or premium costs associated with this work shall be included in the base bid.

4.6 Phasing

1. Provide all required temporary conduit, wiring, equipment and devices as required. Maintain temporary services to areas as required. Remove all temporary material and equipment on completion of work unless Engineer concurs that such material and equipment would be beneficial to the Owner on a permanent basis.

4.7 Cutting and Patching

1. Contractor shall provide all cutting and patching of all holes, chases, sleeves, and other openings required for installation of equipment furnished and installed under this section. Utilize

experienced trades for cutting and patching. Obtain permission from Architect/Engineer before cutting any structural items.

4.8 Equipment Setting

1. Bolt equipment directly to concrete pads or foundations, using hot-dipped galvanized anchor bolts, nuts and washers. Level equipment.

4.9 Painting

1. Touch-up factory finishes on equipment located inside and outside shall be done under Division 26. Obtain matched color coatings from the manufacturer and apply as directed by manufacturer. If corrosion is found during inspection on the surface of any equipment, clean, prime, and paint, as required.

4.10 Clean-up

1. Thoroughly clean all exposed parts of apparatus and equipment of cement, plaster, and other materials and remove all oil and grease spots. Repaint or touch up as required to look like new. During progress of work, Contractor is to carefully clean and leave premises free from debris and in a safe condition.

4.11 Start-up and Operational Test

1. Start each item of equipment in strict accordance with the manufacturer's instructions; or where noted under equipment specification, start-up shall be done by a qualified representative of the manufacturer. Alignment, lubrication, safety, and operating control shall be included in start-up check.

4.12 Record (As Built) Drawings

1. During the progress of the work the Contractor shall record on their field set of Drawings the corrections, variations, and deviations for systems which are not installed exactly as shown on the Contract Drawings. Contractor shall review the record (asbuilt) drawings with the Engineer and the field conditions at every regular job-site meeting. Pay requests will not be processed if record drawings are not accurate and current.

4.13 Acceptance

1. Acceptance will be on the basis of tests and inspections of the work. A representative of the firm which performed the testing shall be in attendance to assist during inspection. Contractor shall furnish necessary electricians to operate system, make any necessary adjustments and assist with final inspection.

4.14 Punch List

1. Submit written confirmation that all punch lists have been checked and the required work completed.

4.15 Instructions & Training

1. At completion of the work, provide a competent and experienced person who is thoroughly familiar with the project, for a period deemed necessary by the Owner to instruct permanent operating personnel in the operation of equipment and control systems. This is in addition to any specific equipment operation and maintenance training.

2. Submit training syllabi prior to training for owner review.

3. Provide video recording of Owner instruction and provide a copy of the video recording in appropriate format to the Owner with the O&M Manual.

4. All Owner training shall be scheduled and completed prior to substantial completion. The Owner may reserve the right to reschedule any training or divide any training session for a period of 1 year after building occupancy.

4.16 Operation and Maintenance Manuals

1. Prepare O&M Manuals as required by Division 1 (if applicable) and as described herein. Furnish searchable PDF manuals with Table of Contents, organized, and organized and tabbed by specification section. Submit prior to Substantial Completion Inspection.

2. Each individual tabbed specification section of the O&M Manual shall contain all applicable information for that particular section, including, but not limited to:

    a. Detailed operating instructions and instructions for making minor adjustments.

    b. Complete wiring and control diagrams.

    c. Routine maintenance operations.

    d. Manufacturer's catalog data, service instructions, and parts lists for each piece of operating equipment.

    e. Copies of final approved version of Action and Informational Submittals.

    f. Copies of all manufacturer's warranties.

    g. Copies of Test Reports and Verification Submittals.

3. All included information shall comply with the following:

    a. Remove all non-related information from O&Ms.

    b. Manuals shall only include information that is project specific and shall only be relevant to the operation and maintenance of the equipment installed.

4. Basic Electrical Tests: In addition to specific tests required in other sections:

    a. Test together and separately to determine that:

1) System is free from short circuits and other faults.

2) Motor starter overload devices are sized correctly.

3) Motors rotate correctly.

4) All equipment operates correctly and as specified.

5. Record Drawings: Submit "Record Drawings".

6. Control Diagrams: Laminate and mount on equipment room wall.

7. Single Line Diagram: Laminate 11"x17" and mount on electrical room wall.

THIS IS A SAMPLE COVER SHEET. USE ONE FOR EACH ACTION AND INFORMATIONAL SUBMITTAL.

PROJECT NAME:

PROJECT NUMBER:

ARCHITECT/ENGINEER: Akin Brooks Engineering

CONTRACTOR: XYZ Construction

SUBCONTRACTOR: ABC Electrical

SUPPLIER: 123 Supply

MANUFACTURER: Various

DATE: 9/16/20

SECTION: 26 05 20 / Interior Lighting

LIST EACH ITEM SEPARATELY

TYPICAL - LIST MFR NAME & MODEL NUMBER

1. Type A,
2. Type B
3. Type C
4. Type D
5. Type E

GENERAL CONTRACTOR'S APPROVAL STAMP MUST BE ON THIS SHEET.

END OF SECTION 260000

SECTION 260010 - ELECTRICAL CODES AND STANDARDS

PART 6 - GENERAL

6.1 General

1. All work under Division 26 shall be constructed in accordance with the codes and standards listed herein. The design has been based on the requirements of these codes and standards. While it is not the responsibility of the Contractor to verify that all work called for complies with these codes and standards, he shall be responsible for calling to the Engineer's attention any details on the Drawings and/or Specifications that are not in conformance with these or other codes and standards. Current issue of code applies unless specifically noted otherwise.

2. Comply with regulations and codes of suppliers of utilities.

3. Where no specific method or form of construction is called for in the Contract Documents, the Contractor shall comply with code requirements when carrying out such work.

4. Where code conflict exists, generally the most stringent requirement applies.

5. Codes or standards applying to a specific part of the work may be included in that section.

6. All electrical materials, installation and systems shall meet the requirements of the listed standards, including the latest addenda and amendments.

PART 7 - CODES

7.1 List of Codes

1. Florida Building Code - Building - Seventh Edition (2020).

2. Florida Building Code - Test Protocols for High Velocity Hurricane Zones - Seventh Edition (2020).

3. National Electrical Code (NFPA 70) – 2017

4. National Fire Alarm Code (NFPA 72) – 2016

5. Florida Fire Prevention Code - Seventh Edition (2020).

6. Fire Code (NFPA 1) - 2018 Florida Edition

7. Life Safety Code (NFPA 101) - 2018 Florida Edition.

8. National Electrical Safety Code (NESC)

PART 8 - STANDARDS

8.1 List of Standards

1. American National Standard Institutes (ANSI)

2. Illuminating Engineering Society (IES).
3. Institute of Electrical and Electronics Engineers (IEEE).
4. National Electrical Manufacturer's Associations (NEMA).
5. National Fire Protection Association (NFPA).
6. National Electrical Contractors Association (NECA)
7. Occupational Safety and Health Act (OSHA).
8. Underwriter's Laboratories, Inc. (UL).
9. Owner’s Construction Standards

END OF SECTION 260010

SECTION 260511 - REINFORCED CONCRETE FOUNDATIONS FOR ELECTRICAL EQUIPMENT

PART 9 - GENERAL

9.1 Related Documents

1. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Sections, apply to the work of this Section.

PART 10 - PRODUCTS

10.1 Concrete

1. Concrete shall have a minimum 28-day compressive strength of 3,000 psi when cured and tested per ASTM C 31 and C 39.

2. Concrete shall be placed within 1-1/2 hours after adding cement.

3. Slump range shall be 2 to 4 inches and air entrainment between 3 percent and 6 percent by volume.

10.2 Reinforcing Steel

1. Shall be deformed bars conforming to ASTM A 615, Grade 60 size #4 (unless shown on drawings).

2. Reinforcing steel shall be supported with concrete blocks of the same strength as the concrete mix. Use of broken concrete, brick or stone for supporting reinforcing steel shall not be permitted.

10.3 Wire Mesh

1. 6" x 6" square pattern welded wire mesh.

10.4 Expansion Joint Filler

1. Shall conform to ASTM D 994, 1/2-inch thick.

10.5 Nonshrink Grout

1. Nonshrink grout shall conform to the Corps of Engineers Specification for Nonshrink Grout, CRD-C586-78.

2. Grout shall be fluid and shall be nonmetallic. Grout shall be nongas-liberating type, cement base, premixed product, requiring only the addition of water for the required consistency. All components shall be inorganic.

10.6 Forms

1. Use new plywood for exposed areas, and shiplap or plywood for unexposed areas. Materials shall produce tight forms and an acceptable finish.

10.7 Form Ties

1. Form ties shall be constructed so the tie remains embedded in the wall, except for the removable portion at each end.

2. Form ties shall have conical or spherical type inserts. Inserts shall be fixed to remain in contact with forming material and shall be constructed so that no metal is within one inch of the concrete surface when forms, inserts, and tie ends are removed.

3. Wire ties shall not be used.

10.8 Anchor Bolts

1. Unless otherwise indicated on the Drawings, anchor bolts shall have a minimum yield strength of 75,000 psi.

2. The thread area plus 6 inches of the bolts shall be hot-dip galvanized. In no case shall less than the top 18 inches of the bolt be galvanized. The remainder of the bolt shall not be galvanized, painted, or coated with oil.

PART 11 - EXECUTION

11.1 Exterior On-Grade Pads

1. Remove all mud, organic silt, organic clay, peat or unprepared fill if they exist below pad and replace with clean fill.

11.2 Forms

1. Forms shall be constructed accurately with tight joints to prevent the escape of mortar and to avoid the formation of fins.

2. Brace forms to prevent distortion during concrete placement.

11.3 Wire Mesh

1. Provide in all concrete pads that do not contain rebar.

11.4 Placing Reinforcing Steel

1. Reinforcing steel shall be placed in accordance with CRSI, Recommended Practice for Placing Reinforcing Bars.

2. Minimum length of splices shall be 18 inches. Splices shall be tied with 18-gauge annealed wire.

11.5 Placing Concrete

1. Prior to placing concrete, remove water from excavation and all debris and foreign material from forms.

2. Before depositing new concrete on old concrete, clean surface and pour a 1-inch layer of cement sand grout over the surface of the old concrete.

3. Place concrete in 2 ft. layers without segregation or loss of ingredients and without splashing forms or steel above. Vertical drop to final placement shall not exceed 6 feet.

4. Do not place concrete when ambient temperature is below 40 degrees F or approaching 40 degrees F and dropping.

5. Compaction: Concrete shall be vibrated in place until it becomes uniformly plastic. Vibrators shall penetrate the fresh placed concrete and into the previous layer of concrete below.

11.6 Concrete Finishing

1. Screed surfaces to true level planes. After absorption of initial water, float with wood float and trowel with steel trowel to a smooth finish.

2. Do not absorb wet spots with neat cement.

3. Foundation shall not vary from level more than 1/4 inch in 10 feet.

11.7 Removal of Forms

1. Forms shall not be removed until the concrete has set sufficiently to carry the dead load and construction load it has to sustain. Forms shall be removed with care to minimize scarring or other surface damage.

11.8 Finishing Formed Concrete Surface

1. Cut out honeycombed and defective areas. Cut edges perpendicular to surface at least 1 inch deep, no featheredge shall be allowed. Soak area to be patched for 24 hours. Allow surface to drain free of standing water and patch with non-shrink grout.

2. When forms are removed, remove fins or projections from surface of exposed areas and rub surface with wood float to provide a uniform surface texture.

11.9 Concrete Protection and Curing

1. Protect fresh concrete from direct rays of the sun, drying winds, and wash by rain. When forms are removed and finishing completed, cure formed surfaces with curing compound applied in conformance with manufacturer's directions.

11.10 Concrete Quality Control

1. Contractor shall furnish certified test reports for the concrete used. Cost of taking, storing, and testing of sample cylinders shall be included in the bid price.

11.11 Concrete Testing

1. Three representative cylinders of each batch of concrete shall be taken and tested as follows:

    a. 1 at 7 days

    b. 1 at 28 days

c. 1 Spare

2. Test cylinders shall be taken at the site of the pour and shall be prepared and cured in a manner similar to the concrete work being done.

3. Cylinders shall be tested by an approved testing laboratory to verify the strength of the concrete.

11.12 Anchor Bolts

1. Anchor bolts shall be set level, square, plumb, to the correct elevation, and properly spaced. Anchor bolts shall not be reinforcing bar.

2. After concrete is set, no force shall be applied to anchor bolts in an attempt to move them and correct their separation.

3. Bolt holes on equipment base plates shall not be reamed or redrilled to fit an improper anchor bolt installation.

END OF SECTION 260511

SECTION 260519 - LOW-VOLTAGE POWER CONDUCTORS AND CABLES

PART 12 - GENERAL

12.1 Related Documents

1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

12.2 Summary

1. Section Includes:

    a. Copper building wire rated 600 V or less.

    b. Connectors, splices, and terminations rated 600 V and less.

12.3 Action Submittals

1. Product Data: For each type of product.

2. Product Schedule: Indicate type, use, location, and termination locations.

PART 13 - PRODUCTS

13.1 Manufacturers

1. Subject to compliance with requirements, provide products by one of the following:

2. Alpha Wire Company

3. Belden Inc.

4. Cerro Wire LLC

5. Encore Wire Corporation

6. General Cable Technologies Corporation

7. Southwire Company

8. CommScope, Inc.

9. Comtran Corporation

10. Draka Cableteg USA, a Prysmian Group Company

11. West Penn Wire

13.2 Copper Building Wire

1. Description: Flexible, insulated and uninsulated, drawn copper current-carrying conductor with an overall insulation layer or jacket, or both, rated 600 V or less.

2. Standards:

    a. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.

    b. RoHS compliant.

    c. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."

3. Conductors: Copper, complying with ASTM B3 for bare annealed copper and with ASTM B8 for stranded conductors.

4. Conductor Insulation:

    a. Type RHW-2: Comply with UL 44.

    b. Type THHN and Type THWN-2: Comply with UL 83.

    c. Type XHHW-2: Comply with UL 44.

13.3 Connectors and Splices

1. Description: Factory-fabricated connectors, splices, and lugs of size, ampacity rating, material, type, and class for application and service indicated; listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.

2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. 3M Electrical Products

    b. AFC Cable Systems; a part of Atkore International

    c. Hubbell Power Systems, Inc.

    d. Ideal Industries, Inc.

    e. ILSCO

    f. NSi Industries LLC

    g. O-Z/Gedney; a brand of Emerson Industrial Automation

h. TE Connectivity Ltd

i. Thomas & Betts Corporation; A Member of the ABB Group

3. Jacketed Cable Connectors: For steel and aluminum jacketed cables, zinc die-cast with set screws, designed to connect conductors specified in this Section.

4. Lugs: One piece, seamless, designed to terminate conductors specified in this Section.

a. Material: Copper.

b. Type: Two hole with long barrels.

c. Termination: Crimp.

PART 14 - EXECUTION

14.1 Conductor Material Applications

1. Feeders: Copper; solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

2. Branch Circuits: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

3. VFC Output Circuits Cable: Extra-flexible stranded for all sizes.

4. Power-Limited Fire Alarm and Control: Solid for No. 12 AWG and smaller.

5. PV Circuits: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

14.2 Conductor Insulation and Multiconductor Cable Applications and Wiring Methods

1. Service Entrance: Type XHHW-2, single conductors in raceway.

2. Feeders: Type THHN/THWN-2, single conductors in raceway or Type XHHW-2, single conductors in raceway.

3. Branch Circuits, Including in Crawlspaces: Type THHN/THWN-2, single conductors in raceway.

4. Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN/THWN-2, single conductors in raceway.

14.3 Installation of Conductors and Cables

1. Conceal cables in finished walls, ceilings, and floors unless otherwise indicated.

2. Complete raceway installation between conductor and cable termination points according to Section 260533 "Raceways and Boxes for Electrical Systems" prior to pulling conductors and cables.

3. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.

4. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.

5. Install exposed cables parallel and perpendicular to surfaces of exposed structural members and follow surface contours where possible.

6. Support cables according to Section 260529 "Hangers and Supports for Electrical Systems."

14.4 Voltage Drop

1. Contractor shall size all wires to accommodate the anticipated voltage drop.

2. For line voltage wires, the minimum size wire shall be #12 AWG. The following indicates the required minimum wire sizes for branch circuits to achieve 3% voltage drop at full load. The contractor shall verify all circuit lengths prior to pulling wire. Wires found to be smaller than those indicated below shall be removed and repulled (including increased conduit size and/or box sizes as required) with the correct wire at the contractor’s expense. The distances indicated below are to be measured to the center of the load.

    a. 120V 100’ and 150’: #10 AWG.

    b. 120V 150’ and 200’: #8 AWG.

    c. 120V 200’: #6 AWG.

    d. 277V >150’: #10 AWG.

14.5 Connections

1. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.

2. Make splices, terminations, and taps that are compatible with conductor material [and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors].

3. Wiring at Outlets: Install conductor at each outlet, with at least 12 inches of slack.

14.6 Identification

1. Identify and color-code conductors and cables according to Section 260553 "Identification for Electrical Systems."

2. Identify each spare conductor at each end with identity number and location of other end of conductor and identify as spare conductor.

14.7 Sleeve and Sleeve-Seal Installation for Electrical Penetrations

1. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 260544 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

14.8 Firestopping

1. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly.

END OF SECTION 260519

SECTION 260526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 15 - GENERAL

15.1 Related Documents

1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

15.2 Summary

1. Section includes grounding and bonding systems and equipment.

15.3 Action Submittals

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

PART 16 - PRODUCTS

16.1 System Description

1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Comply with UL 467 for grounding and bonding materials and equipment.

16.2 Manufacturers

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    a. Burndy; Part of Hubbell Electrical Systems.
    b. ERICO; a brand of nVent.
    c. Harger Lightning & Grounding.
    d. ILSCO.
    e. O-Z/Gedney; a brand of Emerson Industrial Automation.
    f. Robbins Lightning, Inc.
    g. Thomas & Betts Corporation; A Member of the ABB Group.

16.3 Conductors

1. Insulated Conductors: Copper or tinned-copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.

2. Bare Copper Conductors:

    a. Solid Conductors: ASTM B3.

    b. Stranded Conductors: ASTM B8.

    c. Tinned Conductors: ASTM B33.

    d. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.

    e. Bonding Jumper: Copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.

    f. Tinned Bonding Jumper: Tinned-copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.

3. Grounding Bus: Predrilled rectangular bars of annealed copper, 1/4 by 4 inches in cross section, with 9/32-inch holes spaced 1-1/8 inches apart. Stand-off insulators for mounting shall comply with UL 891 for use in switchboards, 600 V and shall be Lexan or PVC, impulse tested at 5000 V.

16.4 Connectors

1. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.

2. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

3. Irreversible Compression Connectors: Equivalent to Burndy HyGround system. For use in above and below ground applications.

4. Bus-Bar Connectors: Compression type, copper or copper alloy, with two wire terminals.

5. Beam Clamps: Mechanical type, terminal, ground wire access from four directions, with dual, tin-plated or silicon bronze bolts.

6. Cable-to-Cable Connectors: Compression type, copper or copper alloy.

7. Conduit Hubs: Mechanical type, terminal with threaded hub.

8. Ground Rod Clamps: Mechanical type, copper or copper alloy, terminal with hex head bolt.

9. Lay-in Lug Connector: Mechanical type, copper rated for direct burial terminal with set screw.

10. Straps: Solid copper, cast-bronze clamp. Rated for 600 A.

    a. U-Bolt Clamps: Mechanical type, copper or copper alloy, terminal listed for direct burial.

11. Water Pipe Clamps:

a. Mechanical type, two pieces with stainless-steel bolts.

b. Material: Tin-plated aluminum.

c. Listed for direct burial.

d. U-bolt type with malleable-iron clamp and copper ground connector.

16.5 Grounding Electrodes

1. Ground Rods: Copper-clad steel, sectional type; 3/4 inch by 10 feet.

PART 17 - EXECUTION

17.1 Applications

1. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger unless otherwise indicated.

2. Underground Grounding Conductors: Install bare tinned-copper conductor, No. 2/0 AWG minimum.

    a. Bury at least 30 inches below grade.

3. Grounding Conductors: Green-colored insulation with continuous yellow stripe.

4. Isolated Grounding Conductors: Green-colored insulation with more than one continuous yellow stripe. On feeders with isolated ground, identify grounding conductor where visible to normal inspection, with alternating bands of green and yellow tape, with at least three bands of green and two bands of yellow.

    a. Install bus horizontally, on insulated spacers 2 inches minimum from wall, 6 inches above finished floor unless otherwise indicated.

    b. Where indicated on both sides of doorways, route bus up to top of door frame, across top of doorway, and down; connect to horizontal bus.

5. Conductor Terminations and Connections:

    a. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.

    b. Underground Connections: Welded connectors except at test wells and as otherwise indicated.

    c. Connections to Ground Rods at Test Wells: Welded connectors.

    d. Connections to Structural Steel: Welded connectors.

17.2 Grounding at the Service

1. Equipment grounding conductors and grounding electrode conductors shall be connected to the ground bus. Install a main bonding jumper between the neutral and ground buses.

17.3 Grounding Separately Derived Systems

1. Generator: Install grounding electrode(s) at the generator location. The electrode shall be connected to the equipment grounding conductor and to the frame of the generator.

17.4 Equipment Grounding

1. Install insulated equipment grounding conductors with all feeders and branch circuits.

2. Isolated Grounding Receptacle Circuits: Install an insulated equipment grounding conductor connected to the receptacle grounding terminal. Isolate conductor from raceway and from panelboard grounding terminals. Terminate at equipment grounding conductor terminal of the applicable derived system or service unless otherwise indicated.

3. Isolated Equipment Enclosure Circuits: For designated equipment supplied by a branch circuit or feeder, isolate equipment enclosure from supply circuit raceway with a nonmetallic raceway fitting listed for the purpose. Install fitting where raceway enters enclosure and install a separate insulated equipment grounding conductor. Isolate conductor from raceway and from panelboard grounding terminals. Terminate at equipment grounding conductor terminal of the applicable derived system or service unless otherwise indicated.

4. Poles Supporting Outdoor Lighting Fixtures: Install grounding electrode and a separate insulated equipment grounding conductor in addition to grounding conductor installed with branch-circuit conductors.

    a. Grounding Conductor: Bare, tinned copper, not less than No. 8 AWG.

5. Grounding Method: At each grounding location, drive a grounding rod vertically until the top is 6 inches below finished grade. Connect rod to fence with No. 6 AWG conductor. Connect conductor to each fence component at grounding location.

6. Bonding Method for Gates: Connect bonding jumper between gate post and gate frame.

17.5 Installation

1. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

2. Ground Bonding Common with Lightning Protection System: Comply with NFPA 780 and UL 96 when interconnecting with lightning protection system. Bond electrical power system ground directly to lightning protection system grounding conductor at closest point to electrical service grounding electrode. Use bonding conductor sized same as system grounding electrode conductor and install in conduit.

3. Ground Rods: Drive rods until tops are 2 inches below finished floor or final grade unless otherwise indicated.

    a. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating if any.

b. Use exothermic welds for all below-grade connections.

c. For grounding electrode system, install at least three rods spaced at least one-rod length from each other and located at least the same distance from other grounding electrodes, and connect to the service grounding electrode conductor.

4. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.

5. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.

6. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install bonding so vibration is not transmitted to rigidly mounted equipment.

7. Use exothermic-welded connectors for outdoor locations; if a disconnect-type connection is required, use a bolted clamp.

8. Grounding and Bonding for Piping:

a. Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes; use a bolted clamp connector or bolt a lug-type connector to a pipe flange by using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.

b. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with a bolted connector.

c. Grounding for Steel Building Structure: Install a driven ground rod at base of each corner column and at intermediate exterior columns at distances not more than 60 feet apart.

d. Ground Ring: Install a grounding conductor, electrically connected to each building structure ground rod and to each steel column, extending around the perimeter of building.

e. Install tinned-copper conductor not less than No. 2/0 AWG for ground ring and for taps to building steel.

9. Bury ground ring not less than 24 inches from building's foundation.

10. Bond grounding conductor to reinforcing steel in at least four locations and to anchor bolts. Extend grounding conductor below grade and connect to building's grounding grid or to grounding electrode external to concrete.

11. Connections: Make connections so possibility of galvanic action or electrolysis is minimized. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact are galvanically compatible.

12. Use electroplated or hot-tin-coated materials to ensure high conductivity and to make contact points closer in order of galvanic series.

13. Make connections with clean, bare metal at points of contact.

14. Make aluminum-to-steel connections with stainless-steel separators and mechanical clamps.

15. Make aluminum-to-galvanized-steel connections with tin-plated copper jumpers and mechanical clamps.

16. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.

17.6 Tests and Inspections

1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.

2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.

3. Test completed grounding system at each location where a maximum ground resistance level is specified, at service disconnect enclosure grounding terminal, and at individual ground rods. Make tests at ground rods before any conductors are connected.

4. Measure ground resistance no fewer than two full days after last trace of precipitation and without soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.

5. Perform tests by fall-of-potential method according to IEEE 81.

6. Prepare dimensioned Drawings locating each, ground rod and ground-rod assembly, and other grounding electrodes. Identify each by letter in alphabetical order, and key to the record of tests and observations. Include the number of rods driven and their depth at each location and include observations of weather and other phenomena that may affect test results. Describe measures taken to improve test results.

7. Grounding system will be considered defective if it does not pass tests and inspections.

8. Prepare test and inspection reports.

9. Report measured ground resistances that exceed the following values:

    a. Power and Lighting Equipment or System with Capacity of 500 kVA and Less: 10 ohms.

    b. Power and Lighting Equipment or System with Capacity of 500 to 1000 kVA: 5 ohms.

    c. Power and Lighting Equipment or System with Capacity More Than 1000 kVA: 3 ohms.

d. Power Distribution Units or Panelboards Serving Electronic Equipment: 1 ohm(s).

e. Substations and Pad-Mounted Equipment: 5 ohms.

f. Manhole Grounds: 10 ohms.

10. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Engineer promptly and include recommendations to reduce ground resistance.

END OF SECTION 260526

SECTION 260529 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 18 - GENERAL

18.1 Related Documents

1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

18.2 Summary

1. Section Includes:
    a. Steel slotted support systems.
    b. Aluminum slotted support systems.
    c. Nonmetallic slotted support systems.
    d. Conduit and cable support devices.
    e. Support for conductors in vertical conduit.
    f. Structural steel for fabricated supports and restraints.
    g. Mounting, anchoring, and attachment components, including powder-actuated fasteners, mechanical expansion anchors, concrete inserts, clamps, through bolts, toggle bolts, and hanger rods.
    h. Fabricated metal equipment support assemblies.

18.3 Action Submittals

1. Product Data: For each type of product.
2. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for the following:
    a. Slotted support systems, hardware, and accessories.
    b. Clamps.
    c. Hangers.
    d. Sockets.
    e. Eye nuts.
    f. Fasteners.

g. Anchors.

h. Saddles.

i. Brackets.

3. Include rated capacities and furnished specialties and accessories.

PART 19 - PRODUCTS

19.1 Support, Anchorage, and Attachment Components

1. Steel Slotted Support Systems: Preformed steel channels and angles with minimum 13/32-inch-diameter holes at a maximum of 8 inches o.c. in at least one surface.

    a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

        1) B-line, an Eaton business.

        2) CADDY; a brand of nVent.

        3) Flex-Strut Inc.

        4) Unistrut; Part of Atkore International.

    b. Standard: Comply with MFMA-4 factory-fabricated components for field assembly.

    c. Material for Channel, Fittings, and Accessories: Galvanized steel.

    d. Channel Width: Selected for applicable load criteria.

    e. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.

2. Aluminum Slotted Support Systems: Extruded-aluminum channels and angles with minimum 13/32-inch-diameter holes at a maximum of 8 inches o.c. in at least one surface.

    a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

        1) Cooper Industries, Inc.

        2) Flex-Strut Inc.

        3) Thomas & Betts Corporation; A Member of the ABB Group.

        4) Unistrut; Part of Atkore International.

    b. Standard: Comply with MFMA-4 factory-fabricated components for field assembly.

    c. Channel Material: 6063-T5 aluminum alloy.

d. Fittings and Accessories Material: 5052-H32 aluminum alloy.

e. Channel Width: Selected for applicable load criteria.

3. Conduit and Cable Support Devices: Steel and malleable-iron hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.

4. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for nonarmored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be made of malleable iron.

5. Structural Steel for Fabricated Supports and Restraints: ASTM A36/A36M steel plates, shapes, and bars; black and galvanized.

6. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:

a. Powder Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.

b. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1) Hilti, Inc.

2) ITW Ramset/Red Head; Illinois Tool Works, Inc.

3) MKT Fastening, LLC.

4) Simpson Strong-Tie Co., Inc.

c. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel, for use in hardened portland cement concrete, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.

d. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1) B-line, an Eaton business.

2) Empire Tool and Manufacturing Co., Inc.

3) Hilti, Inc.

4) ITW Ramset/Red Head; Illinois Tool Works, Inc.

5) MKT Fastening, LLC.

e. Concrete Inserts: Steel or malleable-iron, slotted support system units are similar to MSS Type 18 units and comply with MFMA-4 or MSS SP-58.

f. Clamps for Attachment to Steel Structural Elements: MSS SP-58 units are suitable for attached structural element.

g. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM F3125/F3125M, Grade A325.

h. Toggle Bolts: All-steel springhead type.

i. Hanger Rods: Threaded steel.

19.2 Fabricated Metal Equipment Support Assemblies

1. Description: Welded or bolted structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.

PART 20 - EXECUTION

20.1 Application

1. Comply with the following standards for application and installation requirements of hangers and supports, except where requirements on Drawings or in this Section are stricter:

   a. NECA 1.

   b. NECA 101

   c. NECA 102.

   d. NECA 105.

2. Comply with requirements for raceways and boxes specified in Section 260533 "Raceways and Boxes for Electrical Systems."

3. Maximum Support Spacing and Minimum Hanger Rod Size for Raceways: Space supports for EMT, IMC, and RMC as scheduled in NECA 1, where its Table 1 lists maximum spacings that are less than those stated in NFPA 70. Minimum rod size shall be 1/4 inch in diameter.

4. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted or other support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.

   a. Secure raceways and cables to these supports with two-bolt conduit clamps.

5. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-1/2-inch and smaller raceways serving branch circuits and communication systems above suspended ceilings, and for fastening raceways to trapeze supports.

20.2 Support Installation

1. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this article.

2. Zip ties shall not be used to support conduit.

3. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb.

4. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:

    a. To Wood: Fasten with lag screws or through bolts.

    b. To New Concrete: Bolt to concrete inserts.

    c. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.

    d. To Existing Concrete: Expansion anchor fasteners.

    e. Instead of expansion anchors, powder-actuated driven threaded studs provided with lock washers and nuts may be used in existing standard-weight concrete 4 inches thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inches thick.

    f. To Steel: Beam clamps (MSS SP-58, Type 19, 21, 23, 25, or 27), complying with MSS SP-69.

    g. To Light Steel: Sheet metal screws.

    h. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate.

5. Drill holes for expansion anchors in concrete at locations and to depths that avoid the need for reinforcing bars.

20.3 Installation of Fabricated Metal Supports

1. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.

2. Field Welding: Comply with AWS D1.1/D1.1M.

20.4 Concrete Bases

1. Construct concrete bases of dimensions indicated, but not less than 4 inches larger in both directions than supported unit, and so anchors will be a minimum of 10 bolt diameters from edge of the base.

2. Use 3000-psi, 28-day compressive strength concrete.

3. Anchor equipment to concrete base as follows:

    a. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

    b. Install anchor bolts to elevations required for proper attachment to supported equipment.

    c. Install anchor bolts according to anchor-bolt manufacturer's written instructions.

20.5 Painting

1. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

    a. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils.

2. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A780.

END OF SECTION 260529

SECTION 260533 - RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART 21 - GENERAL

21.1 Related Documents

1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

21.2 Summary

1. Section Includes:
    a. Metal conduits and fittings.
    b. Nonmetallic conduits and fittings.
    c. Metal wireways and auxiliary gutters.
    d. Nonmetal wireways and auxiliary gutters.
    e. Surface raceways.
    f. Boxes, enclosures, and cabinets.
    g. Handholes and boxes for exterior underground cabling.

21.3 Definitions

1. GRC: Galvanized rigid steel conduit.
2. IMC: Intermediate metal conduit.

21.4 Action Submittals

1. Product Data: For each type of product.

PART 22 - PRODUCTS

22.1 Manufacturers

1. Subject to compliance with requirements, provide products by one of the following:
    a. Allied Tube & Conduit; a part of Atkore International.
    b. O-Z/Gedney; a brand of Emerson Industrial Automation.
    c. Republic Conduit.

d. Thomas & Betts Corporation; A Member of the ABB Group.

e. Topaz Electric; a division of Topaz Lighting Corp.

f. Western Tube and Conduit Corporation.

g. Wheatland Tube Company.

h. CANTEX INC.

i. RACO; Hubbell.

j. B-line, an Eaton business.

k. Hoffman; a brand of nVent.

l. MonoSystems, Inc.

m. Square D.

n. Panduit Corp.

o. Wiremold / Legrand.

p. NewBasis.

q. Oldcastle Enclosure Solutions.

r. Quazite: Hubbell Power Systems, Inc.

22.2 Metal Conduit

1. Listing and Labeling: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. GRC: Comply with ANSI C80.1 and UL 6.
3. PVC-Coated Steel Conduit: PVC-coated rigid steel conduit.
4. Comply with NEMA RN 1.
5. Coating Thickness: 0.040 inch, minimum.
6. EMT: Comply with ANSI C80.3 and UL 797.
7. FMC: Comply with UL 1; zinc-coated steel.
8. LFMC: Flexible steel conduit with PVC jacket and complying with UL 360.

22.3 Metal Fittings

a. Comply with NEMA FB 1 and UL 514B.

b. Listing and Labeling: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

c. Fittings, General: Listed and labeled for type of conduit, location, and use.

d. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 1203 and NFPA 70.

e. Fittings for EMT:

1) Material: Steel.

2) Type: Setscrew.

f. Expansion Fittings: PVC or steel to match conduit type, complying with UL 651, rated for environmental conditions were installed, and including flexible external bonding jumper.

g. Coating for Fittings for PVC-Coated Conduit: Minimum thickness of 0.040 inch, with overlapping sleeves protecting threaded joints.

2. Joint Compound for GRC: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

3. All connectors shall have insulated throats.

22.4 Nonmetallic Conduits

1. Listing and Labeling: Nonmetallic conduit shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2. RNC: Type EPC-40-PVC, complying with NEMA TC 2 and UL 651 unless otherwise indicated.

3. LFNC: Comply with UL 1660.

22.5 Nonmetallic Fittings

1. Fittings, General: Listed and labeled for type of conduit, location, and use.

2. Fittings for ENT and RNC: Comply with NEMA TC 3; match to conduit or tubing type and material.

3. Fittings for LFNC: Comply with UL 514B.

4. Solvents and Adhesives: As recommended by conduit manufacturer.

22.6 Metal Wireways and Auxiliary Gutters

1. Description: Sheet metal, complying with UL 870 and NEMA 250, NEMA type as required for environment, unless otherwise indicated, and sized according to NFPA 70.

a. Metal wireways installed outdoors shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2. Fittings and Accessories: Include covers, couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.

3. Wireway Covers: Hinged type or Screw-cover type unless otherwise indicated.

4. Finish: Manufacturer's standard enamel finish.

22.7 Nonmetallic Wireways and Auxiliary Gutters

1. Listing and Labeling: Nonmetallic wireways and auxiliary gutters shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2. Description: PVC, extruded and fabricated to required size and shape, and having snap-on cover, mechanically coupled connections, and plastic fasteners.

3. Fittings and Accessories: Couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings shall match and mate with wireways as required for complete system.

4. Solvents and Adhesives: As recommended by conduit manufacturer.

22.8 Boxes, Enclosures, and Cabinets

1. General Requirements for Boxes, Enclosures, and Cabinets: Boxes, enclosures, and cabinets installed in wet locations shall be listed for use in wet locations.

2. Sheet Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.

3. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, ferrous alloy, Type FD, with gasketed cover.

4. Nonmetallic Outlet and Device Boxes: Comply with NEMA OS 2 and UL 514C.

22.9 Cast Metal Access, Pull, and Junction Boxes

1. Comply with NEMA FB 1 and UL 1773, cast aluminum with gasketed cover.

22.10 Misc. Box Requirements

1. Box extensions used to accommodate new building finishes shall be of same material as recessed box.

2. Device Box Dimensions: Minimum 4 inches square by 1-1/2 inches deep (minimum 2 -1/8 inches deep for telcom and A/V boxes).

3. Gangable boxes are prohibited.

4. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, NEMA type as required for environment, with continuous-hinge cover with flush latch unless otherwise indicated.

    a. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.

    b. Nonmetallic Enclosures: Plastic.

    c. Interior Panels: Steel; all sides finished with manufacturer's standard enamel.

5. Cabinets:

    a. NEMA 250, NEMA type as required for environment, galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.

    b. Hinged door in front cover with flush latch and concealed hinge.

    c. Key latch to match panelboards.

    d. Metal barriers to separate wiring of different systems and voltage.

    e. Accessory feet where required for freestanding equipment.

    f. Nonmetallic cabinets shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

22.11 Handholes and Boxes for Exterior Underground Wiring

1. General Requirements for Handholes and Boxes:

    a. Boxes and handholes for use in underground systems shall be designed and identified as defined in NFPA 70, for intended location and application.

    b. Boxes installed in wet areas shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2. Polymer-Concrete Handholes and Boxes with Polymer-Concrete Cover: Molded of sand and aggregate, bound together with polymer resin, and reinforced with steel, fiberglass, or a combination of the two.

    a. Tier: 15 minimum.

    b. Standard: Comply with SCTE 77.

    c. Configuration: Designed for flush burial with open bottom unless otherwise indicated.

    d. Cover: Weatherproof, secured by tamper-resistant locking devices and having structural load rating consistent with enclosure and handhole location.

    e. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.

f. Cover Legend: Molded lettering, "ELECTRIC.".

g. Conduit Entrance Provisions: Conduit-terminating fittings shall mate with entering ducts for secure, fixed installation in enclosure wall.

h. Handholes 12 Inches Wide by 24 Inches Long and Larger: Have inserts for cable racks and pulling-in irons installed before concrete is poured.

PART 23 - EXECUTION

23.1 Outdoor Raceway Application

1. Apply raceway products as specified below unless otherwise indicated:

   a. Exposed Conduit: GRC.

   b. Concealed Conduit, Aboveground: RNC, Type EPC-40-PVC.

   c. Underground Conduit: RNC, Type EPC-40-PVC, direct buried. Elbows 1-1/2” and larger shall be GRC.

   d. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.

   e. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R.

   f. Conduit, boxes and enclosures in corrosive environments (i.e., cooling tower yard): Stainless steel or PVC. This includes all supports and mounting hardware.

23.2 Indoor Raceway Application

1. Apply raceway products as specified below unless otherwise indicated:

   a. Use only PVC. This includes all supports and mounting hardware.

23.3 Misc. Raceway Requirements

1. Minimum Raceway Size: 1/2-inch trade size.

2. Raceway Fittings: Compatible with raceways and suitable for use and location.

3. Rigid Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.

4. PVC Externally Coated, Rigid Steel Conduits: Use only fittings listed for use with this type of conduit. Patch and seal all joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Use sealant recommended by fitting manufacturer and apply in thickness and number of coats recommended by manufacturer.

5. EMT: Comply with NEMA FB 2.10.

6. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.

7. Do not install aluminum conduits, boxes, or fittings in contact with concrete or earth.

8. Install surface raceways only where indicated on Drawings.

9. Do not install nonmetallic conduit where ambient temperature exceeds 120 deg F.

23.4 Installation

1. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for hangers and supports.

2. Comply with NECA 1 and NECA 101 for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NECA 102 for aluminum conduits. Comply with NFPA 70 limitations for types of raceways allowed in specific occupancies and number of floors.

3. Do not install raceways or electrical items on any "explosion-relief" walls or rotating equipment.

4. Do not fasten conduits onto the bottom side of a metal deck roof.

5. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.

6. Complete raceway installation before starting conductor installation.

7. Length of flexible conduit shall not exceed 36 inches without written consent of Engineer

8. Arrange stub-ups so curved portions of bends are not visible above finished slab.

9. Boxes above ceiling shall not be located directly above a ceiling tile containing a light fixture, sprinkler head, HVAC diffuser or other device.

10. Install no more than the equivalent of three 90-degree bends in any conduit run except for control wiring conduits, for which fewer bends are allowed. Support within 12 inches of changes in direction.

11. Make bends in raceway using large-radius preformed ells. Field bending shall be according to NFPA 70 minimum radii requirements. Use only equipment specifically designed for material and size involved.

12. Conceal conduit within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.

13. Boxes that are required to be mounted in the same stud cavity and face opposite directions (rooms) regardless of vertical separation shall have 3.5" thick sound attenuation batt insulation installed from stud to stud and to a minimum of 12" above and 12" below the boxes. In no case shall these boxes be closer than 4" measured edge of box to edge of box.

14. Support conduit within 12 inches of enclosures to which attached.

15. Extension rings shall not be used, except when required on device boxes in walls and ceilings where standard mud rings, tile rings, masonry rings, etc. will not work with the specific device type (for example: some manufacturer's fire alarm system horn/strobe devices require extension rings in masonry walls). Any extension rings found not meeting this requirement shall be removed and replaced with appropriately sized boxes at the contractor's expense. The intent of this requirement is to have the contractor plan the raceway system out ahead of time. A well planned and designed raceway system shall have boxes sized appropriately without the need for extension rings.

16. Raceways Embedded in Slabs

    a. Run conduit larger than 1-inch trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support. Secure raceways to reinforcement at maximum 10-foot intervals.

    b. Arrange raceways to cross building expansion joints at right angles with expansion fittings.

    c. Arrange raceways to keep a minimum of 2 inches of concrete cover in all directions.

    d. Do not embed threadless fittings in concrete unless specifically approved by Engineer for each specific location.

    e. Change to GRC before rising above floor.

17. Stub-Ups to Above Recessed Ceilings

    a. Use EMT for raceways.

    b. Use a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.

18. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.

19. Coat field-cut threads on PVC-coated raceway with a corrosion-preventing conductive compound prior to assembly.

20. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors including conductors smaller than No. 4 AWG.

21. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to 1-1/4-inch trade size and insulated throat metal bushings on 1-1/2-inch trade size and larger conduits terminated with locknuts. Install insulated throat metal grounding bushings on service conduits.

22. Install raceways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more.

23. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to assure a continuous ground path.

24. Cut conduit perpendicular to the length. For conduits 2-inch trade size and larger, use roll cutter or a guide to make cut straight and perpendicular to the length.

25. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use.

26. Install raceway sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings according to NFPA 70.

27. Install devices to seal raceway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all raceways at the following points:

    a. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.

    b. Where an underground service raceway enters a building or structure.

    c. Conduit extending from interior to exterior of building.

    d. Conduit extending into pressurized duct and equipment.

    e. Conduit extending into pressurized zones that are automatically controlled to maintain different pressure set points.

    f. Where otherwise required by NFPA 70.

28. Comply with manufacturer's written instructions for solvent welding RNC and fittings.

29. Expansion Joint Fittings

    a. Install in each run of aboveground RNC that is located where environmental temperature change may exceed 30 deg F and that has straight-run length that exceeds 25 feet. Install in each run of aboveground RMC and EMT conduit that is located where environmental temperature change may exceed 100 deg F and that has straight-run length that exceeds 100 feet.

    b. Install type and quantity of fittings that accommodate temperature change listed for each of the following locations:

        1) Outdoor Locations Not Exposed to Direct Sunlight: 125 deg F temperature change.

        2) Outdoor Locations Exposed to Direct Sunlight: 155 deg F temperature change.

3) Indoor Spaces Connected with Outdoors without Physical Separation: 125 deg F temperature change.

4) Attics: 135 deg F temperature change.

c. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per deg F of temperature change for PVC conduits. Install fitting(s) that provide expansion and contraction for at least 0.000078 inch per foot of length of straight run per deg F of temperature change for metal conduits.

d. Install expansion fittings at all locations where conduits cross building or structure expansion joints.

e. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at time of installation. Install conduit supports to allow for expansion movement.

30. Flexible Conduit Connections

a. Comply with NEMA RV 3. Use a maximum of 72 inches of flexible conduit for recessed and semi-recessed luminaires, equipment subject to vibration, noise transmission, or movement; and for transformers and motors.

b. Use LFMC in damp or wet locations subject to severe physical damage.

c. Use LFMC or LFNC in damp or wet locations not subject to severe physical damage.

31. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to top of box unless otherwise indicated.

32. Recessed Boxes in Masonry Walls

a. Saw cut opening for box in center of cell of masonry block and install box flush with surface of wall. Prepare block surfaces to provide a flat surface for a raintight connection between box and cover plate or supported equipment and box.

33. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.

34. Provide UL putty pads for all boxes, cabinets, etc. in rated walls as required.

35. Locate boxes so that cover or plate will not span different building finishes.

36. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for the purpose.

37. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.

38. Set metal floor boxes level and flush with finished floor surface.

39. Set nonmetallic floor boxes level. Trim after installation to fit flush with finished floor surface.

23.5 Installation of Underground Conduit

1. Direct-Buried Conduit:

    a. Excavate trench bottom to provide firm and uniform support for conduit.

    b. Install backfill.

    c. After installing conduit, backfill and compact. Start at tie-in point, and work toward end of conduit run, leaving conduit at end of run free to move with expansion and contraction as temperature changes during this process. Firmly hand tamp backfill around conduit to provide maximum supporting strength. After placing controlled backfill to within 12 inches of finished grade, make final conduit connection at end of run and complete backfilling with normal compaction.

    d. Install manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through floor.

    e. For stub-ups at equipment mounted on outdoor concrete bases and where conduits penetrate building foundations, extend steel conduit horizontally a minimum of 60 inches from edge of foundation or equipment base. Install insulated grounding bushings on terminations at equipment.

    f. Underground Warning Tape: Comply with requirements in Section 260553 "Identification for Electrical Systems."

    g. Coat all GRC conduit with two coats of bitumastic.

23.6 Installation of Underground Handholes and Boxes

1. Install handholes and boxes level and plumb and with orientation and depth coordinated with connecting conduits to minimize bends and deflections required for proper entrances.

2. Unless otherwise indicated, support units on a level bed of crushed stone or gravel, graded from 1/2-inch sieve to No. 4 sieve and compacted to same density as adjacent undisturbed earth.

3. Elevation: In paved areas, set so cover surface will be flush with finished grade. Set covers of other enclosures 1 inch above finished grade.

23.7 Sleeve and Sleeve-Seal Installation for Electrical Penetrations

1. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 260544 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

23.8 Firestopping

1. Install firestopping at penetrations of fire-rated floor and wall assemblies.

23.9 Protection

1. Protect coatings, finishes, and cabinets from damage and deterioration.
2. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
3. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION 260533

SECTION 260550 - EXCAVATION AND BACKFILL

PART 24 - GENERAL

24.1 Related Documents

1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

2. Review all project Drawings to be aware of conditions affecting work herein.

PART 25 - PRODUCTS

25.1 Sand

1. Clean, hard, uncoated grains free from organic matter or other deleterious substances. Sand for backfill shall be of a grade equal to mortar sand, with 95% passing a No. 8 sieve, and not more than 8% passing a No. 100 sieve.

25.2 Gravel

1. Clean, well-graded hard stone or lime rock gravel, free from organic material. Size range to be from No. 4 screen retentions to 1".

25.3 Earth

1. Must be free of stones, wood, roots or rubbish.

25.4 Underground-line Warning Tape

1. See specifications Section 260553 Identification for Electrical Systems.

PART 26 - EXECUTION

26.1 Ditching and Excavation

1. Shall be performed by hand wherever the possibility of encountering obstacles or any existing utility lines. The Contractor will be totally responsible to ensure that no utility or service interruptions shall be caused and that no existing utilities or obstructions will prohibit installations of service under this Contract at proper grade and location. Where clear and unobstructed areas are to be excavated, appropriate machine excavation methods may be employed. Avoid use of machine excavations within the limits of the building lines except when machine weights and operation will not damage sub-surface structural components or piping.

2. Excavation shall be maintained in satisfactory condition during the progress of the work. Sub-surface structures shall be constructed in adequately sized excavations and dewatering equipment shall be installed and properly maintained. Shoring shall be employed in the event of unstable soil conditions, and in all cases to protect materials and personnel from injury.

26.2 Bedding

1. Excavate to bottom grade of raceway to be installed, and shape bed of undisturbed earth to contour of conduit for a width of at least 5% of the conduit diameter. If earth conditions necessitate excavation below raceway grade, bring the bed up to the proper elevation with clean, dry sand deposited in 6" layers and firmly tamped by mechanical means. If sub-cut exceeds 12" or if bed is of an unstable nature, a 6" minimum layer of rock will be required before sand bedding begins.

26.3 Placing

1. Conduit shall be carefully handled into place in the excavation. Avoid knocking loose soil from the banks of the trench into the conduit bed. Coated conduit shall have special handling slings to prevent damage to the coating. All holidays in the conduit coating shall be touched in before beginning back filling.

2. Conduits to be installed below the footings or foundations shall be installed prior to the installation of the footings. All soil shall be compacted to meet the structural requirements for the footings. If it is not possible to install the conduit prior to pouring of the footings, it shall be necessary for the contractor to provide a bridge footing to span the excavation plus 2 feet on either side of the excavation. The footing modifications shall be approved prior to installation by the Structural Engineer.

26.4 Backfilling

1. Deposit earth or sand carefully in 6" layers, maintaining adequate side support. Compact fill in 6" layers, using mechanical means up to the top elevation of the conduit and 12" layers to finish grade.

26.5 Identification

1. Provide identifying metalized plastic warning tape above conduit. Replace surface to the original condition, i.e., sodding, sprigging, and fine grading.

END OF SECTION 260550

SECTION 260553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 27 - GENERAL

27.1 Related Documents

1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

27.2 Summary

1. Section Includes:
    a. Color and legend requirements for raceways, conductors, and warning labels and signs.
    b. Labels.
    c. Bands and tubes.
    d. Tapes and stencils.
    e. Tags.
    f. Signs.
    g. Cable ties.
    h. Paint for identification.
    i. Fasteners for labels and signs.

27.3 Action Submittals

1. Product Data: For each type of product.

PART 28 - PRODUCTS

28.1 Performance Requirements

1. Comply with ASME A13.1.
2. Comply with NFPA 70.
3. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.
4. Comply with ANSI Z535.4 for safety signs and labels.

5. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

6. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.

    a. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

28.2 Color and Legend Requirements

1. Cables Carrying Circuits at 600 V or Less: Color shall be factory applied.

    a. Colors for 208/120-V Circuits:

        1) Phase A: Black.

        2) Phase B: Red.

        3) Phase C: Blue.

        4) Neutral: White.

    b. Colors for 240-V Circuits:

        1) Phase A: Black.

        2) Phase B: Red.

        3) Neutral: White.

    c. Colors for 480/277-V Circuits:

        1) Phase A: Brown.

        2) Phase B: Orange.

        3) Phase C: Yellow.

        4) Neutral: gray.

        5) Equipment Ground: Green with a yellow stripe.

    d. Colors for Isolated Grounds: Green with two or more yellow stripes.

2. Accessible Raceways, 600 V or Less: Identification shall completely cover the entire length of the conduit. Colors shall be as follows:

    a. 120/208V: Black

    b. 277/480V: Brown

    c. Access Control: Purple

d. Telecommunications: Blue

e. BAS/HVAC Controls: White

f. Other Systems: Provide a unique pre-approved color

3. Warning Label Colors:

a. Identify system voltage with black letters on an orange background.

4. Warning labels and signs shall include, but are not limited to, the following legends:

a. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."

b. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES."

5. Equipment Identification Labels:

a. Normal Power: Black letters on a white field.

28.3 Labels

1. Vinyl Wraparound Labels: Preprinted, flexible labels laminated with a clear, weather- and chemical-resistant coating and matching wraparound clear adhesive tape for securing label ends.

2. Snap-around Labels: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeves, with diameters sized to suit diameters and that stay in place by gripping action.

3. Self-Adhesive Wraparound Labels: Preprinted, 3-mil-thick, vinyl flexible label with acrylic pressure-sensitive adhesive.

4. Self-Lamination: Clear; UV-, weather- and chemical-resistant; self-laminating, protective shield over the legend. Labels sized such that the clear shield overlaps the entire printed legend.

5. Self-Adhesive Labels: Vinyl, thermal, transfer-printed, 3-mil-thick, multicolor, weather- and UV-resistant, pressure-sensitive adhesive labels, configured for intended use and location.

a. Minimum Nominal Size:

1) 1-1/2 by 6 inches for raceway and conductors.

2) 3-1/2 by 5 inches for equipment.

3) As required by authorities having jurisdiction.

28.4 Bands and Tubes

1. Snap-around, Color-Coding Bands: Slit, pretensioned, flexible, solid-colored acrylic sleeves, 2 inches long, with diameters sized to suit diameters and that stay in place by gripping action.

2. Heat-Shrink Preprinted Tubes: Flame-retardant polyolefin tubes with machine-printed identification labels, sized to suit diameter and shrunk to fit firmly. Full shrink recovery occurs at a maximum of 200 deg F. Comply with UL 224.

28.5 Tapes and Stencils

1. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.

2. Self-Adhesive Vinyl Tape: Colored, heavy duty, waterproof, fade resistant; not less than 3 mils thick by 1 to 2 inches wide; compounded for outdoor use.

3. Tape and Stencil: 4-inch-wide black stripes on 10-inch centers placed diagonally over orange background and are 12 inches wide. Stop stripes at legends.

4. Floor Marking Tape: 2-inch-wide, 5-mil pressure-sensitive vinyl tape, with yellow and black stripes and clear vinyl overlay.

5. Underground-Line Warning Tape:

    a. Recommended by manufacturer for the method of installation and suitable to identify and locate underground electrical and communications utility lines.

    b. Printing on tape shall be permanent and shall not be damaged by burial operations.

    c. Tape material and ink shall be chemically inert and not subject to degradation when exposed to acids, alkalis, and other destructive substances commonly found in soils.

    d. Color and Printing:

        1) Comply with ANSI Z535.1, ANSI Z535.2, ANSI Z535.3, ANSI Z535.4, and ANSI Z535.5.

        2) Inscriptions for Red-Colored Tapes: "ELECTRIC LINE, HIGH VOLTAGE".

        3) Inscriptions for Orange-Colored Tapes: "TELEPHONE CABLE, CATV CABLE, COMMUNICATIONS CABLE, OPTICAL FIBER CABLE".

    e. Construction:

        1) Detectable three-layer laminate, consisting of a printed pigmented polyolefin film, a solid aluminum-foil core, and a clear protective film that allows inspection of the continuity of the conductive core; bright colored, continuous-printed on one side with the inscription of the utility, compounded for direct-burial service.

        2) Width: 6 inches.

        3) Overall Thickness: 5.5 mils.

        4) Foil Core Thickness: 0.35 mil.

5) Weight: 28 lb/1000 sq. ft.

6) Tensile according to ASTM D882: 70 lbf and 4600 psi.

28.6 Metal Tags

1. Brass or aluminum, 2 by 2 by 0.05 inch, with stamped legend, punched for use with self-locking cable tie fastener.

2. Nonmetallic Preprinted Tags: Polyethylene tags, 0.023 inch thick, color-coded for phase and voltage level, with factory printed permanent designations; punched for use with self-locking cable tie fastener.

B. Write-on Tags

1. Polyester Tags: 0.015 inch thick, with corrosion-resistant grommet and cable tie for attachment.

2. Marker for Tags: Machine-printed, permanent, waterproof, black ink marker recommended by printer manufacturer.

28.7 Signs

1. Baked-Enamel Signs:

a. Preprinted aluminum signs punched or drilled for fasteners, with colors, legend, and size required for application.

b. 1/4-inch grommets in corners for mounting.

c. Nominal Size: 7 by 10 inches.

2. Metal-Backed Butyrate Signs:

a. Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs, with 0.0396-inch galvanized-steel backing, punched and drilled for fasteners, and with colors, legend, and size required for application.

b. 1/4-inch grommets in corners for mounting.

c. Nominal Size: 10 by 14 inches.

3. Laminated Acrylic or Melamine Plastic Signs:

a. Engraved legend.

b. Thickness:

1) For signs up to 20 sq. in., minimum 1/16 inch thick.

2) For signs larger than 20 sq. in., 1/8 inch thick.

3) Engraved legend with black letters on white face

4) Punched or drilled for mechanical fasteners with 1/4-inch grommets in corners for mounting

5) Framed with mitered acrylic molding and arranged for attachment at applicable equipment.

28.8 Cable Ties

1. General Purpose Cable Ties: Fungus inert, self-extinguishing, one piece, self-locking, and Type 6/6 nylon.

    a. Minimum Width: 3/16 inch.

    b. Tensile Strength at 73 Deg F according to ASTM D638: 12,000 psi.

    c. Temperature Range: Minus 40 to plus 185 deg F.

    d. Color: Black, except where used for color-coding.

2. UV-Stabilized Cable Ties: Fungus inert, designed for continuous exposure to exterior sunlight, self-extinguishing, one piece, self-locking, and Type 6/6 nylon.

    a. Minimum Width: 3/16 inch.

    b. Tensile Strength at 73 Deg F according to ASTM D638: 12,000 psi.

    c. Temperature Range: Minus 40 to plus 185 deg F.

    d. Color: Black.

3. Plenum-Rated Cable Ties: Self-extinguishing, UV stabilized, one piece, and self-locking.

    a. Minimum Width: 3/16 inch.

    b. Tensile Strength at 73 Deg F according to ASTM D638: 7000 psi.

    c. UL 94 Flame Rating: 94V-0.

    d. Temperature Range: Minus 50 to plus 284 deg F.

    e. Color: Black.

28.9 Miscellaneous Identification Products

1. Paint: Comply with requirements in painting Sections for paint materials and application requirements. Retain paint system applicable for surface material and location (exterior or interior).

2. Fasteners for Labels and Signs: Screws with nuts and flat and lock washers. Material shall be stainless-steel in exterior or corrosive environments.

PART 29 - EXECUTION

29.1 Preparation

1. Self-Adhesive Identification Products: Before applying electrical identification products, clean substrates of substances that could impair bond, using materials and methods recommended by manufacturer of identification product.

29.2 Installation

1. Verify and coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and operation and maintenance manual. Use consistent designations throughout Project.

2. Install identifying devices before installing acoustical ceilings and similar concealment.

3. Verify identity of each item before installing identification products.

4. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and operation and maintenance manual.

5. Apply identification devices to surfaces that require finish after completing finish work.

6. Install signs with approved legend to facilitate proper identification, operation, and maintenance of electrical systems and connected items.

7. System Identification for Raceways containing cables under 600 V: Identification shall completely cover the entire length of the conduit.

8. System Identification for Cables under 600 V: Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.

9. Identify conductors within 3" of terminations to wiring devices.

10. Identify conductors within 3" of terminations to circuit breakers.

11. Use system of marker tape designations that is uniform and consistent with system used by manufacturer for factory-installed connections.

12. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and Operation and Maintenance Manual.

13. For conductors No. 1/0 AWG and larger in vaults, pull and junction boxes, manholes, and handholes use color-coding conductor tape. Identify source and circuit number of each set of conductors. For single conductor cables, identify phase in addition to the above.

14. Where there are conductors for more than three branch circuits in same junction or pull box, use color-coding conductor tape. Identify each ungrounded conductor according to source and circuit number.

15. Tag and pair each neutral with its respective phase conductor (s).

16. System Identification for Raceways and Cables over 600 V: Identification shall completely encircle cable or conduit. Place adjacent identification of two-color markings in contact, side by side.

17. Secure tight to surface of conductor, cable, or raceway.

18. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.

19. Emergency Operating Instruction Signs: Install instruction signs with white legend on a red background with minimum 3/8-inch-high letters for emergency instructions at equipment used for power transfer.

20. Elevated Components: Increase sizes of labels, signs, and letters to those appropriate for viewing from the floor.

21. Box Covers for Raceways: Identify the covers of each junction and pull box of the following systems with the wiring system and pertinent information such as source, destination, system voltage and circuit number, etc. Examples are as follows:

    a. Feeders:

        1) "EMERGENCY POWER 480V FROM 4EDS TO 4EP2"

        2) "NORMAL POWER FROM 208V TO 2MDB”

    b. Branch circuits:

        1) "EMERGENCY POWER 480V CKT 4MDS-3"

        2) "NORMAL POWER 120V CKTS 2P1-6,8,10"

        3) "LIGHTING 277V CKT 4L2-13"

        4) "UPS POWER 208V CKTS 2P3-1,3,5”

    c. Fire Alarm

        1) “FIRE ALARM SLC-1 & NAC-2”

        2) “F/A NAC-2&3”

    d. Telecommunications:

        1) “TELECOM”

29.3 Labeling

1. General Wiring Devices (switches, receptacles, etc.): Write on the front of each device the corresponding circuit description (i.e.: 2P2-32) so that it is visible with the cover plate off and not visible with the cover plate on. Use fine point permanent felt-tip black marker.

2. Fire Alarm Devices: Label each device with its circuit number and/or address number. Label shall be visible on cover. Use heat transfer tape type labeler.

3. Devices above ceiling: Label the ceiling grid (not ceiling tile) directly below where a device is located. Use heat transfer tape type labeler. Example devices are:

    a. Lighting relay or controller.

    b. Light fixture remote driver.

4. Vinyl Wraparound Labels:

    a. Secure tight to surface of raceway or cable at a location with high visibility and accessibility.

    b. Attach labels that are not self-adhesive type with clear vinyl tape, with adhesive appropriate to the location and substrate.

5. Snap-around Labels: Secure tight to surface at a location with high visibility and accessibility.

6. Self-Adhesive Wraparound Labels: Secure tight to surface at a location with high visibility and accessibility.

7. Self-Adhesive Labels:

    a. On each item, install unique designation label that is consistent with wiring diagrams, schedules, and operation and maintenance manual.

    b. Unless otherwise indicated, provide a single line of text with 1/2-inch-high letters on 1-1/2-inch-high label; where two lines of text are required, use labels 2 inches high.

8. Snap-around Color-Coding Bands: Secure tight to surface at a location with high visibility and accessibility.

9. Heat-Shrink, Preprinted Tubes: Secure tight to surface at a location with high visibility and accessibility.

10. Marker Tapes: Secure tight to surface at a location with high visibility and accessibility.

11. Self-Adhesive Vinyl Tape: Secure tight to surface at a location with high visibility and accessibility.

    a. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding.

12. Tape and Stencil: Comply with requirements in painting Sections for surface preparation and paint application.

13. Floor Marking Tape: Apply stripes to finished surfaces following manufacturer's written instructions.

14. Underground Line Warning Tape:

    a. During backfilling of trenches, install continuous underground-line warning tape directly above cable or raceway at 12 inches below finished grade. Use multiple tapes where width of multiple lines installed in a common trench or concrete envelope exceeds 16 inches overall.

    b. Limit use of underground-line warning tape to direct-buried cables.

    c. Install underground-line warning tape for direct-buried cables and cables in raceways.

29.4 Tags

1. Metal Tags:

    a. Place in a location with high visibility and accessibility.

    b. Secure using cable ties.

2. Nonmetallic Preprinted Tags:

    a. Place in a location with high visibility and accessibility.

    b. Secure using cable ties.

3. Write-on Tags:

    a. Place in a location with high visibility and accessibility.

    b. Secure using cable ties.

29.5 Signs

1. Baked-Enamel Signs:

    a. Attach signs that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.

    b. Unless otherwise indicated, provide a single line of text with 1/2-inch-high letters on minimum 1-1/2-inch-high sign; where two lines of text are required, use signs minimum 2 inches high.

2. Metal-Backed Butyrate Signs:

    a. Attach signs that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.

    b. Unless otherwise indicated, provide a single line of text with 1/2-inch-high letters on 1-1/2-inch-high sign; where two lines of text are required, use labels 2 inches high.

3. Laminated Acrylic or Melamine Plastic Signs:

    a. Attach signs that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.

    b. Unless otherwise indicated, provide a single line of text with 1/2-inch-high letters on 1-1/2-inch-high sign; where two lines of text are required, use labels 2 inches high.

29.6 Identification Schedule

1. Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment. Install access doors or panels to provide view of identifying devices.

2. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, pull points, and locations of high visibility. Identify by system and circuit designation.

29.7 Conductor Identification

1. Power-Circuit Conductor Identification, 600 V or Less

    a. For conductors in vaults, pull and junction boxes, manholes, and handholes, use vinyl wraparound labels to identify the phase.

    b. Locate identification at changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.

2. Power-Circuit Conductor Identification, More Than 600 V

    a. For conductors in vaults, pull and junction boxes, manholes, and handholes, use nonmetallic preprinted tags colored and marked to indicate phase, and a separate tag with the circuit designation.

3. Control-Circuit Conductor Identification

    a. For conductors and cables in pull and junction boxes, manholes, and handholes, use write-on tags with the conductor or cable designation, origin, and destination.

4. Control-Circuit Conductor Termination Identification

    a. For identification at terminations, provide heat-shrink preprinted tubes with the conductor designation.

5. Conductors to Be Extended in the Future:

    a. Attach write-on tags to conductors and list source.

29.8 Auxiliary Electrical Systems Conductor Identification

1. Self-adhesive vinyl tape that is uniform and consistent with system used by manufacturer for factory-installed connections.

2. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.

3. Locations of Underground Lines: Underground-line warning tape for power, lighting, communication, and control wiring and optical-fiber cable.

4. Concealed Raceways and Duct Banks, More Than 600 V, within Buildings: Apply floor marking tape to the following finished surfaces:

    a. Floor surface directly above conduits running beneath and within 12 inches of a floor that is in contact with earth or is framed above unexcavated space.

    b. Wall surfaces directly external to raceways concealed within wall.

    c. Accessible surfaces of concrete envelope around raceways in vertical shafts, exposed in the building, or concealed above suspended ceilings.

29.9 Instructional Signs

1. Self-adhesive labels, including the color code for grounded and ungrounded conductors.

2. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting:

    a. Baked-enamel warning signs.

    b. Apply to exterior of door, cover, or other access.

    c. For equipment with multiple power or control sources, apply to door or cover of equipment, including, but not limited to, the following:

        1) Power-transfer switches.

        2) Controls with external control power connections.

3. Arc Flash Warning Labeling: Self-adhesive labels.

4. Operating Instruction Signs: Laminated acrylic or melamine plastic signs.

5. Emergency Operating Instruction Signs: Baked-enamel warning signs or Laminated acrylic or melamine plastic signs with white legend on a red background with minimum 3/8-inch-high letters for emergency instructions at equipment used for power transfer, load shedding, etc.

29.10 Equipment Identification Labels

1. Indoor Equipment: Laminated acrylic or melamine plastic sign.

2. Outdoor Equipment: Laminated acrylic or melamine sign.

3. Equipment to be Labeled:

    a. Panelboards: Typewritten directory of circuits in the location provided by panelboard manufacturer. Panelboard identification shall be in the form of an engraved, laminated acrylic or melamine label.

    b. Enclosures and electrical cabinets.

    c. Access doors and panels for concealed electrical items.

    d. Enclosed switches.

    e. Enclosed controllers.

    f. Push-button stations.

    g. Power-transfer equipment.

    h. Power generating units.

    i. Monitoring and control equipment.

END OF SECTION 260553

SECTION 262416 - PANELBOARDS

PART 30 - GENERAL

30.1 Related Documents

1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

30.2 Summary

1. Section Includes:
    a. Lighting and appliance branch-circuit panelboards.

30.3 Definitions

1. ATS: Acceptance testing specification.
2. GFCI: Ground-fault circuit interrupter.
3. GFEP: Ground-fault equipment protection.
4. MCCB: Molded-case circuit breaker.
5. SPD: Surge protective device.
6. VPR: Voltage protection rating.

30.4 Action Submittals

1. Product Data: For each type of panelboard.
    a. Include materials, switching and overcurrent protective devices, SPDs, accessories, and components indicated.
    b. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.
2. Shop Drawings: For each panelboard and related equipment.
    a. Include dimensioned plans, elevations, sections, and details.
    b. Show tabulations of installed devices with nameplates, conductor termination sizes, equipment features, and ratings.
    c. Detail enclosure types including mounting and anchorage, environmental protection, knockouts, corner treatments, covers and doors, gaskets, hinges, and locks.

d. Detail bus configuration, current, and voltage ratings.

e. Short-circuit current rating of panelboards and overcurrent protective devices.

f. Include evidence of NRTL listing for SPD as installed in panelboard.

g. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.

3. Electrical Room Layouts: For each electrical room and room containing a switchboard or panelboard, provide a 1/4” scaled drawing showing equipment layouts for maintenance and code clearance verification. Show all equipment including equipment (ductwork, piping, equipment, etc) in other specifications sections and divisions. Show all equipment’s required maintenance and code clearances.

30.5 Closeout Submittals

1. Operation and Maintenance Data: For panelboards and components to include in emergency, operation, and maintenance manuals. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:

a. Manufacturer's written instructions for testing and adjusting overcurrent protective devices.

b. Time-current curves, including selectable ranges for each type of overcurrent protective device that allows adjustments.

30.6 Maintenance Material Submittals

1. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

2. Keys: Two spares for each type of panelboard cabinet lock.

30.7 Quality Assurance

1. Manufacturer Qualifications: ISO 9001 or ISO 9002 certified.

30.8 Delivery, Storage, And Handling

1. Handle and prepare panelboards for installation according to NEMA PB 1.

30.9 Field Conditions

1. Environmental Limitations:

a. Do not deliver or install panelboards until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work above panelboards is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

b. Rate equipment for continuous operation under the following conditions unless otherwise indicated:

1) Ambient Temperature: Not exceeding 23 deg F to plus 104 deg F.

2) Altitude: Not exceeding 6600 feet.

2. Interruption of Existing Electric Service: Do not interrupt electric service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electric service according to requirements indicated:

a. Notify Owner no fewer than seven days in advance of proposed interruption of electric service.

b. Do not proceed with interruption of electric service without Owner's written permission.

c. Comply with NFPA 70E.

30.10 Warranty

1. Manufacturer's Warranty: Manufacturer agrees to repair or replace panelboards that fail in materials or workmanship within specified warranty period.

2. Panelboard Warranty Period: 18 months from date of Substantial Completion.

3. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace SPD that fails in materials or workmanship within specified warranty period.

4. SPD Warranty Period: Five years from date of Substantial Completion.

PART 31 - PRODUCTS

31.1 Panelboards Common Requirements

1. Product Selection for Restricted Space: Drawings indicate maximum dimensions for panelboards including clearances between panelboards and adjacent surfaces and other items. Comply with indicated maximum dimensions.

2. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

3. Comply with NEMA PB 1.

4. Comply with NFPA 70.

5. Enclosures: Flush and Surface-mounted, dead-front cabinets.

a. Rated for environmental conditions at installed location.

6. Indoor Dry and Clean Locations: NEMA 250, Type 1.

7. Outdoor Locations: NEMA 250, Type 3R.

8. Other Wet or Damp Indoor Locations: NEMA 250, Type 4.

9. Indoor Locations Subject to Dust, Falling Dirt, and Dripping Noncorrosive Liquids: NEMA 250, Type 5.

    a. Height: 84 inches maximum.

10. Hinged Front Cover: Entire front trim hinged to box and with standard door within hinged trim cover. Trims shall cover all live parts and shall have no exposed hardware.

31.2 Finishes

1. Panels and Trim: Steel, factory finished immediately after cleaning and pretreating with manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat.

2. Back Boxes: Same finish as panels and trim.

3. Incoming Mains:

    a. Location: Convertible between top and bottom.

    b. Main Breaker: Main lug interiors up to 400 amperes shall be field convertible to main breaker.

4. Phase, Neutral, and Ground Buses:

    a. Material: Hard-drawn copper, 98 percent conductivity.

        1) Plating shall run entire length of bus.

        2) Bus shall be fully rated the entire length.

    b. Interiors shall be factory assembled into a unit. Replacing switching and protective devices shall not disturb adjacent units or require removing the main bus connectors.

5. Equipment Ground Bus: Adequate for feeder and branch-circuit equipment grounding conductors; bonded to box.

6. Full-Sized Neutral: Equipped with full-capacity bonding strap for service entrance applications. Mount electrically isolated from enclosure. Do not mount neutral bus in gutter.

7. Extra-Capacity Neutral Bus: Neutral bus rated 200 percent of phase bus and listed and labeled by an NRTL acceptable to authority having jurisdiction, as suitable for nonlinear loads in electronic-grade panelboards and others designated on Drawings. Connectors shall be sized for double-sized or parallel conductors as indicated on Drawings. Do not mount neutral bus in gutter.

8. Conductor Connectors: Suitable for use with conductor material and sizes.

9. Material: Hard-drawn copper, 98 percent conductivity.

10. Terminations shall allow use of 75 deg C rated conductors without derating.

11. Size: Lugs suitable for indicated conductor sizes, with additional gutter space, if required, for larger conductors.

12. Main and Neutral Lugs: Mechanical type, with a lug on the neutral bar for each pole in the panelboard.

13. Ground Lugs and Bus-Configured Terminators: Mechanical type, with a lug on the bar for each pole in the panelboard.

14. Feed-Through Lugs: Mechanical type, suitable for use with conductor material. Locate at opposite end of bus from incoming lugs or main device.

15. Subfeed (Double) Lugs: Mechanical type suitable for use with conductor material. Locate at same end of bus as incoming lugs or main device.

16. Gutter-Tap Lugs: Mechanical type suitable for use with conductor material and with matching insulating covers. Locate at same end of bus as incoming lugs or main device.

17. Extra-Capacity Neutral Lugs: Rated 200 percent of phase lugs mounted on extra-capacity neutral bus.

18. NRTL Label: Panelboards or load centers shall be labeled by an NRTL acceptable to authority having jurisdiction for use as service equipment with one or more main service disconnecting and overcurrent protective devices. Panelboards or load centers shall have meter enclosures, wiring, connections, and other provisions for utility metering. Coordinate with utility company for exact requirements.

19. Future Devices: Panelboards or load centers shall have mounting brackets, bus connections, filler plates, and necessary appurtenances required for future installation of devices.

20. Panelboard Short-Circuit Current Rating: Fully rated to interrupt symmetrical short-circuit current available at terminals. Assembly listed by an NRTL for 100 percent interrupting capacity.

21. Panelboards and overcurrent protective devices rated 240 V or less shall have short-circuit ratings as shown on Drawings, but not less than 10,000 A rms symmetrical.

31.3 Performance Requirements

1. Surge Suppression: Factory installed as an integral part of indicated panelboards, complying with UL 1449 SPD Type 2.

31.4 Manufacturers

1. Subject to compliance with requirements, provide products by one of the following:

    a. Eaton.

    b. General Electric Company; GE Energy Management - Electrical Distribution.

    c. Siemens Industry, Inc., Energy Management Division.

d. Square D; by Schneider Electric.

31.5 Lighting and Appliance Branch-Circuit Panelboards

1. Panelboards: NEMA PB 1, lighting and appliance branch-circuit type.

2. Branch Overcurrent Protective Devices: Bolt-on circuit breakers, replaceable without disturbing adjacent units.

3. Doors: Door-in-door construction with concealed hinges; secured with multipoint latch with tumbler lock; keyed alike. Outer door shall permit full access to the panel interior. Inner door shall permit access to breaker operating handles and labeling, but current carrying terminals and bus shall remain concealed.

31.6 SPD

1. Peak Surge Current Rating: The minimum single-pulse surge current withstand rating per phase shall not be less than 100 kA. The peak surge current rating shall be the arithmetic sum of the ratings of the individual MOVs in a given mode.

    a. Protection modes and UL 1449 VPR for grounded wye circuits with 480Y/277 and 208Y/120, three-phase, four-wire circuits shall not exceed the following:

        1) Line to Neutral: 1200 for 480Y/277 and 700 for 208Y/120.

        2) Line to Ground: 1200 for 480Y/277 and 700 for 208Y/120.

        3) Neutral to Ground: 1200 for 480Y/277 and 700 for 208Y/120.

        4) Line to Line: 2000 for 480Y/277 and 1200 for 208Y/120.

    b. Protection modes and UL 1449 VPR for 240/120-V, single-phase, three-wire circuits shall not exceed the following:

        1) Line to Neutral: 700 V.

        2) Line to Ground: 700 V.

        3) Neutral to Ground: 700 V.

        4) Line to Line: 1200 V.

2. SCCR: Equal to the SCCR of the panelboard in which installed.

3. Nominal Rating: 10 kA.

4. Buses:

    a. Copper phase and neutral buses; 200 percent capacity neutral bus and lugs.

    b. Copper equipment and isolated ground buses.

31.7 Disconnecting and Overcurrent Protective Devices

1. MCCB: Comply with UL 489, with [series-connected rating] [interrupting capacity] to meet available fault currents.

2. Thermal-Magnetic Circuit Breakers:

    a. Inverse time-current element for low-level overloads.

    b. Instantaneous magnetic trip element for short circuits.

    c. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.

3. Adjustable Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.

4. GFCI Circuit Breakers: Single- and double-pole configurations with Class A ground-fault protection (6-mA trip).

5. GFEP Circuit Breakers: Class B ground-fault protection (30-mA trip).

6. Arc-Fault Circuit Interrupter Circuit Breakers: Comply with UL 1699; 120/240-V, single-pole configuration.

7. Subfeed Circuit Breakers: Vertically mounted.

8. MCCB Features and Accessories:

    a. Standard frame sizes, trip ratings, and number of poles.

    b. Breaker handle indicates tripped status.

    c. UL listed for reverse connection without restrictive line or load ratings.

9. Lugs: Mechanical style, suitable for number, size, trip ratings, and conductor materials.

10. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and HID lighting circuits.

31.8 Identification

1. Panelboard Label: Manufacturer's name and trademark, voltage, amperage, number of phases, and number of poles shall be located on the interior of the panelboard door.

2. Breaker Labels: Faceplate shall list current rating, UL and IEC certification standards, and AIC rating.

3. Circuit Directory: Directory card inside panelboard door, mounted in metal frame with transparent protective cover.

    a. Circuit directory shall identify specific purpose with detail sufficient to distinguish it from all other circuits.

4. Circuit Directory: Computer-generated circuit directory mounted inside panelboard door with transparent plastic protective cover.

    a. Circuit directory shall identify specific purpose with detail sufficient to distinguish it from all other circuits.

31.9 Accessory Components and Features

1. Accessory Set: Include tools and miscellaneous items required for overcurrent protective device test, inspection, maintenance, and operation.

2. Portable Test Set: For testing functions of solid-state trip devices without removing from panelboard. Include relay and meter test plugs suitable for testing panelboard meters and switchboard class relays.

PART 32 - EXECUTION

32.1 Examination

1. Verify actual conditions with field measurements prior to ordering panelboards to verify that equipment fits in allocated space in, and comply with, minimum required clearances specified in NFPA 70.

2. Receive, inspect, handle, and store panelboards according to NEMA PB 1.1.

3. Examine panelboards before installation. Reject panelboards that are damaged, rusted, or have been subjected to water saturation.

4. Examine elements and surfaces to receive panelboards for compliance with installation tolerances and other conditions affecting performance of the Work.

5. Proceed with installation only after unsatisfactory conditions have been corrected.

32.2 Installation

1. Coordinate layout and installation of panelboards and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping, encumbrances to workspace clearance requirements, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

2. Comply with NECA 1.

3. Install panelboards and accessories according to NEMA PB 1.1.

4. Equipment Mounting:

    a. Attach panelboard to the vertical finished or structural surface behind the panelboard.

5. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from panelboards.

a. Mount top of trim 6’-6” above finished floor unless otherwise indicated.

b. Mount panelboard cabinet plumb and rigid without distortion of box.

c. Mount recessed panelboards with fronts uniformly flush with wall finish and mating with back box.

d. Mount surface-mounted panelboards to steel slotted supports 5/8 inch in depth. Orient steel slotted supports vertically.

e. Install overcurrent protective devices and controllers not already factory installed.

f. Set field-adjustable, circuit-breaker trip ranges.

g. Tighten bolted connections and circuit breaker connections using calibrated torque wrench or torque screwdriver per manufacturer's written instructions.

h. Make grounding connections and bond neutral for services and separately derived systems to ground. Make connections to grounding electrodes, separate grounds for isolated ground bars, and connections to separate ground bars.

i. Install filler plates in unused spaces.

j. Stub four 1-inch empty conduits from panelboard into accessible ceiling space or space designated to be ceiling space in the future. Stub four 1-inch empty conduits into raised floor space or below slab not on grade.

k. Arrange conductors in gutters into groups and bundle and wrap with wire ties after completing load balancing.

l. Mount spare fuse cabinet in accessible location.

32.3 Identification

1. Identify field-installed conductors, interconnecting wiring, and components; install warning signs complying with requirements in Section 260553 "Identification for Electrical Systems."

2. Create a directory to indicate installed circuit loads after balancing panelboard loads; incorporate Owner's final room designations. Obtain approval before installing. Handwritten directories are not acceptable. Install directory inside panelboard door.

3. Panelboard Nameplates: Label each panelboard with a nameplate complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

4. Device Nameplates: Label each branch circuit device in distribution panelboards with a nameplate complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

    a. Install warning signs complying with requirements in Section 260553 "Identification for Electrical Systems" identifying source of remote circuit.

END OF SECTION 262416

SECTION 262726 - WIRING DEVICES

PART 33 - GENERAL

33.1 Related Documents

1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

33.2 Summary

1. Section Includes:
    a. Standard-grade receptacles, 125 V, 20 A.
    b. GFCI receptacles, 125 V, 20 A.
    c. Toggle switches, 120/277 V, 20 A, 30 A and 40 A.
    d. Wall plates.

33.3 Definitions

1. AFCI: Arc-fault circuit interrupter.
2. BAS: Building automation system.
3. EMI: Electromagnetic interference.
4. GFCI: Ground-fault circuit interrupter.
5. Pigtail: Short lead used to connect a device to a branch-circuit conductor.
6. RFI: Radio-frequency interference.
7. SPD: Surge protective device.

33.4 Action Submittals

1. Product Data: For each type of product.
2. Shop Drawings: List of legends and description of materials and process used for premarking wall plates.

33.5 Closeout Submittals

1. Operation and Maintenance Data: For wiring devices to include in all manufacturers' packing-label warnings and instruction manuals that include labeling conditions.

PART 34 - PRODUCTS

34.1 General Wiring Device Requirements

1. Wiring Devices, Components, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.

2. Comply with NFPA 70.

3. RoHS compliant.

4. Comply with NEMA WD 1.

34.2 Devices for Owner-Furnished Equipment

1. Receptacles: Match plug configurations.

2. Cord and Plug Sets: Match equipment requirements.

3. Device Color:

    a. Wiring Devices Connected to Normal Power System: White unless otherwise indicated or required by NFPA 70 or device listing.

    b. Wiring Devices Connected to Essential Electrical System: Red.

    c. SPD Devices: Blue.

    d. Isolated-Ground Receptacles: As specified above, with orange triangle on face.

4. Wall Plate Color: For plastic covers, match device color.

5. Source Limitations: Obtain each type of wiring device and associated wall plate from single source from single manufacturer.

34.3 Standard Grade Duplex Receptacles, 125 V, 20 A:

1. Manufacturers: Subject to compliance with requirements, provide one of the following:

    a. Hubbell HBL5362.

    b. Leviton 5362.

    c. Pass & Seymour PS5362.

2. Description: Two pole, three wire, and self-grounding.

3. Configuration: NEMA WD 6, Configuration 5-20R.

4. Standards: Comply with UL 498 and FS W-C-596.

34.4 Weather Resistant Duplex Receptacle, 125 V, 20 A

1. Manufacturers: Subject to compliance with requirements, provide one of the following:
    a. Hubbell GF5362SG.
    b. Leviton G5362-WT.
    c. Pass & Seymour WR5362.
2. Description: Two pole, three wire, and self-grounding. Integral shutters that operate only when a plug is inserted in the receptacle. Square face.
3. Configuration: NEMA WD 6, Configuration 5-20R.
4. Standards: Comply with UL 498.
5. Marking: Listed and labeled as complying with NFPA 70, "Receptacles in Damp or Wet Locations" Article.

34.5 Duplex GFCI Receptacles, 125 V, 20 A

1. Manufacturers: Subject to compliance with requirements, provide one of the following:
    a. Hubbell GFRST20.
    b. Leviton GFNT2.
    c. Pass & Seymour 2097.
2. Description: Integral GFCI with "Test" and "Reset" buttons and LED indicator light. Two pole, three wire, and self-grounding.
3. Configuration: NEMA WD 6, Configuration 5-20R.
4. Type: Feed through.
5. Standards: Comply with UL 498, UL 943 Class A, and FS W-C-596.

34.6 Hospital Grade, Duplex SPD Receptacles, 125 V, 20 A

1. Manufacturers: Subject to compliance with requirements, provide one of the following:
    a. Hubbell HBL8362SA.
    b. Leviton 8380.
    c. Pass & Seymour 8300WSP.
2. Description: Two pole, three wire, and self-grounding. Integral SPD in line to ground, line to neutral, and neutral to ground. LED indicator light. With single-piece, rivetless, nickel-plated, all-brass grounding system. Nickel-plated, brass mounting strap.

3. SPD Components: Multiple metal-oxide varistors; with a nominal clamp-level rating of 400 V and minimum single transient pulse energy dissipation of 240 J, according to IEEE C62.41.2 and IEEE C62.45.

4. Active SPD Indication: Visual and audible, with light visible in face of device to indicate device is "active" or "no longer in service."

5. Configuration: NEMA WD 6, Configuration 5-20R.

6. Standards: Comply with UL 498 supplement sd, UL 1449, and FS W-C-596.

7. Marking: Listed and labeled as complying with NFPA 70, "Health Care Facilities" Article.

34.7 Toggle Switches, 120/277 V, 20 A

1. Manufacturers: Subject to compliance with requirements, provide one of the following:

    a. Hubbell HBL122#.

    b. Leviton 122#-2.

    c. Pass & Seymour PS20AC.

    d. Standards: Comply with UL 20 and FS W-S-896.

34.8 Toggle 1-3 Pole Switches, 600 V, 30 A & 40 A

1. Manufacturers: Subject to compliance with requirements, provide one of the following:

    a. Hubbell .

    b. Leviton .

    c. Pass & Seymour .

2. Standards: Comply with UL 20 and FS W-S-896.

34.9 Wall Plates

1. Single Source: Obtain wall plates from same manufacturer of wiring devices.

2. Single and combination types shall match corresponding wiring devices.

3. Plate-Securing Screws: Metal with head color to match plate finish.

4. Material for Finished Spaces: Smooth, high-impact thermoplastic.

5. Material for Unfinished Spaces: Smooth, high-impact thermoplastic.

6. Material for Damp Locations: Cast aluminum with spring-loaded lift cover and listed and labeled for use in wet and damp locations.

7. Wet Location, Weatherproof Cover Plates: NEMA 250, complying with Type 3R, weather resistant in use, die cast aluminum with lockable cover.

PART 35 - EXECUTION

35.1 Installation

1. Comply with NECA 1, including mounting heights listed in that standard, unless otherwise indicated.

2. Coordination with Other Trades:

    a. Protect installed devices and their boxes. Do not place wall finish materials over device boxes, and do not cut holes for boxes with routers that are guided by riding against outside of boxes.

    b. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.

    c. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.

    d. Install wiring devices after all wall preparation, including painting, is complete.

    e. Do not locate outlets/receptacles within 12” of an oxygen outlet/supply.

35.2 Conductors

1. Do not strip insulation from conductors until right before they are spliced or terminated on devices.

2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.

3. The length of free conductors at outlets for devices shall comply with NFPA 70, Article 300, without pigtails.

4. Existing Conductors

    a. Cut back and pigtail or replace all damaged conductors.

    b. Straighten conductors that remain and remove corrosion and foreign matter.

    c. Pigtailing existing conductors is permitted, provided the outlet box is large enough.

    d. Connections to wiring devices (other than cord connected devices) shall be with solid wire not stranded.

35.3 Device Installation

1. Replace devices that have been in temporary use during construction and that were installed before building finishing operations were complete.

2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.

3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.

4. Connect devices to branch circuits using pigtails that are not less than 6 inches in length. Do not use feed thru terminals

5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, two-thirds to three-fourths of the way around terminal screw.

6. Use a torque screwdriver when a torque is recommended or required by manufacturer.

7. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections.

8. Tighten unused terminal screws on the device.

9. When mounting into metal boxes, remove the fiber or plastic washers used to hold device-mounting screws in yokes, allowing metal-to-metal contact.

35.4 Receptacle Orientation

1. Install ground pin of vertically mounted receptacles up, and on horizontally mounted receptacles to the left.

2. Install hospital-grade receptacles in patient-care areas with the ground pin or neutral blade at the top.

3. Device Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.

35.5 GFCI Receptacles

1. Install non-feed-through GFCI receptacles where protection of downstream receptacles is not required.

35.6 Identification

1. Comply with Section 260553 "Identification for Electrical Systems."

2. Identify each receptacle with panelboard identification and circuit number. Use engraved machine printing with black-filled lettering on face of plate, and durable wire markers or tags inside outlet boxes.

3. Essential Electrical System: Mark receptacles supplied from the essential electrical system to allow easy identification using a self-adhesive label.

END OF SECTION 262726

SECTION 262813 - FUSES

PART 36 - GENERAL

36.1 Related Documents

1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

36.2 Summary

1. Section Includes:
    a. Cartridge fuses rated 600 V ac and less for use in the following:
        1) Control circuits.
        2) Motor-control centers.
        3) Panelboards.
        4) Switchboards.
        5) Enclosed controllers.
        6) Enclosed switches.
    b. Spare-fuse cabinets.

36.3 Action Submittals

1. Product Data: For each type of product. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for spare-fuse cabinets. Include the following for each fuse type indicated:
    a. Dimensions and manufacturer's technical data on features, performance, electrical characteristics, and ratings.
    b. Current limitation curves for fuses with current-limiting characteristics.
    c. Time current coordination curves (average melt) and current-limitation curves (instantaneous peak let-through current) for each type and rating of fuse. Submit in electronic format suitable for use in coordination software and in PDF format.
    d. Coordination charts and tables and related data.

36.4 Maintenance Material Submittals

1. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

    a. Fuses: Equal to 10 percent of quantity installed for each size and type, but no fewer than three of each size and type.

PART 37 - PRODUCTS

37.1 Manufacturers

1. Subject to compliance with requirements, provide products by one of the following:

    a. Bussmann, an Eaton business.

    b. Edison; a brand of Bussmann by Eaton.

    c. Littelfuse, Inc.

    d. Mersen USA.

2. Source Limitations: Obtain fuses, for use within a specific product or circuit, from single source from single manufacturer.

37.2 Cartridge Fuses

1. Characteristics: NEMA FU 1, current limiting, nonrenewable cartridge fuses with voltage ratings consistent with circuit voltages.

    a. Type RK-1: zero- to 600-A rating, 200 kAIC, time delay.

    b. Type RK-5: zero- to 600-A rating, 200 kAIC, time delay.

    c. Type J: 600-V, zero- to 600-A rating, 200 kAIC, time delay.

    d. Type L: 600-V, 601- to 6000-A rating, 200 kAIC, time delay.

    e. Type T: 250-V, zero- to 1200-A, 600-V, zero- to 800-A rating, 200 kAIC, time delay.

2. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

3. Comply with NEMA FU 1 for cartridge fuses.

4. Comply with NFPA 70.

5. Coordinate fuse ratings with utilization equipment nameplate limitations of maximum fuse size and with system short-circuit current levels.

37.3 Spare-Fuse Cabinet

1. Characteristics: Wall-mounted steel unit with full length, recessed piano hinged door and key coded cam lock and pull.

    a. Size: Adequate for storage of spare fuses specified with 15 percent spare capacity minimum.

    b. Finish: Gray, baked enamel.

    c. Identification: "SPARE FUSES" in 1-1/2-inch-high letters on exterior of door.

    d. Fuse Pullers: For each size of fuse, where applicable and available, from fuse manufacturer.

PART 38 - EXECUTION

38.1 Examination

1. Examine fuses before installation. Reject fuses that are moisture damaged or physically damaged.

2. Examine holders to receive fuses for compliance with installation tolerances and other conditions affecting performance, such as rejection features.

3. Examine utilization equipment nameplates and installation instructions. Install fuses of sizes and with characteristics appropriate for each piece of equipment.

4. Evaluate ambient temperatures to determine if fuse rating adjustment factors must be applied to fuse ratings.

5. Proceed with installation only after unsatisfactory conditions have been corrected.

38.2 Fuse Applications

1. Cartridge Fuses:

    a. Service Entrance: Class L, time delay Class RK1, time delay Class J, time delay.

    b. Feeders: Class L, time delay Class RK1, time delay Class RK5, time delay Class J, time delay.

    c. Motor Branch Circuits: Class RK1 Class RK5, time delay.

    d. Large Motor Branch (601-4000 A): Class L, time delay.

    e. Power Electronics Circuits: Class J, high speed Class T, fast acting.

    f. Other Branch Circuits: Class RK1, time delay Class RK5, time delay Class J, time delay.

    g. Control Transformer Circuits: Class CC, time delay, control transformer duty.

h. Provide open fuse indicator fuses or fuse covers with open fuse indication.

38.3 Installation

1. Install fuses in fusible devices. Arrange fuses so rating information is readable without removing fuse.

2. Install spare-fuse cabinet(s) in location shown on the Drawings or as indicated in the field by Owner.

38.4 Identification

1. Install labels complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems" and indicating fuse replacement information inside of door of each fused switch and adjacent to each fuse block, socket, and holder.

END OF SECTION 262813

SECTION 262816 - ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 39 - GENERAL

39.1 Related Documents

a. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

39.2 Summary

1. Section Includes:

    a. Fusible switches.

    b. Nonfusible switches.

    c. Enclosures.

39.3 Definitions

1. NC: Normally closed.
2. NO: Normally open.
3. SPDT: Single pole, double throw.

39.4 Action Submittals

1. Product Data: For each type of enclosed switch, circuit breaker, accessory, and component indicated. Include nameplate ratings, dimensioned elevations, sections, weights, and manufacturers' technical data on features, performance, electrical characteristics, ratings, accessories, and finishes.

    a. Enclosure types and details for types other than NEMA 250, Type 1.

    b. Current and voltage ratings.

    c. Short-circuit current ratings (interrupting and withstand, as appropriate).

    d. Include time-current coordination curves (average melt) for each type and rating of overcurrent protective device; include selectable ranges for each type of overcurrent protective device. Provide in PDF electronic format.

2. Shop Drawings: For enclosed switches and circuit breakers.

    a. Include wiring diagrams for power, signal, and control wiring.

b. Include plans, elevations, sections, details, and attachments to other work.

39.5 Maintenance Material Submittals

1. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

    a. Fuses: Equal to 10 percent of quantity installed for each size and type, but no fewer than three of each size and type.

    b. Fuse Pullers: Two for each size and type.

39.6 Field Conditions

Limitations: Rate equipment for continuous operation under the following conditions unless otherwise indicated:

a. Ambient Temperature: Not less than minus 22 deg F and not exceeding 104 deg F.

b. Altitude: Not exceeding 6600 feet.

39.7 Warranty

1. Manufacturer's Warranty: Manufacturer and Installer agree to repair or replace components that fail in materials or workmanship within specified warranty period.

    a. Warranty Period: One year(s) from date of Substantial Completion.

PART 40 - PRODUCTS

40.1 General Requirements

1. Source Limitations: Obtain enclosed switches and circuit breakers, overcurrent protective devices, components, and accessories, within same product category, from single manufacturer.

2. Product Selection for Restricted Space: Drawings indicate maximum dimensions for enclosed switches and circuit breakers, including clearances between enclosures, and adjacent surfaces and other items. Comply with indicated maximum dimensions.

3. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended location and application.

4. Comply with NFPA 70.

40.2 Fusible Switches

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Eaton.

    b. General Electric Company.

c. Siemens Industry, Inc., Energy Management Division.

d. Square D; by Schneider Electric.

2. Type HD, Heavy Duty:

a. Single throw.

b. Three pole.

c. UL 98 and NEMA KS 1, horsepower rated, with clips or bolt pads to accommodate specified fuses.

d. Lockable handle with capability to accept three padlocks and interlocked with cover in closed position.

3. Accessories:

a. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.

b. Class R Fuse Kit: Provides rejection of other fuse types when Class R fuses are specified.

c. Lugs: Mechanical type, suitable for number, size, and conductor material.

d. Service-Rated Switches: Labeled for use as service equipment.

40.3 Nonfusible Switches

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Eaton.

b. General Electric Company.

c. Siemens Industry, Inc., Energy Management Division.

d. Square D; by Schneider Electric.

2. Type HD, Heavy Duty, Three Pole, Single Throw: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.

3. Accessories:

a. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.

b. Lugs: Mechanical type, suitable for number, size, and conductor material.

c. Service-Rated Switches: Labeled for use as service equipment.

40.4 Enclosures

1. Enclosed Switches and Circuit Breakers: UL 489, NEMA KS 1, NEMA 250, and UL 50, to comply with environmental conditions at installed location.

2. Enclosure Finish: The enclosure shall be finished with gray baked enamel paint, electrodeposited on cleaned, phosphatized steel (NEMA 250 Type 1), gray baked enamel paint, electrodeposited on cleaned, phosphatized galvannealed steel (NEMA 250 Types 3R, 12), a brush finish on Type 304 stainless steel (NEMA 250 Type 4-4X stainless steel), copper-free cast aluminum alloy (NEMA 250 Types 7, 9).

3. Conduit Entry: NEMA 250 Types 4, 4X, and 12 enclosures shall contain no knockouts. NEMA 250 Types 7 and 9 enclosures shall be provided with threaded conduit openings in both end walls.

4. Operating Mechanism: The circuit-breaker operating handle shall be externally operable with the operating mechanism being an integral part of the box, not the cover. The cover interlock mechanism shall have an externally operated override. The override shall not permanently disable the interlock mechanism, which shall return to the locked position once the override is released. The tool used to override the cover interlock mechanism shall not be required to enter the enclosure in order to override the interlock.

5. Enclosures designated as NEMA 250 Type 4, 4X stainless steel, 12, or 12K shall have a dual cover interlock mechanism to prevent unintentional opening of the enclosure cover when the circuit breaker is ON and to prevent turning the circuit breaker ON when the enclosure cover is open.

6. NEMA 250 Type 7/9 enclosures shall be furnished with a breather and drain kit to allow their use in outdoor and wet location applications.

PART 41 - EXECUTION

41.1 Examination

1. Examine elements and surfaces to receive enclosed switches and circuit breakers for compliance with installation tolerances and other conditions affecting performance of the Work.

2. Proceed with installation only after unsatisfactory conditions have been corrected.

    a. Commencement of work shall indicate the Installer’s acceptance of the areas and conditions as satisfactory.

41.2 Preparation

1. Interruption of Existing Electric Service: Do not interrupt electric service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electric service according to requirements indicated:

    a. Notify Owner no fewer than seven days in advance of proposed interruption of electric service.

b. Indicate method of providing temporary electric service.

c. Do not proceed with interruption of electric service without written permission.

d. Comply with NFPA 70E.

41.3 Enclosure Environmental Rating Applications

1. Enclosed Switches and Circuit Breakers: Provide enclosures at installed locations with the following environmental ratings.

    a. Indoor, Dry and Clean Locations: NEMA 250, Type 1.

    b. Outdoor Locations: NEMA 250, Type 3R.

    c. Other Wet or Damp, Indoor Locations: NEMA 250, Type 4.

    d. Indoor Locations Subject to Dust, Falling Dirt, and Dripping Noncorrosive Liquids: NEMA 250, Type 12.

41.4 Installation

1. Coordinate layout and installation of switches, circuit breakers, and components with equipment served and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

2. Install individual wall-mounted switches and circuit breakers with tops at uniform height unless otherwise indicated.

3. Temporary Lifting Provisions: Remove temporary lifting of eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.

4. Install fuses in fusible devices.

5. Comply with NFPA 70 and NECA 1.

41.5 Identification

1. Comply with requirements in Section 260553 "Identification for Electrical Systems."

    a. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.

    b. Label each enclosure with engraved metal or laminated-plastic nameplate.

END OF SECTION 262816

SECTION 263213 STANDBY ENGINE GENERATORS

PART 42 - GENERAL

42.1 Related Documents

1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

42.2 Summary

1. Section includes packaged engine generators for emergency use with the following features:
    a. Diesel engine.
    b. Control and monitoring.
    c. Generator overcurrent and fault protection.
    d. Generator, exciter, and voltage regulator.
    e. Outdoor engine generator enclosure.
    f. Vibration isolation devices.
    g. Finishes.
2. Related Requirements:
    a. Section 263600 "Transfer Switches" for transfer switches including sensors and relays to initiate automatic-starting and -stopping signals for engine generators.

42.3 Definitions

1. EPS: Emergency power supply.
2. EPSS: Emergency power supply system.
3. Operational Bandwidth: The total variation from the lowest to highest value of a parameter over the range of conditions indicated, expressed as a percentage of the nominal value of the parameter.

42.4 Action Submittals

1. Product Data: For each type of product.
    a. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
    b. Include thermal damage curve for generator.

c. Include time-current characteristic curves for generator protective device.

d. Include fuel consumption in gallons per hour at 0.8 power factor at 0.5, 0.75 and1.0 times generator capacity.

e. Include generator efficiency at 0.8 power factor at 0.5, 0.75 and1.0 times generator capacity.

f. Include airflow requirements for cooling and combustion air in cubic feet per minute at 0.8 power factor, with air-supply temperature of 95, 80, 70, and 50 deg F. Provide Drawings indicating requirements and limitations for location of air intake and exhausts.

g. Include generator characteristics, including, but not limited to, kilowatt rating, efficiency, reactance, and short-circuit current capability.

2. Shop Drawings:

a. Include plans and elevations for engine generator and other components specified.

b. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

c. Identify fluid drain ports and clearance requirements for proper fluid drain.

d. Design calculations for selecting vibration isolators and seismic restraints and for designing vibration isolation bases.

3. Vibration Isolation Base Details:

a. Detail fabrication, including anchorages and attachments to structure and supported equipment. Include base weights.

b. Include diagrams for power, signal, and control wiring. Complete schematic, wiring, and interconnection diagrams showing terminal markings for EPS equipment and functional relationship between all electrical components.

42.5 Informational Submittals

1. Source Quality-Control Reports: Including, but not limited to, the following:

a. Certified summary of prototype-unit test report.

b. Certified Test Reports: For components and accessories that are equivalent, but not identical, to those tested on prototype unit.

2. Field quality control reports.

3. Warranty: For special warranty.

42.6 Closeout Submittals

1. Operation and Maintenance Data: For packaged engine generators to include in emergency, operation, and maintenance manuals.

    a. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:

        1) List of tools and replacement items recommended to be stored at Project for ready access. Include part and drawing numbers, current unit prices, and source of supply.

        2) Operating instructions laminated and mounted adjacent to generator location.

        3) Training plan.

42.7 Maintenance Material Submittals

1. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

2. Fuses: One for every 10 of each type and rating, but no fewer than one of each.

3. Indicator Lamps: Two for every six of each type used, but no fewer than two of each.

4. Filters: One set each of lubricating oil, fuel, and combustion-air filters.

5. Tools: Each tool listed by part number in operations and maintenance manual.

42.8 Warranty

1. Manufacturer's Warranty: Manufacturer agrees to repair or replace components of packaged engine generators and associated auxiliary components that fail in materials or workmanship within specified warranty period.

    a. Warranty Period: five years from date of Substantial Completion.

PART 43 - PRODUCTS

43.1 Manufacturers

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Caterpillar, Inc.; Electric Power Division.

    b. Cummins Power Generation.

    c. Generac Power Systems, Inc.

    d. Kohler Power Systems.

e. MTU Onsite Energy Corporation.

2. Source Limitations: Obtain packaged engine generators and auxiliary components from single source from single manufacturer.

43.2 Performance Requirements

1. B11 Compliance: Comply with B11.19.

2. NFPA Compliance:

   a. Comply with NFPA 37.

   b. Comply with NFPA 70.

3. UL Compliance: Comply with UL 2200.

4. Engine Exhaust Emissions: Comply with EPA requirements and applicable state and local government requirements.

5. Noise Emission: Comply with applicable state and local government requirements for maximum noise level at adjacent property boundaries due to sound emitted by engine generator, including engine, engine exhaust, engine cooling-air intake and discharge, and other components of installation.

6. Environmental Conditions: Engine generator system shall withstand the following environmental conditions without mechanical or electrical damage or degradation of performance capability:

   a. Ambient Temperature: 5 to 104 deg F.

   b. Relative Humidity: Zero to 95 percent.

   c. Altitude: Sea level to 1000 feet.

43.3 Engine Generator Assembly Description

1. Factory assembled and tested, water-cooled engine, with brushless generator and accessories.

2. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.

3. Induction Method: Naturally aspirated.

4. Governor: Adjustable isochronous, with speed sensing.

5. Mounting Frame: Structural-steel framework to maintain alignment of mounted components without depending on concrete foundation. Provide lifting attachments sized and spaced to prevent deflection of base during lifting and moving.

   a. Rigging Diagram: Inscribed on metal plate permanently attached to mounting frame to indicate location and lifting capacity of each lifting attachment and engine generator center of gravity.

6. Capacities and Characteristics:

    a. Power Output Ratings: Nominal ratings as indicated at 0.8 power factor excluding power required for the continued and repeated operation of the unit and auxiliaries, with capacity as required to operate as a unit as evidenced by records of prototype testing.

    b. Nameplates: For each major system component to identify manufacturer's name and address, and model and serial number of component.

7. Engine Generator Performance:

    a. Steady-State Voltage Operational Bandwidth: 3 percent of rated output voltage, from no load to full load.

    b. Transient Voltage Performance: Not more than 20 percent variation for 50 percent step-load increase or decrease. Voltage shall recover and remain within the steady-state operating band within three seconds.

    c. Steady-State Frequency Operational Bandwidth: 0.5 percent of rated frequency, from no load to full load.

    d. Steady-State Frequency Stability: When system is operating at any constant load within the rated load, there shall be no random speed variations outside the steady-state operational band and no hunting or surging of speed.

    e. Transient Frequency Performance: Less than 5 percent variation for 50 percent step-load increase or decrease. Frequency shall recover and remain within the steady-state operating band within five seconds.

    f. Output Waveform: At no load, harmonic content measured line to line or line to neutral shall not exceed 5 percent total and 3 percent for single harmonics. Telephone influence factor, determined according to

43.4 Engine

1. Fuel: Diesel.

2. Rated Engine Speed: 1800 rpm.

3. Lubrication System: Engine or skid mounted.

    a. Filter and Strainer: Rated to remove 90 percent of particles 5 micrometers and smaller while passing full flow.

    b. Thermostatic Control Valve: Control flow in system to maintain optimum oil temperature. Unit shall be capable of full flow and is designed to be fail-safe.

    c. Crankcase Drain: Arranged for complete gravity drainage to an easily removable container with no disassembly and without use of pumps, siphons, special tools, or appliances.

4. Cooling System: Closed loop, liquid cooled, with radiator factory mounted on engine generator mounting frame and integral engine driven coolant pump.

5. Coolant: Solution of 50 percent ethylene-glycol-based antifreeze and 50 percent water, with anticorrosion additives as recommended by engine manufacturer.

6. Size of Radiator: Adequate to contain expansion of total system coolant, from cold start to 110 percent load condition.

7. Temperature Control: Self-contained, thermostatic-control valve modulates coolant flow automatically to maintain optimum constant coolant temperature as recommended by engine manufacturer.

8. Coolant Hose: Flexible assembly with inside surface of nonporous rubber and outer covering of aging, UV, and abrasion-resistant fabric.

9. Rating: 50-psig maximum working pressure with coolant at 180 deg F, and noncollapsible under vacuum.

10. End Fittings: Flanges or steel pipe nipples with clamps to suit piping and equipment connections.

11. Muffler/Silencer:

    a. Critical type sized as recommended by engine manufacturer and selected with exhaust piping system to not exceed engine manufacturer's engine backpressure requirements.

    b. Minimum sound attenuation of 25 dB at 500 Hz.

    c. Sound level measured at a distance of 25 feet from exhaust discharge after installation is complete shall be 78 dBA or less.

12. Muffler/Silencer: Semicritical type, sized as recommended by engine manufacturer and selected with exhaust piping system to not exceed engine manufacturer's engine backpressure requirements.

    a. Minimum sound attenuation of 18 dB at 500 Hz.

13. Air-Intake Filter: Standard-duty, engine-mounted air cleaner with replaceable dry-filter element and "blocked filter" indicator.

14. Starting System: 12-V electric, with negative ground.

    a. Components: Sized so they are not damaged during a full engine-cranking cycle, with ambient temperature at maximum specified in "Performance Requirements" Article.

    b. Cranking Motor: Heavy-duty unit that automatically engages and releases from engine flywheel without binding.

c. Battery: Lead acid, with capacity within ambient temperature range specified in "Performance Requirements" Article to provide specified cranking cycle at least twice without recharging.

d. Battery Cable: Size as recommended by engine manufacturer for cable length indicated. Include required interconnecting conductors and connection accessories.

e. Battery Compartment: Factory fabricated of metal with acid-resistant finish and thermal insulation. Thermostatically controlled heater shall be arranged to maintain battery above 50 deg F regardless of external ambient temperature within range specified in "Performance Requirements" Article. Include accessories required to support and fasten batteries in place. Provide ventilation to exhaust battery gases.

f. Battery Stand: Factory fabricated, two-tier metal with acid-resistant finish designed to hold the quantity of battery cells required and to maintain the arrangement to minimize lengths of battery interconnections.

g. Battery Charging Alternator: Factory mounted on engine with solid-state voltage regulation and 35-A minimum continuous rating.

h. Battery Charger: Current limiting, automatic equalizing and float charging type designed for lead acid batteries. Unit shall comply with UL 1236 and include the following features:

1) Operation: Equalizing-charging rate of 10 A shall be initiated automatically after battery has lost charge until an adjustable equalizing voltage is achieved at battery terminals. Unit shall then be automatically switched to a lower float-charging mode and shall continue to operate in that mode until battery is discharged again.

2) Automatic Temperature Compensation: Adjust float and equalize voltages for variations in ambient temperature from minus 40 to 140 deg F to prevent overcharging at high temperatures and undercharging at low temperatures.

3) Automatic Voltage Regulation: Maintain constant output voltage regardless of input voltage variations up to plus or minus 10 percent.

4) Ammeter and Voltmeter: Flush mounted in door. Meters shall indicate charging rates.

5) Safety Functions: Sense abnormally low battery voltage and close contacts providing low battery voltage indication on control and monitoring panel. Sense high battery voltage and loss of ac input or dc output of battery charger. Either condition shall close contacts that provide a battery-charger malfunction indication at system control and monitoring panel.

6) Enclosure and Mounting: NEMA 250, Type 1, wall-mounted cabinet.

43.5 Diesel Fuel Oil System

1. Subbase Mounted, Double wall, Fuel Oil Tank: Factory installed and piped complying with UL 142 fuel-oil tank. Features include the following:

    a. Tank level indicator

    b. Fuel-Tank Capacity: minimum 133 percent of total fuel required for periodic maintenance operations between fuel refills, plus fuel for the hours of continuous operation for EPSS class.

    c. Leak detection in interstitial space.

    d. Vandal-resistant fill cap.

    e. Containment provisions: Comply with requirements of authorities having jurisdiction.

43.6 Control and Monitoring

1. Automatic Starting System Sequence of Operation: When mode-selector switch on the control and monitoring panel is in the automatic position, remote-control contacts in one or more separate automatic transfer switches initiate starting and stopping of engine generator. When mode-selector switch is switched to the on position, engine generator starts. The off position of same switch initiates engine generator shutdown. When engine generator is running, specified system or equipment failures or derangements automatically shut down engine generator and initiate alarms.

2. Manual Starting System Sequence of Operation:

    a. Switching On-Off switch on the generator control panel to the on position starts engine generator. The off position of same switch initiates engine generator shutdown. When engine generator is running, specified system or equipment failures or derangements automatically shut down engine generator and initiate alarms.

    b. Provide minimum run-time control set for 30 minutes, with override only by operation of a remote emergency-stop switch.

    c. Comply with UL 508A.

    d. Include accessories at transfer switches and generator to monitor the integrity of the generator remote start circuits per NEC 700.10.D.3.

3. Configuration: Operating and safety indications, protective devices, basic system controls, and engine gages shall be grouped in a common control and monitoring panel mounted on the engine generator. Mounting method shall isolate the control panel from engine generator vibration. Panel shall be powered from the engine generator battery.

4. Control and Monitoring Panel:

    a. Digital controller with integrated LCD display, controls, and microprocessor, capable of local and remote control, monitoring, and programming, with battery backup.

b. Instruments: Located on the control and monitoring panel and viewable during operation.

1) Engine lubricating-oil pressure gage.

2) Engine-coolant temperature gage.

3) DC voltmeter (alternator battery charging).

4) Running-time meter.

5) AC voltmeter, for each phase.

6) AC ammeter, for each phase.

7) AC frequency meter.

8) Generator-voltage adjusting rheostat.

c. Controls and Protective Devices: Controls, shutdown devices, and common visual alarm indication as required by NFPA 110 for Level 1 system, including the following:

1) Cranking control equipment.

2) Run-Off-Auto switch.

3) Control switch not in automatic position alarm.

4) Overcrank alarm.

5) Overcrank shutdown device.

6) Low water temperature alarm.

7) High engine temperature pre-alarm.

8) High engine temperature.

9) High engine temperature shutdown device.

10) Overspeed alarm.

11) Overspeed shutdown device.

12) Low-fuel main tank.

13) Low-fuel-level alarm shall be initiated when the level falls below that required for operation for the duration required for the indicated EPSS class.

14) Coolant low-level alarm.

15) Coolant low-level shutdown device.

16) Coolant high-temperature prealarm.

17) Coolant high-temperature alarm.

18) Coolant low-temperature alarm.

19) Coolant high-temperature shutdown device.

20) EPS load indicator.

21) Battery high-voltage alarm.

22) Low-cranking voltage alarm.

23) Battery-charger malfunction alarm.

24) Battery low-voltage alarm.

25) Lamp test.

26) Contacts for local and remote common alarm.

27) Generator overcurrent-protective-device not-closed alarm.

43.7 Generator Overcurrent and Fault Protection

1. Overcurrent protective devices for the entire EPSS shall be coordinated to optimize selective tripping when a short circuit occurs. Coordination of protective devices shall consider both utility and EPSS as the voltage source.

2. Overcurrent protective devices for the EPSS shall be accessible only to authorized personnel.

3. Generator Circuit Breaker: Molded-case, thermal-magnetic type; 100 percent rated; complying with UL 489.

4. Tripping Characteristic: Designed specifically for generator protection.

5. Trip Rating: Matched to generator output rating.

6. Shunt Trip: Connected to trip breaker when engine generator is shut down by other protective devices.

7. Mounting: Adjacent to, or integrated with, control and monitoring panel.

8. Generator Circuit Breaker: Molded case, electronic trip type; 100 percent rated; complying with UL 489.

9. Tripping Characteristics: Adjustable long-time and short-time delay and instantaneous.

10. Trip Settings: Selected to coordinate with generator thermal damage curve.

11. Shunt Trip: Connected to trip breaker when engine generator is shut down by other protective devices.

12. Mounting: Adjacent to or integrated with control and monitoring panel.

13. Generator Protector: Microprocessor-based unit shall continuously monitor current level in each phase of generator output, integrate generator heating effect over time, and predict when thermal damage of alternator will occur. When signaled by generator protector or other engine generator protective devices, a shunt-trip device in the generator disconnect switch shall open the switch to disconnect the generator from load circuits. Protector performs the following functions:

    a. Initiates a generator overload alarm when generator has operated at an overload equivalent to 110 percent of full rated load for 60 seconds. Indication for this alarm is integrated with other engine generator malfunction alarms. Contacts shall be available for load shed functions.

    b. Under single or three phase fault conditions, regulates generator to 300 percent of rated full-load current for up to 10 seconds.

    c. As overcurrent heating effect on the generator approaches the thermal damage point of the unit, protector switches the excitation system off, opens the generator disconnect device, and shuts down the engine generator.

    d. Senses clearing of a fault by other overcurrent devices and controls recovery of rated voltage to avoid overshoot.

14. Ground-Fault Indication: Comply with NFPA 70 Article 700, "Emergency System" signals for ground fault.

    a. Indicate ground fault with other engine generator alarm indications.

    b. Trip generator protective device on ground fault.

43.8 Generator, Exciter, and Voltage Regulator

1. Comply with NEMA MG 1.

2. Drive: Generator shaft shall be directly connected to engine shaft. Exciter shall be rotated integrally with generator rotor.

3. Electrical Insulation: Class H or Class F.

4. Stator-Winding Leads: Brought out to terminal box to permit future reconnection for other voltages if required. Provide 12-lead alternator.

5. Range: Provide [limited] [broad] [extended] range of output voltage by adjusting the excitation level.

6. Construction shall prevent mechanical, electrical, and thermal damage due to vibration, overspeed up to 125 percent of rating, and heat during operation at 110 percent of rated capacity.

7. Enclosure: Dripproof.

8. Voltage Regulator: Solid-state type, separate from exciter, providing performance as specified and as required by NFPA 110.

    a. Adjusting Rheostat on Control and Monitoring Panel: Provide plus or minus 5 percent adjustment of output-voltage operating band.

    b. Maintain voltage within 20 percent on one step, full load.

    c. Provide anti-hunt provision to stabilize voltage.

    d. Maintain frequency within 10 percent and stabilize at rated frequency within 2 seconds.

9. Strip Heater: Thermostatically controlled unit arranged to maintain stator windings above dew point.

10. Windings: Two-thirds pitch stator winding and fully linked amortisseur winding.

11. Subtransient Reactance: 12 percent, maximum.

43.9 Outdoor Engine Generator Enclosure

1. Description: Vandal resistant, sound-attenuating weatherproof aluminum housing, wind resistant up to 100 mph. Multiple panels shall be lockable and provide adequate access to components requiring maintenance. Panels shall be removable by one person without tools. Instruments and control shall be mounted within enclosure.

2. Sound Attenuation Level: Entire package delivers a maximum sound pressure level of 80 dBA at 7 meters at full load.

3. Structural Design and Anchorage: Comply with ASCE/SEI 7 for wind loads up to150 mph.

4. Hinged Doors: With padlocking provisions.

5. Space Heater: Thermostatically controlled and sized to prevent condensation.

6. Thermal Insulation: Manufacturer's standard materials and thickness selected in coordination with space heater to maintain winter interior temperature within operating limits required by engine generator components.

7. Muffler Location: Within enclosure.

8. Engine Cooling Airflow through Enclosure: Maintain temperature rise of system components within required limits when unit operates at 110 percent of rated load for two hours with ambient temperature at top of range specified in system service conditions.

43.10 Vibration Isolation Devices

1. Elastomeric Isolator Pads: Oil and water resistant elastomer or natural rubber, arranged in single or multiple layers, molded with a nonslip pattern and galvanized-steel baseplates of sufficient stiffness for uniform loading over pad area, and factory cut to sizes that match requirements of supported equipment.

2. Material: Standard neoprene separated by steel shims.

3. Shore A Scale Durometer Rating: 50.

4. Number of Layers: Two.

5. Minimum Deflection: 1 inch.

6. Restrained Spring Isolators: Freestanding, steel, open-spring isolators with seismic restraint.

7. Housing: Steel with resilient vertical-limit stops to prevent spring extension due to wind loads or if weight is removed; factory drilled baseplate bonded to 1/4-inch-thick, elastomeric isolator pad attached to baseplate underside; and adjustable equipment-mounting and -leveling bolt that acts as blocking during installation.

8. Outside Spring Diameter: Not less than 80 percent of compressed height of the spring at rated load.

9. Minimum Additional Travel: 50 percent of required deflection at rated load.

10. Lateral Stiffness: More than 80 percent of rated vertical stiffness.

11. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.

12. Minimum Deflection: 1 inch.

    a. Comply with requirements in Section 232116 "Hydronic Piping Specialties" for vibration isolation and flexible connector materials for steel piping.

    b. Comply with requirements in Section 233113 "Metal Ducts" for vibration isolation and flexible connector materials for exhaust shroud and ductwork.

    c. Vibration isolation devices shall not be used to accommodate misalignments or to make bends.

43.11 Finishes

1. Indoor and Outdoor Enclosures and Components: Manufacturer's standard finish over corrosion-resistant pretreatment and compatible primer.

43.12 Source Quality Control

1. Prototype Testing: Factory test engine generator using same engine model, constructed of identical or equivalent components and equipped with identical or equivalent accessories.

2. Tests: Comply with NFPA 110, Level 1 Energy Converters and with IEEE 115.

PART 44 - EXECUTION

44.1 Examination

1. Examine areas, equipment bases, and conditions, with Installer present, for compliance with requirements for installation and other conditions affecting packaged engine generator performance.

2. Examine roughing-in for piping systems and electrical connections to verify actual locations of connections before packaged engine generator installation.

3. Proceed with installation only after unsatisfactory conditions have been corrected.

44.2 Preparation

1. Interruption of Existing Electrical Service: Do not interrupt electrical service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electrical service according to requirements indicated:

    a. Notify Owner no fewer than 7 working days in advance of proposed interruption of electrical service.

    b. Do not proceed with interruption of electrical service without Owner's written permission.

44.3 Installation

1. Comply with NECA 1 and NECA 404.

2. Comply with packaged engine generator manufacturers' written installation and alignment instructions and with NFPA 110.

3. Equipment Mounting:

    a. Install packaged engine generators on cast-in-place concrete equipment bases.

    b. Coordinate size and location of concrete bases for packaged engine generators. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified with concrete.

    c. Install packaged engine generator to provide access, without removing connections or accessories, for periodic maintenance.

    d. Electrical Wiring: Install electrical devices furnished by equipment manufacturers but not specified to be factory mounted.

44.4 Connections

1. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."

2. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables." Provide a minimum of one 90-degree bend in flexible conduit routed to the engine generator from a stationary element.

3. Balance single-phase loads to obtain a maximum of 10 percent unbalance between any two phases.

44.5 Identification

1. Identify system components according to Section 260553 "Identification for Electrical Systems."

2. Install a sign indicating the generator neutral is bonded to the main service neutral at the main service location.

44.6 Field Quality Control

1. Perform tests and inspections with the assistance of a factory authorized service representative.

44.7 Tests and Inspections

1. Perform tests recommended by manufacturer and each visual and mechanical inspection and electrical and mechanical test listed in first two subparagraphs below, as specified in NETA ATS. Certify compliance with test parameters.

    a. Visual and Mechanical Inspection:

        1) Compare equipment nameplate data with Drawings and the Specifications.

        2) Inspect physical and mechanical condition.

        3) Inspect anchorage, alignment, and grounding.

        4) Verify that the unit is clean.

2. Electrical and Mechanical Tests

    a. Perform insulation-resistance tests according to IEEE 43.

    b. Machines Larger Than 200 hp Test duration shall be 10 minutes. Calculate polarization index.

    c. Machines 200 hp or Less: Test duration shall be one minute. Calculate the dielectric-absorption ratio.

    d. Test protective relay devices.

    e. Verify phase rotation, phasing, and synchronized operation as required by the application.

    f. Functionally test engine shutdown for low oil pressure, overtemperature, overspeed, and other protection features as applicable.

    g. Perform vibration test for each main bearing cap.

h. Conduct performance test according to NFPA 110.

i. Verify correct functioning of the governor and regulator.

3. NFPA 110 Acceptance Tests: Perform tests required by NFPA 110 that are additional to those specified here including, but not limited to, single step full load pickup test.

4. Battery Tests:

a. Equalize charging of battery cells according to manufacturer's written instructions. Record individual cell voltages.

b. Measure charging voltage and voltages between available battery terminals for full-charging and float-charging conditions. Check electrolyte level and specific gravity under both conditions.

c. Test for contact integrity of all connectors. Perform an integrity load test and a capacity load test for the battery.

d. Verify acceptance of charge for each element of the battery after discharge.

e. Verify that measurements are within manufacturer's specifications.

5. Battery-Charger Tests: Verify specified rates of charge for both equalizing and float-charging conditions.

6. System Integrity Tests: Methodically verify proper installation, connection, and integrity of each element of engine generator system before and during system operation. Check for air, exhaust, and fluid leaks.

7. Voltage and Frequency Transient Stability Tests: Use recording oscilloscope to measure voltage and frequency transients for 50 and 100 percent step-load increases and decreases and verify that performance is as specified.

8. Leak Test: After installation, charge exhaust, coolant, and fuel systems and test for leaks. Repair leaks and retest until no leaks exist.

9. Operational Test:

a. After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation for generator and associated equipment.

b. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

c. Remove and replace malfunctioning units and retest as specified above.

10. Retest:

a. Correct deficiencies identified by tests and observations, and retest until specified requirements are met.

b. Report results of tests and inspections in writing. Record adjustable relay settings and measured insulation resistances, time delays, and other values and observations. Attach a label or tag to each tested component indicating satisfactory completion of tests.

44.8 Maintenance Service

1. Initial Maintenance Service: Beginning at Substantial Completion, maintenance service shall include 12 months' full maintenance by skilled employees of manufacturer's authorized service representative. Include quarterly preventive maintenance and exercising to check for proper starting, load transfer, and running under load. Include routine preventive maintenance as recommended by manufacturer and adjusting as required for proper operation. Parts shall be manufacturer's authorized replacement parts and supplies.

44.9 Demonstration

1. Engage a factory authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain packaged engine generators.

END OF SECTION 263213

SECTION 263600 - TRANSFER SWITCHES

PART 45 - GENERAL

45.1 Related Documents

1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

45.2 Summary

1. Section includes automatic transfer switches rated 600 V and less, including the following:

45.3 Action Submittals

1. Product Data: For each type of product.
    a. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for transfer switches.
    b. Include rated capacities, operating characteristics, electrical characteristics, and accessories.
2. Shop Drawings:
    a. Include plans, elevations, sections, details showing minimum clearances, conductor entry provisions, gutter space, and installed features and devices.
    b. Include material lists for each switch specified.

45.4 Informational Submittals

1. Field quality-control reports.

45.5 Closeout Submittals

1. Operation and Maintenance Data: For each type of product to include in emergency, operation, and maintenance manuals.
    a. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:
        1) Features and operating sequences, both automatic and manual.
        2) List of all factory settings of relays; provide relay-setting and calibration instructions, including software, where applicable.

45.6 Field Conditions

1. Interruption of Existing Electrical Service: Do not interrupt electrical service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electrical service:

    a. Notify Owner no fewer than 7 days in advance of proposed interruption of electrical service.

    b. Do not proceed with interruption of electrical service without Owner's written permission.

45.7 Warranty

1. Manufacturer's Warranty: Manufacturer agrees to repair or replace components of transfer switch or transfer switch components that fail in materials or workmanship within specified warranty period.

    a. Warranty Period: 12 months from date of Substantial Completion.

PART 46 - PRODUCTS

46.1 Performance Requirements

1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2. Comply with NEMA ICS 1.

3. Comply with UL 1008 unless requirements of these Specifications are stricter.

4. Indicated Current Ratings: Apply as defined in UL 1008 for continuous loading and total system transfer, including tungsten filament lamp loads not exceeding 30 percent of switch ampere rating, unless otherwise indicated.

5. Tested Fault-Current Closing and Short-Circuit Ratings: Adequate for duty imposed by protective devices at installation locations in Project under the fault conditions indicated, based on testing according to UL 1008.

    a. Short-time withstand capability for 30 cycles.

6. Repetitive Accuracy of Solid-State Controls: All settings shall be plus or minus 2 percent or better over an operating temperature range of minus 20 to plus 70 deg C.

7. Resistance to Damage by Voltage Transients: Components shall meet or exceed voltage-surge withstand capability requirements when tested according to IEEE C62.62. Components shall meet or exceed voltage-impulse withstand test of NEMA ICS 1.

8. Electrical Operation: Accomplish by a nonfused, momentarily energized solenoid or electric-motor-operated mechanism. Switches for emergency or standby purposes shall be mechanically and electrically interlocked in both directions to prevent simultaneous connection to both power sources unless closed transition.

9. Neutral Terminal: Solid and fully rated unless otherwise indicated.

10. Heater: Equip switches exposed to outdoor temperatures and humidity, and other units indicated, with an internal heater. Provide thermostat within enclosure to control heater.

11. Factory Wiring: Train and bundle factory wiring and label, consistent with Shop Drawings, by color-code or by numbered or lettered wire and cable shrinkable sleeve markers at terminations. Color-coding and wire and cable markers are specified in Section 260553 "Identification for Electrical Systems."

    a. Designated Terminals: Pressure type, suitable for types and sizes of field wiring indicated.

    b. Power-Terminal Arrangement and Field-Wiring Space: Suitable for top, side, or bottom entrance of feeder conductors as indicated.

    c. Control Wiring: Equipped with lugs suitable for connection to terminal strips.

    d. Accessible via front access.

12. Enclosures: NEMA type as required for location, unless otherwise indicated.

46.2 Contactor Type Automatic Transfer Switches

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. ASCO.

    b. Caterpillar, Inc.; Electric Power Division.

    c. Cummins Power Generation.

    d. Emerson.

    e. Generac Power Systems, Inc.

    f. General Electric Company.

    g. Kohler Power Systems.

    h. MTU Onsite Energy Corporation.

    i. Russelectric, Inc.

2. Comply with Level 1 equipment according to NFPA 110.

3. Switch Characteristics: Designed for continuous duty repetitive transfer of full rated current between active power sources.

4. Limitation: Switches using molded-case switches or circuit breakers or insulated-case circuit-breaker components are unacceptable.

5. Switch Action: Double throw; mechanically held in both directions.

6. Contacts: Silver composition or silver alloy for load-current switching. Contactor-style automatic transfer-switch units, rated 600 A and higher, shall have separate arcing contacts.

7. Conductor Connectors: Suitable for use with conductor material and sizes.

8. Material: Hard-drawn copper, 98 percent conductivity.

9. Main and Neutral Lugs: Mechanical type.

10. Ground Lugs and Bus-Configured Terminators:

    a. Mechanical type.

    b. Ground bar.

    c. Connectors shall be marked for conductor size and type according to UL 1008.

11. Automatic Open Transition Transfer Switches:

    a. Interlocked to prevent the load from being closed on both sources at the same time.

    b. Sources shall be mechanically and electrically interlocked to prevent closing both sources on the load at the same time.

12. Failure of power source serving load initiates automatic break-before-make transfer.

13. Electric Nonautomatic Switch Operation: Electrically actuated by push buttons designated "Normal Source" and "Alternative Source." Switch shall be capable of transferring load in either direction with either or both sources energized.

14. Signal Before Transfer Contacts: A set of normally open/normally closed dry contacts operates in advance of retransfer to normal source. Interval shall be adjustable from 1 to 30 seconds.

15. Automatic Transfer-Switch Controller Features: Controller operates through a period of loss of control power.

16. Undervoltage Sensing for Each Phase of Normal and Alternate Source: Sense low phase-to-ground voltage on each phase. Pickup voltage shall be adjustable from 85 to 100 percent of nominal, and dropout voltage shall be adjustable from 75 to 98 percent of pickup value. Factory set for pickup at 90 percent and dropout at 85 percent.

17. Voltage/Frequency Lockout Relay: Prevent premature transfer to generator. Pickup voltage shall be adjustable from 85 to 100 percent of nominal. Factory set for pickup at 90 percent. Pickup frequency shall be adjustable from 90 to 100 percent of nominal. Factory set for pickup at 95 percent.

18. Time Delay for Retransfer to Normal Source: Adjustable from zero to 30 minutes, and factory set for 10 minutes. Override shall automatically defeat delay on loss of voltage or sustained undervoltage of emergency source, provided normal supply has been restored.

19. Test Switch: Simulate normal-source failure.

20. Switch Position Pilot Lights: Indicate source to which load is connected.

21. Source Available Indicating Lights: Supervise sources via transfer switch normal and emergency-source sensing circuits.

    a. Normal Power Supervision: Green light with nameplate engraved "Normal Source Available."

    b. Emergency Power Supervision: Red light with nameplate engraved "Emergency Source Available."

22. Unassigned Auxiliary Contacts: Two normally open, single-pole, double-throw contacts for each switch position, rated 10 A at 240-V ac.

23. Transfer Override Switch: Overrides automatic retransfer control so transfer switch will remain connected to emergency power source regardless of condition of normal source. Pilot light indicates override status.

24. Engine Starting Contacts: One isolated and normally closed, and one isolated and normally open; rated 10 A at 32-V dc minimum.

25. Engine Shutdown Contacts: Time delay adjustable from zero to five minutes, and factory set for five minutes. Contacts shall initiate shutdown at remote engine-generator controls after retransfer of load to normal source.

26. Engine-Generator Exerciser: Solid-state, programmable-time switch starts engine generator and transfers load to it from normal source for a preset time, then retransfers and shuts down engine after a preset cool-down period. Initiates exercise cycle at preset intervals adjustable from 7 to 30 days. Running periods shall be adjustable from 10 to 30 minutes. Factory settings shall be for 7-day exercise cycle, 20-minute running period, and 5-minute cool-down period. Exerciser features include the following:

    a. Exerciser Transfer Selector Switch: Permits selection of exercise with and without load transfer.

    b. Push-button programming control with digital display of settings.

    c. Integral battery operation of time switch when normal control power is unavailable.

46.3 Source Quality Control

1. Factory Tests:

    a. Test and inspect components, assembled switches, and associated equipment according to UL 1008. Ensure proper operation. Check transfer time and voltage, frequency, and time-delay settings for compliance with specified requirements. Perform dielectric strength test complying with NEMA ICS 1.

    b. Prepare test and inspection reports.

c. For each of the tests required by UL 1008, performed on representative devices, for emergency systems. Include results of test for the following conditions:

1) Overvoltage.

2) Undervoltage.

3) Loss of supply voltage.

4) Reduction of supply voltage.

5) Alternative supply voltage or frequency is at minimum acceptable values.

6) Temperature rise.

7) Dielectric voltage-withstand; before and after short-circuit test.

8) Overload.

9) Contact opening.

10) Endurance.

11) Short circuit.

12) Short-time current capability.

13) Receptacle withstand capability.

14) Insulating base and supports damage.

PART 47 - EXECUTION

47.1 Installation

1. Floor Mounting Switch:

   a. Anchor to floor by bolting.

   b. Install transfer switches on cast-in-place concrete equipment base(s).

   c. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases.

   d. Provide workspace and clearances required by NFPA 70.

2. Annunciator and Control Panel Mounting: Flush in wall unless otherwise indicated.

3. Identify components according to Section 260553 "Identification for Electrical Systems."

4. Set field-adjustable intervals and delays, relays, and engine exerciser clock.

5. Comply with NECA 1.

47.2 Connections

1. Wiring to Remote Components: Match type and number of cables and conductors to generator sets, control, and communication requirements of transfer switches as recommended by manufacturer. Increase raceway sizes at no additional cost to Owner, if necessary, to accommodate required wiring.

2. Wiring Method:

    a. Install cables in raceways and cable trays except within electrical enclosures. Conceal raceway and cables except in unfinished spaces.

    b. Comply with requirements for raceways and boxes specified in Section 260533 "Raceways and Boxes for Electrical Systems."

3. Wiring within Enclosures:

    a. Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii.

    b. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."

    c. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

    d. Connect twisted pair cable according to Section 260523 "Control-Voltage Electrical Power Cables."

    e. Route and brace conductors according to manufacturer's written instructions and Section 260529 "Hangers and Supports for Electrical Systems." Do not obscure manufacturer's markings and labels.

    f. Final connections to equipment shall be made with liquid tight, flexible metallic conduit no more than 18 inches in length.

47.3 Field Quality Control

    a. Perform the following tests and inspections [with the assistance of a factory authorized service representative:

    b. After installing equipment, test for compliance with requirements according to NETA ATS.

2. Visual and Mechanical Inspection:

    a. Compare equipment nameplate data with Drawings and Specifications.

    b. Inspect physical and mechanical condition.

    c. Inspect anchorage, alignment, grounding, and required clearances.

d. Verify that the unit is clean.

e. Verify appropriate lubrication on moving current-carrying parts and on moving and sliding surfaces.

f. Verify that manual transfer warnings are attached and visible.

g. Verify tightness of all control connections.

h. Inspect bolted electrical connections for high resistance using one of the following methods, or both:

1) Use of low-resistance ohmmeter.

2) Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method according to manufacturer's published data.

i. Perform manual transfer operation.

j. Verify positive mechanical interlocking between normal and alternate sources.

k. Perform visual and mechanical inspection of surge arresters.

l. Inspect control power transformers.

m. Inspect for physical damage, cracked insulation, broken leads, tightness of connections, defective wiring, and overall general condition.

n. Verify that primary and secondary fuse or circuit-breaker ratings match Drawings.

o. Verify correct functioning of drawout disconnecting contacts, grounding contacts, and interlocks.

3. Electrical Tests:

a. Perform insulation-resistance tests on all control wiring with respect to ground.

b. Verify settings and operation of control devices.

c. Calibrate and set all relays and timers.

d. Verify phase rotation, phasing, and synchronized operation.

e. Perform automatic transfer tests.

f. Verify correct operation and timing of the following functions:

g. Normal source voltage sensing and frequency-sensing relays.

h. Engine start sequence.

i. Time delay on transfer.

j. Alternative source voltage-sensing and frequency-sensing relays.

k. Automatic transfer operation.

l. Interlocks and limit switch function.

m. Time delay and retransfer on normal power restoration.

n. Engine cool-down and shutdown feature.

o. Measure insulation resistance phase-to-phase and phase-to-ground with insulation resistance tester. Include external annunciation and control circuits. Use test voltages and procedure recommended by manufacturer. Comply with manufacturer's specified minimum resistance.

p. Check for electrical continuity of circuits and for short circuits.

q. Inspect for physical damage, proper installation and connection, and integrity of barriers, covers, and safety features.

r. Verify that manual transfer warnings are properly placed.

s. Perform manual transfer operation.

t. After energizing circuits, perform each electrical test for transfer switches stated in NETA ATS and demonstrate interlocking sequence and operational function for each switch at least three times.

u. Simulate power failures of normal source to automatic transfer switches and retransfer from emergency source with normal source available.

v. Simulate loss of phase-to-ground voltage for each phase of normal source.

w. Verify time-delay settings.

x. Verify pickup and dropout voltages by data readout or inspection of control settings.

47.4 Demonstration

1. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain transfer switches and related equipment.

2. Training shall include testing ground-fault protective devices and instructions to determine when the ground-fault system shall be retested. Include instructions on where ground-fault sensors are located and how to avoid negating the ground-fault protection scheme during testing and circuit modifications.

3. Coordinate this training with that for generator equipment.

END OF SECTION 263600

SECTION 264113 - LIGHTNING PROTECTION FOR STRUCTURES

PART 48 - GENERAL

48.1 Related Documents

1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

48.2 Summary

a. Section includes lightning protection system for ordinary structures.

48.3 Action Submittals

1. Product Data: For each type of product.
2. Shop Drawings:
    a. Include layouts of the lightning protection system, with details of the components to be used in the installation.
    b. Include raceway locations needed for the installation of conductors.
    c. Details of air terminals, ground rods, ground rings, conductor supports, splices, and terminations, including concealment requirements.
    d. Include roof attachment details, coordinated with roof installation.
    e. Calculations required by NFPA 780 for bonding of metal bodies.

48.4 Informational Submittals

1. Coordination Drawings: Lightning protection system Shop Drawings, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
    a. Lightning protection cabling attachments to roofing systems and accessories.
    b. Lightning protection strike termination device attachment to roofing systems, coordinated with the roofing system manufacturer.
    c. Lightning protection system components penetrating roofing and moisture protection systems and system components, coordinated with the roofing system manufacturer.
2. Qualification Data: For Installer.

3. Product Certificates: For each type of roof adhesive for attaching the roof-mounted air terminal assemblies, approved by the roofing-material manufacturer.

4. Field quality-control reports.

48.5 Closeout Submittals

1. Maintenance Data: For lightning protection system to include in maintenance manuals.

    a. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:

        1) Dimensioned site plan showing dimensioned route of the ground loop conductor and the ground rod locations. Comply with requirements of Section 017839 "Project Record Documents."

        2) A system testing and inspection record, listing the results of inspections and ground resistance tests, as recommended by NFPA 780, Annex D.

2. Completion Certificate:

    a. UL Master Label Certificate.

48.6 Quality Assurance

1. Installer Qualifications: UL-listed installer.

PART 49 - PRODUCTS

49.1 Manufacturers

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. East Coast Lightning Equipment Inc.

    b. ERICO; a brand of nVent.

    c. Harger Lightning & Grounding.

    d. Heary Bros. Lightning Protection Co. Inc.

    e. Robbins Lightning, Inc.

    f. Thompson Lightning Protection, Inc.

49.2 Performance Requirements

1. NFPA Lightning Protection Standard: Comply with NFPA 780 requirements for Class I buildings.

2. UL Lightning Protection Standard: Comply with UL 96A requirements for Class I buildings.

3. Lightning Protection Components, Devices, and Accessories: Listed and labeled by a qualified testing agency as complying with UL 96 and marked for intended location and application.

49.3 Materials

1. Air Terminals:
    a. Aluminum unless otherwise indicated.
    b. 1/2-inch diameter by 12 inches long.
    c. Pointed tip.
    d. Threaded base support.
2. Air Terminal Bracing:
    a. Aluminum.
3. Class 1 Main Conductors:
    a. Aluminum: 98,600 circular mils in diameter.
4. Secondary Conductors:
    a. Aluminum: 41,400 circular mils in diameter.
5. Ground Loop Conductor: Tinned copper.
6. Ground Rods:
    a. Material: Copper-clad steel.
    b. Diameter: 3/4 inch.
    c. Rods shall be not less than 120 inches long.
    d. Sectional type, with integral threads.
7. Conductor Splices and Connectors: Compression fittings that are installed with hydraulically operated tools, or exothermic welds, approved for use with the class type.

PART 50 - EXECUTION

50.1 Installation

1. Install lightning protection components and systems according to UL 96A.
2. Install conductors with direct paths from air terminals to ground connections. Avoid bends less than 90 degrees and 8 inches in radius and narrow loops.

3. Conceal conductors within normal view from exterior locations at grade within 200 feet of building. Comply with requirements for concealed installations in UL 96A.

    a. Roof penetrations required for down conductors and connections to structural-steel framework shall be made using listed through-roof fitting and connector assemblies with solid rods and appropriate roof flashings. Use materials approved by the roofing manufacturer for the purpose. Conform to the methods and materials required at roofing penetrations of the lightning protection components to ensure compatibility with the roofing specifications and warranty.

    b. Install conduit where necessary to comply with conductor concealment requirements.

4. Air Terminals on Single-Ply Membrane Roofing: Comply with adhesive manufacturer's written instructions.

5. Ground Ring Electrode: The conductor shall be not less than the main-size lightning conductor.

50.2 Connections

1. Aboveground concealed connections, and connections in earth or concrete, shall be done by exothermic welds or by high-compression fittings listed for the purpose.

2. Aboveground exposed connections shall be done using the following types of connectors, listed and labeled for the purpose: bolted connectors.

3. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance, except where routed through short lengths of conduit.

4. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.

5. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install bonding so vibration is not transmitted to rigidly mounted equipment.

50.3 Corrosion Protection

1. Do not combine materials that can form an electrolytic couple that will accelerate corrosion in the presence of moisture unless moisture is permanently excluded from junction of such materials.

2. Use conductors with protective coatings where conditions would cause deterioration or corrosion of conductors.

50.4 Field Quality Control

1. Special Inspections: Engage a qualified special inspector to perform the following special inspections:

    a. Perform inspections as required to obtain a UL Master Label for system.

2. Prepare test and inspection reports and certificates.

END OF SECTION 264113

SECTION 265119 - LED INTERIOR LIGHTING

PART 51 - GENERAL

51.1 Related Documents

1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

51.2 Summary

1. Section includes LED luminaires.

51.3 Definitions

1. CCT: Correlated color temperature.
2. CRI: Color Rendering Index.
3. Fixture: See "Luminaire."
4. IP: International Protection or Ingress Protection Rating.
5. LED: Light-emitting diode.
6. Lumen: Measured output of lamp and luminaire, or both.
7. Luminaire: Complete lighting unit, including lamp, reflector, and housing.

51.4 Action Submittals

1. Product Data: For each type of product.
    a. Arrange in order of luminaire designation.
    b. Include data on features, accessories, and finishes.
    c. Include physical description and dimensions of luminaires.
    d. Include emergency lighting units, including batteries and chargers.
    e. Include life, output (lumens, CCT, and CRI), and energy-efficiency data.
    f. Photometric data and adjustment factors based on laboratory tests, complying with IES "Lighting Measurements Testing and Calculation Guides" for each luminaire type. The adjustment factors shall be for lamps and accessories identical to those indicated for the luminaire as applied in this Project IES LM-79 and IES LM-80.

2. Manufacturers' Certified Data: Photometric data certified by manufacturer's laboratory with a current accreditation under the National Voluntary Laboratory Accreditation Program for Energy Efficient Lighting Products.

3. Shop Drawings: For nonstandard or custom luminaires.

    a. Include plans, elevations, sections, and mounting and attachment details.

    b. Include details of luminaire assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

    c. Include diagrams for power, signal, and control wiring.

4. Product Schedule: For luminaires and lamps. Use same designations indicated on Drawings.

51.5 Closeout Submittals

1. Operation and Maintenance Data: For luminaires and lighting systems to include in operation and maintenance manuals.

    a. Provide a list of all lamp types used on Project; use ANSI and manufacturers' codes.

51.6 Quality Assurance

1. Luminaire Photometric Data Testing Laboratory Qualifications: Luminaire manufacturer's laboratory that is accredited under the NVLAP for Energy Efficient Lighting Products.

2. Provide luminaires from a single manufacturer for each luminaire type.

51.7 Delivery, Storage, And Handling

1. Protect finishes of exposed surfaces by applying a strippable, temporary protective covering before shipping.

51.8 Warranty

1. Warranty: Manufacturer and Installer agree to repair or replace components of luminaires that fail in materials or workmanship within specified warranty period.

2. Warranty Period: Five year(s) from date of Substantial Completion.

PART 52 - PRODUCTS

52.1 Luminaire Requirements

1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2. Factory-Applied Labels: Comply with UL 1598. Include recommended lamps. Locate labels where they will be readily visible to service personnel, but not seen from normal viewing angles when lamps are in place.

a. Label shall include the following lamp characteristics:

1) "USE ONLY" and include specific lamp type.

2) Lamp diameter, shape, size, wattage, and coating.

3) CCT and CRI.

b. Recessed luminaires shall comply with NEMA LE 4.

52.2 General Requirements For Emergency Lighting

1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2. NRTL Compliance: Fabricate and label emergency lighting units, exit signs, and batteries to comply with UL 924.

3. Comply with NFPA 70 and NFPA 101.

4. Comply with NEMA LE 4 for recessed luminaires.

5. Internal Type Emergency Power Unit: Self-contained, modular, battery-inverter unit, factory mounted within luminaire body.

6. Emergency Connection: Operate one lamp(s) continuously at an output of 1100 lumens each upon loss of normal power. Connect unswitched circuit to battery-inverter unit and switched circuit to luminaire ballast.

7. Operation: Relay automatically turns lamp on when power-supply circuit voltage drops to 80 percent of nominal voltage or below. Lamp automatically disconnects from battery when voltage approaches deep-discharge level. When normal voltage is restored, relay disconnects lamps from battery, and battery is automatically recharged and floated on charger.

8. Test Push-Button and Indicator Light: Visible and accessible without opening luminaire or entering ceiling space.

9. Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.

10. Indicator Light: LED indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.

11. Battery: Sealed, maintenance-free, nickel-cadmium type.

12. Charger: Fully automatic, solid-state, constant-current type with sealed power transfer relay.

13. Integral Self-Test: Factory-installed electronic device automatically initiates code-required test of unit emergency operation at required intervals. Test failure is annunciated by an integral audible alarm and a flashing red LED.

14. External Type: Self-contained, modular, battery-inverter unit, suitable for powering one or more lamps, remote mounted from luminaire.

15. Emergency Connection: Operate one LED lamp continuously. Connect unswitched circuit to battery-inverter unit and switched circuit to luminaire.

16. Operation: Relay automatically turns lamp on when power-supply circuit voltage drops to 80 percent of nominal voltage or below. Lamp automatically disconnects from battery when voltage approaches deep-discharge level. When normal voltage is restored, relay disconnects lamps from battery, and battery is automatically recharged and floated on charger.

17. Battery: Sealed, maintenance-free, nickel-cadmium type.

18. Charger: Fully automatic, solid-state, constant-current type.

19. Housing: NEMA 250, Type 1 enclosure listed for installation inside, on top of, or remote from luminaire. Remote assembly shall be located no less than half the distance recommended by the emergency power unit manufacturer, whichever is less.

20. Test Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.

21. LED Indicator Light: Indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.

22. Integral Self-Test: Factory-installed electronic device automatically initiates code-required test of unit emergency operation at required intervals. Test failure is annunciated by an integral audible alarm and a flashing red LED.

52.3 Materials

1. Metal Parts:

    a. Free of burrs and sharp corners and edges.

    b. Sheet metal components shall be steel unless otherwise indicated.

    c. Form and support to prevent warping and sagging.

2. Steel:

    a. ASTM A36/A36M for carbon structural steel.

    b. ASTM A568/A568M for sheet steel.

3. Stainless Steel:

    a. Manufacturer's standard grade.

    b. Manufacturer's standard type, ASTM A240/240M.

4. Galvanized Steel: ASTM A653/A653M.

5. Aluminum: ASTM B209.

52.4 Metal Finishes

1. Variations in finishes are unacceptable in the same piece. Variations in finishes of adjoining components are acceptable if they are within the range of approved Samples and if they can be and are assembled or installed to minimize contrast.

52.5 Luminaire Support

1. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for channel and angle iron supports and nonmetallic channel and angle supports.

2. Single-Stem Hangers: 1/2-inch steel tubing with swivel ball fittings and ceiling canopy. Finish same as luminaire.

3. Wires: ASTM A641/A641M, Class 3, soft temper, zinc-coated steel, 12 gage.

4. Rod Hangers: 3/16-inch minimum diameter, cadmium-plated, threaded steel rod.

5. Hook Hangers: Integrated assembly matched to luminaire, line voltage, and equipment with threaded attachment, cord, and locking-type plug.

PART 53 - EXECUTION

53.1 Examination

1. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

2. Examine roughing-in for luminaire to verify actual locations of luminaire and electrical connections before luminaire installation.

3. Proceed with installation only after unsatisfactory conditions have been corrected.

53.2 Temporary Lighting

1. If approved by the Architect, use selected permanent luminaires for temporary lighting. When construction is sufficiently complete, clean luminaires used for temporary lighting and install new lamps.

53.3 Installation

1. Comply with NECA 1.

2. Install luminaires level, plumb, and square with ceilings and walls unless otherwise indicated.

3. Mounting heights specified or indicated shall be to bottom of fixture for ceiling-mounted fixtures and to center of fixture for wall-mounted fixtures. Obtain approval of the exact mounting for lighting fixtures on the job before installation is commenced and, where applicable, after coordinating with the type, style, and pattern of the ceiling or wall being installed.

4. There are many types of ceiling systems available on the market and any number of these ceiling systems may be used as part of this work. Verify the types of ceiling construction before ordering fixture fabrication. Determine that suspension methods and flange arrangements for fixtures coordinate with ceiling types and their suspension systems.

5. Supports:

    a. Sized and rated for luminaire weight.

    b. Able to maintain luminaire position after cleaning and relamping.

    c. Provide support for luminaire without causing deflection of ceiling or wall.

    d. Luminaire-mounting devices shall be capable of supporting a horizontal force of 100 percent of luminaire weight and a vertical force of 400 percent of luminaire weight.

6. Flush-Mounted Luminaires:

    a. Secured to outlet box.

    b. Attached to ceiling structural members at four points equally spaced around circumference of luminaire.

    c. Trim ring flush with finished surface.

7. Wall Mounted Luminaires:

    a. Attached to structural members in walls.

    b. Do not attach luminaires directly to gypsum board.

8. Suspended Luminaires:

    a. Ceiling Mount:

        1) Aircraft cables.

        2) Threaded rod.

    b. Pendants and Rods: Where longer than 48 inches, brace to limit swinging.

9. Stem-Mounted, Single-Unit Luminaires: Suspend with twin-stem hangers. Support with approved outlet box and accessories that hold stem and provide damping of luminaire oscillations. Support outlet box vertically to building structure using approved devices.

10. Continuous Rows of Luminaires:

    a. Use tubing or stem for wiring at one point and wire support for suspension for each unit length of luminaire chassis, including one at each end.

    b. Do not use ceiling grid as support for pendant luminaires. Connect support wires or rods to building structure.

11. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables" for wiring connections.

53.4 Identification

1. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

END OF SECTION 265119

SECTION 269000 - INSTRUMENTATION AND CONTROLS

PART 54 - GENERAL

54.1 Description of Work

1. In general, the work specified in this section of the specifications includes the furnishing of all labor, material, and services necessary to install the instrumentation, control and monitoring systems, including all fees, charges, and permits.

2. The Contractor shall refer to other sections and drawings for locations of pressure-operated control switches, float switches, solenoid-operated valves, limit switches, alarm actuating contacts, and other devices requiring wiring.

3. The Contractor shall make all interconnections required between transmitters, receivers, control panels, and miscellaneous devices, and shall provide for electrical supply to metering and signal systems.

4. All conduit and wiring between electrical and instrumentation panels, all field-mounted devices, and power sources shall be furnished and installed as required for a complete operable system.

54.2 Related Documents

1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to the work of this section.

2. This is a basic Instrumentation and Controls Section. The provisions of this section shall include all sections of Division 26.

54.3 System Responsibility

1. To ensure a coordinated control system, to properly achieve the indicated functions, and to provide a maximum interchangeability of equipment items and parts, the complete instrument and control system shall be furnished by a single Instrumentation System Contractor/Supplier who shall be responsible for the satisfactory operation of the system.

2. The system contractor/supplier shall maintain a permanent in-house system engineering and fabrication facility including a quality assurance organization with the ability to perform complete system checkout and simulation in the shop prior to shipment.

3. The system contractor/supplier shall maintain a permanent field service engineer for maintenance service.

4. The system contractor/supplier shall perform all system engineering, prepare all necessary internal and external wiring and piping drawings, and assume full responsibility with the performance requirements of these specifications, and as required for a complete and operable system.

5. The instrumentation equipment locations and conduit drawings are diagrammatic to show the general scope and route of instrumentation system conduit. The Instrumentation System Contractor/Supplier shall provide all conduit and wiring necessary for his specific requirements, in accordance with these specifications, and without additional cost to the Owner.

6. The Instrumentation System Contractor/Supplier shall be responsible for providing all applications programming and configuration services to accomplish the control and monitoring functions described in the Specifications and Contract Drawings.

7. Provide all programming functions including, but not limited to, any control strategies and communications. The Instrumentation System Contractor/Supplier shall also provide all application programming and configuration services necessary to produce the HMI graphic displays, reports, trends, historical archive, etc. as described in the Specifications and Contract Drawings.

8. Perform all system engineering, prepare all necessary internal and external wiring and piping drawings, and assume full responsibility with the performance requirements of these specifications, and as required for a complete and operable facility.

9. Coordinate the control systems for proper operation with related equipment and materials furnished by other suppliers under other sections of these specifications and with related existing equipment.

10. Auxiliary and accessory programming structures necessary for system operation or performance shall be included whether or not they are specified or shown on the contract drawings.

11. All equipment shall be controlled in full conformity with the specifications, drawings, engineering data, instructions, and recommendations of the equipment manufacturer.

12. To facilitate the Owner’s future operation and maintenance requirements, all programming and operator interface development shall match the form and function of the existing Columbia County standards.

13. The Instrumentation System Contractor/Supplier shall coordinate and schedule all testing procedures.

54.4 Verification of Owner's Data

1. Prior to commencing any work, the Contractor shall satisfy himself as to the accuracy of all data as indicated in these plans and specifications and/or as provided by the Owner. Should the Contractor discover any inaccuracies, errors, or omissions in the data, he shall immediately notify the Architect/Engineer in order that proper adjustments can be anticipated and ordered. Commencement by the Contractor of any work shall be held as an acceptance of the data by him after which time the Contractor has no claim against the Owner resulting from alleged errors, omissions or inaccuracies of the said data.

54.5 Delivery and Storage of Materials

1. Materials delivered to site shall be inspected for damage, unloaded, and stored with a minimum of handling. All material shall be stored to provide protection from the weather and accidental damage.

2. Extent of work is indicated by the drawings, schedules, and the requirements of the specifications. Singular references shall not be constructed as requiring only one device if multiple devices are shown on the drawings or are required for proper system operation.

54.6 Guarantee

1. The chemical metering pump manufacturer shall provide a two-year warranty on the metering pump mechanical drive and one year on the liquid end and pump accessories.

2. Damage due to makeup water particulates shall not be considered as a warranty defect and will be the responsibility of the owner.

3. Owner reserves right to make emergency repairs as required to keep equipment in operation without voiding Contractor's Guarantee Bond nor relieving Contractor of his responsibilities during guarantee period.

4. Chlorine Process Measurement Devices shall have a 12-month warranty from the date of start-up by an Authorized Manufacturer’s Representative.

54.7 Approval Submittals

1. The Contractor's attention is directed to the requirements of section 260000 Electrical General with regards to submissions for approval. To facilitate review and approval of the proposed system, shop drawing submittals shall be made in two steps. The first submittal shall include all in-line devices such as flowmeters, control valves, etc., to be supplied or coordinated with the instrumentation system. The second submittal shall include complete details of the instrumentation system.

2. Shop drawing submittals shall include the following:

    a. Field Instrument Submittal

        1) Instrument data sheets indicating all pertinent data including complete model number, and description of each option and accessory.

        2) Each instrument shall be identified by tag number and nomenclature as indicated on the drawings and in these specifications.

    b. System Hardware Submittal

        1) Complete front panel view with component locations, subpanel view with component locations, and electrical schematics.

        2) Functional description of the entire system including individual loop diagram descriptions.

        3) Detail loop diagrams showing both piping and wiring requirements for each analog instrument loop in the system.

        4) Component drawing for each component showing dimensions, mounting, and external connection details.

        5) Detail layout, dimensions, fabrication, piping, and wiring schematic, connection, and interconnection drawings for each instrumentation panel, graphic display, termination cabinet, etc.

c. System Software Submittal

1) Preliminary Graphics Submittal

2) Process Control Strategy, Graphic Screen and Reports Submittal

3. Preliminary Graphics Submittal: The preliminary graphics submittal shall be reviewed at first coordination meeting and shall include the following:

a. Standard symbols

b. Standard color conventions to be used for pumps, valves, filters, pipe colors, equipment on and off, alarm status colors, etc.

c. Sample HMI graphic displays

d. Sample equipment interface popup displays.

e. Alarm display descriptions —

f. Alarm acknowledge descriptions

4. Process Control Strategy, Graphic Screen and Reports

a. The Instrumentation System Contractor/Supplier shall hold all necessary meetings at the project site and Owner's office building to solicit the Owner and Engineer's input prior to submitting the process control strategies and operator interface submittals. These meetings shall also be used to establish standards for developing the database, trends, graphics, reports and control strategies.

b. The process control strategies shall be developed in a functional block (logic) diagram presentation based on information from the specifications and drawings. Included with each diagram shall be:and in these specifications.

1) A short narrative of the control strategy

2) Any assumptions made in developing the program "

3) I/O database list showing all field inputs and output signals or data points associated with the control strategy.

4) Cross-reference list of all l/O showing to which I/O modules or software modules they are linked

5) List of all operator inputs or outputs to and from the control strategy

6) Specific OIT and HMI graphic displays and reports related to the strategy shall be illustrated, defined and formatted.

7) A narrative of the operation of any panels shall be described as it relates to the strategy.

8) A narrative of the failure contingencies shall be described in detail.

c. This submittal shall cover any associated program (function block diagrams, script language, etc.) developed under this contract required to implement the control strategy specified.

d. The annotated program shall be submitted in 8-1/2 inch by 11-inch format and electronic media for all logic developed. Annotation shall be 3 lines of 6 characters each for every logic contact. In addition, each network or rung shall be annotated so that a non-technical person can read and easily comprehend what control function the rung or network is performing.

e. This submittal shall also include PLC l/O configuration tables, I/O reference usage table, complete cross-reference to specific rung used of all inputs, outputs, internal coils, data registers and special purpose coils. In addition, any special switch settings or hardware configuration requirements such as communications port configurations shall be described in detail and submitted.

f. This submittal shall cover the specific plant control strategies as well as the semifinal details of the plant reports and process graphic displays. This submittal shall also include what appears on each display and what appears on each display and what calculations are required to support them.

g. Each system point shall have the capability of being stored historically for an indefinite period of time and shall be capable of being changed. Each system point's raw value shall be available for trending.

h. A complete list of all signals to be collected for long-term historical information shall be provided. This listing shall include frequency of data sampling and duration for which the data shall immediately accessible.

5. Shop drawings shall include detailed Bill of Materials for each component.

6. Operation and maintenance manuals, in accordance with the provisions of section 260000, shall also be supplied. Operating instructions shall incorporate an updated functional description of the entire system including the system schematics that reflect as-built modifications. Special maintenance requirements particular to the system shall be clearly defined along with special calibration and test procedures.

a. A complete set of "as-built" wiring, fabrication, and interconnection drawings shall be included with the manuals.

b. Electronic copies of the O&M manuals with as-built drawings shall be provided in PDF format.

c. Electronic copies of the as-built drawings shall also be provided on compact disk in AutoCAD format.

54.8 Test Reports and Verification Submittals

1. Submit test reports, certifications and verification letters as called for in other sections. Contractor shall coordinate the required testing and documentation of system performance such that sufficient time exists to prepare the reports, submit the reports, review the reports and take corrective action within the scheduled contract time.

54.9 Quality Assurance

1. The chemical feed equipment shall be the product of manufacturers that have designed and manufactured similar equipment and have a record of ten years or more of successful operation of such equipment in the field. The manufacturer must have ISO 9001 Certification.

2. All equipment provided under this section shall be obtained from a single supplier or manufacturer that shall assume full responsibility for the completeness and proper installation of the chemical feed equipment.

3. The Chlorine Measurement Device shall be the product of a manufacturer that has designed and manufactured similar equipment. The manufacturer must have ISO 9001 and UL 508A Certification.

4. To ensure quality and unit responsibility, the Contractor must assemble and test the Chlorine Measurement Device at its facility. The Chlorine Measurement Device shall be a standard regularly marketed product of that manufacturer. The manufacturer must have a physical plant, technical and design staff and fabricating personnel to complete the work specified.

PART 55 - PRODUCTS

55.1 General Equipment Requirements

1. All materials shall be new as shown on the drawings, the best of their respective kinds, suitable for the conditions and duties imposed on them at the building and shall be of reputable manufacturers. The description, characteristics, and requirements of materials to be used shall be in accordance with qualifying conditions established in the following sections.

55.2 Equipment and Materials

1. Shall be new and the most suitable grade for the purpose intended. Equipment furnished under this section shall be the product of a manufacturer regularly engaged in the manufacturer of such items for a period of three years. Where practical, all of the components shall be products of a single manufacturer in order to provide proper coordination and responsibility. Where required, Contractor shall furnish proof of installation of similar units or equipment.

2. Each item of equipment shall bear a name plate showing the manufacturer's name, trade name, model number, serial number, ratings and other information necessary to fully identify it. This plate shall be permanently mounted in a prominent location and shall not be concealed, insulated or painted.

3. The label of the approving agency, such as UL, by which a standard has been established for the particular item shall be in full view.

4. The equipment shall be essentially the standard product of a manufacturer regularly engaged in the production of such equipment and shall be a product of the manufacturer's latest design.

5. A service organization with personnel and spare parts shall be available within two hours for each type of equipment furnished.

6. Install in accordance with manufacturer's recommendations. Place in service by a factory trained representative where required.

7. Materials and equipment are specified herein by a single or by multiple manufacturers to indicate quality, material and type of construction desired. Manufacturer's products shown on the drawings have been used as basis for design; it shall be the Contractor's responsibility to ascertain that alternate manufacturer's products, or the particular products of named manufacturers, meet the detailed specifications and that size and arrangement of equipment are suitable for installation.

55.3 Model Numbers

1. Catalog numbers and model numbers indicated in the drawings and specifications are used as a guide in the selection of the equipment and are only listed for the contractor's convenience. The contractor shall determine the actual model numbers for ordering materials in accordance with the written description of each item and with the intent of the drawings and specifications.

55.4 Requests for Substitution

1. Where a particular system, product or material is specified by name, consider it as standard basis for bidding, and base proposal on the particular system, product or material specified.

2. Requests by Contractor for substitution will be considered only when reasonable, timely, fully documented, and qualifying under one or more of the following circumstances:

    a. Required product cannot be supplied in time for compliance with Contract time requirements.

    b. Required product is not acceptable to governing authority, or determined to be non-compatible, or cannot be properly coordinated, warranted or insured, or has other recognized disability as certified by Contractor.

    c. Substantial cost advantage is offered Owner after deducting offsetting disadvantages including delays, additional compensation for redesign, investigation, evaluation and other necessary services and similar considerations.

3. All requests for substitution shall contain a "Comparison Schedule" and clearly and specifically indicate any and all differences or omissions between the product specified as the basis of design and the product proposed for substitution. Differences shall include but shall not be limited to data as follows for both the specified and substituted products:

    a. Principal of operation.

    b. Materials of construction or finishes.

    c. Thickness of gauge of materials.

d. Weight of item.

e. Deleted features or items.

f. Added features or items.

g. Changes in other work caused by the substitution.

h. Actuators when applicable.

4. If the approved substitution contains differences or omissions not specifically called to the attention of the Architect/Engineer, the Owner reserves the right to require equal or similar features to be added to the substituted products (or to have the substituted products replaced) at the Contractor's expense.

55.5 Chlorine Analyzer and Controller: The Chlorine Measurement Device shall be based on an amperometric type Chlorine sensor, providing continuous measurement of residual chlorine without the use of any reagents or buffers in the sample stream. A membrane shall protect the electrodes from flow, pressure, and conductivity-based interferences. The Chlorine Measurement Device(s) shall be the standard equipment of the supplier involved in the manufacture of similar type equipment and shall be as manufactured by ProMinent Fluid Controls, Inc. or Engineer Approved Equal.

1. Install, calibrate, test, adjust, and place into satisfactory operation analyzers as shown on the Drawings and specified herein.

2. Coordination: Coordinate with other suppliers for installation of all items specified herein and required to ensure the complete and proper interfacing of all the components and systems.

3. The Contractor shall supply all components necessary for a functional system including but not limited to the sensor(s), sensor holder with a flow meter, flow control valve, pressure regulator, pressure gauge and mounting brackets, chlorine monitor, and all required cables and spare parts. The sensor, holder, and monitor shall all be made by the same manufacturer to ensure compatibility and provide sole source responsibility.

4. Chlorine Process Measurement Devises Required

System Tag No.		CLT-200	CLT-201
Qty		1	1
Measured Parameter	Both Free and Total Cl	Yes	Yes
Normal Monitored Concentration	mg/L	3.0	.2
Maximum Monitored Concentration	mg/L	4.0	.5
Minimum Monitored Concentration	ppm	.2	.2
Standard Process Communication		4-20mA	4-20mA
Optional Communication Protocol	SCADA	Yes (Future)	Yes (Future)

5. Analyzer

   a. The chlorine dosage shall primarily be flow-paced, with a Cl2 residual feedback loop to "trim" the dosage as needed.

   b. The analyzer shall be microprocessor-based, with illuminated LCD indicator of measured value, status, and error annunciation. Unit shall feature non-volatile memory to retain settings in the event of power failure: menu-driven calibration, limit and control settings; sensor monitoring to alarm upon sensor failure or loss of sensitivity; programmable access code allowing calibration but not the unauthorized adjustment of limits and outputs.

   c. The device shall have the provision to be configured with two (2) additional independent channels for control of additional application parameters. Possible parameters shall include pH, ORP, Chlorine, Chlorine Dioxide, Chlorite, Bromine, Conductivity, Peracetic Acid, Hydrogen Peroxide, Ozone, Dissolved Oxygen and Fluoride.

   d. The unit shall have the ability to control via proportional or PID loop control functions.

   e. In Free Chlorine applications the analyzer shall use one of the additional channels to allow for pH compensation of the Free Chlorine reading via a pH probe installed in the sample stream and wired to the analyzer.

f. The controller shall have the provision of saving data (data logging) to an SD card. Logged data shall include event, calibration and measured data logs.

g. The unit shall be able to accept a process flow rate disturbance variable and shall adjust its corresponding chemical feed output based on this variable.

h. In addition to the above requirements the analyzer shall have the following capabilities and specifications:

1) Resolution – 0.01 ppm (Chlorine) / 0.01 (pH)

2) Accuracy – 0.3% based on the full-scale reading

3) pH Compensation Range for Chlorine (when specified) – 6.5 to 8.5

4) Process Disturbance Signal Input – Water flow rate via mA or frequency (pulse) input

5) Current Input – Remote external input to adjust the process setpoint for Channel 1 (Chlorine) via 4-20mA signal.

6) Digital Inputs – Five (5) remote dry contact inputs for the remote pause of control, level input from supply tanks, water flow rate or similar input applications.

7) Current Outputs – Three (3) 0/4-20mA electrically isolated customer configured signals for measured value, correction value or control variable output.

8) Digital Outputs – Two (2) Pulse Frequency Outputs for metering pump pacing with PID loop control and two (2) Relays (limit value, 3-point step or pulse length control).

9) Alarm Relay – 250 Volt, 3 Amp, 700 VA (maximum)

10) Communication Options (as specified in 2.02 above) – LAN SCADA

11) Enclosure – IP67

12) Tests and Approvals – CE, MET (Corresponding to UL according to IEC 61010)

6. Sensor

a. The chlorine sensor shall be an amperometric type, providing continuous measurement of residual chlorine without the use of any reagents or buffers in the sample stream. A membrane shall protect the electrodes from flow, pressure, and conductivity-based interferences.

b. The measured value shall be either free chlorine or total chlorine as specified in 2.5.4 above. Specific sensor model selection shall be per the best recommendation of the

analyzer manufacturer or their Authorized Manufacturer's Representative. Selection shall be made to best meet the application requirements.

c. Signal response time to 90% of measured value shall be better than two minutes. Drift shall be less than 2% per month.

d. The sensor shall include integral automatic temperature compensation. The signal to the monitor shall be 4-20mA via 2-wire technology. The sensor shall feature a terminal block with watertight cable gland for field connection of any length cable to the monitor.

e. For applications calling for Free Chlorine measurement, automatic pH compensation shall be provided employing a double junction pH sensor with a signal converter to provide 4-20mA signal to the monitor via 2-wire technology. The signal converter shall feature a terminal block with watertight cable gland for field connection of any length cable to the monitor.

7. Sensor Holder

a. The sensor holder shall be transparent PVC material with integral flow control valve and rotameter for setting the sample flow rate between 8 and 15 gph. The flow shall be directed at the sensor membrane to provide a continuous cleaning action. Mounting brackets for wall mounting shall be included.

b. A flow switch shall be provided as part of the rotameter. This switch shall be wired to the controller that shall be able to initiate a pause to chemical feed if a loss of sample flow is detected.

c. The sample flow shall be controlled via a control valve, pressure regulator and installed a pressure gauge.

8. The analyzer, sensor, and sensor holder specified herein shall be installed on a single back panel and shall be fully wired and ready for installation with sample tubing or piping connections as required. The analyzer back panel shall be made of Polyethylene/Polypropylene sheet material of at least 3/8" thickness and shall be UV resistant.

55.6 Skid Mounted Feed System

1. The skid mounting of the metering pumps shall conform to the following requirements (See also section 2.7 for additional pump requirements):

a. The chemical feed system shall be completely assembled, mounted, calibrated, tested, and delivered to the site on a single skid. Components to be mounted on the skid are as indicated on the drawings and shall include the metering pumps, calibration column, piping, valves, piping accessories (pulsation dampeners, strainers, back pressure valves, pressure relief valves, etc.), and wiring integral to the skid. The chemical metering pump manufacturer shall be responsible for providing all equipment, valves and piping within the skid boundary.

b. The skids shall be constructed of fusion welded black polypropylene sheets with adequate supports for all equipment and piping and a ½" drip lip. Forklift truck cut outs shall also be provided.

c. All components of the skid-mounted system (pumps, piping and controls) shall be fully tested.

2. Skid mounted accessories to include the following:

a. Calibration Chamber:

1) Provide one, clear plastic calibration chamber with vent for use in calibrating the metering pumps.

2) The chamber shall be sized to give adequate capacity for a minimum 30 second draw down test.

3) The scale shall give direct readings in mL and GPH without the need for calculations.

4) The calibration chamber shall be piped and valved so that each pump shall be able to utilize the calibration chamber without interfering with the operation of the other pumps.

5) The top of the chamber shall have a threaded fitting to allow for piping to a common vent.

3. Pulsation Dampeners:

a. Shall be of the single diaphragm design, capable of arresting water hammer in the pump discharge lines created by the metering pumps.

b. Materials of construction of diaphragm and body shall be corrosion resistant to the chemical fluid pumped.

c. Provide one dampener on the discharge side of each metering pump.

d. Each pulsation dampener shall include an integral pressure gauge.

e. Pulsation dampeners shall be sized appropriately for each pump to remove a minimum of 95% of the pulsations. The manufacturer shall provide calculations to verify sizing if requested by the ENGINEER.

4. Backpressure and Pressure Relief Valves

a. Adjustable diaphragm backpressure sustaining type valve installed on pump discharge header and set at location recommended by manufacturer. Materials to be suitable for rated chemical service.

b. Adjustable diaphragm pressure relief valve installed externally on pump discharge header and set at location recommended by manufacturer. PRV required for each

pump mounted on feed system. Materials to be suitable for respective chemical service.

5. Piping, Valves and Appurtenances

    a. Skid piping shall be Schedule 80 PVC. Cement shall be as recommended by the pipe manufacturer for the service outlined in this Section.

    b. True-union ball valves shall be provided for isolation of major equipment. Seals shall be compatible with the chemical being pumped.

55.7 Diaphragm Metering Pumps

1. Metering pumps specified herein shall be of the solenoid driven, diaphragm-type with maximum published flow rates up to 11.9 gph. Pumps shall be microprocessor controlled and offer the required input and output signals as specified in 2.01B below for optimum system control.

2. The diaphragm metering pumps shall be the standard equipment of the supplier involved in the manufacture of similar type equipment and shall be as manufactured by ProMinent Fluid Controls, Inc. or Engineer Approved Equal.

3. To ensure quality and unit responsibility, the chemical metering pumps must be assembled and tested by the manufacturer at its facility and be a standard regularly marketed product of that manufacturer. The manufacturer must have a physical plant, technical and design staff and fabricating personnel to complete the work specified.

4. Prior to shipment, the chemical metering pumps shall be inspected for quality of construction verifying all fasteners and fittings are tight, all wires are secure and connections are whisker-free. All chemical metering pumps shall be tested with water under pressure to verify capacity and pressure requirements are met. If leaks are found the equipment shall be fixed and a new test shall be conducted. All pumps shall include a test report verifying the performance of the pump under testing.

5. Diaphragm-type metering pumps required:

	Pump Tag No.	MP-1	MP-2
	Qty. Required	1	1
	Product Pumped	12.5% NaOCl	12.5% NaOCl
Performance Parameter	Units		
Flow Rate Range	GPH	.1 – 1.3 gph	.1 – 1.3 gph
Discharge Pressure (max)	PSIG	25 (To Be Verified)	25 (To Be Verified)
Speed Control	Manual + Pulse + 4-20mA	Yes	Yes
Remote Pause	Dry Contact	Yes	Yes
Diaphragm Failure Indication	Local Only Remote	Yes	Yes
Output Relay	Fault	Yes	Yes

B. The pump manufacturer or manufacturer's authorized distributor or representative shall be responsible for the selection of the proper pump model based on the application information above. All pumps shall be selected to meet flow, pressure, control, communication and chemical requirements based upon best selection practices.

C. Pump Description

1. The chemical metering pump(s) shall be microprocessor-controlled, solenoid driven, reciprocating, diaphragm type. The pump shall have a corrosion resistant housing with a minimum IP65 protection rating.

2. All pumping functions shall be set by membrane switch keypad and click wheel and status shall be displayed on an illuminated LCD. The keypad shall allow for simple scrolling and display of programmed parameters.

3. The pump shall have a universal power supply that allows it to operate at a supply voltage in the range of 100-230 VAC +/-10%, 50-60Hz, single phase.

4. The diaphragm shall be constructed of a solid core, vulcanized into nylon-reinforced EPDM, with a PTFE-faced fluid contact surface. The diaphragm shall have a convex design fitting into a concave liquid end to minimize dead volume and promote the flow of solids in suspension. The pump shall also have a diaphragm failure detector with a visible indicator of a diaphragm rupture. There shall also be an option for a fault indication or

pump shut down in the case of a diaphragm rupture. Diaphragm options shall be supplied as specified in 2.6.5 above.

5. The liquid end shall be physically separated from the drive unit by a back plate with weep hole creating an air gap. An elastomer shaft wiper seal shall prevent contamination of the drive if the primary diaphragm fails.

6. The liquid end shall be either virgin PVDF or 316 stainless steel as required by the application. Pumps with PVDF liquid ends shall be NSF 61 Certified for use with standard water treatment chemicals. Pumps with 316 stainless steel liquid ends shall have suction and discharge valves made of 316 stainless steel with Teflon seals and stainless steel valve balls. Liquid end material selection shall be based on the best compatibility with the chemicals listed in 2.6.5 above. Chemical compatibility information should be made available at the customer's request.

7. Stroke length control shall be electronically adjustable by means of the click wheel, in increments of 1%, from 1% to 100% of stroke length. Stroke length shall be controlled by the pump solenoid without the use of mechanical stops and provide accurate feedback to the electronics of the pump for calibration for LCD display of stroke length.

8. Stroke frequency shall be adjustable via the click wheel and membrane switch keypad from 1 to 12,000 strokes per hour (0.0167 to 200 strokes per minute).

9. It shall be possible to selectively slow the discharge and/or the suction stroke speed of the pump to accommodate application requirements and process fluid viscosity and off-gassing conditions.

10. Provision shall be made to allow for input of chemical concentrations for simple adjustment with volume proportional metering applications.

11. Utilizing the electronic solenoid, the pump shall monitor discharge pressure and adjust pump flow accordingly to compensate for changes in the downstream pressure of the system.

12. For simplified operator monitoring the pump shall be equipped with a three LED Display (Red, Yellow & Green) to locally indicate normal operation, fault conditions and warning conditions. The indicator lights shall be visible 360 degrees around the pump.

D. Pump Operating Modes: The pump shall have the following operating modes available:

1. Manual operating mode permitting the operation of the pump stroke and speed controls manually.

2. Contact operating mode providing the option of controlling the pump externally by means of potential-free contacts (e.g. by means of a contact water meter). The number of pump strokes per input contact can be scaled by a factor ranging from 0.01 to 99.99 to tailor the pump feed rate to the application.

3. Batch operating mode providing the option of working with large factors (up to 99,999). Metering can be triggered either by pressing the Click wheel or by a pulse received via the "External control" terminal or through a contact or a semiconductor switching

element. It is possible to pre-select a metering volume (batch) or a number of strokes using the Click wheel in the Settings menu.

4. Analog operating mode allows the capacity and/or stroke rate to be controlled via an analog (4-20mA) current signal via the "External control" socket. The processing of the current signal can be preselected via the control unit.

E. To facilitate easy pump installation, removal, service and replacement the pump unit shall have a removable mounting plate into which the pump positively locks.

F. The chemical metering pumps shall be Gamma X Series models as manufactured by ProMinent Fluid Controls, Pittsburgh, PA or Engineer Pre-Approved Equal.

1. There shall be a system Chlorine Analyzer feed to measure chlorine residual on the well entering piping and discharge piping after it exits the pre-chlorination booster station.

2. The operator shall have the ability to input four Chlorine alarm levels and one setpoint level. The initial levels shall be set as follows:

Transmitter ID

TABLE 1.01		
TRANSMITTER ID	DESCRIPTION	SETPOINT/ RANGE
CLIT-200	LOW-LOW CL ALARM	TBD MG/L
CLIT-200	LOW CL ALARM	TBD MG/L
CLIT-200	DESIRED CL RESIDUAL	TBD MG/L
CLIT-200	HIGH CL RESIDUAL	TBD MG/L
CLIT-200	HIGH-HIGH CL RESIDUAL	TBD MG/L
NOTE 1: ALL VALUES TO BE COORDINATED WITH OWNER AND ENGINEER		

55.8 Wireless, Web Based Monitoring System: Wireless, web-based alarm detection and notification system from RACO designed specifically for water and wastewater applications. System shall be sufficiently robust to permit direct user on demand management of the following functions via the web; administration and configuration of WRTUs (Wireless Remote Terminal Unit), system preferences, adding users, reporting parameters, and report generation. The system shall be able to operate in a Cloud-Based SCADA (CBS) mode. If chosen, this state allows the WRTU to report in constant stream all sampled measured data that users require reported from the

system. CBS allows users to see in real-time all local conditions at the WRTU. These conditions include:

1. All I / O states

2. Incoming power conditions

3. Battery charging states and voltage levels

4. A service contract with local cellular carriers shall NOT be required for WRTU operation. The WRTU shall communicate with a dedicated website via wireless cellular communications. RACO shall own and maintains all connection with cellular carriers.

5. The WRTU shall have the following minimum complement of inputs and outputs:

    a. Input Monitoring Function: The basic unit shall continuously monitor the presence of AC power the status of (8) contact closure inputs and (2) universal inputs. AC power failure or violation of the alarm criteria at any input shall cause the unit to go into alarm status. Each input channel shall also be independently programmable, without the need to manipulate circuit board switches or jumpers.

    b. Alarm Trip Delay: All alarm inputs, power failure alarms shall have individually assigned alarm trip delay settings. The range shall be 2 seconds – 1 hour.

    c. Eight Digital Inputs: Eight (8) digital inputs monitoring dry (unpowered) contacts. Open circuit voltage shall be 3.0 V; closed circuit current shall be 1.0 mA. All digital inputs shall use a single common return. Digital inputs may be programmed for the following functions:

    d. Two Universal Analog / Digital Inputs: Two (2) analog 4-20 mA inputs shall be provided, with 10 bit resolution (0.125%), single ended and surge protected. Absolute accuracy shall be 0.5%. Loop resistance shall be nominally 250 ohm.

    e. Relay Contact Outputs: 2 Normally Open Output relays shall be provided.

6. LED Indicators shall include, both performance and diagnostic categories.

7. AlarmAgent.com WRTUs shall utilize the data services of most national and regional LTE cellular carriers in North America.

8. The basic WRTU configuration items shall be performable via local switch settings on the WRTU, or remotely via the website. With all digital inputs in their non-alarm state, pressing an “accept” pushbutton on the WRTU shall automatically set the open / closed alarm criteria for each input. The WRTU shall at the user’s option be configurable from the website without need to visit the WRTU.

9. Future firmware enhancements of the operating features of the WRTU shall be implemented via over-the-air firmware upgrades automatically sent to the WRTU by the manufacturer.

10. All wiring connections shall be via unpluggable screw-clamp terminal blocks, which accommodate 16 to 26 AWG wire.

11. The WRTU shall operate on 12 VDC power input; with 12 VDC input, current shall be 1 ampere peak 200 mA average.

12. The WRTU shall incorporate a sealed lead-acid backup battery contained within the enclosure. The battery shall be automatically charged, providing 24 hours nominal backup time (In real-time operations this nominal back-up time is reduced due to operational demands). All enclosure options shall accommodate the battery internally.

13. Digital inputs shall be optically isolated and rated at 5,000 V. Universal inputs shall be rated at 600 watts. Power input shall be protected to 1,500 watts peak. Surge protection shall be 1,500 watts peak. The fuse shall reset automatically.

14. The WRTU shall transmit both alarms and returns to normal to the website. Website settings shall determine whether actual notifications are delivered to users upon return to normal.

15. The WRTU shall incorporate means to suppress alarm reports arising from any given input going in and out of alarm repeatedly. Such suspensions shall apply only to the input involved. Notification shall be provided when such suspensions occur. Such suspensions will automatically clear upon receipt of template reports or when manually cleared at the WRTU.

16. The Manufacturer shall provide a two year limited warranty on all equipment provided covering parts and labor performed at the factory.

55.9 Flow Meter: Electromagnetic flow meters for permanent installation above ground. The flow meter shall utilize bipolar pulse DC coil excitation to measure voltage induced by the flow of conductive liquid through a magnetic flux. The voltage shall be linearly proportional to flow velocity from 0.033 to 33 feet per second.

A. Manufacturer: Endress+Hauser Promag 400 W Series

B. Submittals: Furnish complete Product Data, Shop Drawings, Test Reports, Operating Manuals, Record Drawings, Manufacturer's certifications, Manufacturer's Field Reports and the following specific product data:

1. Dimensional Drawings.

2. Materials of Construction:

a. Sensor.

b. Liner.

c. Electrodes.

d. Flanges.

3. Measurement accuracy.

4. Range and range ability.

5. Enclosure Rating.

6. Classification Rating.

7. Power:

a. Voltage.

b. Wattage.

8. Output options.

C. Quality Assurance

1. Manufacture facilities shall be certified to the quality standards of ISO Standard 9001 Quality Systems - Model for Quality Assurance in Design/Development, Production, Installation, and Servicing.

2. Provide instrument suitable for the installed outdoor site conditions including but not limited to material compatibility, site altitude, process and ambient temperature, and humidity conditions.

D. The meter shall be commissioned by a factory certified technician, to extend the warranty coverage to three years from the date of shipment.

E. Provide all parts, necessary for maintenance and calibration purposes throughout the warranty period. Deliver all of these supplies before project substantial completion.

F. Instrument documentation, like original calibration certificates, manuals and product status information shall be accessed via a web enabled system with a license. The instrument-specific information shall be accessed via its serial number. When services are provided by an authorized service provider the services information like subsequent field calibrations shall be archived and accessible via this web enabled system.

G. Manufactured Unit: The flow meter shall be a flanged sensor (by application and instrument schedule) which complies with AWWA C751 and transmitter which may be mounted integral (compact) to the sensor or remote with interconnecting cables up to 650 feet in length.

1. The flow metering system shall be microprocessor-based and possess a non-volatile memory to store the sensor calibration and transmitter setup information. The electronics shall be interchangeable for meters sizes 1”- 90”.

2. The sensor shall be the proper size to measure the design flow rate of the piping and measure bi-directional flow as a standard.

3. The sensor shall consist of a stainless steel flow tube with ANSI B16.5 or AWWA C207 carbon steel or stainless steel flanges. The flanges shall be Class 150 for 24” and smaller, and AWWA Class D for 28” and larger (listed by the application and instrument schedule).

4. Sensors from 1”-12” shall have fixed (welded) or rotating lap joint flanges.

5. Sensors from 14”-120” shall have the flanges welded to the sensor body.

H. The sensor liner and electrode material shall be chosen to be compatible with the process fluid. All fluids require a minimum conductivity of 5µS/cm (20µS/cm for deionized water).

I. The sensor tube shall be lined with polyurethane, hard rubber or PTFE in accordance with NSF-61 based upon the size of the flow meter and the process media conditions.

J. The sensor shall house two measuring electrodes, a grounding electrode, and one for physical empty pipe detection. The electrodes shall be bullet-nosed shaped and made of 316L SS or Alloy C22 (listed by the application and instrument schedule).

K. Optional unrestricted mounting magnetic flowmeter sensor for applications without the typical inlet/outlet straight pipe run requirements. The full bore magnetic flowmeter in sizes 1”-120” shall maintain zero pressure loss while achieving 0.5% of rate accuracy even when mounted directly before or after a piping elbow, T-fitting or insertion device. This flow tube shall have four measuring electrodes (sizes 1-2.5”) and six measuring electrodes (sizes 3”-120”) plus a grounding electrode and an empty pipe electrode.

L. The external sensor housing shall enclose the coil assemblies and internal wiring. The materials shall be designed and constructed to prevent moisture ingress and promote corrosion resistance.

M. The electrode circuit shall have a minimum impedance of 1012 ohms to overcome moderate coating buildup.

N. The sensor shall be rated for NEMA 4X service as standard.

O. The transmitter shall be a three-stage microprocessor controller mounted integrally or remotely as specified in the instrument schedule. The transmitter shall incorporate a universal 100-240 VAC/18-30 VDC power supply. The transmitter housing will carry a NEMA 4X rating and shall be constructed to prevent moisture ingress, promote corrosion resistance, and be impervious to saline environments and include the following features:

1. The transmitter shall allow local programming that can be operated through the enclosure window without opening the electrical enclosure.

2. The transmitter display shall indicate simultaneous flow rate and total flow with 3 totalizers (forward, reverse and net total) and user-selectable engineering units, readout of diagnostic error messages, and support 12 standard languages.

3. The transmitter shall safeguard against entering of invalid data for the particular meter size and all programming parameters shall be access-code protected with a minimum requirement of dual passwords according to data sensitivity.

4. The transmitter output shall be specified, as either: 4-20mA HART®, 0-20mA, pulse/frequency/switch.

5. The transmitter output(s) shall be integral to the magnetic flowmeter transmitter electronics and using an external third party signal converter is unacceptable.

6. There shall be no limitation of transmitter operational capability or diagnostic dependency between integral and compact mounting orientation.

7. The transmitter output selected must be supported by add-on instructions (AOI), Level 3 add-on profiles (AOP), device drivers (DD), general station description (GSD) files, instructions and pre-engineered code.

8. The transmitter shall support commissioning options via a service interface or device driver less operation via an internal web server accessible through a transmitter accessible RJ-45 Ethernet port or a WLAN (Wireless Local Area Network) connection as specified.

9. The transmitter shall retain all setup parameters and accumulated measurements internally in non-volatile memory in the event of power failure. The memory unit shall be transferrable from a damaged unit or used for a duplicate device with no loss of device parameters or data stored.

10. The transmitter shall be protected against voltage spikes from the power source with internal transient protection. Power consumption shall be no more than 16 VA, independent of meter size.

11. Device failure modes, self-monitoring characteristics and remedy diagnosis shall follow NAMUR standards NE 43 and NE 107.

12. The transmitter shall provide access to service and monitoring parameters designed to identify transient or permanent process influences.

13. The transmitter and sensor shall include a method to verify flow meter performance to the original manufacturer specifications and include.

a. The system shall be traceable to factory calibration using a third party, attested onboard system pursuant to ISO standards.

b. The verification technique shall not require external handhelds, interfaces, special tooling or electrical access for a verification to be performed.

c. The transmitter shall store up to eight verifications in the microprocessor.

d. A verification of the system shall be possible at any time, locally or remotely, on demand and under process conditions.

e. The verification report shall be compliant to common quality systems such as ISO 9000 7.6.a to prove reliability of the meter specified accuracy.

P. Provide grounding rings, as per manufacture’s recommendations, if required

Q. Provide sun shield for outdoor installations as required per the instrument schedule.

R. Magnetic flow meters shall be factory calibrated on an ISO-17025 accredited test stand per “General Requirements for the Competence of Testing and Calibration Laboratories” with certified accuracy traceable to NIST.

S. Evidence of accreditation shall originate from a national verification agency such as A2LA.

T. Each meter shall ship with a certificate of a 2-point calibration report exceeding stated standard accuracy of 0.5% of rate.

U.A real-time computer generated printout of the actual calibration data points shall indicate apparent and actual flows. The flow calibration data shall be confirmed by the manufacturer and shipped with the meters to the project site.

V.The manufacturer shall provide complete documentation covering the traceability of all calibration instruments.

W. The manufacturer shall provide ISA data sheet ISA-TR20.00.01 as latest revision of form 20F2321. The manufacturer shall complete the form with all known data and model codes and dash out the inapplicable fields. Incomplete data sheets submitted will result in a rejected submittal.

55.10 NaCl Storage Tank Level Sensors: Include high and low level float type level sensors compatible with NaCl with dry contact output signal capability.

PART 56 - EXECUTION

56.1 Installation

1. All materials and equipment shall be installed and completed in a first-class workmanlike manner and in accordance with the best modern methods and practice. Any materials installed which do not present an orderly and reasonably neat and/or workmanlike appearance, or do not allow adequate space for maintenance, shall be removed and replaced when so directed by the Architect/Engineer.

2. The equipment shall be installed per the contract documents and the manufacturer's recommendations.

3. Provide a manufacturer's certificate showing the equipment has been satisfactorily calibrated and tested.

4. An authorized manufacturer's representative shall inspect the installation of all work furnished under this section and shall provide a certificate of proper installation.

5. The manufacturer or manufacturer's authorized distributor or representative shall provide the following:

    a. Services of an experienced, authorized representative who shall be present at the job site and/or classroom designated by the City/District for the minimum man-days listed for the services shown below.

    b. One man-day per site for inspection, start-up, functional testing and certificate of proper installation.

    c. One man-day per site for training and commissioning

    d. All services shall be inclusive of travel and associated expenses.

56.2 Coordination

1. The Contractor shall be responsible for full coordination of the ICS and related systems with shop drawings of the related systems so that provisions for piping, ductwork, or other equipment are made.

2. Any additional steel supports required for the installation of any ICS equipment shall be furnished and installed under the section of the specifications requiring the additional supports.

3. It shall be the Contractor's responsibility to see that all equipment such as valves, dampers, sensors and such other apparatus or equipment that may require maintenance and operation are made easily accessible, regardless of the diagrammatic location shown on the drawings.

4. All connections to equipment shown on the drawings shall be considered diagrammatic unless otherwise indicated by detail. The actual connections shall be made to fully suit the requirements of each case and adequately provide for expansion and servicing.

5. The Contractor shall protect equipment, material, and fixtures at all times. He shall replace all equipment, material, and fixtures which are damaged as a result of inadequate protection.

6. Prior to starting and during progress of work, examine work and materials installed by others as they apply to work in this division. Report conditions which will prevent satisfactory installation.

7. Start of work will be construed as acceptance of suitability of work of others.

56.3 Interruption of Service

1. Before any equipment is shut down for disconnecting or tie-ins, arrangements shall be made with the Architect/Engineer and this work shall be done at the time best suited to the Owner. This will typically be on weekends and/or holidays and/or after normal working hours. Services shall be restored the same day unless prior arrangements are made. All overtime or premium costs associated with this work shall be included in the base bid.

56.4 Cutting and Patching

1. Contractor shall provide all cutting and patching of all holes, chases, sleeves, and other openings required for installation of equipment furnished and installed under this section. Utilize experienced trades for cutting and patching. Obtain permission from Architect/Engineer before cutting any structural items.

56.5 Painting

1. Touch-up factory finishes on equipment located inside and outside shall be done under this section. Obtain matched color coatings from the manufacturer and apply as directed. If corrosion is found during inspection on the surface of any equipment, clean, prime, and paint, as required.

56.6 Clean-up

1. Thoroughly clean all exposed parts of apparatus and equipment of cement, plaster, and other materials and remove all oil and grease spots. Repaint or touch up as required to look like new.

During progress of work, contractor is to carefully clean up and leave premises and all portions of building free from debris and in a clean and safe condition.

56.7 Start-up and Operational Test

1. Start each item of equipment in strict accordance with the manufacturer's instructions; or where noted under equipment specification, start-up shall be done by a qualified representative of the manufacturer. Alignment, safety, and operating control shall be included in start-up check.

56.8 Climate Control

1. Operate heating and cooling systems as required after initial startup to maintain temperature and humidity conditions to avoid freeze damage and warping or sagging of ceilings and carpet.

56.9 Flow Meter Installation

1. As shown on installation details and mechanical Drawings.

2. As recommended by the manufacturer’s installation and operation manual.

3. Specific attention should be given to the following technical requirements:

4. Verify ground rings (if required) have been installed according to the manufacturer recommendations.

5. Reduced inlet installations must either be specified in the device ordering information or accompanied by manufacturer’s documented evidence of third party testing and data collection in comparison to a traceable standard.

6. Field Quality Control

    a. Each instrument shall be tested before commissioning and the Engineer shall witness the interface capability in the PLC control system and associated registers.

        1) Each instrument shall provide direct programming capability through the PLC

        2) Each instrument shall provide direct control of totalizer reset functions through the PLC

        3) Each instrument shall be supported with a device profile permitting direct integration in the PLC

7. The Engineer shall witness all instrument verifications in the field.

8. Manufacturers Field Services shall be included for start-up and commissioning by a Factory field service representative or a manufacturer’s authorized service provider (ASP) – the warranty against manufacturing defects is three years.

    a. Manufacturer representative shall verify installation of all installed flow tubes and transmitters.

b. Manufacturer representative shall notify the ENGINEER in writing of any problems or discrepancies and proposed solutions.

c. Manufacturer representative shall perform field verification at the time of installation for long-term analysis of device linearity, repeatability and electronics health. A comparative report shall be generated for each meter tested.

d. Manufacturer representative shall generate a configuration report for each meter.

56.10 Record (As Built) Drawings

1. During the progress of the work the Contractor shall record on their field set of drawings the exact location, as installed, of all controls, equipment, and other systems which are not installed exactly as shown on the contract drawings. [Contractor shall review the record (as-built) drawings with the Engineer and the field conditions at every regular job-site meeting. Pay requests will not be processed if record drawings are not accurate and current.]

2. Upon completion of the work, record drawings shall be prepared as described in the General Conditions, Supplementary Conditions, and Division 1.

3. For projects done in Revit, the A/E will update the Revit model for all field orders, ASIs or other Owner directed revisions. The Contractor shall update the Revit model with all shop drawing data, manufacturer model numbers and field adjustments. True Revit files are required. Imported files such as PDF, linked files, print clouds and IFC files are not acceptable.

56.11 Acceptance

a. Punch List: Submit written confirmation that all punch lists have been checked and the required work completed.

b. Instructions: At completion of the work, provide a competent and experienced person who is thoroughly familiar with project, for one day to instruct permanent operating personnel in operation of equipment and control systems. This is in addition to any specific equipment operation and maintenance training.

56.12 Operation and Maintenance Manuals

a. Furnish searchable PDF format with Table of Contents, organized, and tabbed by specification section.

b. Detailed operating instructions and instructions for making minor adjustments.

c. Complete wiring and control diagrams.

d. Routine maintenance operations.

e. Manufacturer's catalog data, service instructions, and parts lists for each piece of operating equipment.

f. Copies of approved submittals.

g. Copies of all manufacturer's warranties.

h. Copies of test reports and verification submittals.

56.13 Record Drawings

a. Submit record drawings.

b. Acceptance will be made on the basis of tests and inspections of job. Contractor shall furnish trained individuals to operate system, make any necessary adjustments and assist with final inspection.

END OF SECTION 269000

SECTION 310513 - SOILS FOR EARTHWORK

PART 57 - GENERAL

57.1 SUMMARY

A. Section Includes:

1. Subsoil materials.
2. Topsoil materials.

B. Related Sections:

1. Section 312213 - Rough Grading.
2. Section 312316.13 - Trenching.

57.2 UNIT PRICES - MEASUREMENT AND PAYMENT

A. Subsoil:

1. Basis of Measurement: By cubic yard.
2. Basis of Payment: Includes excavating existing subsoil, supplying subsoil materials, and stockpiling.

B. Topsoil:

1. Basis of Measurement: By cubic yard.
2. Basis of Payment: Includes excavating existing topsoil, supplying topsoil materials, and stockpiling.

57.3 REFERENCES

A. American Association of State Highway and Transportation Officials:

1. AASHTO T180 - Standard Specification for Moisture-Density Relations of Soils Using a 10-lb Rammer and an 18-in. Drop.
2. AASHTO M 145 - Standard Specification for Classification of Soils and Soil–Aggregate Mixtures for Highway Construction Purposes

B. ASTM International:

1. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3).
2. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3).
3. ASTM D2487 - Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System).

57.4 QUALITY ASSURANCE

A. Furnish each material from single source throughout the Work.

B. Perform Work in accordance with State of Florida Department of Transportation standards.

PART 58 - PRODUCTS

58.1 SUBSOIL MATERIALS

A. Subsoil Type Regular:

1. Excavated and re-used material.
2. Graded.
3. Free of lumps larger than 3 inches, rocks larger than 2 inches, and debris.
4. Conforming to AASHTO M 145 Group A-1 or A-3.

B. Subsoil Type Borrow:

1. Imported borrow.
2. Graded.
3. Free of lumps larger than 3 inches, rocks larger than 2 inches, and debris.
4. Conforming to AASHTO M 145 Group A-1 or A-3.

58.2 TOPSOIL MATERIALS

A. Topsoil Type Regular:

1. Excavated and reused material.
2. Graded.
3. Free of roots, rocks larger than 1/2 inch, subsoil, debris, large weeds and foreign matter.

    a. Screening: Single screened.

4. Conforming to State of Florida Department of Transportation Standard Specifications Section 987.

B. Topsoil Type Borrow:

1. Imported borrow.
2. Friable loam.
3. Free of roots, rocks larger than 1/2 inch, subsoil, debris, large weeds, and foreign matter.

    a. Screening: Single screened.

4. Conforming to State of Florida Department of Transportation Standard Specifications Section 987.

58.3 SOURCE QUALITY CONTROL

A. Section 014000 - Quality Requirements.

B. Testing and Analysis of Subsoil Material: Perform in accordance with AASHTO T180.

C. Testing and Analysis of Topsoil Material: Analyze to determine percentage of nitrogen, phosphorus, potash, soluble salt, organic matter, and pH.

D. When tests indicate materials do not meet specified requirements, change material and retest.

E. Furnish materials of each type from same source throughout the Work.

PART 59 - EXECUTION

59.1 EXCAVATION

A. Excavate subsoil and topsoil from proposed building, driveway and sidewalk areas and other designated in the Drawings. Strip topsoil to full depth of topsoil in designated areas.

B. Stockpile excavated material meeting requirements for subsoil materials and topsoil materials.

C. Remove excess excavated subsoil and topsoil not intended for reuse, from site.

59.2 STOCKPILING

A. Stockpile materials on site at locations designated by Owner’s Representative.

B. Stockpile in sufficient quantities to meet Project schedule and requirements.

C. Separate differing materials with dividers or stockpile apart to prevent mixing.

D. Stockpile topsoil 8 feet high maximum.

E. Prevent intermixing of soil types or contamination.

F. Direct surface water away from stockpile site to prevent erosion or deterioration of materials.

G. Stockpile any contaminated materials on impervious material and cover to prevent erosion and leaching, until disposed of.

59.3 STOCKPILE CLEANUP

A. Remove stockpile, leave area in clean and neat condition. Grade site surface to prevent free standing surface water.

END OF SECTION 310513

SECTION 311000 - SITE CLEARING

PART 60 - GENERAL

60.1 SCOPE OF WORK

A. This Section covers clearing, grubbing and stripping along the construction sites, complete as specified herein.

B. The Contractor shall clear and grub all of the area within the limits of construction or as required, which includes but is not limited to, utility easements. The width of the area to be cleared shall be established by the Owner's Representative prior to the beginning of any clearing.

C. Related Sections:

1. Section 312213 - Rough Grading.

60.2 UNIT PRICE - MEASUREMENT AND PAYMENT

A. Site Clearing:

1. Basis of Measurement: By square yard.
2. Basis of Payment: Includes clearing site, loading and removing waste materials from site.

60.3 QUALITY ASSURANCE

A. Conform to applicable Columbia County standards.

B. Perform Work in accordance with the State of Florida Highways standards.

PART 61 - PRODUCTS

61.1 Not Applicable. The use of herbicides in clearing and grubbing is specifically prohibited.

PART 62 - EXECUTION

62.1 EXAMINATION

A. Section 013000 - Administrative Requirements.

B. Verify existing plant life designated to remain is tagged or identified.

62.2 PREPARATION

A. Call Local Utility Line Information service at 811 not less than three working days before performing Work.

1. Request underground utilities to be located and marked within and surrounding construction areas.
2. In areas so designated, topsoil shall be stockpiled. Topsoil so stockpiled shall be protected until it is placed as specified. Any topsoil remaining after all work is in place shall be disposed of by the Contractor.

62.3 PROTECTION

A. Locate, identify, and protect from damage all utilities indicated to remain.

B. Protect from damage existing plant life where indicated on Drawings.

C. Protect benchmarks, survey control points, and existing structures from damage or displacement.

62.4 CLEARING AND GRUBBING

A. Clearing

The surface of the ground, for the area to be cleared and grubbed shall be completely cleared of all timber, brush, stumps, roots, grass, weeds, rubbish and all other objectionable obstructions resting on or protruding through the surface of the ground. However, those trees which are designated by the Owner's Representative shall be preserved as hereinafter specified. Clearing operations shall be conducted so as to prevent damage to existing structures and installations, and to those under construction, and so as to provide for the safety of employees and others. Clearing for structures shall consist of topsoil and vegetation removal.

B. Grubbing

Grubbing shall consist of the complete removal of all stumps, roots larger than 1-1/2 inches in diameter, matted roots, brush, timber, logs and any other organic or metallic debris not suitable for foundation purposes, resting on, under or protruding through the surface of the ground to a depth of 18 inches below the subgrade. All depressions excavated below the original ground surface for or by the removal of such objects, shall be refilled with suitable materials and compacted to a density conforming to the surrounding ground surface.

All organic surface soils and muck shall be removed under all structures, tanks, pipes, slabs and roads, plus a 5-foot margin all around.

62.5 REMOVAL

A. The Contractor shall dispose of all material and debris from the clearing and grubbing operation by hauling such material and debris away to an approved dump. Disposal by burning or burial shall not be permitted. The cost of disposal (including hauling) of cleared and grubbed material and debris shall be considered a subsidiary obligation of the Contractor, the cost of which shall be included in the contract prices.

B. If the land owner desires the timber or small trees, the Contractor shall cut and neatly pile it in 4-foot lengths for removal by land owner; otherwise the Contractor shall dispose of it by hauling away from the project site.

C. Remove debris, rock, and extracted plant life from site.

D. Partially remove paving, curbs, and, as indicated on Drawings. Neatly saw cut edges at right angle to surface.

E. Remove abandoned utilities. Indicate removal termination point for underground utilities on Record Documents.

F. Continuously clean-up and remove waste materials from site. Do not allow materials to accumulate on site and leave site in clean condition.

62.6 PRESERVATION OF TREES

A. Those trees which are designated on the Drawings for preservation shall be carefully protected from damage. The Contractor shall erect such barricades, guards, and enclosures as may be considered necessary by him for the protection of the trees during all construction operations.

62.7 PRESERVATION OF DEVELOPED PRIVATE PROPERTY

A. The Contractor shall exercise extreme care to avoid unnecessary disturbance of developed private property as applicable. Trees, shrubbery, gardens, lawn and other landscaping, which in the opinion of the Owner's Representative must be removed, shall be replaced and replanted to restore the construction easement to the condition existing prior to construction.

B. All soil preparation procedures and replanting operations shall be under the supervision of a nurseryman experienced in such operations.

62.8 TOPSOIL EXCAVATION

A. Excavate topsoil from areas to be further excavated, relandscaped, or regraded, without mixing with foreign materials for use in finish grading.

B. Do not excavate wet topsoil.

C. Stockpile in area designated on site to depth not exceeding 8 feet and protect from erosion. Stockpile material on impervious material and cover over with same material, until disposal.

D. Remove excess topsoil not intended for reuse, from site.

62.9 SUBSOIL EXCAVATION

A. Excavate subsoil from areas to be further excavated, relandscaped, or regraded.

B. Do not excavate wet subsoil or excavate and process wet material to obtain optimum moisture content.

C. When excavating through roots, perform Work by hand and cut roots with sharp axe.

D. Remove excess subsoil not intended for reuse, from site.

E. Benching Slopes: Horizontally bench existing slopes greater than 1: 4 to key placed fill material to slope to provide firm bearing.

F. Stability: Replace damaged or displaced subsoil as specified for fill.

END OF SECTION 311000

SECTION 312213 - ROUGH GRADING

PART 63 - GENERAL

63.1 SCOPE OF WORK

A. This Section includes, except as elsewhere provided, excavation, filling and grading to attain the subgrades and grades indicated on the Drawings.

B. Supplemental foundation and site preparation notes are indicated on the Drawings.

A. Related Sections:

1. Section 310513 - Soils for Earthwork.
2. Section 311000 - Site Clearing.
3. Section 312316 - Excavation.
4. Section 312316.13 - Trenching.

63.2 REFERENCES

A. American Association of State Highway and Transportation Officials:

1. AASHTO T180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.

B. ASTM International:

1. ASTM C136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
2. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3).
3. ASTM D1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.
4. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN-m/m3).
5. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
6. ASTM D2419 - Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate.
7. ASTM D2434 - Standard Test Method for Permeability of Granular Soils (Constant Head).
8. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
9. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).

63.3 CLOSEOUT SUBMITTALS

A. Section 017000 - Execution and Closeout Requirements.

B. Project Record Documents: Accurately record actual locations of utilities remaining by horizontal dimensions, elevations or inverts, and slope gradients.

63.4 QUALITY ASSURANCE

A. Barricade open excavations occurring as part of this work and post with warning lights. Operate warning lights as recommended by authorities having jurisdiction.

B. Protect structures, utilities, sidewalks, pavements, and other facilities from possible damage which may result from settlement, lateral movement, undermining, washout and other hazards created by earthwork operations.

C. The Contractor shall examine the site taking into consideration all conditions that may affect his work. The Owner and Engineer will not assume responsibility for variations of sub-soil quality or conditions. A Soils Report has been prepared and is attached as an Appendix to this Report.

D. Existing Utilities: Locate existing underground utilities in the areas of work. If utilities are to remain in place, provide adequate means of protection during earthwork operations.

E. Should uncharted, or incorrectly charted, piping or other utilities be encountered during excavation, consult the Engineer and the Owner of such piping or utility immediately for directions.

F. Cooperate with Owner and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to satisfaction of utility owner.

G. Demolish and completely remove from site existing underground utilities indicated to be removed.

PART 64 - PRODUCTS

64.1 SOIL MATERIALS

A. Satisfactory soil materials are defined as those complying with American Association of State Highway and Transportation Officials (AASHTO) M2145, soil classification Groups A-1, A-2-4, A-2-5, and A-3.

B. Unsatisfactory soil materials are those defined in AASHTO M145 soil classification Groups A-2-6, A-2-7, A-4, A-5, A-6, and A- 7; also, peat and other highly organic soils.

C. Sub-base Material: Naturally or artificially graded mixture of sand clay, natural, or crushed sand, as acceptable to Owner’s Representative.

D. Backfill and Fill Materials: Satisfactory soil materials free of clay, rock or gravel larger than 2-inches in any dimension, debris, waste, frozen materials, vegetable and other deleterious matter.

PART 65 - EXECUTION

65.1 EXAMINATION

A. Examine the areas and conditions under which excavating, filling, and grading are to be performed. Notify Owner's Representative of any unsatisfactory conditions. Do not proceed with the work until unsatisfactory conditions have been corrected.

B. Examine and accept existing grade of walks, pavements and steps prior to commencement of work and report to Owner's Representative if elevations of existing subgrade varies from elevations shown on Drawings.

C. Verify survey benchmark and intended elevations for the Work are as indicated on Drawings.

65.2 PREPARATION

A. Call Local Utility Line Information service at 811 not less than three working days before performing Work.

1. Request underground utilities to be located and marked within and surrounding construction areas.

B. Identify required lines, levels, contours, and datum.

C. Protect utilities indicated to remain from damage.

D. Protect from damage existing plant life where indicated on Drawings.

E. Protect benchmarks, survey control points, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

65.3 EXCAVATION

A. Authorized earth excavation includes removal and disposal of pavements and other obstructions visible on ground surface, underground structures and utilities indicated to be demolished and removed, material of any classification indicated in soil boring data on subsurface conditions, and other materials encountered that are not classified as rock excavation or unauthorized excavation.

B. Unauthorized excavation consists of removal of material beyond the limits needed to establish required grade and subgrade elevations without specific direction of Owner's Representative. Unauthorized excavation, as well as remedial work directed by Owner's Representative shall be at the Contractor's expense.

1. Under footings, foundation bases, or retaining walls, fill unauthorized excavation by extending the indicated bottom elevation of the footing or base to the excavation bottom, without altering required top elevation. Lean (unreinforced) concrete fill may be used to bring bottom elevations to proper position, when acceptable to Engineer.
2. Elsewhere, backfill and compact unauthorized excavations as specified for authorized excavations of same classification, unless otherwise directed by Engineer.

C. Additional Excavation: When excavation has reached required subgrade elevations, notify the Engineer who will contact a specialized geotechnical consultant and make an inspection of conditions.

1. If unsuitable bearing materials are encountered at the required subgrade elevations, carry excavations deeper and replace the excavated material as directed by the Engineer.
2. Removal of unsuitable material and its replacement as directed beyond the authorized limits will be paid on the basis of contract conditions relative to changes in work.

D. Stability of Excavations: Slope sides of excavations to comply with local codes and ordinances having jurisdiction or as shown on the Drawings. Shore and brace where sloping is not possible because of space restrictions or stability of material excavated.

1. Maintain sides and slopes of excavations in a safe condition until completion of backfilling.

E. Shoring and Bracing: Provide materials for shoring and bracing, such as sheet piling, uprights, stringers and cross-braces, in good serviceable condition.

1. Establish requirements for trench shoring and bracing to comply with local codes and authorities having jurisdiction. Provide design drawings of all shoring and bracing signed and sealed by a Registered Professional Engineer.
2. Maintain shoring and bracing in excavations regardless of time period excavations will be open. Carry down shoring and bracing as excavation progresses.

F. Dewatering: Prevent surface water and subsurface or ground water from flowing into excavations and from flooding project site and surrounding area.

1. Do not allow water to accumulate in excavations. Remove water to prevent softening of foundation bottoms, undercutting footings, and soil changes detrimental to stability of subgrades and foundations. Provide and maintain pumps, well points, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations. Maintain groundwater table level a minimum of one foot below excavation level.
2. Convey water removed from excavations and rainwater to collecting or run-off areas. Establish and maintain temporary drainage ditches and other diversions outside excavation limits for each structure. Do not use trench excavations as temporary drainage ditches.
3. While dewatering for new Construction in the vicinity of existing structures, depletion of the groundwater level underneath these existing structures may cause settlement. To avoid this settlement, the groundwater level under these structures shall be maintained by appropriate methods of construction as approved by Owner’s Representative.

G. Material Storage: Stockpile satisfactory excavated materials where directed, until required for backfill or fill. Place, grade, and shape stockpiles for proper drainage.

1. Locate and retain soil materials away from edge of excavations.
2. Dispose of excess soil material and waste materials as herein specified.

H. Excavation for Structures: Conform to elevations and dimensions shown within a tolerance of plus or minus 0.10 feet, and extending a sufficient distance from footings and foundations to permit placing and removal of concrete formwork, installation of services, other construction, and for inspection, or as shown on the Drawings.

1. In excavating for footings and foundations, take care not to disturb bottom of excavation. Excavate by hand to final grade just before concrete reinforcement is placed. Trim bottoms to required lines and grades to leave solid base to receive concrete.

I. Cold Weather Protection: Protect excavation bottoms against freezing when atmospheric temperature is less than 35 degrees F.

65.4 COMPACTION

A. General: Control soil compaction during construction providing minimum percentage of density specified on the drawings for each area classification.

B. Percentage of Maximum Density Requirements:

1. Compact soil to not less than the following percentages of maximum dry density in accordance with AASHTO T-180.

    a. Structures and 5 feet-0-inches around Perimeter of Building: Compact top 12-inches of subgrade and each layer of backfill or fill material at 98% maximum dry density.
    b. Building Slabs: Compact top 12-inches of subgrade and each layer of backfill or fill material at 98% maximum dry density.
    c. Lawn or Unpaved Areas: Compact top 6-inches subgrade and each layer of backfill or fill.
    d. Walkways: Compact top 6-inches of subgrade 95% maximum dry density.
    e. Pavements and Steps: Compact top 6-inches of subgrade at 98% maximum dry density.

C. Moisture Control: Where subgrade or layer of soil material must be moisture conditioned before compaction, uniformly apply water to surface of subgrade, or layer of soil material, to prevent free water from appearing on surface during or subsequent to compaction operations.

1. Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density.
2. Soil material that has been removed because it is too wet to permit compaction but is otherwise satisfactory may be stockpiled or spread and allowed to dry. Assist drying by discing, harrowing or pulverizing until moisture content is reduced to a satisfactory value.

65.5 BACKFILL AND FILL

A. General: Place material in layers to required subgrade elevations, for each area classification listed below.

1. In excavations, use satisfactory excavated or borrow material.
2. Under grassed areas, use satisfactory excavated or borrow material.
3. Under walks and pavements, use subbase material.
4. Under steps, use subbase material.

B. Backfill excavations as promptly as work permits, but not until completion of the following:

1. Acceptance by Owner's Representative of construction below finish grade including, where applicable, dampproofing, waterproofing, and perimeter insulation
2. Inspection, testing, approval, and recording locations of underground utilities.
3. Removal of concrete formwork
4. Removal of shoring and bracing, and backfilling of voids with satisfactory materials
5. Removal of trash and debris
6. Permanent or temporary horizontal bracing is in place on horizontally supported walls. Layout and location of bracing shall consider loads of the structure as well as the effects of the soil and groundwater.

C. Placement and Compaction: Place backfill and fill materials in layers not more than 9-inches loose depth for material compacted by heavy compaction equipment, and not more than 4-inches loose depth for material compacted by hand-operated tampers.

1. Before compaction, moisten or aerate each layer as necessary to provide the optimum moisture content. Compact each layer to required percentage of maximum dry density or relative dry density for each classification. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.
2. Place backfill and fill materials evenly adjacent to structures, to required elevations. Take care to prevent wedging action of backfill against structures by carrying the material uniformly around structure to approximately same elevation in each lift.
3. Large compaction equipment shall not be used within 5 feet of walls.

65.6 GRADING

A. General: Uniformly grade areas within limits of grading under this Section, including adjacent transition areas. Smooth finished surface within specified tolerances, compact with uniform levels or slopes between points where elevations are shown, or between such points and existing grades.

B. Grading Outside Building Lines: Grade areas adjacent to building lines, as shown on the Drawings, to drain away from structures and to prevent ponding. Finish surfaces free from irregular surface changes, and as follows:

1. Grassed or Unpaved Areas: Finish areas to not more than 0.10 feet above or below the required elevation.
2. Walks and Drives: Shape surface of areas under walks to line, grade and cross-section, with finish surface not more than 0.10 feet above or below the required subgrade.
3. Make grade changes gradual, blending slope into level areas.

C. Grading Surface of Fill Under Building Slabs: Grade smooth and even, free of voids, compacted as specified, and to required elevation. Provide final grades within a tolerance of 1-2-inch when tested with a 10-foot straightedge.

D. Compaction: After grading, compact subgrade surfaces to the depth and percentage of maximum density for each area classification.

E. Place material in continuous layers as follows:

1. Subsoil Fill: Maximum 12 inches compacted depth.

2. Structural Fill: Maximum 8 inches compacted depth.
3. Granular Fill: Maximum 6 inches compacted depth.

F. Maintain optimum moisture content of fill materials to attain required compaction density.

65.7 FIELD QUALITY CONTROL

A. Quality Control Testing During Construction: Allow testing service to inspect and approve subgrades and fill layers before further construction work is performed.

B. If, in opinion of Owner's Representative, based on testing service reports and inspection, subgrade or fills which have been placed are below specified density, provide additional compaction and testing at no additional expense.

65.8 MAINTENANCE

A. Protection of Graded Areas:

1. Protect newly graded areas from traffic and erosion. Keep areas free of trash and debris.
2. Repair and re-establish grades in settled, eroded and rutted areas to specified tolerances.

B. Reconditioning Compacted Areas:

1. Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, reshape, and compact to required density prior to further construction.

65.9 SCHEDULES

A. Structural Fill:

1. Fill Type A-1: To subgrade elevation.
2. Compact uniformly to minimum 98 percent of maximum density.

B. Subsoil Fill:

1. Fill Type A-3: To subgrade elevation.
2. Compact uniformly to minimum 98 percent of maximum density.

C. Topsoil Fill:

1. Fill Type A-3: To subgrade elevation.
2. Compact uniformly to minimum 90 percent of maximum density.

END OF SECTION 312213

SECTION 312316 - EXCAVATION

PART 66 - GENERAL

66.1 SUMMARY

A. Section Includes:

1. Soil densification.
2. Excavating for building foundations.
3. Excavating for paving, roads, and parking areas.
4. Excavating for slabs-on-grade.
5. Excavating for site structures.

66.2 PAYMENT

A. Excavating Soil Materials:

1. Basis of Measurement: By cubic yard.
2. Basis of Payment: Includes general excavating to required elevations, loading, placing materials in stockpile and/or removing from site. Over Excavating: Payment will not be made for over excavated work nor for replacement materials.

66.3 REFERENCES

A. Local utility standards when working within 24 inches of utility lines.

66.4 SUBMITTALS

A. Section 013300 - Submittal Procedures.

B. Excavation Protection Plan: Describe sheeting, shoring, and bracing materials and installation required to protect excavations and adjacent structures and property; include structural calculations to support plan.

66.5 QUALITY ASSURANCE

A. Perform Work in accordance with Florida Department of Transportation and Columbia County standards.

66.6 QUALIFICATIONS

A. Prepare excavation protection plan under direct supervision of Professional Engineer experienced in design of this Work and licensed in the State of Florida.

PART 67 - PRODUCTS

67.1 Not Used.

PART 68 - EXECUTION

68.1 PREPARATION

A. Call Utility Line Information service at 811 not less than three working days before performing Work.

1. Request underground utilities to be located and marked within and surrounding construction areas.

B. Identify required lines, levels, contours, and datum.

C. Notify utility company to hold, remove and/or relocate utilities where needed.

D. Protect utilities indicated to remain from damage.

E. Protect from damage existing plant life where indicated on Drawings.

F. Protect benchmarks, survey control points, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

68.2 EXCAVATION

A. Underpin adjacent structures which may be damaged by excavation work.

B. Excavate subsoil to accommodate building foundations, slabs-on-grade, paving, site structures and construction operations.

C. Excavate to working elevation for piling work.

D. Compact disturbed load bearing soil in direct contact with foundations to original bearing capacity.

E. Slope banks with machine to angle of repose or less until shored.

F. Do not interfere with 45 degree bearing splay of foundations.

G. Grade top perimeter of excavation to prevent surface water from draining into excavation.

H. Trim excavation. Remove loose matter.

I. Remove lumped subsoil, boulders, and rock up to 1/3 cu yd measured by volume. Remove larger material as specified.

J. Notify Owner’s Representative of unexpected subsurface conditions.

K. Remove excavated material from site.

L. Repair or replace items indicated to remain damaged by excavation.

68.3 FIELD QUALITY CONTROL

A. Request visual inspection of bearing surfaces by Owner's Representative before installing subsequent work.

68.4 PROTECTION

A. Prevent displacement or loose soil from falling into excavation; maintain soil stability.

B. Protect bottom of excavations and soil adjacent to and beneath foundation from freezing.

C. Protect structures, utilities and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth operations.

END OF SECTION 312316

SECTION 312316.13 - TRENCHING

PART 69 - GENERAL

69.1 SUMMARY

A. Section Includes:

1. Excavating trenches for utilities from 5 feet outside building to utility service.
2. Compacted fill from top of utility bedding to subgrade elevations.
3. Backfilling and compaction.

B. Related Sections:

1. Section 310513 – Soils for Earthwork

69.2 UNIT PRICE - MEASUREMENT AND PAYMENT

A. Trenching:

1. Basis of Measurement: By cubic yard.
2. Basis of Payment: Includes excavating to required elevations, protecting excavation, and removing excavated materials from site. Over Excavating: Payment is not made for over excavated work nor for replacement materials.

B. Subsoil Fill:

1. Basis of Measurement: By cubic yard.
2. Basis of Payment: Includes furnishing fill material, stockpiling, scarifying substrate surface, placing where required, and compacting.

C. Structural Fill:

1. Basis of Measurement: By cubic yard.
2. Basis of Payment: Includes furnishing fill material, stockpiling, shaping substrate surface, placing where required, and compacting.

D. Granular Fill:

1. Basis of Measurement: By cubic yard.
2. Basis of Payment: Includes furnishing fill material, stockpiling, scarifying substrate surface, placing where required, and compacting.

E. Concrete Fill:

1. Basis of Measurement: By cubic yard.
2. Basis of Payment: Includes furnishing materials, forming, mixing and placing where required, and curing.

69.3 REFERENCES

A. American Association of State Highway and Transportation Officials:

1. AASHTO T180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.

B. ASTM International:

1. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3).
2. ASTM D1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.
3. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN-m/m3).
4. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
5. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
6. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).

69.4 DEFINITIONS

A. Utility: Any buried pipe, duct, conduit, or cable.

69.5 SUBMITTALS

A. Excavation Protection Plan: Describe sheeting, shoring, and bracing materials and installation required to protect excavations and adjacent structures and property; include structural calculations to support plan.

B. Product Data: Submit data for geotextile fabric indicating fabric and construction.

C. Samples: Submit, in air-tight containers, 10 lb. sample of each type of fill to testing laboratory.

D. Materials Source: Submit name of imported fill materials suppliers.

E. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

69.6 QUALITY ASSURANCE

A. Perform Work in accordance with Florida Department of Transportation and Columbia County standards.

69.7 QUALIFICATIONS

A. Prepare excavation protection plan under direct supervision of Professional Engineer experienced in design of this Work and licensed in the State of Florida.

69.8 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

69.9 COORDINATION

A. Section 013000 - Administrative Requirements.

B. Verify Work associated with lower elevation utilities is complete before placing higher elevation utilities.

PART 70 - PRODUCTS

70.1 FILL MATERIALS

A. Structural Fill: Type A1 as specified in Section 310513**.**

B. Granular Fill: Type A3 as specified in Section 310516**.**

C. Concrete: Lean concrete

70.2 ACCESSORIES

A. Materials:

1. Substitutions: Not Permitted.

PART 71 - EXECUTION

71.1 LINES AND GRADES

A. Lay pipes to lines and grades indicated on Drawings.

1. Engineer reserves right to make changes in lines, grades, and depths of utilities when changes are required for Project conditions.

B. Use laser-beam instrument with qualified operator to establish lines and grades.

71.2 PREPARATION

A. Call Utility Line Information service at 811 not less than three working days before performing Work.

1. Request underground utilities to be located and marked within and surrounding construction areas.

B. Identify required lines, levels, contours, and datum locations.

C. Protect plant life, lawns, and other features remaining as portion of final landscaping.

D. Protect benchmarks, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

E. Maintain and protect above and below grade utilities indicated to remain.

F. Establish temporary traffic control and detours when trenching is performed in public right-of-way. Relocate controls and reroute traffic as required during progress of Work.

71.3 TRENCHING

A. Excavate subsoil required for utilities to utility service.

B. Remove lumped subsoil, boulders, and rock up of 1/6 cubic yard, measured by volume. Remove larger material.

C. Perform excavation within 24 inches of existing utility service in accordance with utility's requirements.

D. Do not advance open trench more than 200 feet ahead of installed pipe.

E. Cut trenches to width indicated on Drawings. Remove water or materials that interfere with Work.

F. Excavate bottom of trenches maximum 2 feet wider than outside diameter of pipe.

G. Excavate trenches to depth indicated on Drawings. Provide uniform and continuous bearing and support for bedding material and pipe.

H. Do not interfere with 45 degree bearing splay of foundations.

I. When Project conditions permit, slope side walls of excavation starting 2 feet above top of pipe. When side walls cannot be sloped, provide sheeting and shoring to protect excavation as specified in this section.

J. When subsurface materials at bottom of trench are loose or soft, excavate to greater depth as directed by Engineer until suitable material is encountered.

K. Cut out soft areas of subgrade not capable of compaction in place. Backfill with Fill Type A3 and compact to density equal to or greater than requirements for subsequent backfill material.

L. Trim excavation. Hand trim for bell and spigot pipe joints. Remove loose matter.

M. Correct areas over excavated areas with compacted backfill as specified for authorized excavation or replace with fill concrete as directed by Engineer.

N. Remove excess subsoil not intended for reuse, from site.

71.4 SHEETING AND SHORING

A. Sheet, shore, and brace excavations to prevent danger to persons, structures and adjacent properties and to prevent caving, erosion, and loss of surrounding subsoil.

B. Support trenches more than 5 feet deep excavated through unstable, loose, or soft material. Provide sheeting, shoring, bracing, or other protection to maintain stability of excavation.

C. Design sheeting and shoring to be left in place as part of the completed Work, cut off minimum 18 inches below finished grade.

71.5 BACKFILLING

A. Backfill trenches to contours and elevations with unfrozen fill materials.

B. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen, or spongy subgrade surfaces.

C. Place geotextile fabric prior to placing subsequent fill materials.

D. Place fill material in continuous layers and compact in accordance with construction drawings.

E. Employ placement method that does not disturb or damage foundation perimeter drainage or utilities in trench.

F. Maintain optimum moisture content of fill materials to attain required compaction density.

G. Do not leave more than 50 feet of trench open at end of working day.

H. Protect open trench to prevent danger to the public.

71.6 TOLERANCES

A. Section 014000 - Quality Requirements.

B. Top Surface of Backfilling Under Paved Areas: Plus or minus 1 inch from required elevations.

C. Top Surface of General Backfilling: Plus or minus 1 inch from required elevations.

71.7 FIELD QUALITY CONTROL

A. Field inspecting, testing, adjusting, and balancing.

B. Perform laboratory material tests in accordance with AASHTO T180.

C. Perform in place compaction tests in accordance with the following:

1. Density Tests: ASTM D1556, ASTM D2167, or ASTM D2922.
2. Moisture Tests: ASTM D3017.

D. When tests indicate Work does not meet specified requirements: remove Work, replace, compact, and retest.

E. Frequency of Tests: 1 every 2,000’ or as directed by Owner’s Representative.

71.8 PROTECTION OF FINISHED WORK

A. Reshape and re-compact fills subjected to vehicular traffic during construction.

END OF SECTION 312316.13

SECTION 330505.31 - HYDROSTATIC TESTING

PART 72 - GENERAL

72.1 SUMMARY

A. Section Includes: Hydrostatic testing of pressure piping.

B. Related Requirements:

1. Section 330533 - High Density Polyethylene (HDPE) Pipe, Fittings & Joining.
2. Section 331413 - Public Water Utility Distribution Piping.
3. Section 331416 - Site Water Utility Distribution Piping.

72.2 REFERENCE STANDARDS

A. American Water Works Association:

1. AWWA C600 - Installation of Ductile-Iron Water Mains and Their Appurtenances.
2. AWWA C906 - Polyethylene (PE) Pressure Pipe and Fittings, 4 In. (100 mm) Through 63 In. (1,600 mm), for Water Distribution and Transmission.

72.3 SUBMITTALS

A. Section 013300 - Submittal Procedures.

B. Submit following items prior to start of testing:

1. Testing procedures.
2. List of test equipment.
3. Testing sequence schedule.
4. Provisions for disposal of flushing and test water.
5. Certification of test gage calibration.

C. Test and Evaluation Reports: Indicate results of piping tests.

D. Qualifications Statement:

1. When requested by Owner’s Representative, submit qualifications data for applicator.

72.4 QUALITY ASSURANCE

A. Perform Work according to AWWA C600 and C906 standards and Columbia County standards.

72.5 QUALIFICATIONS

A. Applicator: Company specializing in performing Work of this Section with minimum three years' documented experience.

PART 73 - PRODUCTS

73.1 HYDROSTATIC TESTING

A. Equipment:

1. Pressure pump.
2. Pressure hose.
3. Water meter.
4. Test connections.
5. Pressure relief valve.
6. Pressure Gage: Calibrated to 0.1 psi.

PART 74 - EXECUTION

74.1 EXAMINATION

A. Section 017000 - Execution and Closeout Requirements.

B. Verify that piping is ready for testing.

C. Verify that trenches are backfilled.

D. Verify that pressure piping thrust restraints have been installed.

74.2 FIELD QUALITY CONTROL

A. Section 017000 - Execution and Closeout Requirements.

B. Testing of Pressure Piping:

1. Test ductile iron components according to AWWA C600 and the following:

    a. Hydrostatically test each portion of pressure piping, including valved section, at 1.5 times working pressure of piping, based on elevation of lowest point in piping corrected to elevation of test gage.
    b. Conduct hydrostatic testing for at least two hours.
    c. Slowly fill with water portion of piping to be tested, expelling air from piping at high points.
    d. Install corporation cocks at high points.
    e. Close air vents and corporation cocks after air is expelled.
    f. Raise pressure to specified test pressure.

g. Observe joints, fittings, and valves undergoing testing.
h. Remove and renew cracked pipes, joints, fittings, and valves that show visible leakage.
i. Retest.
j. Correct visible deficiencies and continue testing at same test pressure for additional two hours to determine leakage rate.
k. Maintain pressure within plus or minus 5.0 psi of test pressure.
l. Leakage is defined as quantity of water supplied to piping necessary to maintain test pressure during period of testing.
m. Compute maximum allowable leakage using following formula:

1) L = [SD x sqrt(P)]/C.
2) L = testing allowance, gph .
3) S = length of pipe tested, feet .
4) D = nominal diameter of pipe, inches .
5) P = average test pressure during hydrostatic testing, psig .
6) C = 148,000 .
7) If pipe undergoing testing contains sections of various diameters, calculate allowable leakage from sum of computed leakage for each pipe size.

2. Test HDPE components according to AWWA C906 and as specified in Section 330533.
3. If testing of piping indicates leakage greater than that allowed, locate source of leakage, make corrections, and retest until leakage is within acceptable limits.
4. Correct visible leaks regardless of quantity of leakage.

END OF SECTION 330505.31

SECTION 330507.13 - UTILITY DIRECTIONAL DRILLING

PART 75 - GENERAL

75.1 SUMMARY

A. Section Includes:

1. Excavation for approach trenches and pits.
2. Horizontal directional drilling.
3. Pipe.
4. Drilling fluid system.

B. Related Requirements:

1. Section 312316 - Excavation.
2. Section 312316.13 - Trenching.
3. Section 330505.31 - Hydrostatic Testing
4. Section 330597 - Identification and Signage for Utilities.
5. Section 331413 - Public Water Utility Distribution Piping.

75.2 UNIT PRICE - MEASUREMENT AND PAYMENT

A. Section 012000 - Price and Payment Procedures.

B. Horizontal Directional Drilling:

1. Basis of Measurement: By linear foot.
2. Basis of Payment: Includes excavation, drilling, pipe**,** accessories, tests, and backfill.

75.3 REFERENCE STANDARDS

A. American Association of State Highway and Transportation Officials:

1. AASHTO T 180 - Standard Method of Test for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.

B. American Water Works Association:

1. AWWA C111 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
2. AWWA C900 - Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 In. Through 12 In. (100 mm Through 300 mm), for Water Transmission and Distribution.
3. AWWA C906 - Polyethylene (PE) Pressure Pipe and Fittings, 4 In. (100 mm) Through 63 In. (1,600 mm), for Water Distribution and Transmission.

C. ASTM International:

1. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort 12,400 ft-lbf/ft3 .
2. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort 56,000 ft-lbf/ft3 .
3. ASTM D1784 - Standard Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds.
4. ASTM D2239 - Standard Specification for Polyethylene (PE) Plastic Pipe (SIDR-PR) Based on Controlled Inside Diameter.
5. ASTM D2241 - Standard Specification for Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series).
6. ASTM D2837 - Standard Test Method for Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Materials or Pressure Design Basis for Thermoplastic Pipe Products.
7. ASTM D3035 - Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter.
8. ASTM D3139 - Standard Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals.
9. ASTM D3261 - Standard Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing.
10. ASTM D3350 - Standard Specification for Polyethylene Plastics Pipe and Fittings Materials.
11. ASTM D6938 - Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).
12. ASTM F714 - Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Outside Diameter.
13. ASTM F1056 - Standard Specification for Socket Fusion Tools for Use in Socket Fusion Joining Polyethylene Pipe or Tubing and Fittings.
14. ASTM F1962 - Standard Guide for Use of Maxi-Horizontal Directional Drilling for Placement of Polyethylene Pipe or Conduit Under Obstacles, Including River Crossings.

D. North American Society for Trenchless Technology:

1. NASTT - Horizontal Directional Drilling Good Practices Guidelines.

E. Plastics Pipe Institute:

1. PPI TR-46 - Guidelines for Use of Mini-Horizontal Directional Drilling for Placement of High Density Polyethylene Pipe.

75.4 COORDINATION

A. Section 013000 - Administrative Requirements.

B. Coordinate Work of this Section with FDOT, Columbia County Public Works and utilities within construction area.

75.5 PREINSTALLATION MEETINGS

A. Section 013000 - Administrative Requirements.

B. Convene minimum one week prior to commencing Work of this Section.

75.6 SUBMITTALS

A. Section 013300 - Submittal Procedures.

B. Product Data:

1. Identify source of water used for drilling.
2. Submit copy of approvals and permits for use of water source.

C. Shop Drawings:

1. Submit technical data for equipment, method of installation, and proposed sequence of construction.
2. Include information pertaining to pits, dewatering, method of spoils removal, and equipment size, capacity, and capabilities, including installing pipe on radius, type of drill bit, drilling fluid, method of monitoring line and grade, detection of surface movement, name plate data for drilling equipment, and mobile spoils removal unit.

D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

E. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.

F. Qualifications Statement:

1. Submit qualifications data for driller.

G. Submit FDOT and Columbia County occupancy permit for installations under public throughways and lands.

75.7 CLOSEOUT SUBMITTALS

A. Section 017000 - Execution and Closeout Requirements.

B. Project Record Documents: Record actual locations of pipe and invert and centerline elevations.

C. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

D. Record actual depth of pipe at 25-foot intervals.

E. Record actual horizontal location of installed pipe.

F. Show depth and location of abandoned bores.

G. Record depth and location of drill bits and drill stems not removed from bore.

75.8 QUALITY ASSURANCE

A. Perform Work according to following:

1. NASST - Horizontal Directional Drilling Good Practices Guidelines.
2. ASTM F1962.
3. PPI TR-46.

B. Perform Work according to ASTM F1962-11 standards and Columbia County standards.

75.9 QUALIFICATIONS

A. Driller: Company specializing in performing Work of this Section with minimum three years' documented experience.

75.10 DELIVERY, STORAGE, AND HANDLING

A. Section 016000 - Product Requirements.

B. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.

C. Handling:

1. Use shipping braces between layers of stacked pipe.
2. Support pipes with nylon slings during handling.

D. Storage:

1. According to manufacturer instructions.
2. Stack piping lengths no more than three layers high.
3. Store field joint materials in original shipping containers in dry area indoors.

E. Protection:

1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
2. Protect pipe from entry of foreign materials and water by installing temporary covers, completing sections of Work, and isolating parts of completed system.
3. Provide additional protection according to manufacturer instructions.

75.11 AMBIENT CONDITIONS

A. Section 015000 - Temporary Facilities and Controls.

B. Maintain storage temperature of 60 to 85 degrees F.

75.12 EXISTING CONDITIONS

A. Field Measurements:

1. Verify field measurements prior to fabrication.
2. Indicate field measurements on Shop Drawings.

PART 76 - PRODUCTS

76.1 HORIZONTAL DIRECTIONAL DRILLING

A. Performance and Design Criteria:

1. Drilling Steering System: Remote with continuous electronic monitoring of boring depth and location.
2. Directional Change Capability: 90 degrees with 35-foot radius curve.
3. Minimum distance for single bores and between boring pits, as determined by driller.

    a. Pipe Size 3 to 6 Inches : 300 feet.

4. Ratio of Reaming Diameter to Pipe OD:

    a. Nominal Pipe Diameter of 6 Inches and Smaller: Maximum of 1.5.
    b. Nominal Pipe Diameter Larger Than 6 Inches : Submit recommended ratio and reaming procedures for review by Owner’s Representative.

B. Water Source:

1. Potable.
2. Obtained from Contractor.

C. Underground Pipe Markers: As specified in Section 330597 - Identification and Signage for Utilities.

D. Materials:

1. Drilling Fluid: Liquid bentonite clay slurry; totally inert with no environmental risk.

E. Polyethylene (PE) Piping:

1. Pipe: Comply with AWWA C906 [ASTM D3035] DR 11 for 160 psig pressure rating.
2. Materials:

    a. Comply with ASTM D3350.
    b. Cell Classification: 445574C.

3. Fittings:

    a. Comply with AWWA C906.
    b. Style: Molded .

4. Joints:

    a. End Connections: plain end for mechanical joint.

F. Subsoil Fill: Type A-3, as specified in Section 310513 - Soils for Earthwork; to be determined by geotechnical recommendation of driller.

76.2 MIXES

A. Grout: As specified in Section 036000 - Grouting.

B. Flowable Fill: As specified in Section 312324 - Flowable Fill.

PART 77 - EXECUTION

77.1 EXAMINATION

A. Section 017000 - Execution and Closeout Requirements.

B. Verify that connections to existing piping system sizes, locations, and invert centerline elevations are according to Drawings.

77.2 PREPARATION

A. Section 017000 - Execution and Closeout Requirements

B. Local Utility:

1. Call local utility line information service at 811 not less than three working days before performing Work.
2. Request underground utilities to be located and marked within and surrounding construction areas.
3. Request utility company to remove or relocate utilities.

C. Maintain access to existing facilities and indicated to remain; modify pipe installation indicated on Drawings to maintain access to existing facilities.

D. Locate and identify utilities indicated to remain and protect from damage.

E. Identify required lines, levels, contours, and data locations.

F. Protect plant life, lawns, and other features remaining as portion of final landscaping.

G. Protect benchmarks such as: existing structures, fences, sidewalks, paving, curbs and survey control points from excavating equipment and vehicular traffic.

H. Establish pipe elevations with no less than 3 feet of cover.

I. Establish minimum separation between piping according to DEP regulations, Project drawings and Project specifications**.**

77.3 INSTALLATION

A. Dewatering:

1. Intercept and divert surface drainage, precipitation, and ground water away from excavation using dikes, curb walls, ditches, pipes, sumps, or other approved means.
2. Develop and maintain substantially dry subgrade during drilling and pipe installation.
3. Comply with State of Florida requirements for discharging water to watercourse, preventing stream degradation, and controlling erosion and sediment.

B. Excavation:

1. Excavate subsoil as specified in Section 312316 - Excavation
2. Excavate approach trenches and pits according to Shop Drawings and as Site conditions require; minimize number of access pits.
3. Provide sump areas to contain drilling fluids.
4. Install excavation supports as specified in Section 312316 - Excavation.
5. Restore areas after completion of drilling and carrier pipe installation.

C. Drilling:

1. Drill pilot bore with vertical and horizontal alignment as indicated on Shop Drawings.
2. Surveying:

    a. Survey entire drill path and mark entry and exit locations with stakes.
    b. If a magnetic guidance system is used, survey drill path for surface geomagnetic variations or anomalies.

3. Guiding:

    a. Guide drill remotely from ground surface to maintain alignment by monitoring signals transmitted from drill bit.
    b. Monitor depth, pitch, and position.
    c. Adjust drill head orientation to maintain correct alignment.

4. Drilling Fluid:

    a. Inject drilling fluid into bore to stabilize hole, remove cuttings, and lubricate drill bit and pipe.
    b. Continuously monitor drilling fluid pumping rate, pressure, viscosity, and density while drilling pilot bore, back reaming, and installing pipe to ensure adequate removal of soil cuttings and stabilization of bore.
    c. Provide relief holes when required to relieve excess pressure.
    d. Minimize heaving during pullback.

5. Verification of Accuracy:

    a. Calibrate and verify electronic monitor accuracy during first 50 feet of bore in presence of Architect/Engineer before proceeding with other drilling.
    b. Excavate minimum of four test pits spaced along first 50 feet of bore to verify required accuracy.
    c. If required accuracy is not met, adjust equipment or provide new equipment capable of meeting required accuracy.

6. After completing pilot bore, remove drill bit.

D. Drilling Obstructions:

1. If obstructions are encountered during drilling, notify Owner's Representative immediately.
2. Do not proceed around obstruction without approval of Owner's Representative.
3. For conditions requiring more than 3 feet of deviation in horizontal alignment, submit revised Shop Drawings to Owner's Representative for approval before resuming Work.
4. Maintain adjusted bore alignment within easement or right-of-way.

E. Piping:

1. Install reamer and pipe pulling head; select reamer with minimum bore diameter required for pipe installation.
2. Attach pipe to pipe pulling head and pull reamer and pipe to entry pit along pilot bore.
3. Inject drilling fluid through reamer to stabilize bore and lubricate pipe.
4. Install piping with horizontal and vertical alignment as shown on Shop Drawings.
5. Protect and support pipe being pulled into bore such that pipe moves freely and is not damaged during installation.
6. Do not exceed pipe manufacturer's recommended pullback forces.
7. Trace Wire:

    a. Install trace wire continuous with each bore.
    b. Splice trace wire only at intermediate bore pits.
    c. Tape or insulate trace wire to prevent corrosion and maintain integrity of pipe detection.
    d. Terminate trace wire for each pipe run at structures along pipe system.
    e. Provide extra length of trace wire at each structure such that trace wire can be pulled 3 feet out top of structure for connection to detection equipment.
    f. Test trace wire for continuity for each bore before acceptance.

8. Provide sufficient length of pipe to extend past termination point to allow connection to other pipe sections.
9. Allow minimum of 24 hours for stabilization after installing pipe before making connections to pipe.
10. Mark location and depth of bore with spray paint on paved surfaces and on wooden stakes on non-paved surfaces at 25-foot intervals.

F. Slurry Removal and Disposal:

1. Contain excess drilling fluids at entry and exit points until recycled or removed from Site; provide recovery system to remove drilling spoils from access pits.
2. Drilling Spoils:

    a. Remove, transport, and legally dispose of drilling spoils.
    b. Do not discharge drilling spoils in sanitary sewers, storm sewers, or other drainage systems.
    c. When drilling in suspected contaminated soil, test drilling fluid for contamination before disposal.

3. If drilling fluid leaks to surface, immediately contain leak and barricade area from vehicular and pedestrian travel before resuming drilling operations.
4. Complete cleanup of drilling fluid at end of each working day.

G. Backfilling:

1. Install backfill as specified in Section 312213 – Rough Grading.
2. Backfill approach trenches and pits with subsoil fill to contours and elevations as indicated on Drawings.
3. Compact subsoil fill as specified in Section 312213 – Rough Grading, to minimum 97 percent of maximum density.

77.4 TOLERANCES

A. Section 014000 - Quality Requirements.

B. Maximum Variation from Horizontal Position: 12 inches.

C. Maximum Variation from Vertical Elevation: 2 inches.

D. Minimum Horizontal and Vertical Clearance from Other Utilities: 12 inches.

E. Deviation:

1. If pipe installation deviates beyond specified tolerances, abandon bore, remove installed pipe, rebore, and reinstall pipe in correct alignment.
2. Fill abandoned bores greater than 3 inches in diameter with grout or flowable fill material.

77.5 FIELD QUALITY CONTROL

A. Section 017000 - Execution and Closeout Requirements.

B. Upon completion of pipe installation, test pipe according to following:
1. Water Distribution Pipe Testing: As specified in Section 330505.31 - Hydrostatic Testing, and Section 330507.13 – Utility Directional Drilling.
2. If tests indicate Work does not meet specified requirements, remove Work, replace, and retest.

C. Compaction Testing:

1. Comply with AASHTO T 180
2. If tests indicate Work does not meet specified requirements, remove Work, replace, and retest.
3. Testing Frequency: One for each lift.

D. Frequency of Compaction Testing: Two for each lift.

E. Certify that equipment for drilling has been properly set up and is ready for drilling.

77.6 CLEANING

A. Section 017000 - Execution and Closeout Requirements.

B. Upon completion of drilling and pipe installation, remove drilling spoils, debris, and unacceptable material from approach trenches and pits.

C. Clean up excess slurry from ground.

D. Restore approach trenches and pits to original condition.

E. Remove temporary facilities for drilling operations as specified in Section 015000 - Temporary Facilities and Controls.

END OF SECTION 330507.13

SECTION 330509.33 - THRUST RESTRAINT FOR UTILITY PIPING

PART 78 - GENERAL

78.1 SUMMARY

A. Section Includes:

1. Tied joint restraint system.

B. Related Requirements:

1. Section 312316.33 – Trenching.
2. Section 331413 - Public Water Utility Distribution Piping.

78.2 UNIT PRICE - MEASUREMENT AND PAYMENT

A. Section 012000 - Price and Payment Procedures.

B. Tied Joint Restraint System:

1. Basis of Measurement: By unit.
2. Basis of Payment: Includes tied joint restraint system and accessories.

78.3 REFERENCE STANDARDS

A. American Water Works Association:

1. AWWA C600 - Installation of Ductile-Iron Water Mains and Their Appurtenances.

B. ASME International:

1. ASME B1.1 - Unified Inch Screw Threads, UN and UNR Thread Form.

C. ASTM International:

1. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength.
2. ASTM A563 - Standard Specification for Carbon and Alloy Steel Nuts.
3. ASTM A588/A588M - Standard Specification for High-Strength Low-Alloy Structural Steel, up to 50 ksi Minimum Yield Point, with Atmospheric Corrosion Resistance.
4. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel.
5. ASTM F436 - Standard Specification for Hardened Steel Washers.

78.4 COORDINATION

A. Section 013000 - Administrative Requirements.

B. Coordinate Work of this Section with installation of fittings and joints that require restraint.

78.5 SUBMITTALS

A. Section 013300 - Submittal Procedures.

B. Product Data: Submit manufacturer catalog information for restrained joint details and installation instructions.

C. Shop Drawings:

1. Indicate restrained joint details and materials being used.
2. Submit layout drawings showing piece numbers and locations.
3. Indicate restrained joint locations.

D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

E. Delegated Design Submittals:

1. Submit signed and sealed Shop Drawings with design calculations and assumptions for restrained lengths.
2. Submit joint restraint details.
3. Use joint restraint devices specifically designed for applications described in manufacturer information.

F. Manufacturer Instructions: Submit detailed instructions on installation requirements, including storage and handling procedures.

G. Qualifications Statement:

1. When requested by Owner’s Representative, submit qualifications data for manufacturer, fabricator, and licensed professional.

78.6 CLOSEOUT SUBMITTALS

A. Section 017000 - Execution and Closeout Requirements.

B. Project Record Documents: Record actual locations of joint restraints.

78.7 QUALITY ASSURANCE

A. Perform Work according to AWWA & ASTM standards and Columbia County standards.

78.8 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years' documented experience.

B. Fabricator: Company specializing in fabricating products specified in this Section with minimum three years' documented experience.

78.9 DELIVERY, STORAGE, AND HANDLING

A. Section 016000 - Product Requirements.

B. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.

C. Store materials according to manufacturer instructions.

D. Protection:

1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
2. Provide additional protection according to manufacturer instructions.

78.10 EXISTING CONDITIONS

A. Field Measurements:

1. Verify field measurements prior to fabrication.
2. Indicate field measurements on Shop Drawings.

PART 79 - PRODUCTS

79.1 PERFORMANCE AND DESIGN CRITERIA

A. Provide pressure pipeline with restrained joints at each bend, tee, and change in direction.

79.2 TIED JOINT RESTRAINT SYSTEMS

A. Materials:

1. Furnish materials according to AWWA & ASTM standards.

B. Tie Bolts:

1. Mechanical Joints on 2- and 3-Inch Pipe:

a. Size: 5/8 inch.
b. Comply with ASTM A588/A588M, Grade B.
c. Comply with ASTM A325, Type 3, except increase tensile strength of full body threaded section to 40,000 lb. minimum for 5/8 inch and 60,000 lb. minimum for 3/4 inch by heat-treating (quenching and tempering) to manufacturer's reheat and hardness specifications.

2. Mechanical and Flanged Joints on 4- to 12-Inch Pipe:

    a. Size: 3/4 inch.
    b. Comply with ASTM A588/A588M, Grade B.
    c. Comply with ASTM A325, Type 3, except increase tensile strength of full body threaded section to 40,000 lb. minimum for 5/8 inch and 60,000 lb. minimum for 3/4 inch by heat-treating (quenching and tempering) to manufacturer's reheat and hardness specifications.

C. Tie Nut:

1. Description: Hex nut for each tie bolt and tie rods.
2. Comply with ASTM A563, Grade C3.
3. Finish: zinc plated

D. Tiepin:

1. Bends and Hydrants: 3/4-inch round bar stock.
2. Size and Shape: 6-inch hairpin.
3. Comply with ASME B1.1 and ASTM A588/A588M.
4. Finish: zinc plated.

E. Tie Coupling:

1. Description: Extension of continuous-threaded rods.
2. Provide with center stop to aid installation.
3. Comply with ASTM A588/A588M.
4. Finish: zinc plated.

F. Tie Clamp:

1. Description: Retainer clamp for ductile iron, asbestos-cement, and PVC push-on pipe.
2. Location: In front of bell.
3. Comply with ASTM A36/A36M, ASTM A307, Grade A, and ASTM A563, Grade A.
4. Finish: zinc plated.

G. Tie Rod:

1. Description: Continuous-threaded rod for cutting to desired lengths.
2. Comply with ASTM A588/A588M, Grade B, ASTM A325, Type 3, and ASME B1.1.
3. Finish: zinc plated.

H. Tie Bar:

1. Description: Steel bar used to restrain push-in plugs.
2. Comply with ASTM A36/A36M.
3. Finish: zinc plated

I. Tie Washer:

1. Description: Round flat washers.

2. ASTM A588/A588M, ASTM F436, Type 1.
3. Finish: zinc plated.

79.3 MATERIALS

A. Steel:

1. High-Strength Low-Alloy Steel: Comply with ASTM A588/A588M, heat treated.
2. High-Strength Low-Alloy Steel: Comply with ASTM A588/A588M.
3. Carbon Steel: Comply with ASTM A36/A36M.

79.4 FINISHES

A. Zinc Plating:

1. Factory applied.
2. Comply with ASTM B633.

B. Galvanizing:

1. Factory applied.
2. Comply with ASTM A153/A153M.

PART 80 - EXECUTION

80.1 EXAMINATION

A. Section 017000 - Execution and Closeout Requirements

B. Verify that pipe and fittings are ready to receive Work.

C. Field measure and verify conditions for installation of Work.

80.2 PREPARATION

A. Section 017000 - Execution and Closeout Requirements.

B. Clean surfaces of pipe and fittings that are to receive tied joint restraint systems.

80.3 INSTALLATION

A. Installation Standards: Install Work according to AWWA & ASTM standards and Columbia County standards.

80.4 TOLERANCES

A. Section 014000 - Quality Requirements.

B. Torque 5/8-inch nuts on mating threaded fasteners from 45 to 60 ft.-lbf.

C. Torque 3/4-inch nuts on mating threaded fasteners from 75 to 90 ft.-lbf.

D. Torque 1-inch nuts from 100 to 120 ft.-lbf.

END OF SECTION 330509.33

SECTION 330533 – HIGH DENSITY POLYETHYLENE (HDPE) PIPE, FITTINGS & JOINING

PART 81 - GENERAL

81.1 SUMMARY

A. Section Includes:
1. HDPE pressure pipe and fittings for water and wastewater utility use.
2. Joining methods and installation practices.

B. Related Requirements:
1. Section 312316 - Excavation.
2. Section 312316.13 - Trenching.
3. Section 330505.31 - Hydrostatic Testing.
4. Section 330507.13 - Utility Directional Drilling.
5. Section 330509.33 - Thrust Restraint for Utility Piping.
6. Section 330553 - Identification and Signage for Utilities
7. Section 331419 - Valves and Hydrants for Water Utility Service.

81.2 UNIT PRICE - MEASUREMENT AND PAYMENT

A. Section 012000 - Price and Payment Procedures.

B. Pipe and Fittings:
1. Basis of Measurement: By linear foot.
2. Basis of Payment: Includes pipe and fittings, cutting and joining, joint restraints, excavation, bedding, and backfill.

81.3 REFERENCE STANDARDS

A. American Association of State Highway and Transportation Officials:
1. AASHTO T 180 - Standard Method of Test for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.

B. American National Standards Institute / American Water Works Association:
1. ANSI/AWWA C901 Polyethylene (PE) Pressure Pipe and Tubing, 1/2 In. (13 mm) Through 3 In. (76 mm) for Water Service
2. ANSI/AWWA C906 Polyethylene (PE) Pressure Pipe and Fittings, 4 In. (100 mm) Through 63 In. (1,600 mm), for Water Distribution and Transmission
3. ANSI/AWWA C651 Standard for Disinfecting Water Mains
4. AWWA M55 Manual of Water Supply Practices, PE Pipe—Design and Installation

C. ASTM International:
1. ASTM F 585 Standard Guide for Insertion of Flexible Polyethylene Pipe into Existing Sewers
2. ASTM F 714 Standard Specification for Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter
3. ASTM F 905 Standard Practice for Qualification of Polyethylene Saddle-Fused Joints

4. ASTM F 1055 Standard Specification for Electrofusion Type Polyethylene Fittings for Outside Diameter Controlled Polyethylene and Crosslinked Polyethylene (PEX) Pipe and
5. ASTM F 1290 Standard Practice for Electrofusion Joining Polyolefin Pipe and Fittings
6. ASTM F 1962 Standard Guide for Use of Maxi-Horizontal Directional Drilling for Placement of Polyethylene Pipe or Conduit under Obstacles, Including River Crossings
7. ASTM F 2164 Standard Practice for Field Leak Testing of Polyethylene (PE) Pressure Piping Systems Using Hydrostatic Pressure
8. ASTM F2206 Standard Specification for Fabricated Fittings of Butt-Fused Polyethylene (PE) Plastic Pipe, Fittings, Sheet Stock, Plate Stock, or Block Stock
9. ASTM D 2321 Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications
10. ASTM F 2620 Standard Practice for Heat Fusion Joining of Polyethylene Pipe and Fittings
11. ASTM D 2683 Standard Specification for Socket-Type Polyethylene Fittings for Outside Diameter- Controlled Polyethylene Pipe and Tubing
12. ASTM D 2737 Standard Specification for Polyethylene (PE) Plastic Tubing
13. ASTM D 2774 Standard Practice for Underground Installation of Thermoplastic Pressure Piping
14. ASTM F 2880 Standard Specification for Lap-Joint Type Flange Adapters for Polyethylene Pressure Pipe in Nominal Pipe Sizes V4 in. to 65 in.
15. ASTM F 3124 Standard Practice for Data Recording the Procedure Used to Produce Heat Butt Fusion Joints
16. ASTM D 3261 Standard Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing
17. ASTM D 3035 Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter
18. ASTM D 3350 Standard Specification for Polyethylene Plastics Pipe and Fittings Materials

D. Plastics Pipe Institute
1. PPI Handbook of Polyethylene Pipe — 2009 (2ndEdition)
2. PPI Municipal Advisory Board (MAB) Generic Electrofusion Procedure for Field Joining of 12 Inch and Smaller Polyethylene (PE) Pipe
3. PPI Material Handling Guide for HDPE Pipe and Fittings
4. PPI TR-33 Generic Butt Fusion Joining Procedure for Polyethylene Gas Pipe
5. PPI TR-34 Disinfection of Newly Constructed Polyethylene Water Mains
6. PPI TR-38 Bolt Torque for Polyethylene Flanged Joints
7. PPI TN-42 Recommended Minimum Training Guidelines for PE Pipe Butt Fusion Joining Operators for Municipal and Industrial Projects
8. PPI TR-46 Guidelines for Use of Mini-Horizontal Directional Drilling for Placement of High Density Polyethylene Pipe

81.4 COORDINATION

A. Section 013000 - Administrative Requirements.

B. Coordinate Work of this Section with connection to CR 136 / I 75 Water and Sewer Lines.

81.5 SUBMITTALS

A. Section 013300 - Submittal Procedures.

B. Product Data: Submit manufacturer information indicating pipe material used, pipe fittings, pipe accessories and joint restraint details and materials. Contractor shall also submit the following to Engineer for approval:
1. Certified dimensional as-built drawings/profile of all installed pipe, specials and fittings.
2. Details of fittings and specials such as elbows, tees, outlets, connections, test bulkheads, nozzles or other special items where shown on the Construction Drawings. All connections to jointed gasketed pipe materials, valves or fire hydrants must be restrained and supported independently to withstand the pressure transients, soil settlement, and external loading conditions.
3. The Supplier of the material shall submit, through the Contractor, a Certificate of Compliance that the HDPE pipe and fittings furnished for this project are FM approved materials that meet or exceed the standards set forth in this specification. The Contractor shall submit these certificates to the Engineer prior to installation of the pipe materials.
4. Provide a statement that personnel responsible for fusing the pipe have been trained and qualified.

C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

D. Manufacturer Instructions: Submit special procedures required to install specified products.

E. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.

F. Qualifications Statement:
1. Submit qualifications for manufacturer and installer.

81.6 CLOSEOUT SUBMITTALS

A. Section 017000 - Execution and Closeout Requirements.

B. Project Record Documents: Record invert elevations and actual locations of pipe runs and connections.

C. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

81.7 QUALITY ASSURANCE

A. Perform Work according to AWWA and ASTM standards and Columbia County standards.

B. Maintain one copy of each standard affecting Work of this Section on Site.

81.8 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years' documented experience.

B. Installer: Company specializing in performing Work of this Section with minimum three years' documented experience.

81.9 DELIVERY, HANDLING AND STORAGE

A. Section 016000 - Product Requirements

B. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.

C. Delivery:

1. The manufacturer shall package product in a manner designed to deliver the pipe and fittings to the project neatly, intact and without physical damage. During transportation each pipe shall rest on suitable pads, strips skids, or blocks securely wedged or tied in place.
2. All pipe and fittings shall be subjected to visual inspection at time of delivery and before they are lowered into the trench to be laid. Defective, damaged, or unsound pipe will be rejected. Cuts, punctures, or gouges that penetrate or reduce the wall thickness by 10% or more are not acceptable and must be removed and discarded.

D. Handling:

1. During loading, transportation, and unloading, every precaution should be taken to prevent damage to the pipe. The handling of the pipeline shall be in such a manner that the pipe is not damaged by dragging it over sharp and cutting objects. Cuts or gouges that reduce the wall thickness by more than 10% are not acceptable and must be cut out and discarded.
2. Handle the pipe in accordance with the PPI Handbook of Polyethylene Pipe (2nd Edition), Chapter 2. All pipe and accessories shall be loaded and unloaded by lifting with hoists or by skidding in order to avoid shock or damage. Under no circumstances shall materials be dropped. Pipe handled on skidways shall not be rolled or skidded against pipe on the ground. Slings, hooks or pipe tongs shall be padded and used in such a manner as to prevent damage to the exterior surface or interior of the pipe.
3. Do not place materials on private property or in areas obstructing pedestrian or vehicle traffic.

E. Storage:

1. Materials, if stored, shall be kept safe from damage and shall not be stacked higher than the limits recommended by the manufacturer. The bottom tiers shall be kept off the ground on timbers, rails, or concrete. Block individual and stockpiled pipe lengths to prevent moving. Store PE and PVC materials out of sunlight and away from heat sources.
2. Store materials according to manufacturer instructions. The contractor shall be responsible for all security, damage and loss of pipe, excluding Acts of God.
3. The interior of the pipe as well as all sealing surfaces of mating components (i.e. flange faces) shall be kept free from dirt or foreign matter at all times. The open ends of all sections of joined and/or installed pipe (not in service) shall be plugged to prevent insects, animals, or foreign material from entering the pipeline or pipe section. The practice of stuffing cloth or paper in the open ends of the pipe will not be permitted. Use waterproof nightcaps to prevent the entrance of any type of natural precipitation into the carrier or containment pipe and will be secured to the pipe in such a manner that the wind cannot blow them loose. Where possible, the pipe shall be raised and supported at a suitable distance from the open end such that the open end will be below the level of the pipe at the point of support.
4. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas. Provide additional protection according to manufacturer instructions.
5. Store gaskets for mechanical and push-on joints in cool and dry location, out of direct sunlight, and not in contact with petroleum products.

81.10 EXISTING CONDITIONS

A. Field Measurements:
1. Verify field measurements prior to fabrication.
2. Indicate field measurements on Shop Drawings.

81.11 WARRANTY

A. Section 017000 - Execution and Closeout Requirements.

B. Provide extended warranty for workmanship and integrity of fusion joints.

PART 82 - PRODUCTS

82.1 HIGH DENSITY POLYETHYLENE MATERIALS

A. Resin and Material Requirements:
1. All material shall be manufactured from a PE 4710 resin listed with the Plastic Pipe Institute (PPI) as TR-4. The resin material shall meet the specifications of ASTM D 3350 with a minimum cell classification of 445474C. HDPE pipe and fittings shall contain no recycled compounds except that generated in the manufacturer's own plant from resin of the same specification from the same raw material. HDPE products shall be homogeneous throughout and free of visible cracks, holes, foreign inclusions, voids or other injurious defects.

B. HDPE Pipe
1. Pipe shall be made of HDPE material with a minimum material designation code of PE4710 and with a minimum Cell Classification as noted in 2.01.A. The polyethylene compound shall be suitably protected against degradation by ultraviolet light by means of carbon black of not less than 2 percent. The manufacture of the HDPE resin shall certify the cell classification indicated.
2. Pipe sizes 3” and larger shall have a manufacturing standard of ASTM F 714, while pipe smaller than 3” shall be manufactured to the dimensional requirements of ASTM D 3035. Dimension Ratio (DR) and Outside Diameter (IPS/DIPS) shall be as specified on plans.
3. Pipe shall meet AWWA C901 (1/2” to 3”) or AWWA C906 (4” to 63”) and shall be listed as meeting NSF-61.
4. When required by the owner, pipe shall be color coded for the intended service. The color coding shall be permanently co-extruded stripes on the pipe outside surface as part of the pipe’s manufacturing process. Color coding shall be as follows:
    a. Sewer — green.
    b. Water — blue.
    c. Reclaim — purple.

C. HDPE Fittings
1. Butt Fusion Fittings
    a. Fittings shall be made of HDPE material with a minimum material designation code of PE4710 and with a minimum Cell Classification as noted in 2.01.A. Fittings shall have a minimum pressure rating equal to or greater than the pipe to which they are joined unless otherwise specified on the plans or accepted by owner/engineer. All fittings shall meet the requirements of AWWA C901 or C906.

b. Molded fittings shall comply with the requirements of ASTM D 326l.
c. All fabricated elbows, tees, reducing tees and end caps shall be produced and meet the requirements of ASTM F 2206 by an approved ISO 9001 certified manufacturer. Each fitting will be marked per ASTM F2206 Section 10 including the nominal size and fitting EDR, which will meet or exceed the pipe DR identified for the project. Fabricated fittings shall be manufactured using a data logger to record fusion pressure and temperature and shall be stamped with unique joint number that corresponds to the joint report. A graphic representation of the temperature and pressure data for all fusion joints made producing fittings shall be maintained for a minimum of 5 years as part of the quality control and will be available upon request of owner. Test results to validate ASTM F2206 Sections 7.3 and 9 shall be provided to owner or owner's representative upon request.
d. Socket fittings shall meet ASTM D 2683.

2. Electrofusion Fittings - Fittings shall be made of HDPE material with a minimum material designation code of PE 4710 and with a minimum Cell Classification as noted in 2.01.A. Electrofusion Fittings shall have a manufacturing standard of ASTM F1055. Fittings shall have a minimum pressure rating equal to or greater than the pipe to which they are joined unless otherwise specified on the plans. For potable water systems, all electrofusion fittings shall have AWWA approval.
3. Bolted Connections - Flanges and MJ Adapters shall be fused onto the pipe and shall have a minimum pressure rating equal to or greater than the pipe unless otherwise specified on the drawings.
   a. Metallic back-up rings (Van-Stone style lap joint flanges), shall have a radius on the inside diameter of the bore so as to be compatible with HDPE Flanges. Back up rings shall have bolt pattern that will mate with AWWA C207 Class D (generically known as 150-pound patterns).
   b. Flange assemblies shall be assembled and torqued according to PPI TN-38, "Bolt Torque for Polyethylene Flanged Joints."
   c. Four-inch and larger transitions to mechanical joint fittings and valves shall be accomplished using an MJ Adapter with kit. The D.I./HDPE mechanical joint adaptor shall consist of a fused HDPE mechanical joint transition fitting, rubber gasket, a mechanical joint backup drive ring, and Corten mechanical joint tee bolts. The kit shall also include stainless steel stiffener inserts for all mechanical joint transition fittings.

D. Mechanical Fittings: The use of mechanical coupling and saddles shall be approved by the owner or engineer prior to installation. Mechanical Fittings shall be designed for use and compatible with HDPE pipe, including SS stiffeners when specified herein or when required by manufacturer. Mechanical fittings shall have a pressure rating equal to or greater than the pipe.

E. Fusion Equipment Requirements
1. Butt fusion equipment must be in satisfactory working order and the hydraulic system must be leak free. Heater plates shall be free from scrapes, gouges, and have a consistent clean coated surface. The pressure gage and thermometer should be checked for accuracy. When requested by the owner, records showing a maintenance service/inspection within 3 months prior to use for this project shall be provided.
2. Rental Butt Fusion Equipment must be maintained by a manufacturer-authorized service and repair center with at least one certified Master Mechanic on staff and must have been inspected within 3 months prior to arrival at jobsite.
3. Electrofusion Processors shall be maintained and calibrated per manufacturer's requirements and recommendations.

F. Approved Suppliers
1. All pipe, fittings and fusion equipment shall be provided by one supplier.

82.2 ACCESSORIES

A. Pipe Markers: As specified in Section 330553 - Identification for Utilities Piping.

82.3 MATERIALS

A. Bedding and Cover:
1. Bedding: Fill Type A1 or A3, as specified in the construction plans.
2. Cover: Fill Type A1 or A3, as specified in the construction plans.
3. Soil Backfill from above Pipe to Finish Grade:
    a. Soil Type A-3, as specified in the construction plans.
    b. Subsoil: No rocks more than 3/4 inches in diameter, frozen earth, or foreign matter.

82.4 MIXES

A. Concrete: As specified in the construction plans.

PART 83 - EXECUTION

83.1 EXAMINATION

A. Section 017000 - Execution and Closeout Requirements.

B. Verify that trench cut is ready to receive Work.

C. Verify that excavations, dimensions, elevations and inverts are as indicated on Drawings.

83.2 PREPARATION

A. Section 017000 - Execution and Closeout Requirements.

B. Preconstruction Site Photos:
1. As specified in Section 017000 - Execution and Closeout Requirements.
2. Take photographs along centerline of proposed pipe trench; minimum one photograph for each 50 feet of pipe trench.
3. Show mailboxes, curbing, lawns, driveways, signs, culverts, and other existing Site features.
4. Include Project description, date taken, and sequential number on back of each photograph.

C. Correct over-excavation with fine aggregate.

D. Remove large stones or other hard matter capable of damaging pipe or of impeding consistent backfilling or compaction.

83.3 FUSION AND JOINING

A. Fusion Joining Requirements:

1. All HDPE pipe shall be joined to itself by the heat fusion process which produces homogeneous, seal, water-tight joints. Tie-ins between sections of HDPE pipe shall be made by butt fusion whenever possible.
2. Butt Fusion: The pipe shall be joined by the butt fusion procedure outlined in ASTM F 2620 or PPI TR-33. A record or certificate of training for the fusion operator must be provided to document training in accordance with the fundamentals of ASTM F 2620. Considerations should be given to and provisions made for adverse weather conditions, such as temperatures below freezing, precipitation, or wind, which is accepted by the owner/engineer.
3. Electrofusion: Electrofusion joining shall be done in accordance with the manufacturer's recommended procedure. Other sources of electrofusion joining information are ASTM F 1290, PPI TN 34, and PPI Municipal Advisory Board (MAB) Generic Electrofusion Procedure for Field Joining of 12 Inch and Smaller Polyethylene (PE) Pipe. The electrofusion processor must be capable of reading and storing the input parameters and the fusion results for later download to a record file. Qualification of the fusion technician shall be demonstrated by evidence electrofusion training within the past year on the equipment to be utilized for this project.

B. Fusion Operators

1. The employer of the fusion machine operator is responsible for the fusion joint quality of the fusion weld made by that individual. The employer is responsible for documenting all training and qualification records for that individual, including compliance to any code requirements for fusion/bonder operators.
2. All HDPE fusion equipment operators shall be qualified to the procedure used to perform pipe joining. Fusion equipment operators shall have current, formal training on all fusion equipment employed on the project. Training received more than two years prior to operation with no evidence of activity within the past 6 months shall not be considered current.
3. For Projects with at least 5,000 feet or with pipe larger than 24 inches, operators or their supervisor must have a current manufacturer-approved fusion training certificate for the equipment to be used on the project.

C. Butt Fusion Equipment

1. For 6" and larger pipe sizes, the pipe butt fusion machine shall be a hydraulic fusion machine capable of butt fusing HDPE pipe. The carriage must be removable from the chassis for in-ditch use. The machine must be compatible with an electronic data recording device. Accessories will include all butt fusion inserts for the specified range of pipe sizes, a pyrometer kit for checking the surface temperature of the heater, extension cord of appropriate gauge (25' minimum), and hydraulic extension hoses (minimum of four).

83.4 INSTALLATION

A. Direct Burial

1. Buried HDPE pipe and fittings shall be installed in accordance with ASTM D 2321 or ASTM D 2774 for pressure systems and AWWA Manual of Water Supply Practices M55 Chapter 8. The Design Window identified in AWWA M55 Chapter 5 (page 65 of 2006 version) shall be considered acceptable design and installation conditions.
2. Unless required by the owner's engineer, no thrust blocks shall be placed in the HDPE pipe system since the fused system is fully restrained.

B. Trenchless or Pull-in Installation Methods
1. For Horizontal Directional Drilling (HDD), refer to ASTM F1962, PPI TR-46, PPI PE Handbook (Chapter 12) and www.PP1BoreAid.com. See Section 330507.13 of this Specification.
2. For sliplining, refer to ASTM F585, PPI PE Handbook (Chapter 11) and www.HDPEapp.com.
3. For pipe bursting, refer to PPI PE Handbook (Chapter 16)

C. Appurtenances
1. All appurtenances (tees, elbows, services, valves, air relief valves, fire hydrants, etc.), must be independently supported and shall not rely on the pipeline and its connections for this support. Excessive stresses may be encountered when appurtenances are inadequately supported.
2. Hydrant Assemblies shall be installed and field tested according to the requirements of AWWA M17.
3. Installation of Tracer Wire. The Contractor shall install pipe locating tracer wire along the entire section of pipeline per local and manufacturer's requirements. The tracer wire shall be installed simultaneously with the polyethylene piping system. Tracer wire shall be installed by the Contractor once backfill has been placed and compacted to at least 12 inches above the top of the pipe and not more than 18 inches above the top of the pipe. Tracer wire shall be properly spliced at each end connection and each service connection. Care should be taken to adequately wrap and protect wire at all splice locations. No bare tracer wire shall be accepted. Provide magnesium alloy anode for cathodic protection that conforms to the requirements of ASTM B843

D. Bedding:
1. Excavation:
    a. As specified in Section 312316 – Excavation
    b. As specified in Section 312316.13 – Trenching.
    c. Excavate pipe trench as specified in Drawings.
2. Dewater excavations to maintain dry conditions and to preserve final grades at bottom of excavation.
3. Place bedding material at trench bottom and maintain optimum moisture content of bedding material to attain required compaction density.

E. Piping:
1. Installation Standards: Install Work according to AWWA M55 Manual and applicable ASTM and AASHTO T180 standards.
2. Maintain 10 feet of horizontal separation between water main and sewer piping according to FDEP requirements.
3. Install pipe with no high points. If unforeseen field conditions arise that necessitate high points, coordinate with Engineer to provide an air release valve assembly.
4. Maintain uniform bearing along entire length of pipe.
5. Allow for expansion and contraction without stressing pipe or joints.
6. Close pipe openings with watertight plugs during Work stoppages.
7. Install pipe markers as specified in Section 330553 - Identification for Utilities Piping.

F. Backfilling:
1. Backfill around sides and to top of pipe with level fill in a continuous lift not exceeding 6 inches of compacted depth , tamp in place, and compact to 95 percent of maximum density.
2. Place and compact material immediately adjacent to pipes to avoid damage to pipe and prevent pipe misalignment.
3. Maintain optimum moisture content of bedding material to attain required compaction density.

G. Thrust Restraints:

1. Provide pressure pipeline with restrained joints at pumps, bends, tees, and changes in direction. Refer to the requirement for fused MJ Adapters specified herein.

83.5 FLUSHING, CLEANING, AND DISINFECTING

A. All mains shall be cleaned and flushed to remove all dirt, sand, debris and foreign matter.

B. Disinfection:

1. Cleaning and disinfecting of potable water systems shall be in accordance with AWWA C651 and AWWA MSS Chapter 9, and PPI Handbook of Polyethylene Pipe Chapter 2 (2"d Edition). The disinfection chemicals should be limited to less than 12% active chlorine. The duration of the disinfection should not exceed 24 hours. Chlorine tablets and powders are not permitted. Upon completion, the system should be thoroughly flushed with fresh water, and sampled to verify the disinfectant chlorine level has been reduced to potable drinking water concentrations in all service water tubing and branch lateral pipes.

83.6 TESTING AND LEAKAGE

A. The contractor shall ensure testing can be accomplished in a safe manner, including protection of personnel, equipment, and public in the event of a failure during testing. The contractor shall restrain pipe, components, and test equipment as required. All pumps, valves, temporary connections, meters, gauges and other measuring devices shall be furnished, installed and operated by the Contractor and all such equipment and devices and their installation shall be approved by the Owner's Engineer.

B. The test pressure shall be 1.5 times the operating pressure, based on the lowest point in elevation in the test section.

C. Test pressures require consideration of thermal conditions. Polyethylene piping materials are typically pressure rated at 73°F (23°C) and PE piping at temperatures greater than 80°F (26°C) require reduced test pressures. (Note that higher pipe temperatures should consider both ambient temperatures and radiant solar heating of exposed black HDPE pipe) Guidance for elevated temperatures can be found in the appendix of Chapter 3 (Material Properties) of the PPI Handbook of PE Pipe.

D. Pressure Pipelines-Pressure testing shall be conducted in accordance with requirements and recommendations of ASTM F 2164 (Field Leak Testing of Polyethylene Pressure Piping Systems Using Hydrostatic Pressure), AWWA M55 Chapter 9, and PPI Handbook of Polyethylene Pipe Chapter 2 (2"d Edition). Pneumatic (compressed air) leakage testing of HDPE pressure piping is prohibited for safety reasons.

1. The section of pipe to be tested shall be filled with potable or generally clean water (uncontaminated river/lake water) approved by the Owner/Engineer. While the system is being filled with water, air shall be carefully and completely exhausted.
2. If the Contractor elects to perform hydrostatic testing against valves in an existing distribution system, it does so at his own risk and will bear the cost of any damages to the existing valve, piping system, private or public property, or the new pipeline under test.
3. The test procedure for HDPE pipe consists of two steps: 1) the initial phase or expansion phase and 2) the test phase. During the initial/expansion phase, sufficient make-up water shall be added

hourly for 3 hours to return to the test pressure. During the test phase, the expansion phase pressure is reduced by 10 psi to test phase pressure and monitored for at least one hour (3 hours maximum).

4. Under no circumstances shall the total time under testing exceed eight (8) hours. If the test is not completed due to leakage, equipment failure or any other reason, depressurize the test section and permit the system to "relax" for eight (8) hours prior to the next testing sequence.
5. In accordance with section 9.8 of ASTM F 2164, the pipe shall pass if the final pressure is within 5% of the test phase pressure for the testing period (3 hours maximum). If the test section fails this test, the Contractor shall repair or replace all defective materials and/or workmanship at no additional cost to the Owner.

83.7 FIELD QUALITY CONTROL

A. Section 014000 - Quality Requirements

B. Section 017000 - Execution and Closeout Requirements.

C. Inspections: Request inspection by Engineer prior to placing bedding.

D. Pressure Testing: As specified in Section 330505.31 - Hydrostatic Testing, and as specified above in this section.

E. Perform pressure test on piping according to ASTM and AWWA standards.

F. Compaction Testing:
1. Comply with AASHTO T 180.
2. Testing Frequency: every 500 feet or as dictated by field conditions.

83.8 PROTECTION

A. Section 017000 - Execution and Closeout Requirements.

B. Protect pipe and aggregate cover from damage or displacement until backfilling operation is in progress.

END OF SECTION 330533

SECTION 330597 - IDENTIFICATION FOR UTILITIES PIPING

PART 84 - GENERAL

84.1 SUMMARY

A. Section Includes:

1. Pipe Warning Tape
2. Tracing Wire

B. Related Requirements:

1. Section 331413 - Public Water Utility Distribution Piping.

84.2 REFERENCE STANDARDS

A. American Society of Mechanical Engineers:

1. ASME A13.1 - Scheme for the Identification of Piping Systems.

84.3 SUBMITTALS

A. Section 013300 - Submittal Procedures.

B. Product Data: Submit manufacturer's catalog literature for each product required.

84.4 QUALITY ASSURANCE

A. Perform Work according to AWWA and ASTM standards and Columbia County standards.

PART 85 - PRODUCTS

2.1 Buried Warning and Identification Tape: Polyethylene plastic and metallic core or metallic-faced, acid and alkali-resistant, polyethylene plastic warning tape manufactured specifically for warning and identification of buried utility lines. Provide tape on rolls, 3-inch minimum width, color coded as specified below for the intended utility with warning and identification imprinted in bold black letters continuously over the entire tape length. Warning and identification to read, “CAUTION, BURIED [*INTENDED*

SERVICE] LINE BELOW" or similar working. Color and printing shall be permanent, unaffected by moisture or soil.

2.2 Warning Tape Color Codes: Blue (Water Systems), Green (Sanitary Force Mains)

2.3 Locate wiring shall be 10-gauge, single strand, UF-rated (direct burial), copper wire. Plastic ties for connecting to water and sewer mains shall be plastic, zipper type ties. Ground clamps shall be bronze serrated head with brass-bronze screws. Locate wiring must have the ability to conduct an electrical current; therefore, the wiring must be continuous with any breaks in the line spliced. Locate wire shall be spliced with Engineer approved wire connectors. Wire connectors shall be PinPoint wire connectors by Duraline or approved equal.

2.4 Locate wiring shall include 45-mil (minimum) insulation rated to 600 volts. Insulation shall be HDPE or PVC material; THHN is not acceptable.

PART 86 - EXECUTION

86.1 INSTALLATION

A. Install underground plastic pipe markers 6 to 8 inches below finished grade, directly above buried pipe.

END OF SECTION 330597

SECTION 331413 - PUBLIC WATER UTILITY DISTRIBUTION PIPING

PART 87 - GENERAL

87.1 SUMMARY

A. Section Includes:

1. Pipe and fittings for public utilities, including potable water mains.
2. Tapping sleeves and valves.
3. Bedding and cover materials.

B. Related Requirements:

1. Section 310513 - Soils for Earthwork.
2. Section 312316 - Excavation.
3. Section 312316.13 - Trenching.
4. Section 330507.13 - Utility Directional Drilling.
5. Section 330509.33 - Thrust Restraint for Utility Piping.
6. Section 330533 - High Density Polyethylene (HDPE) Pipe, Fittings & Joining
7. Section 331419 - Valves and Hydrants for Water Utility Service.

87.2 UNIT PRICE - MEASUREMENT AND PAYMENT

A. Section 012000 - Price and Payment Procedures.

B. Pipe and Fittings:

1. Basis of Measurement: By linear foot.
2. Basis of Payment: Includes excavation and backfill; pipe, fittings, and appurtenances; bedding; joint restraint connection and tap to Site service piping.

C. Valves:

1. Basis of Measurement: By each.
2. Basis of Payment: Includes excavation, bedding, backfill, valve, fittings, and accessories.

D. Fire Hydrants:

1. Basis of Measurement: By each.
2. Basis of Payment: Includes excavation , gravel sump, bedding, backfill, hydrant, valve, connection, and accessories.

E. Taps:

1. Basis of Measurement: By each.
2. Basis of Payment: Includes tapping sleeve, tapping valves, and accessories.

87.3 REFERENCE STANDARDS

A. American Association of State Highway and Transportation Officials:

1. AASHTO T 180 - Standard Method of Test for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.

B. American Society of Mechanical Engineers:

1. ASME B16.1 - Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250.

C. ASTM International:

1. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.
2. ASTM A123 (/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products).
3. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength.
4. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12 400 ft-lbf/ft3 (600 kN-m/m3).
5. ASTM D1785 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
6. ASTM D3035 - Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter.
7. ASTM D3139 - Standard Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals.
8. ASTM D6938 - Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).
9. ASTM F477 - Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.

D. American Water Works Association:

1. AWWA C104 - Cement-Mortar Lining for Ductile-Iron Pipe and Fittings.
2. AWWA C105 - Polyethylene Encasement for Ductile-Iron Pipe Systems.
3. AWWA C110 - Ductile-Iron and Gray-Iron Fittings.
4. AWWA C111 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
5. AWWA C115 - Flanged Ductile-Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges.
6. AWWA C151 - Ductile-Iron Pipe, Centrifugally Cast.
7. AWWA C153 - Ductile-Iron Compact Fittings.
8. AWWA C500 - Metal-Seated Gate Valves for Water Supply Service.
9. AWWA C600 - Installation of Ductile-Iron Mains and Their Appurtenances.
10. AWWA C605 - Underground Installation of Polyvinyl Chloride (PVC) and Molecularly Oriented Polyvinyl Chloride (PVCO) Pressure Pipe and Fittings.
11. AWWA C606 - Grooved and Shouldered Joints.
12. AWWA C700 - Cold-Water Meters - Displacement Type, Metal Alloy Main Case.
13. AWWA C900 - Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 In. Through 12 In. for Water Transmission and Distribution.
14. AWWA C901 - Polyethylene (PE) Pressure Pipe and Tubing, 1/2 In. Through 3 In. , for Water Service.

E. Manufacturers Standardization Society of the Valve and Fittings Industry:

1. MSS SP-60 - Connecting Flange Joints between Tapping Sleeves and Tapping Valves.

F. National Fire Protection Association:

1. NFPA 24 - Standard for the Installation of Private Fire Service Mains and Their Appurtenances.

G. NSF International:

1. NSF 61 - Drinking Water System Components - Health Effects.
2. NSF 372 - Drinking Water System Components - Lead Content.

87.4 COORDINATION

A. Section 013000 - Administrative Requirements.

87.5 SUBMITTALS

A. Section 013300 - Submittal Procedures.

B. Product Data: Submit manufacturer information regarding pipe materials, pipe fittings, valves, hydrants and meters.

C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

D. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.

E. Preconstruction Photographs: Submit digital files of color photographs of Work areas and material storage areas, as specified in Section 017000 - Execution and Closeout Requirements.

F. Qualifications Statements:

1. When requested by Engineer, submit qualifications data for manufacturer and installer.

87.6 CLOSEOUT SUBMITTALS

A. Section 017000 - Execution and Closeout Requirements.

B. Project Record Documents: Record actual locations of piping mains, valves, connections, and centerline elevations.

C. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

87.7 QUALITY ASSURANCE

A. Valves: Mark valve body with manufacturer's name and pressure rating.

B. Materials in Contact with Potable Water: Certified according to NSF 61 and NSF 372.

C. Perform Work according to AWWA and ASTM standards and Columbia County standards.

87.8 DELIVERY, STORAGE, AND HANDLING

A. Section 016000 - Product Requirements.

B. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.

C. Storage:

1. Store materials according to manufacturer instructions.
2. Block individual and stockpiled pipe lengths to prevent moving.
3. Do not place pipe or pipe materials on private property or in areas obstructing pedestrian or vehicle traffic.
4. Store PE and PVC materials out of sunlight.

D. Protection:

1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
2. Provide additional protection according to manufacturer instructions.

87.9 EXISTING CONDITIONS

A. Field Measurements:

1. Verify field measurements prior to fabrication.
2. Indicate field measurements on Shop Drawings.

87.10 WARRANTY

A. Section 017000 - Execution and Closeout Requirements.

PART 88 - PRODUCTS

88.1 WATER PIPING

A. Ductile-Iron Pipe:

1. Comply with AWWA C151.
2. Bituminous Outside Coating: Comply with AWWA C151.
3. Pipe Mortar Lining:

    a. Comply with AWWA C104.
    b. Thickness: Double.

4. PE Encasement: Comply with AWWA C105.

5. Pipe Class:

    a. Comply with AWWA C151.

6. Fittings:

    a. Material: Ductile iron; comply with AWWA C110.
    b. Compact Fittings: Comply with AWWA C153.
    c. Coating and Lining:

        1) Bituminous Coating: Comply with AWWA C151.
        2) Cement-Mortar Lining: Comply with AWWA C104; double thickness.

7. Joints:

    a. Mechanical and Push-on Joints: Comply with AWWA C111.
    b. Flanged Joints: Comply with AWWA C115
    c. Restrained Joints: joint restraint independent of joint seal.

B. PVC:

1. Comply with AWWA C900 and C905, DR 18.
2. Fittings: Comply with AWWA C900, C905 and C111.
3. Joints:

    a. Comply with ASTM D3139 and F477.
    b. Seals: PVC flexible elastomeric.
    c. Solvent-cement couplings are not permitted.

C. PE Tubing:

1. Comply with AWWA C901 and ASTM D1248, SDR 9
2. Fittings:

    a. Comply with AWWA C901.
    b. Type: Molded.

3. Joints: Compression.

88.2 TAPPING SLEEVES AND VALVES

A. Tapping Sleeves:

1. Description:

    a. Material: Type 304 SS (reduced size steel sleeves).
    b. Material: Ductile iron (“size-on-size” mechanical joint sleeves).
    c. Type: Dual compression.
    d. Outlet Flange Dimensions and Drilling: Comply with ASME B16.1, Class 125 and MSS SP-60.

B. Tapping Valves:

1. Description:

a. Comply with AWWA C509.
b. Type: Resilient wedge with non-rising stem.
c. Inlet Flanges: Comply with ASME B16.1, Class 125 and MSS SP-60.
d. Mechanical Joint Outlets: Comply with AWWA C111.

88.3 VALVES AND FIRE HYDRANTS

A. As specified in Section 331419 - Valves and Hydrants for Water Utility Service.

88.4 CONCRETE ENCASEMENT AND CRADLES

A. Concrete:

1. As specified in Section 033000 - Cast-in-Place Concrete.
2. Type: Reinforced, air entrained.
3. Compressive Strength: 4,000 psi at 28 days.
4. Finish: Rough troweled.

B. Concrete Reinforcement: As specified in Section 032000 - Concrete Reinforcing.

88.5 FINISHES

A. Steel: Hot-dip galvanized after fabrication, according to ASTM A123/A123M.

B. Protective Coating: Bituminous paint.

88.6 ACCESSORIES

A. Thrust Restraints: As specified in Section 330509.33 - Thrust Restraint for Utility Piping.

B. Pipe Markers: As specified in Section 330597 - Identification and Signage for Utilities.

C. Steel Rods, Bolt, Lugs, and Brackets:

1. Comply with ASTM A36/A36M.
2. Grade A carbon steel.

PART 89 - EXECUTION

89.1 EXAMINATION

A. Section 017000 - Execution and Closeout Requirements

B. Verify that existing utility water main size, location, and invert are as indicated on Drawings.

89.2 PREPARATION

A. Section 017000 - Execution and Closeout Requirements

B. Preconstruction Site Photos:

1. As specified in Section 017000 - Execution and Closeout Requirements.
2. Take photographs along centerline of proposed pipe trench; minimum one photograph for each 50 feet of pipe trench.
3. Show mailboxes, curbing, lawns, driveways, signs, culverts, and other existing Site features.
4. Include Project description, date taken, and sequential number on back of each photograph.

C. Pipe Cutting:

1. Cut pipe ends square, ream pipe and tube ends to full pipe diameter, and remove burrs.
2. Use only equipment specifically designed for pipe cutting; use of chisels or hand saws is not permitted.
3. Grind edges smooth with beveled end for push-on connections.

D. Remove scale and dirt on inside and outside before assembly.

E. Prepare pipe connections to equipment with flanges or unions.

89.3 INSTALLATION

A. Bedding:

1. Excavation:

    a. As specified in Section 312316 – Excavation and Section 312316.13 - Trenching
    b. Hand trim for accurate placement of pipe to elevations as indicated on Drawings.

2. Dewater excavations to maintain dry conditions and to preserve final grades at bottom of excavation.
3. Place bedding material at trench bottom, level fill materials in one continuous layer not exceeding 6 inches of compacted depth, and compact to 95 percent of maximum density.

B. Piping:

1. Comply with AWWA C600.
2. Handle and assemble pipe according to manufacturer instructions and as indicated on Drawings.
3. Steel Rods, Bolts, Lugs, and Brackets: Coat buried steel before backfilling.
4. Maintain 10 feet of horizontal separation between water main and sewer piping according to FDEP requirements.
5. Ductile-Iron Piping and Fittings: Comply with AWWA C600.
6. Flanged Joints: Do not use in underground installations except within structures.
7. Route pipe in straight line and re-lay pipe that is out of alignment or grade.
8. High Points:

a. Install pipe with no high points.
b. If field conditions necessitate high points, install air-release valves as indicated on Drawings and per Columbia County standards.

9. Bearing:

a. Maintain bearing along entire length of pipe.
b. Excavate bell holes to permit proper joint installation.
c. Do not lay pipe in wet or frozen trench.

10. Prevent foreign material from entering pipe during placement.
11. Allow for expansion and contraction without stressing pipe or joints.
12. Close pipe openings with watertight plugs during Work stoppages.
13. Install access fittings to permit disinfection of water system.
14. Cover:

a. Establish elevations of buried piping with not less than 2.5 feet of cover.
b. Measure depth of cover from final surface grade to top of pipe barrel.

15. Pipe Markers: As specified in Section 330597 - Identification and Signage for Utilities.

C. Valves and Hydrants: As specified in Section 331419 - Valves and Hydrants for Water Utility Service.

D. Tapping Sleeves and Valves: As indicated on Shop Drawings and according to manufacturer instructions.

E. PE Encasement:

1. Encase piping in PE as indicated on Drawings to prevent contact with surrounding backfill material.
2. Comply with AWWA C105.
3. Terminate encasement 3 to 6 inches above ground where pipe is exposed.

F. Thrust Restraints: As specified in Section 330509.33 - Thrust Restraint for Utility Piping.

G. Backfilling:

1. Backfill around sides and to top of pipe with cover fill in minimum lifts of 6 inches , tamp in place, and compact to 95 percent of maximum density.
2. Place and compact material immediately adjacent to pipes to avoid damage to pipe and prevent pipe misalignment.
3. Maintain optimum moisture content of bedding material to attain required compaction density.

H. Disinfection of Potable Water Piping Systems: As specified in Section 330110.58 - Disinfection of Water Utility Piping Systems.

89.4 TOLERANCES

A. Section 014000 - Quality Requirements.

B. Install pipe to indicated elevation within tolerance of 5/8 inch .

89.5 FIELD QUALITY CONTROL

A. Section 014000 - Quality Requirements.

B. Testing:

1. Pressure test piping system according to AWWA C600 and following:

    a. Test Pressure: Not less than 200 psig or 50 psi in excess of maximum static pressure, whichever is greater.
    b. Conduct hydrostatic test for a minimum of two hours.
    c. Slowly fill section to be tested with water; expel air from piping at high points.
    d. Install corporation cocks at high points.
    e. Close air vents and corporation cocks after air is expelled.
    f. Raise pressure to specified test pressure.
    g. Observe joints, fittings, and valves under test.
    h. Remove and renew cracked pipes, joints, fittings, and valves showing visible leakage, and retest.
    i. Correct visible deficiencies and continue testing at same test pressure for additional two hours to determine leakage rate.
    j. Maintain pressure within plus or minus 5 psi of test pressure.
    k. Leakage is defined as quantity of water supplied to piping necessary to maintain test pressure during period of test.
    l. Compute maximum allowable leakage using following formula:

        1) L = SD x sqrt(P)/C
        2) L = testing allowance, gph
        3) S = length of pipe tested, feet
        4) D = nominal diameter of pipe, inches
        5) P = average test pressure during hydrostatic test, psig
        6) C = 148,000

    m. If pipe under test contains sections of various diameters, calculate allowable leakage from sum of computed leakage for each size.
    n. Leakage:

        1) If test of pipe indicates leakage greater than allowed, locate source of leakage, make corrections, and retest until leakage is within allowable limits.
        2) Correct visible leaks regardless of quantity of leakage.

SECTION 331416 - SITE WATER UTILITY DISTRIBUTION PIPING

PART 90 - GENERAL

90.1 SUMMARY

A. Section Includes:

1. Pipe and fittings for Site water piping, including domestic water piping, fire water piping, and appurtenances.

    a. Tapping sleeves and valves.
    b. Valves and boxes.
    c. Fire hydrants and yard hydrants.
    d. Reduced-pressure backflow preventers.
    e. Pipe support systems.
    f. Bedding and cover materials.

B. Related Requirements:

1. Section 330509.33 - Thrust Restraint for Utility Piping.
2. Section 312316 - Excavation
3. Section 312316.13 - Trenching.
4. Section 330597 - Identification for Utilities Piping and Equipment.
5. Section 331419 - Valves and Hydrants for Water Utility Service
6. Section 331900 - Water Utility Metering Equipment

90.2 UNIT PRICE - MEASUREMENT AND PAYMENT

A. Section 012000 - Price and Payment Procedures.

B. Piping:

1. Basis of Measurement: By linear foot.
2. Basis of Payment: Includes hand-trimming excavation, pipe and fittings, bedding, backfilling, concrete thrust restraints, supports, connection and tap to building service piping, and connection and tap to municipal utility water source.

C. Valves:

1. Basis of Measurement: By each.
2. Basis of Payment: Includes valve, fittings, and accessories.

D. Fire Hydrants:

1. Basis of Measurement: By each.
2. Basis of Payment: Includes excavation, hand trimming, gravel sump, hydrant, valve, valve box, backfilling, connection, and accessories.

E. Yard Hydrants:

1. Basis of Measurement: By each.
2. Basis of Payment: Includes excavation, hand trimming, gravel sump, hydrant, valve, valve box, backfilling, connection, and accessories.

F. Meters:

1. Basis of Measurement: By each.
2. Basis of Payment: Includes meter, fittings, meter box, and accessories.

G. Backflow Preventers:

1. Basis of Measurement: By each.
2. Basis of Payment: Includes backflow preventer, fittings, and accessories.

H. Taps:

1. Basis of Measurement: By each.
2. Basis of Payment: Includes tapping sleeve, tapping valves, and accessories.

90.3 REFERENCE STANDARDS

A. American Association of State Highway and Transportation Officials:

1. AASHTO T 180 - Standard Method of Test for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.

B. American Society of Mechanical Engineers:

1. ASME B16.1 - Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250.
2. ASME B16.18 - Cast Copper Alloy Solder-Joint Pressure Fittings.
3. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings.

C. American Society of Sanitary Engineering:

1. ASSE 1012 - Performance Requirements for Backflow Preventers with an Intermediate Atmospheric Vent.
2. ASSE 1013 - Performance Requirements for Reduced Pressure Principle Backflow Preventers and Reduced Pressure Principle Fire Protection Backflow Preventers.

D. ASTM International:

1. ASTM B88 - Standard Specification for Seamless Copper Water Tube.
2. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12 400 ft-lbf/ft3 (600 kN-m/m3).
3. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN-m/m3).
4. ASTM D1785 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.

5. ASTM D2241 - Standard Specification for Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series).
6. ASTM D2466 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.
7. ASTM D2855 - Standard Practice for the Two-Step (Primer and Solvent Cement) Method of Joining Poly (Vinyl Chloride) (PVC) or Chlorinated Poly (Vinyl Chloride) (CPVC) Pipe and Piping Components with Tapered Sockets.
8. ASTM D3035 - Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter.
9. ASTM D3139 - Standard Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals.
10. ASTM D6938 - Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

E. American Water Works Association:

1. AWWA C104 - Cement-Mortar Lining for Ductile-Iron Pipe and Fittings.
2. AWWA C105 - Polyethylene Encasement for Ductile-Iron Pipe Systems.
3. AWWA C111 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
4. AWWA C151 - Ductile-Iron Pipe, Centrifugally Cast.
5. AWWA C203 - Coal-Tar Protective Coatings and Linings for Steel Water Pipe.
6. AWWA C500 - Metal-Seated Gate Valves for Water Supply Service.
7. AWWA C600 - Installation of Ductile-Iron Mains and Their Appurtenances.
8. AWWA C606 - Grooved and Shouldered Joints.
9. AWWA C900 - Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 In. Through 12 In. (100 mm Through 300 mm), for Water Transmission and Distribution.
10. AWWA C901 - Polyethylene (PE) Pressure Pipe and Tubing, 1/2 In.(13 mm) Through 3 In. (76 mm) for Water Service.
11. AWWA C906 - Polyethylene (PE) Pressure Pipe and Fittings, 4 In. (100 mm) Through 63 In. (1,600 mm), for Waterworks.

F. Manufacturers Standardization Society of the Valve and Fittings Industry:

1. MSS SP-60 - Connecting Flange Joints between Tapping Sleeves and Tapping Valves.

G. NSF International:

1. NSF 61 - Drinking Water System Components - Health Effects.
2. NSF 372 - Drinking Water System Components - Lead Content.

90.4 SUBMITTALS

A. Section 013300 - Submittal Procedures.

B. Product Data: Submit manufacturer information regarding pipe materials, pipe fittings, valves, hydrants.

C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

D. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.

E. Qualifications Statements:

1. When requested by Owner’s Representative, submit qualifications data for manufacturer and installer.

90.5 CLOSEOUT SUBMITTALS

A. Section 017000 - Execution and Closeout Requirements

B. Project Record Documents: Record actual locations of piping mains, valves, connections, thrust restraints, and invert elevations.

C. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

90.6 QUALITY ASSURANCE

A. Valves: Mark valve body with manufacturer's name and pressure rating.

B. Materials in Contact with Potable Water: Certified according to NSF 61 and NSF 372.

C. Perform Work according to AWWA and ASTM standards and Columbia County standards.

90.7 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years' documented experience.

B. Installer: Company specializing in performing Work of this Section with minimum three years' documented experience in installation of Work of this Section.

90.8 DELIVERY, STORAGE, AND HANDLING

A. Section 016000 - Product Requirements.

B. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.

C. Storage:

1. Store materials according to manufacturer instructions.
2. Block individual and stockpiled pipe lengths to prevent moving.
3. Do not place pipe or pipe materials on private property or in areas obstructing pedestrian or vehicle traffic.
4. Store PE and PVC materials out of sunlight.

D. Protection:

1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
2. Provide additional protection according to manufacturer instructions.

90.9 EXISTING CONDITIONS

A. Field Measurements:

1. Verify field measurements prior to fabrication.
2. Indicate field measurements on Shop Drawings.

90.10 WARRANTY

A. Section 017000 - Execution and Closeout Requirements.

B. Furnish five-year manufacturer's warranty for valves, meters and fire hydrants.

PART 91 - PRODUCTS

91.1 PIPING

A. Ductile Iron Pipe:

1. Comply with AWWA.
2. Fittings:
    a. Material: Ductile iron.
    b. Thickness: Standard.
3. Joints:
    a. Comply with AWWA C111.
    b. Provide rubber gasket with rods.
4. Jackets: AWWA C105 PE jacket.

B. PVC Pipe:

1. ASTM D1785, Schedule 40.
2. Fittings: PVC, ASTM D2466.
3. Joints:
    a. Comply with ASTM D2855.
    b. Type: Solvent weld.

C. PVC Pipe:

1. Comply with AWWA C900, Class 235.

2. Fittings:

    a. Material: Cast iron.
    b. Comply with AWWA C111.

3. Joints:

    a. Comply with ASTM D3139.
    b. Furnish compression gasket ring.

91.2 TAPPING SLEEVES AND VALVES

A. Tapping Sleeves:

1. Materials:

    a. Furnish materials according to AWWA and ASTM standards and Columbia County standards.

B. Description:

1. Material: Ductile iron.
2. Type: Dual compression.
3. Outlet Flange Dimensions and Drilling: Comply with ASME B16.1, Class 125, and MSS SP-60.

C. Tapping Valves:

1. Materials:

    a. Furnish materials according to AWWA and ASTM standards and Columbia County standards.

D. Description:

1. Comply with AWWA C500.
2. Type: Double disc with non-rising stem.
3. Inlet Flanges: Comply with ASME B16.1, Class 125, and MSS SP-60.
4. Mechanical Joint Outlets: Comply with AWWA C111.
5. Mark manufacturer's name and pressure rating on valve body.

91.3 VALVES AND HYDRANTS

A. Valves, Valve Boxes, and Fire Hydrants: As specified in Section 331419 - Valves and Hydrants for Water Utility Service.

B. Yard Hydrants:

1. Materials:

a. Furnish materials according to AWWA and ASTM standards and Columbia County standards.

2. Description:

a. Automatic-draining, non-freezing yard hydrant for hose connection.
b. Inlet:

1) Size: 1-inch NPT.
2) Fitting: Female.

c. Nozzle:

1) Size: 3/4 inch.
2) Material: Brass.
3) Fitting: Male.

d. Casing:

1) Description: Galvanized-steel pipe.
2) Size: 1-1/4 inch.

e. Drain Hole: Tapped, 1/8-inch NPT.
f. Operating Rod:

1) Description: Galvanized-steel pipe.
2) Size: 3/8 inch.

g. Working Pressure: 125 psig.

91.4 REDUCED-PRESSURE BACKFLOW PREVENTERS

A. Materials:

1. Furnish materials according to AWWA and ASTM standards and Columbia County standards.

B. Description:

1. Comply with ASSE 1013.
2. Materials:

a. Body: Bronze.
b. Internal Parts: Bronze.
c. Springs: Stainless steel.

3. Check Valves:

a. Quantity: Two.
b. Description: Independently operating, spring loaded.
c. Type: Diaphragm type, differential pressure relief, located between check valves.
d. Provide third check valve opening under back pressure in case of diaphragm failure.

e. Vent Outlet: Non-threaded.

4. Furnish two gate valves, one strainer, and four test cocks.

C. Double Check Valve Assemblies:

1. Comply with ASSE 1012.
2. Description: Two independently operating check valves, with intermediate atmospheric vent.
3. Materials:

a. Body: Bronze.
b. Internal Parts: Corrosion resistant.
c. Springs: Stainless steel.

91.5 MATERIALS

A. Bedding and Cover:

1. Bedding: Fill Type A1 or A3 as specified in construction plans.
2. Cover: Fill Type A1 or A3 as specified in construction plans.
3. Soil Backfill from Above Pipe to Finish Grade:

a. Soil Type A-3 as specified in construction plans.
b. Subsoil with no rocks greater than 3/4 inches in diameter, frozen earth, or foreign matter.

91.6 ACCESSORIES

A. Thrust Restraints: As specified in Section 330509.33 - Thrust Restraint for Utility Piping.

B. Air-Release Valves:

1. As located on Drawings.
2. As specified in Section 400578.11 - Air Release Valves for Water Service.

C. Pipe Markers: As specified in Section 330597 - Identification and Signage for Utilities.

D. Vaults: As specified in Section 330563 - Concrete Vaults and Chambers.

E. Metering Equipment: As specified in Section 331900 - Water Utility Metering Equipment.

F. Steel Rods, Bolt, Lugs, and Brackets:

1. Comply with ASTM A36.
2. Grade A carbon steel.

PART 92 - EXECUTION

92.1 EXAMINATION

A. Section 017000 - Execution and Closeout Requirements: Requirements for installation examination.

B. Verify that building service connections and municipal utility water main sizes, locations, and elevations are as indicated on Drawings.

92.2 PREPARATION

A. Section 017000 - Execution and Closeout Requirements.

B. Cut pipe ends square, ream pipe and tube ends to full pipe diameter, and remove burrs.

C. Remove scale and dirt on inside and outside before assembly.

D. Prepare pipe connections to equipment with flanges or unions.

E. Protect and support existing distribution piping and appurtenances as Work progresses.

92.3 INSTALLATION

A. Bedding:

1. Excavate pipe trench as specified in construction plans.
2. Placement:

    a. Place bedding material as indicated on Drawings.
    b. Level fill materials in one continuous layer not exceeding 6 inches of compacted depth.
    c. Compact to 97 percent maximum density.

3. Backfill around sides and to top of pipe with cover fill, tamp in place, and compact to 98 percent maximum density.

B. Pipe and Fittings:

1. Maintain separation of water main from other piping according to Chapter 62-555.314, F.A.C.
2. Group piping with other Site piping work whenever practical.
3. Install pipe to elevations indicated on Drawings.
4. Install ductile-iron piping and fittings according to AWWA C600.
5. Route pipe in straight line.
6. Install access fittings to permit disinfection of water system per AWWA and ASTM standards.
7. Thrust Restraints: See construction plans.
8. Establish elevations of buried piping with not less than three feet of cover.
9. Pipe Markers: As specified in Section 330597 - Identification and Signage for Utilities.

C. Meters and Boxes: As specified in Section 331900 - Water Utility Metering Equipment.

D. Disinfection: As specified in Section 330110.58 - Disinfection of Water Utility Piping Systems.

92.4 TOLERANCES

A. Section 014000 - Quality Requirements

B. Install pipe within tolerance of 5/8.

92.5 FIELD QUALITY CONTROL

A. Section 014000 - Quality Requirements.

B. Testing:

1. Pressure test piping system according to AWWA C600.
2. Compaction Testing:

    a. Comply with AASHTO T 180.
    b. Frequency of Compaction Tests: every 500 feet or as dictated by field conditions.
    c. If tests indicate Work does not meet specified requirements, remove Work, replace, and retest.

END OF SECTION 331416

SECTION 331419 - VALVES AND HYDRANTS FOR WATER UTILITY SERVICE

PART 93 - GENERAL

93.1 SUMMARY

A. Section Includes:

1. Valves.
2. Valve boxes.
3. Fire hydrants.

B. Related Requirements:

1. Section 330509.33 - Thrust Restraint for Utility Piping.
2. Section 331413 - Public Water Utility Distribution Piping
3. Section 331416 - Site Water Utility Distribution Piping.

93.2 UNIT PRICE - MEASUREMENT AND PAYMENT

A. Section 012000 - Price and Payment Procedures.

B. Valves:

1. Basis of Measurement: By each.
2. Basis of Payment: Includes excavation, valve, valve box, accessories, bedding, and backfill.

C. Fire Hydrants:

1. Basis of Measurement: By each.
2. Basis of Payment: Includes excavation, hydrant, isolation valve and box, accessories, foundation bedding, and backfill.

93.3 REFERENCE STANDARDS

A. American Water Works Association:

1. AWWA C500 - Metal-Seated Gate Valves for Water Supply Service.
2. AWWA C502 - Dry-Barrel Fire Hydrants.
3. AWWA C503 - Wet-Barrel Fire Hydrants.
4. AWWA C509 - Resilient-Seated Gate Valves for Water Supply Service.
5. AWWA C550 - Protective Interior Coatings for Valves and Hydrants.

B. National Fire Protection Association:

1. NFPA 291 - Recommended Practice for Fire Flow Testing and Marking of Hydrants.

C. NSF International:

1. NSF 61 - Drinking Water System Components - Health Effects.
2. NSF 372 - Drinking Water System Components - Lead Content.

93.4 COORDINATION

A. Section 013000 - Administrative Requirements.

B. Coordinate Work of this Section with installation of water mains.

93.5 SUBMITTALS

A. Section 013300 - Submittal Procedures.

B. Product Data: Submit manufacturer information regarding component materials, fittings, assembly and parts diagram, and accessories.

C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

D. Manufacturer Instructions: Submit detailed instructions on installation requirements, including storage and handling procedures.

E. Source Quality-Control Submittals: Indicate results of factory tests and inspections.

F. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.

G. Qualifications Statements:

1. When requested by Engineer, submit qualifications data for manufacturer and installer.
2. When requested by Engineer, submit manufacturer's approval of installer.

93.6 CLOSEOUT SUBMITTALS

A. Section 017000 - Execution and Closeout Requirements.

B. Project Record Documents: Record actual locations of valves and hydrants.

93.7 MAINTENANCE MATERIAL SUBMITTALS

A. Section 017000 - Execution and Closeout Requirements.

B. Tools: Furnish one tee wrench of required length to Owner.

93.8 QUALITY ASSURANCE

A. Materials in Contact with Potable Water: Certified according to NSF 61 and NSF 372.

B. Cast manufacturer's name, pressure rating, and year of fabrication into valve body.

C. Perform Work according to AWWA & ASTM standards and Columbia County standards.

93.9 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years' documented experience.

B. Installer: Company specializing in performing Work of this Section with minimum three years' documented experience.

93.10 DELIVERY, STORAGE, AND HANDLING

A. Section 016000 - Product Requirements.

B. Delivery:

1. Seal valve and hydrant ends to prevent entry of foreign matter.
2. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.

C. Store materials according to manufacturer instructions.

D. Protection:

1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
2. Provide additional protection according to manufacturer instructions.

PART 94 - PRODUCTS

94.1 VALVES

A. Performance and Design Criteria:

1. Pressure Rating:

    a. 12-inch Diameter and Smaller: 200 psig.
    b. 14-inch Diameter and Larger: 150 psig.

2. End Connections: Mechanical joint
3. Furnish valves of diameters 16 inches and larger with bypass valves and gear operators.
4. Coatings:

    a. Comply with AWWA C550.
    b. Application: Interior and exterior.

B. Resilient-Wedge Gate Valves:

1. Materials:

    a. Furnish materials according to AWWA & ASTM standards and Columbia County standards.

2. Description:

    a. Comply with AWWA C509.
    b. Body: Ductile iron
    c. Seats: Resilient.
    d. Stem Type:

        1) Non-rising (buried service).
        2) OS&Y rising (aboveground service).
        3) Material: Bronze.

    e. Operation:

        1) Square operating nut (buried service).
        2) Cast iron handwheel (aboveground service).
        3) Opening Direction: Counterclockwise.

94.2 FIRE HYDRANTS

A. Materials:

1. Furnish materials according to AWWA & ASTM standards and Columbia County standards.

B. Dry-Barrel, Breakaway Type:

1. Comply with AWWA C502.
2. Body: Cast iron.
3. Valve: Compression type.
4. Burial Depth: As indicated on Drawings.
5. Inlet Connection Size: 6 inches.
6. Valve Opening: 5-1/4 inches in diameter.
7. End Connections: Mechanical joint.
8. Bolts and Nuts: Stainless steel.
9. Interior Coating: Comply with AWWA C502 and C550.
10. Opening Direction: Counterclockwise.

C. Hose Connections:

1. One pumper, two hose nozzles.
2. Obtain thread type and size from local fire department.
3. Attach nozzle caps by separate chains.

D. Finishes:

1. Primer and two coats of enamel as specified in Section 09900 - Painting and Coating.
2. Color: Comply with requirements of AWWA & ASTM.

94.3 VALVE BOXES

A. Materials:

1. Furnish materials according to AWWA & ASTM standards and Columbia County standards.

B. Description:

1. 12-inch Diameter Valves and Smaller:

    a. Material: Cast iron.
    b. Type: Two piece; adjustable screw.

2. Valves Larger than 12-inch Diameter:

    a. Material: Cast iron.
    b. Type: Three piece; adjustable screw.
    c. Base: Round.

3. Lid Inscription: WATER.

94.4 ACCESSORIES

A. Thrust Restraints: As specified in Section 330509.33 - Thrust Restraint for Utility Piping.

B. Valve Box Aligner: High-strength plastic device designed to automatically center valve box base and to prevent it from shifting off center during backfilling.

C. Fire Hydrant Drainage Gravel: As specified in Drawings.

PART 95 - EXECUTION

95.1 EXAMINATION

A. Section 017000 - Execution and Closeout Requirements

B. Determine exact location and size of valves from Drawings.

C. Identify required lines, levels, contours, and datum locations.

D. Verify that elevations of existing facilities prior to excavation and installation of valves and hydrants are as indicated on Drawings.

95.2 PREPARATION

A. Section 017000 - Execution and Closeout Requirements

B. Locate, identify, and protect from damage utilities to remain.

C. Do not interrupt existing utilities without permission and without making arrangements to provide temporary utility services.

1. Notify Owner's Representative not less than seven days in advance of proposed utility interruption.
2. Do not proceed without written permission from Owner's Representative.

95.3 INSTALLATION

A. Perform trench excavation, backfilling, and compaction as specified.

B. Install valves and hydrants in conjunction with pipe laying.

C. Provide buried valves with valve boxes installed flush with finished grade.

D. Provide support blocking and drainage gravel while installing fire hydrants; do not block drain hole.

E. Orientation:

1. Set valves and hydrants plumb.
2. Set fire hydrants with pumper nozzle facing roadway.
3. Set fire hydrants with centerline of pumper nozzle 18 inches above finished grade and with safety flange not more than 6 inches nor less than 2 inches above grade.

F. After main-line pressure testing, flush fire hydrants and check for proper drainage.

G. Installation Standards: Install Work according to AWWA & ASTM standards and Columbia County standards.

H. Disinfection of Water Piping System: Flush and disinfect valves and hydrants with water mains as specified in Section 330110.58 - Disinfection of Water Utility Piping Systems.

95.4 FIELD QUALITY CONTROL

A. Section 014000 - Quality Requirements.

B. Section 017000 - Execution and Closeout Requirements.

C. Testing: Pressure test valves and hydrants with water mains as specified in Section 331413 - Public Water Utility Distribution Piping

END OF SECTION 331419

SECTION 331900 - WATER UTILITY METERING EQUIPMENT

PART 96 - GENERAL

96.1 SUMMARY

A. Section Includes:
1. Ultrasonic flow meters.
2. Transmitters.
3. Indicators.
4. Recorders.
5. Integrators.

B. Related Requirements:

1. Section 330563 – Concrete Vaults and Chambers
2. Section 331413 - Public Water Utility Distribution Piping.
3. Section 331416 - Site Water Utility Distribution Piping

96.2 UNIT PRICE - MEASUREMENT AND PAYMENT

A. Section 012000 - Price and Payment Procedures.

B. Meters:

1. Basis of Measurement: By unit.
2. Basis of Payment: Includes meter, fittings, accessories, meter box, and installation.

96.3 REFERENCE STANDARDS

A. American Society of Mechanical Engineers:

1. ASME B16.1 - Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250.
2. ASME PTC 19.5 - Flow Measurement.

B. American Water Works Association:

1. AWWA C700 - Cold-Water Meters - Displacement Type, Metal Alloy Main Case.
2. AWWA C701 - Cold-Water Meters - Turbine Type, for Customer Service.
3. AWWA C702 - Cold-Water Meters - Compound Type.
4. AWWA C704 - Propeller-Type Meters for Waterworks Applications.
5. AWWA C707 - Encoder-Type Remote-Registration Systems for Cold-Water Meters.
6. AWWA M6 - Water Meters - Selection, Installation, Testing, and Maintenance.

C. ASTM International:

1. ASTM A126 - Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings.
2. ASTM B61 - Standard Specification for Steam or Valve Bronze Castings.

D. National Electrical Manufacturers Association:

1. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

E. NSF International:

1. NSF 61 - Drinking Water System Components - Health Effects.
2. NSF 372 - Drinking Water System Components - Lead Content.

96.4 SUBMITTALS

A. Section 013300 - Submittal Procedures.

B. Product Data: Submit manufacturer information for water meters and accessories.

C. Manufacturer's Certificate: Certify that water meters meet or exceed specified requirements.

D. Manufacturer Instructions: Submit detailed instructions on installation requirements, including storage and handling procedures.

E. Source Quality-Control Submittals: Indicate results of factory tests and inspections.

F. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.

G. Manufacturer Reports:

1. Certify that equipment has been installed according to manufacturer's instructions.
2. Indicate activities on Site, adverse findings, and recommendations.

H. Qualifications Statements:

1. When requested by Owner’s Representative, submit qualifications data for manufacturer and installer.

96.5 CLOSEOUT SUBMITTALS

A. Section 017000 - Execution and Closeout Requirements.

B. Project Record Documents: Record actual locations of water meters.

96.6 QUALITY ASSURANCE

A. Materials in Contact with Potable Water: Certified to NSF 61 and NSF 372.

B. Perform Work according to ASTM, AWWA, and ASME standards and Columbia County standards.

96.7 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years' documented experience.

B. Installer: Company specializing in performing Work of this Section with minimum three years' documented experience.

96.8 DELIVERY, STORAGE, AND HANDLING

A. Section 016000 - Product Requirements.

B. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.

C. Store materials according to manufacturer instructions.

D. Protection:

1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
2. Provide additional protection according to manufacturer instructions.

96.9 EXISTING CONDITIONS

A. Field Measurements:

1. Verify field measurements prior to fabrication.
2. Indicate field measurements on Shop Drawings.

96.10 WARRANTY

A. Section 017000 - Execution and Closeout Requirements.

B. Furnish five-year manufacturer's warranty for water meters.

PART 97 - PRODUCTS

97.1 ULTRASONIC TUBE FLOW METERS

A. Manufacturers:

1. Badger Meter: E-Series G2 Commercial Ultrasonic Flow Meter or equal

B. Materials:

1. Furnish materials according to ASTM and AWWA standards and Columbia County standards.

2. Materials in Contact with Potable Water: Certified to NSF 61 and NSF 372

C. Description:

1. Ultrasonic Open Flow Tube-type flow meter to measure fluid velocity and convert to flow rate.
2. Flow Rate Range: 4 to 3,500 gpm.
3. Accuracy: Plus or minus 1.5 percent of actual flow rate over the full range.
4. Register Display: Consumption up to nine digits, gallons unit of measure, gpm rate of flow.
5. Size: As indicated on Drawings.
6. Materials: Comply with AWWA C704.

D. Tube Type:

1. Working Pressure: 150 psig.
2. End Connections: Flanged, ASME B16.1 to match pipe.

E. Power Supply:
1. 3.6 volt lithium thionyl chloride battery, fully encapsulated
2. Minimum 20-year life span

97.2 ULTRASONIC CLAMP-ON FLOW METER

A. Manufacturers:

1. Badger Meter: TFX-5000 Ultrasonic Clamp-on Flow Meter or equal

B. Description:

1. Clamp separate and nonintrusive transmitting and receiving transducers to outside of process pipe.
2. Flow Rate Range: 10 to 4000 gpm.
3. Ambient Operating Temperature Range: Outdoors: -4 to 140 degrees F.

C. Output Signal:

1. 4 to 20 mA dc.
2. Linear with flow rate.
3. Linearity: Plus or minus 0.5 percent.
4. Repeatability: 0.1 percent under simulated flow.
5. Long-Term Drift: Less than 0.1 percent.

D. Power Supply:
1. 110 V AC, 60 Hz

97.3 TRANSMITTERS: CAPABILITY SHALL BE INCLUDED SO THE METER COULD BE CONVERTED TO REMOTE READING AT A FUTURE TIME.

97.4 INDICATORS

A. Materials:

1. Furnish materials according to ASTM, AWWA, and ASME standards and Columbia County standards.

97.5 RECORDERS

A. Materials:

1. Furnish materials according to ASTM, AWWA, and ASME standards and Columbia County standards.

97.6 INTEGRATORS

A. Materials:

1. Furnish materials according to ASTM, AWWA, and ASME standards and Columbia County standards.

97.7 METER BOXES

A. As specified in Section 330563 - Concrete Vaults and Chambers.

97.8 SOURCE QUALITY CONTROL

A. Section 014000 - Quality Requirements.

B. Provide shop inspection and testing of meters.

C. Test meters according to AWWA M6.

D. Certificate of Compliance:

1. If manufacturer is approved by authorities having jurisdiction, submit certificate of compliance indicating Work performed at manufacturer's facility conforms to Contract Documents.

PART 98 - EXECUTION

98.1 EXAMINATION

A. Section 017000 - Execution and Closeout Requirements.

B. Verify that building service connections and municipal utility water main sizes, locations, and elevations are as indicated on Shop Drawings.

98.2 PREPARATION

A. Section 017000 - Execution and Closeout Requirements

B. Before attaching meter, ensure that pipe ends are deburred, square, and plumb and that scale and dirt on inside and outside of piping has been removed.

C. Prepare pipe connections to equipment with flanges or unions, as appropriate.

D. Protect and support existing distribution piping as Work progresses.

98.3 INSTALLATION

A. Meters:

1. Install meters according to AWWA M6, with isolating valves on inlet and outlet.

B. Meter Boxes:

1. As specified in Section 330563 - Concrete Vaults and Chambers.

2. Installation Standards: Install Work according to ASTM and AWWA standards and Columbia County standards.

98.4 FIELD QUALITY CONTROL

A. Section 017000 - Execution and Closeout Requirements.

B. Testing:

1. Test and calibrate flow meter to demonstrate specified accuracy requirements.
2. Test meters according to AWWA M6.

C. Manufacturer Services: Furnish services of manufacturer's representative experienced in installation of products furnished under this Section on Site for installation, inspection, startup, field testing, and instructing Owner's personnel in maintenance of equipment.

D. Equipment Acceptance:

1. Adjust, repair, modify, or replace components failing to perform as specified and rerun tests.
2. Make final adjustments to equipment under direction of manufacturer's representative.

E. Furnish installation certificate from equipment manufacturer's representative attesting that equipment has been properly installed and is ready for startup and testing.

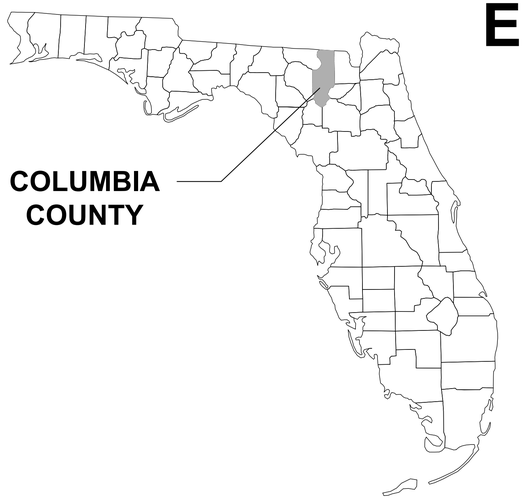
98.5 DEMONSTRATION

A. Section 017000 - Execution and Closeout Requirements

B. Demonstrate equipment startup, shutdown, routine maintenance, and emergency repair procedures to Owner's personnel.

END OF SECTION 331900

ELLISVILLE WATER MAIN EXTENSION
COLUMBIA COUNTY, FLORIDA

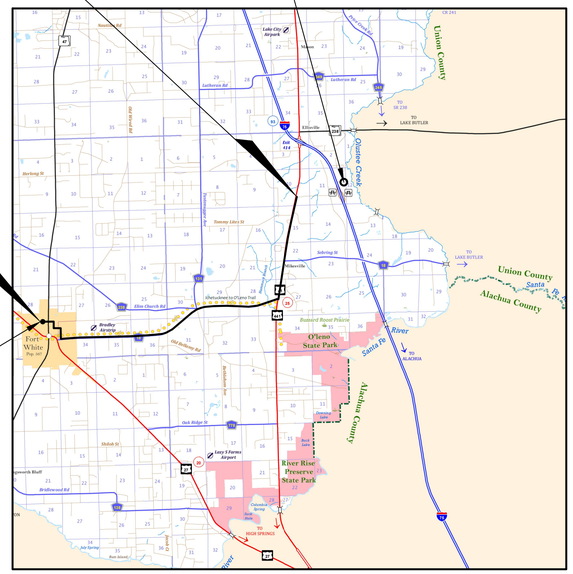


END PROJECT
STA. 951+83.00

ELLISVILLE WTP

BEGIN PROJECT
STA. 100+00.00

FT WHITE WTP



SHEET INDEX

SHEET COVER	1
SIGNATURE SHEET	2
GENERAL NOTES	3
EROSION CONTROL NOTES	4
WATER & SEWER NOTES	5 - 6
TYPICAL SECTIONS	7 - 8
KEY MAP	9 - 14
FORT WHITE WTP SITE PLAN	15
ELLISVILLE WTP SITE PLAN	16
CHLORINE BOOSTER STATION SITE PLAN	17
PLAN SHEETS	18 - 64
HDD CROSSING PROFILES	65 - 75
CHLORINE BOOSTER STATION DETAIL	76
CHLORINE BUILDING DETAILS	77
CHLORINE BUILDING NOTES	78
WATER DETAILS	79 - 86
MISCELLANEOUS DETAILS	87 - 89
ELEC - LEGENDS, CODES & STANDARDS	90
ELEC - FLOOR PLANS, DIAGRAMS & DETAILS	91
INST - LEGENDS & DIAGRAMS	92

PLANS PREPARED FOR:

COLUMBIA COUNTY BOCC
135 HERNANDO AVE, SUITE 203
LAKE CITY, FL 32055
(386)758-1005

11/2023
ISSUED FOR BID

THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.

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DATE	DESCRIPTION

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JOB NUMBER: L220110CCB
EOR: RICKY L. HENDRIX
P.E. NO.: 45239

COVER SHEET

SHEET NO. 1

Cayden Sanders 11/28/2023 3:05:46 PM X:\2022\L220110CCB\H.CADD\Roadway\KEYSRD01_ELLISVILLE_WATERLINE.dwg

RICKY L. HENDRIX
LICENSE
No.45239
STATE OF
FLORIDA
PROFESSIONAL ENGINEER

THIS ITEM HAS BEEN DIGITALLY SIGNED AND SEALED BY RICKY L. HENDRIX ON THE DATE ADJACENT TO THE SEAL.

PRINTED COPIES OF THIS DOCUMENT ARE NOT CONSIDERED SIGNED AND SEALED AND THE SIGNATURE MUST BE VERIFIED ON ANY ELECTRONIC COPIES.

NORTH FLORIDA PROFESSIONAL SERVICES INC.
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LAKE CITY, FL 32056
CERTIFICATE OF AUTHORIZATION: 29011
RICKY L. HENDRIX, P.E. NO. 45239

THE ABOVE NAMED PROFESSIONAL ENGINEER SHALL BE RESPONSIBLE FOR THE FOLLOWING SHEETS IN ACCORDANCE WITH RULE 61G15-23.004, F.A.C.

SHEET INDEX

SHEET COVER	1
SIGNATURE SHEET	2
GENERAL NOTES	3
EROSION CONTROL NOTES	4
WATER & SEWER NOTES	5 - 6
TYPICAL SECTIONS	7 - 8
KEY MAP	9 - 14
FORT WHITE WTP SITE PLAN	15
ELLISVILLE WTP SITE PLAN	16
CHLORINE BOOSTER STATION SITE PLAN	17
PLAN SHEETS	18 - 64
HDD CROSSING PROFILES	65 - 75
CHLORINE BOOSTER STATION DETAIL	76
CHLORINE BUILDING DETAILS	77
CHLORINE BUILDING NOTES	78
WATER DETAILS	79 - 86
MISCELLANEOUS DETAILS	87 - 89

SHEET INDEX (CONT.)

ELEC - LEGENDS, CODES & STANDARDS	90
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SHEET INDEX (CONT.)

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Akin Brooks Engineering

Akin Brooks Engineering, Inc.
14260 W Newberry Rd #115
Newberry, FL 32669

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352.281.7104
akinbrooks.com

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SIGNATURE SHEET
ELLISVILLE WATER MAIN EXTENSION
COLUMBIA COUNTY, FLORIDA

SHEET NO. 2

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GENERAL NOTES

1. THE CONTRACTOR SHALL VERIFY ALL EXISTING CONDITIONS AND DIMENSIONS AT THE JOB SITE TO ENSURE THAT ALL NEW WORK WILL FIT IN THE MANNER INTENDED ON THE PLANS. SHOULD ANY CONDITIONS EXIST THAT ARE CONTRARY TO THOSE SHOWN ON THE PLANS, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY ENGINEER AND THE OWNER OF SUCH DIFFERENCES IMMEDIATELY AND PRIOR TO PROCEEDING WITH THE WORK.

2. THE CONTRACTOR SHALL COMPLY WITH ALL CONDITIONS AS SET FORTH BY THE ISSUED FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION 10/2 SELF-CERTIFICATION, SUWANNEE RIVER WATER MANAGEMENT DISTRICT ENVIRONMENTAL RESOURCE PERMIT, FLORIDA DEPARTMENT OF TRANSPORTATION DRIVEWAY CONNECTION PERMIT, FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION DRINKING WATER FACILITY PERMIT.

3. THE CONTRACTOR SHALL MAINTAIN THE CONSTRUCTION SITE IN A SECURE MANNER. ALL OPEN TRENCHES AND EXCAVATED AREAS SHALL BE PROTECTED FROM ACCESS BY THE GENERAL PUBLIC.

4. ALL EXISTING PROPERTY, FENCING, DRIVEWAYS, SIDEWALK, SIGNS, STRUCTURES, UTILITIES AND OTHER ITEMS DISTURBED BY PROJECTS CONSTRUCTION SHALL BE RESTORED BY CONTRACTOR TO ORIGINAL LINE AND GRADE UNLESS OTHERWISE APPROVED BY ENGINEER. CONTRACTOR SHALL, AT ALL, TIMES, MAINTAIN ACCESS TO ADJOINING PROPERTIES ALONG THE PROJECT ROUTE.

5. CONTRACTOR SHALL, AT ALL TIMES, MAINTAIN TRAFFIC PER FDOT STANDARD SPECIFICATIONS FOR ROAD AND BRIDGES CONSTRUCTION, ROADWAY AND TRAFFIC DESIGN STANDARDS AND THE MANUAL ON UNIFORM TRAFFIC DEVICES, LATEST EDITION.

6. ANY PUBLIC LAND CORNER WITHIN THE LIMITS OF CONSTRUCTION SHALL BE PROTECTED. IF A CORNER MONUMENT IS IN DANGER OF BEING DESTROYED AND HAS NOT BEEN PROPERLY REFERENCED, THE CONTRACTOR SHOULD NOTIFY THE ENGINEER.

7. THE SITE IS LOCATED IN SECTION 10, 15, 22, 27-31, TOWNSHIP 6 SOUTH, RANGE 17 EAST AND SECTIONS 33-36 OF TOWNSHIP 6 SOUTH, RANGE 16 EAST IN COLUMBIA COUNTY, FLORIDA.

8. THE CONTRACTOR SHALL IMPLEMENT ALL COMPONENTS OF THE EROSION AND SEDIMENTATION CONTROL PLAN PRIOR TO ANY EARTH DISTURBING ACTIVITIES. ALL COMPONENTS SHALL BE MAINTAINED BY THE CONTRACTOR UNTIL ALL VEGETATION IS ESTABLISHED, THE ENTIRE PROJECT AREA IS STABILIZED AND THE OWNER HAS ACCEPTED OPERATION AND MAINTENANCE.

9. THE STORMWATER BASIN IS DESIGNED IN ACCORDANCE WITH SRWMD APPLICANT HANDBOOK VOLUME II AND 62-330 F.A.C.

10. ALL SLOPES OF THE STORMWATER BASIN SHALL BE GRASSED. ALL SLOPES STEEPER THAN 3:1 SHALL BE STAPLED SOD.

11. ALL DISTURBED AREAS NOT SODDED SHALL BE SEEDED WITH A MIXTURE OF LONG-TERM VEGETATION AND QUICK GROWING SHORT-TERM VEGETATION FOR THE FOLLOWING CONDITIONS. FOR THE MONTHS FROM SEPTEMBER THROUGH MARCH, THE MIX SHALL CONSIST OF 70 POUNDS PER ACRE OF LONG-TERM SEED AND 20 POUNDS PER ACRE OF WINTER RYE. FOR THE MONTHS OF APRIL THROUGH AUGUST, THE MIX SHALL CONSIST OF 70 PER ACRE OF LONG-TERM SEED AND 20 POUNDS PER ACRE OF MILLET.

12. THE LOCATION OF THE UTILITIES SHOWN IN THE PLANS ARE APPROXIMATE ONLY. THE EXACT LOCATION SHALL BE DETERMINED BY THE CONTRACTOR PRIOR TO CONSTRUCTION. ALL CONFLICTS OR DISCREPANCIES BETWEEN THESE PLANS AND EXISTING FIELD CONDITIONS SHALL BE BROUGHT TO THE IMMEDIATE ATTENTION OF ENGINEER. CONTRACTOR SHALL PROTECT ALL UTILITIES WITHIN THE PROJECT AREAS. CONTRACTOR SHALL CONTACT SUNSHINE 811 OR (800) 432-4770 FOR UTILITY CONSTRUCTION LOCATES AT LEAST TWO (2) BUSINESS DAYS PRIOR TO CONSTRUCTION. UTILITY CONTACT INFORMATION AS FOLLOWS:

NAME	CONTACT	PHONE	EMAIL
AT&T	PK PANTEL	904-727-1568	pp563@att.com
CENTURY LINK	JAMES YOUNG	352-303-2430	jimmyyoung@lumens.net
CLAY ELETRIC	CHRIS BRYAN	352-473-8000 x 8424	cbryan@clayelectric.com
DUKE ENERGY			DEFTransmissionGOV@duke-energy.com
			PEFtransmissiongov@pgnmail.com
MCI			ASGinvestigationsteam@ASGINC.US
TOWN OF FORT WHITE	VERNON ZIMMERMAN	386-497-2321	town@fortwhitefl.com
WINDSTREAM COMM	DAVID JORDAN	386-364-2493	David.jordan@windstream.com

13. ALL UTILITY CONSTRUCTION SHALL MEET COLUMBIA COUNTY WATER AND WASTEWATER UTILITY STANDARDS, AVAILABLE FROM COLUMBIA COUNTY PUBLIC WORKS.

14. CONTRACTOR SHALL FOLLOW ALL TRENCH SAFETY PRACTICES PER OSHA GUIDELINES AND THE FLORIDA TRENCH SAFETY ACT, CHAPTER 553 F.S.

15. ALL SITE CONSTRUCTION SHALL BE IN ACCORDANCE WITH COLUMBIA COUNTY LAND DEVELOPMENT REGULATIONS.

16. CONTRACTOR SHALL REVIEW AND BECOME FAMILIAR WITH ALL REQUIRED UTILITY CONNECTIONS PRIOR TO BIDDING. CONTRACTOR SHALL PROVIDE ALL WORK AND MATERIALS REQUIRED TO COMPLETE CONNECTION TO THE EXISTING UTILITIES. THIS INCLUDES BUT IS NOT LIMITED TO MANHOLE CORING, WET TAPS, PAVEMENT REPAIRS AND DIRECTIONAL BORING.

17. CONTRACTOR SHALL COORDINATE ALL WORK WITH OTHER CONTRACTORS WITHIN PROJECT AREA.

18. FINISHED FLOOR ELEVATIONS SHALL BE AT LEAST ONE (1) FOOT ABOVE THE CENTERLINE OF THE ADJACENT ROADWAY OR AS NOTED FOR THE APPLICABLE LOT, THE LOT SHALL BE GRADED TO DRAIN TO THE ROADSIDE DITCH OF THE ADJACENT ROADWAY.

19. THIS PROJECT IS TO BE CONSTRUCTED IN ACCORDANCE WITH THE F.D.O.T. STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION (CURRENT EDITION) AND THE F.D.O.T. STANDARD PLANS FOR ROAD AND BRIDGE CONSTRUCTION (CURRENT EDITION), AWWA SPECIFICATIONS, AND THE COLUMBIA COUNTY DEVELOPMENT STANDARDS UNLESS OTHERWISE NOTED.

20. IF UNSUITABLE MATERIAL IS ENCOUNTERED DURING GRADING, CONTRACTOR SHALL REMOVE UNSUITABLE MATERIAL TO A DEPTH OF 24" BELOW FINISHED GRADE WITHIN THE CONSTRUCTION LIMITS.

21. CONTRACTOR SHALL NOTIFY THE COUNTY AT LEAST 48 HOURS PRIOR TO BEGINNING OF CONSTRUCTION.

22. CONTRACTOR SHALL NOTIFY FDOT PRIOR TO ANY WORK WITHIN FDOT RIGHT-OF-WAY LIMITS

23. CONTRACTOR SHALL SUBMIT A NOTICE OF CONSTRUCTION COMMENCEMENT TO THE WATER MANAGEMENT DISTRICT AT LEAST 48 HOURS PRIOR TO THE BEGINNING OF CONSTRUCTION.

24. CONTRACTOR SHALL SUBMIT A NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM NOTICE OF INTENT ALONG WITH SUPPORTING DOCUMENTATION TO THE FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION AT LEAST 48 HOURS PRIOR TO BEGINNING OF CONSTRUCTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL PERMIT FEES.

25. CONTRACTOR SHALL NOTIFY THE COUNTY AT LEAST 48 HOURS IN ADVANCE OF THE PRESSURE AND LEAKAGE TESTS. NO FINAL TESTING OR PRESSURE TESTING WILL BE ACCEPTED UNLESS WITNESSED BY THE COUNTY'S REPRESENTATIVE.

26. NO WORK SHALL BE PERFORMED ON SATURDAY OR SUNDAY WITHOUT WRITTEN NOTIFICATION TO THE COUNTY AND ENGINEER.

27. IF DURING CONSTRUCTION OR OPERATION OF THE STORM WATER MANAGEMENT SYSTEM, A STRUCTURAL FAILURE IS OBSERVED THAT HAS THE POTENTIAL TO CAUSE THE DIRECT DISCHARGE OF SURFACE WATER INTO THE FLORIDAN AQUIFER SYSTEM, CORRECTIVE ACTIONS DESIGNED OR APPROVED BY A REGISTERED PROFESSIONAL SHALL BE TAKEN AS SOON AS PRACTICAL TO CORRECT THE FAILURE. SEE KARST REPAIR DETAIL #E23. IN ADDITION, A REPORT PREPARED BY A REGISTERED PROFESSIONAL MUST BE PROVIDED AS SOON AS PRACTICAL TO THE DEPARTMENT FOR REVIEW AND APPROVAL THAT PROVIDES REASONABLE ASSURANCE THAT THE BREACH WILL BE PERMANENTLY CORRECTED.

28. ALL UTILITY AND/OR DRAINAGE STRUCTURES SHALL BE PRECAST UNLESS APPROVED BY THE ENGINEER. CONTRACTOR SHALL SUBMIT SHOP DRAWINGS FOR APPROVAL PRIOR TO PROCUREMENT.

29. CONTRACTOR SHALL PROVIDE AN AS-BUILT SURVEY MEETING THE REQUIREMENTS OF CHAPTER 61G17 F.A.C. FOR THE STORMWATER MANAGEMENT SYSTEMS. INCLUDE HORIZONTAL AND VERTICAL DIMENSIONAL DATA SO THAT IMPROVEMENTS ARE LOCATED AND DELINEATED RELATIVE TO THE BOUNDARY. THIS AS-BUILT SURVEY SHOULD INCLUDE ALL OUTFALL STRUCTURES. PROVIDE SUFFICIENT DETAILED DATA TO DETERMINE WHETHER THE IMPROVEMENTS WERE CONSTRUCTED IN ACCORDANCE WITH THE PLANS. A COPY OF THE AS-BUILT SURVEY (IN PAPER AND DIGITAL AUTOCAD FORMAT) MUST BE SUBMITTED TO COLUMBIA COUNTY AND THE ENGINEER.

30. PROJECT DESIGN IS BASED ON STATE PLANE FLORIDA NORTH COORDINATES AND NAVD88 DATUM FROM FDOT (EPIC) PUBLISHED CONTROL ALONG THE PROJECT ROADWAYS. CONSTRUCTION LAYOUT AND AS-BUILT SURVEY SHALL BE BASED ON THIS SAME CONTROL. FDOT PUBLISHED CONTROL IS AVAILABLE AT: HTTPS://FDOTEWP1.DOT.STATE.FL.US/ENTERPRISEPNCINFORMATIONCOLLECTION/

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JOB NUMBER: L220110CCB
EOR: RICKY L. HENDRIX
P.E. NO.: 45239

GENERAL NOTES
ELLISVILLE WATER MAIN EXTENSION
COLUMBIA COUNTY, FLORIDA

SHEET NO. 3

EROSION CONTROL NOTES

1. THIS EROSION AND SEDIMENTATION CONTROL PLAN COMPLIES WITH THE REQUIREMENTS OF THE "FLORIDA DEVELOPMENT MANUAL" AND THE "FLORIDA EROSION AND SEDIMENT CONTROL INSPECTOR'S MANUAL".

2. THE CONTRACTOR SHALL ADHERE TO COLUMBIA COUNTY, SRWMD, AND OTHER GOVERNING AUTHORITIES FOR EROSION AND SEDIMENT CONTROL REGULATIONS. IF THE CONTRACTOR NEEDS TO CHANGE THIS PLAN TO MORE EFFECTIVELY CONTROL EROSION AND SEDIMENTATION, THE CONTRACTOR SHALL USE BMP's FROM THE "FLORIDA EROSION AND SEDIMENT CONTROL INSPECTOR'S MANUAL".

3. THE CONTRACTOR SHALL ADJUST AND REVISE THIS PLAN TO MEET ACTUAL FIELD CONDITIONS. ANY REVISIONS SHALL BE APPROVED BY THE REVIEWING AGENCIES.

4. SEDIMENT AND EROSION CONTROL FACILITIES, STORM DRAINAGE FACILITIES AND DETENTION BASINS SHALL BE INSTALLED PRIOR TO ANY OTHER CONSTRUCTION.

5. EROSION CONTROL MEASURES SHALL BE INSPECTED WEEKLY AND AFTER EACH RAINFALL OF 0.5 INCHES OR GREATER, AND REPAIRED OR REPLACED AS NECESSARY.

6. SEDIMENT AND EROSION CONTROL MEASURES SHALL NOT BE REMOVED UNTIL ALL CONSTRUCTION IS COMPLETE AND UNTIL A PERMANENT GROUND COVER HAS BEEN ESTABLISHED.

7. ALL OPEN DRAINAGE SWALES SHALL BE GRASSED AND RIPRAP SHALL BE PLACED AS REQUIRED TO CONTROL EROSION.

8. SILT FENCES SHALL BE LOCATED ON SITE TO PREVENT SEDIMENT AND EROSION FROM LEAVING PROJECT LIMITS.

9. CONTRACTOR SHALL PLACE A DOUBLE ROW OF SILT FENCE IN AREAS WHERE RUNOFF FROM DISTURBED AREAS MAY ENTER WETLANDS.

10. DURING CONSTRUCTION AND AFTER CONSTRUCTION IS COMPLETE, ALL STRUCTURES SHALL BE CLEANED OF ALL DEBRIS AND EXCESS SEDIMENT.

11. ALL GRADED AREAS SHALL BE STABILIZED IMMEDIATELY WITH A TEMPORARY FAST-GROWING COVER AND/OR MULCH.

12. A PAD OF RUBBLE RIP RAP SHALL BE PLACED AT THE BOTTOM OF ALL COLLECTION FLUMES AND COLLECTION PIPE OUTLETS. GRANITE OR LIMESTONE RIPRAP IS REQUIRED, NO BROKEN CONCRETE WILL BE ACCEPTED.

13. ALL SIDE SLOPES STEEPER THAN 3:1 SHALL BE ADEQUATELY PROTECTED FROM EROSION THROUGH THE USE OF SYNTHETIC BALES OR SODDING.ALL STORMWATER BASIN SLOPES STEEPER THAN 3:1 SHALL BE STAPLED SOD

14. ALL STABILIZATION PRACTICES SHALL BE INITIATED AS SOON AS PRACTICABLE IN AREAS OF THE JOB WHERE CONSTRUCTION ACTIVITIES HAVE TEMPORARILY OR PERMANENTLY STOPPED, BUT IN NO CASE SHALL THE DISTURBED AREA BE LEFT UNPROTECTED FOR MORE THAN SEVEN DAYS.

15. ALL WASTE GENERATED ON THE PROJECT SHALL BE DISPOSED OF BY THE CONTRACTOR IN AREAS PROVIDED BY CONTRACTOR.

16. LOADED HAUL TRUCKS SHALL BE COVERED WITH TARPS.

17. EXCESS DIRT SHALL BE REMOVED DAILY.

18. QUALIFIED PERSONNEL SHALL INSPECT THE AREA USED FOR STORAGE OF STOCKPILES, THE SILT FENCE AND STRAW BALES, THE LOCATION WHERE VEHICLES ENTER OR EXIT THE SITE, AND THE DISTURBED AREAS THAT HAVE NOT BEEN FINALLY STABILIZED, AT LEAST ONCE EVERY SEVEN CALENDAR DAYS AND WITHIN 24 HOURS OF THE END OF A STORM OF 0.5 INCHES OR GREATER.

19. SITES THAT HAVE BEEN FINALLY STABILIZED WITH SOD OR GRASSING SHALL BE INSPECTED AT LEAST ONCE EVERY WEEK.

20. SILT FENCE SHALL BE INSTALLED ALONG THE NORTH AND WEST SIDES OF THE CHLORINE BOOSTER STATION SITE AS WELL AS ALONG THE CR-18 PIPE ALIGNMENT (APPROXIMATELY FROM STATION 401+00 TO 733+00), EXCEPT FOR HDD AREAS. SILT FENCE ALONG CR-18 SHALL TYPICALLY BE INSTALLED ALONG THE SOUTH SIDE OF THE TRENCH AND UPSTREAM OF EXISTING SWALE FLOWLINES OR NEARBY WETLANDS. ADDITIONAL SILT FENCE SHALL BE INSTALLED AS NEEDED ACROSS EXISTING SWALES AT DOWNSTREAM SIDE DRAINS. NO SILT FENCING IS ANTICIPATED ALONG OTHER ROADS UNLESS OTHERWISE DIRECTED BY OWNER'S REPRESENTATIVE

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EROSION CONTROL NOTES
ELLISVILLE WATER MAIN EXTENSION
COLUMBIA COUNTY, FLORIDA

SHEET NO. 4

WATER AND SEWER NOTES

1. CONTRACTOR SHALL FIELD VERIFY EXISTING UTILITY CONDITIONS AT ALL INTERSECTIONS WITH PROPOSED WORK. CONTRACTOR SHALL IMMEDIATELY NOTIFY ENGINEER OF ANY POTENTIAL CONFLICTS AND SHALL PROVIDE TO THE ENGINEER SUCH RELEVANT INFORMATION AS UTILITY TYPE, VERTICAL AND HORIZONTAL LOCATION, MATERIAL, SIZE AND APPARENT CONDITION OF THE CONFLICTING UTILITY. FIELD VERIFICATION USING "SOFT DIG" EXCAVATIONS, GROUND PENETRATING RADAR (GPR) OR OTHER ACCEPTABLE DETECTION METHODS, SHALL BE PERFORMED 48 HOURS IN ADVANCE OF THE WORK. FOR DIRECTIONAL DRILLING, FIELD VERIFICATION SHALL BE PERFORMED PRIOR TO MOBILIZATION OF THE DRILLING EQUIPMENT.

2. CONTRACTOR IS SOLELY RESPONSIBLE FOR LOCATING AND PROTECTING ALL UTILITIES AND OTHER OBSTRUCTIONS BOTH ABOVE AND BELOW GROUND SURFACE. ALL DAMAGE RESULTING FROM FAILURE TO COMPLY WITH THESE REQUIREMENTS SHALL BE REPAIRED SOLELY AT THE CONTRACTOR'S EXPENSE.

3. WHEN SERVICE INTERRUPTIONS ARE NECESSARY FOR EXISTING WATER AND SEWER MAINS, CONTRACTOR SHALL MINIMIZE SUCH INTERRUPTIONS DURING THE COURSE OF CONSTRUCTION. ALL WATER OR SEWER SERVICE CONNECTIONS, INTERRUPTIONS OR RELOCATIONS SHALL BE COORDINATED IN ADVANCE WITH OWNER OR OWNER'S REPRESENTATIVE.

4. ALL NEW OR RELOCATED WATER MAINS THAT SERVE FIRE HYDRANTS AND ALL FIRE HYDRANT LEADS SHALL BE NO SMALLER THAN SIX INCHES IN DIAMETER. AUXILIARY VALVES SHALL BE PROVIDED ON ALL HYDRANT LEADS.

5. SUFFICIENT VALVES SHALL BE PROVIDED IN NEW AND RELOCATED WATER MAINS SO THAT INCONVENIENCE AND SANITARY HAZARDS WILL BE MINIMIZED DURING REPAIRS. ISOLATION VALVES SHALL GENERALLY BE SPACED AT NO MORE THAN 600-FOOT INTERVALS IN RESIDENTIAL AND COMMERCIAL DISTRICTS AND NO MORE THAN 2,000-FOOT INTERVALS IN RURAL AREAS.

6. PROPOSED AIR RELEASE/ VACUUM VALVES (ARVV) SHALL BE FURNISHED AND INSTALLED WHERE SHOWN HEREIN. CONTRACTOR SHALL FIELD ADJUST ARVV LOCATIONS FOR LOCALIZED HIGH POINTS BASED ON AS-BUILT WATER MAIN CONDITIONS.

7. PROPER BACKFLOW-PREVENTION ASSEMBLIES/DEVICES SHALL BE PROVIDED IN ACCORDANCE WITH RULE 62-555.360, F.A.C., AND THE AWWA'S MANUAL M14, RECOMMENDED PRACTICE FOR BACKFLOW PREVENTION AND CROSS-CONNECTION CONTROL.

8. THIS PROJECT SHALL NOT INCLUDE ANY INTERCONNECTION BETWEEN PREVIOUSLY SEPARATE PUBLIC WATER SYSTEMS THAT HAVE SEPARATE WATER SUPPLY SOURCES. A SPECIFIC CONSTRUCTION PERMIT IS REQUIRED FOR SUCH AN INTERCONNECTION FROM THE FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION (FDEP)

9. COPPER TRACER WIRE SHALL BE PLACED ON ALL POTABLE WATER LINES AND WATER LATERALS. TRACER WIRE SHALL BE CONTINUOUS WITH NO INTERRUPTIONS. CONTRACTOR SHALL PERFORM CONTINUITY TESTING ON ALL TRACER WIRE AND PROVIDE WRITTEN TEST RESULTS TO ENGINEER.

10. LOCATOR BALLS SHALL BE PROVIDED AT THE END OF ALL WATER AND SANITARY SEWER LATERALS. THE LOCATOR BALLS SHALL BE SECURED TO THE LATERALS WITH A PLASTIC TIE STRAP.

11. RESTRAINED JOINTING USING MEGALUG-TYPE RESTRAINTS, AS WELL AS ALL WATER AND SANITARY SEWER LATERALS SHALL BE LEFT UNCOVERED UNTIL INSPECTED BY THE ENGINEER OR THE ENGINEER'S INSPECTOR.

12. CONTRACTOR SHALL PROVIDE TEMPORARY STAKES (2" BY 2" WOODEN STAKES) AT THE END OF EACH LATERAL. EACH STAKE SHALL INDICATE EITHER WATER OR SANITARY SEWER LATERAL. CONTRACTOR SHALL MAINTAIN THE STAKES UNTIL AN AS-BUILT SURVEY OF ALL WATER AND SANITARY SEWER MAINS AND LATERALS ARE COMPLETE AND SUBMITTED TO ENGINEER FOR APPROVAL.

13. FOR SANITARY SEWERAGE ALIGNMENT: EACH SECTION OF THE COMPLETED SEWER SYSTEM SHALL BE INSPECTED FOR PROPER ALIGNMENT. INSPECTION SHALL CONSIST OF "LAMPING" FROM MANHOLE TO MANHOLE. ANY SECTION OF THE SEWER SYSTEM, WHICH DOES NOT DISPLAY TRUE, CONCENTRIC ALIGNMENT, SHALL BE INSTALLED AT NO ADDITIONAL EXPENSE TO THE OWNER.

14. ALL PIPE, PIPE FITTINGS, PIPE JOINT PACKING AND JOINTING MATERIALS, VALVES, FIRE HYDRANTS, AND METERS INSTALLED UNDER THIS PROJECT SHALL CONFORM TO APPLICABLE AMERICAN WATER WORKS ASSOCIATION (AWWA) STANDARDS.

15. ALL PIPE SIZES AND MATERIALS (INCLUDING PRESSURE CLASS, SCHEDULE AND/OR DIMENSION RATIO) SHALL BE AS INDICATED IN THESE DRAWINGS.

16. POLYVINYL CHLORIDE (PVC) PRESSURE PIPE SHALL CONFORM TO STANDARDS ASTM D1784 AND ASTM D1785 (SIZE 3-INCH OR LESS), AWWA C900 (SIZE 4-THROUGH 12-INCH) OR AWWA C905 (SIZE 14-INCH OR GREATER).

17. PVC NON-PRESSURE GRAVITY PIPE SHALL CONFORM TO STANDARDS ASTM D3404 AND ASTM F679 (SIZE 4- THROUGH 15-INCH).

18. DUCTILE IRON PIPE (DIP) SHALL CONFORM TO STANDARDS AWWA C150 AND C151 (SIZE 4-INCH OR GREATER).

19. HIGH DENSITY POLYETHYLENE (HDPE) PIPE SHALL CONFORM TO STANDARDS AWWA C901 (SIZE 3-INCH OR LESS) OR AWWA C906 (SIZE 4-INCH OR GREATER).

20. ALL PUBLIC WATER SYSTEM COMPONENTS, EXCLUDING FIRE HYDRANTS, THAT WILL BE INSTALLED UNDER THIS PROJECT AND THAT WILL COME INTO CONTACT WITH DRINKING WATER SHALL CONFORM TO NSF INTERNATIONAL STANDARD 60/61 AS ADOPTED IN RULE 62-555.335, F.A.C., OR OTHER APPLICABLE STANDARDS, REGULATIONS, OR REQUIREMENTS REFERENCED IN PARAGRAPH 62-555.320(3)(B), F.A.C.

21. ALL PIPE AND PIPE FITTINGS INSTALLED UNDER THIS PROJECT SHALL CONTAIN NO MORE THAN 8.0% LEAD, AND ANY SOLDER OR FLUX USED IN THIS PROJECT WILL CONTAIN NO MORE THAN 0.2% LEAD.

22. ALL WATER MAIN PIPE AND FITTINGS, EXCEPT PIPE INSTALLED UNDER A CONSTRUCTION PERMIT FOR WHICH THE DEPARTMENT RECEIVED A COMPLETE APPLICATION, SHALL BE COLOR CODED OR MARKED USING BLUE AS A PREDOMINANT COLOR TO DIFFERENTIATE DRINKING WATER FROM RECLAIMED OR OTHER WATER. UNDERGROUND PLASTIC PIPE SHALL BE SOLID-WALL BLUE PIPE, SHALL HAVE A CO-EXTRUDED BLUE EXTERNAL SKIN, OR SHALL BE WHITE OR BLACK PIPE WITH BLUE STRIPES INCORPORATED INTO, OR APPLIED TO, THE PIPE WALL; AND UNDERGROUND METAL OR CONCRETE PIPE SHALL HAVE BLUE STRIPES APPLIED TO THE PIPE WALL. PIPE STRIPED DURING MANUFACTURING OF THE PIPE SHALL HAVE CONTINUOUS STRIPES THAT RUN PARALLEL TO THE AXIS OF THE PIPE, THAT ARE LOCATED AT NO GREATER THAN 90-DEGREE INTERVALS AROUND THE PIPE, AND THAT WILL REMAIN INTACT DURING AND AFTER INSTALLATION OF THE PIPE. IF TAPE OR PAINT IS USED TO STRIPE PIPE DURING INSTALLATION OF THE PIPE, THE TAPE OR PAINT SHALL BE APPLIED IN A CONTINUOUS LINE THAT RUNS PARALLEL TO THE AXIS OF THE PIPE AND THAT IS LOCATED ALONG THE TOP OF THE PIPE; FOR PIPES WITH AN INTERNAL DIAMETER OF 24 INCHES OR GREATER, TAPE OR PAINT SHALL BE APPLIED IN CONTINUOUS LINES ALONG EACH SIDE OF THE PIPE AS WELL AS ALONG THE TOP OF THE PIPE. ABOVEGROUND PIPE AT DRINKING WATER TREATMENT PLANTS SHALL BE COLOR CODED AND LABELED IN ACCORDANCE WITH SUBSECTION 62-555.320(10), F.A.C., AND ALL OTHER ABOVEGROUND PIPE SHALL BE PAINTED BLUE OR SHALL BE COLOR CODED OR MARKED LIKE UNDERGROUND PIPE.

23. ALL FIRE HYDRANTS THAT WILL BE INSTALLED UNDER THIS PROJECT AND THAT WILL HAVE UNPLUGGED, UNDERGROUND DRAINS SHALL BE LOCATED AT LEAST THREE FEET FROM ANY EXISTING OR PROPOSED STORM SEWER, STORMWATER FORCE MAIN, PIPELINE CONVEYING RECLAIMED WATER REGULATED UNDER PART III OF CHAPTER 62-610, F.A.C., OR VACUUM-TYPE SANITARY SEWER; CONVEYING RECLAIMED WATER REGULATED UNDER PART III OF CHAPTER 62-610, F.A.C., OR VACUUM-TYPE SANITARY SEWER; OR PIPELINE CONVEYING RECLAIMED WATER NOT REGULATED UNDER PART III OF CHAPTER 62-10, F.A.C.; AND AT LEAST TEN FEET FROM ANY EXISTING OR PROPOSED "ON-SITE SEWAGE TREATMENT AND DISPOSAL SYSTEM."

24. NEW OR ALTERED CHAMBERS, PITS, OR MANHOLES THAT CONTAIN VALVES, BLOW-OFFS, METERS, OR OTHER SUCH WATER DISTRIBUTION SYSTEM APPURTENANCES AND THAT ARE INCLUDED IN THIS PROJECT WILL NOT BE CONNECTED DIRECTLY TO ANY SANITARY OR STORM SEWER, AND BLOW-OFFS OR AIR RELEASE VALVES INSTALLED UNDER THIS PROJECT SHALL NOT BE CONNECTED DIRECTLY TO ANY SANITARY OR STORM SEWER.

25. NEW OR ALTERED WATER MAINS INCLUDED IN THIS PROJECT SHALL BE INSTALLED IN ACCORDANCE WITH APPLICABLE AWWA STANDARDS OR IN ACCORDANCE WITH MANUFACTURERS' RECOMMENDED PROCEDURES.

26. A CONTINUOUS AND UNIFORM BEDDING SHALL BE PROVIDED IN TRENCHES FOR UNDERGROUND PIPE INSTALLED UNDER THIS PROJECT; BACKFILL MATERIAL WILL BE TAMPED IN LAYERS AROUND UNDERGROUND PIPE INSTALLED UNDER THIS PROJECT AND TO A SUFFICIENT HEIGHT ABOVE THE PIPE TO ADEQUATELY SUPPORT AND PROTECT THE PIPE; AND UNSUITABLY SIZED STONES (AS DESCRIBED IN APPLICABLE AWWA STANDARDS OR MANUFACTURERS' RECOMMENDED INSTALLATION PROCEDURES) FOUND IN TRENCHES WILL BE REMOVED FOR A DEPTH OF AT LEAST SIX INCHES BELOW THE BOTTOM OF UNDERGROUND PIPE INSTALLED UNDER THIS PROJECT.

27. ALL BURIED PRESSURE PIPING INSTALLED UNDER THIS PROJECT SHALL USE RESTRAINED JOINTS WHERE REQUIRED TO PREVENT PIPE MOVEMENT DUE TO THRUST. ALL BURIED PRESSURE FITTINGS, PLUGS, VALVES AND HYDRANTS SHALL BE RESTRAINED WITH MECHANICAL JOINT RETAINER GLANDS (MEGALUG OR EQUIVALENT), WITH VALVES BEING RESTRAINED AS DEAD ENDS IN BOTH DIRECTIONS. REFER TO THE PIPE RESTRAINT JOINT SCHEDULE AND MECHANICAL RESTRAINT DETAILS IN THESE DRAWINGS. NO CONCRETE THRUST BLOCKS SHALL BE ALLOWED.

28. ALL BURIED DUCTILE IRON PIPE, FITTINGS AND VALVES SHALL BE ENCASED IN 8-MIL POLYETHYLENE (PE) IN ACCORDANCE WITH AWWA C105. REFER TO SPECIFICATIONS SECTION 331413 ADDITIONAL ENCASEMENT REQUIREMENTS.

29. NEW OR ALTERED WATER MAINS THAT ARE INCLUDED IN THIS PROJECT AND THAT WILL BE CONSTRUCTED OF POLYVINYL CHLORIDE PIPE SHALL BE PRESSURE AND LEAKAGE TESTED IN ACCORDANCE WITH AWWA STANDARD C605, AS INCORPORATED INTO RULES 62-555.320(21) AND 62-555.330, F.A.C., AND ALL OTHER NEW OR ALTERED WATER MAINS INCLUDED IN THIS PROJECT SHALL BE PRESSURE AND LEAKAGE TESTED IN ACCORDANCE WITH AWWA STANDARD C600 AS INCORPORATED INTO RULE 62-555.320(21) AND 62-555.330.

30. CONTRACTOR SHALL PROVIDE ALL TEMPORARY BACKFILLING, THRUST RESTRAINT, BRACING, TEST PLUGS, PUMPING EQUIPMENT, WATER METERS, PRESSURE GAUGES AND OTHER MATERIALS AND EQUIPMENT NEEDED TO COMPLETE HYDROSTATIC PRESSURE TESTING OF ALL APPLICABLE PIPING. ONCE CONTRACTOR HAS PERFORMED SATISFACTORY PRETESTING, CONTRACTOR SHALL NOTIFY OWNER AND ENGINEER 48 HOURS IN ADVANCE OF PROPOSED PRESSURE TESTING AND BACTERIOLOGICAL SAMPLING.

31. PRESSURE TESTING PIPE LENGTHS SHALL NOT EXCEED THE SPACING BETWEEN ISOLATION VALVES. PRESSURE TESTING AGAINST CLOSED VALVES IS ACCEPTABLE. REFER TO SPECIFICATION SECTIONS 330505.31 AND 330533 FOR ADDITIONAL HYDROSTATIC TESTING REQUIREMENTS.

32. BACTERIOLOGICAL SAMPLING SHALL CONFORM WITH THE FDEP PERMIT REQUIREMENTS INCLUDING A SAMPLE AT EVERY 1,200 LF OF WATER MAIN.

33. NEW OR ALTERED WATER MAINS, INCLUDING FIRE HYDRANT LEADS AND INCLUDING SERVICE LINES THAT WILL BE UNDER THE CONTROL OF A PUBLIC WATER SYSTEM AND THAT HAVE AN INSIDE DIAMETER OF THREE INCHES OR GREATER, SHALL BE FLUSHED DISINFECTED AND BACTERIOLOGICALLY EVALUATED IN ACCORDANCE WITH AWWA STANDARD C651, AS INCORPORATED INTO RULE 62-555.340, F.A.C.

34. TEMPORARY JUMPER CONNECTIONS ARE REQUIRED AT ALL CONNECTIONS BETWEEN EXISTING ACTIVE WATER SYSTEM AND PROPOSED NEW OR ALTERED WATER MAINS WHERE NEEDED FOR FILLING AND FLUSHING ACTIVITIES. JUMPER CONNECTIONS SHALL BE MAINTAINED UNTIL ALL FLUSHING, DISINFECTION, AND TESTING ARE COMPLETE TO THE OWNER'S SATISFACTION AND UNTIL CLEARANCE FOR SERVICE HAS BEEN ISSUED BY THE FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION (FDEP) AND ALL OTHER PERTINENT AGENCIES.

35. NEW OR ALTERED WATER MAINS THAT ARE INCLUDED IN THIS PROJECT AND THAT WILL BE INSTALLED IN AREAS WHERE THERE ARE KNOWN AGGRESSIVE SOIL CONDITIONS SHALL BE PROTECTED THROUGH USE OF CORROSION-RESISTANT WATER MAIN MATERIALS, THROUGH ENCASEMENT OF THE WATER MAINS IN POLYETHYLENE, OR THROUGH PROVISION OF CATHODIC PROTECTION.

36. NEW OR RELOCATED UNDERGROUND UTILITIES SHALL MEET THE SEPARATION REQUIREMENTS OF CHAPTER 62-555.314 F.A.C. WHERE MINIMUM SEPARATION BETWEEN UTILITIES IS REQUIRED, SEPARATION DISTANCES SHALL BE MEASURED FROM OUTSIDE OF PIPE TO OUTSIDE OF PIPE. REFER TO THE TYPICAL PIPE SEPARATION DETAIL IN THESE DRAWINGS.

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P.E. NO.: 45239

WATER & SEWER NOTES
ELLISVILLE WATER MAIN EXTENSION
COLUMBIA COUNTY, FLORIDA

SHEET NO. 5

WATER AND SEWER NOTES (CONTINUED)

37. NEW OR RELOCATED, UNDERGROUND WATER MAINS INCLUDED IN THIS PROJECT SHALL BE LAID TO PROVIDE A HORIZONTAL DISTANCE OF AT LEAST THREE FEET BETWEEN THE OUTSIDE OF THE WATER MAIN AND THE OUTSIDE OF ANY EXISTING OR PROPOSED VACUUM-TYPE SANITARY SEWER, STORM SEWER, STORMWATER FORCE MAIN, OR PIPELINE CONVEYING RECLAIMED WATER REGULATED UNDER PART III OF CHAPTER 62-610, F.A.C.

38. NEW OR RELOCATED, UNDERGROUND WATER MAINS INCLUDED IN THIS PROJECT SHALL HAVE A HORIZONTAL DISTANCE OF AT LEAST SIX FEET, AND TEN FEET IS PREFERRED BETWEEN THE OUTSIDE OF THE WATER MAIN AND THE OUTSIDE OF ANY EXISTING OR PROPOSED GRAVITY-TYPE SANITARY SEWER, EXISTING OR PROPOSED PRESSURE-TYPE SANITARY SEWER, WASTEWATER FORCE MAIN, OR PIPELINE CONVEYING RECLAIMED WATER NOT REGULATED UNDER PART III OF CHAPTER 62-610, F.A.C.

38. THE HORIZONTAL SEPARATION DISTANCE BETWEEN WATER MAINS AND GRAVITY-TYPE SANITARY SEWERS MAY BE REDUCED TO THREE FEET WHERE THE BOTTOM OF THE WATER MAIN IS LAID AT LEAST SIX INCHES, TWELVE INCHES IS PREFERRED, ABOVE THE TOP OF THE SEWER.

39. A HORIZONTAL SEPARATION DISTANCE OF AT LEAST TEN FEET SHALL BE MAINTAINED BETWEEN THE OUTSIDE OF THE WATER MAIN AND ALL PARTS OF ANY EXISTING OR PROPOSED "ON-SITE SEWAGE TREATMENT AND DISPOSAL SYSTEM".

40. NEW OR RELOCATED, UNDERGROUND WATER MAINS THAT ARE INCLUDED IN THIS PROJECT AND THAT WILL CROSS ANY EXISTING OR PROPOSED GRAVITY- OR VACUUM-TYPE SANITARY SEWER OR STORM SEWER SHALL BE LAID SO THE OUTSIDE OF THE WATER MAIN IS AT LEAST 6 INCHES, PREFERABLY 12 INCHES ABOVE THE OTHER PIPELINE. NEW OR RELOCATED, UNDERGROUND WATER MAINS THAT ARE INCLUDED IN THIS PROJECT AND THAT WILL CROSS ANY EXISTING OR PROPOSED PRESSURE-TYPE SANITARY SEWER, WASTEWATER OR STORMWATER FORCE MAIN, OR PIPELINE CONVEYING RECLAIMED WATER WILL BE LAID SO THE OUTSIDE OF THE WATER MAIN IS AT LEAST 12 INCHES ABOVE THE OUTSIDE OF THE OTHER PIPELINE. HOWEVER IT IS PREFERABLE TO LAY THE WATER MAIN ABOVE OR BELOW THE OTHER PIPELINE. REFER TO THE UTILITY CONFLICT ADJUSTMENT DETAILS IN THESE DRAWINGS.

41. AT THE UTILITY CROSSINGS DESCRIBED ABOVE, SEPARATION DISTANCE SHALL NOT APPLY WHERE A WATER SERVICE PIPE CROSSES A SEWER PIPE, PROVIDED THE WATER SERVICE PIPE IS SLEEVED TO AT LEAST FIVE FEET HORIZONTALLY FROM THE SEWER PIPE CENTERLINE ON BOTH SIDES OF SUCH CROSSINGS WITH PIPE MATERIAL LISTED IN FLORIDA BUILDING CODE SECTION 603.2.

42. CONTRACTOR SHALL PROVIDE AN AS-BUILT SURVEY, MEETING THE REQUIREMENTS OF CHAPTER 61G17 F.A.C. FOR THE POTABLE WATER MAIN EXTENSION AND THE SANITARY SEWER COLLECTION AND TRANSMISSION. INCLUDE HORIZONTAL AND VERTICAL DIMENSIONAL DATA SO THAT IMPROVEMENTS ARE LOCATED AND DELINEATED RELATIVE TO THE BOUNDARY. PROVIDE SUFFICIENT DETAILED DATA TO DETERMINE WHETHER THE IMPROVEMENTS WERE CONSTRUCTED IN ACCORDANCE WITH THE PLANS. A COPY OF THE AS-BUILT SURVEY (IN PAPER AND DIGITAL AUTOCAD FORMAT) MUST BE SUBMITTED TO OWNER AND THE ENGINEER

43. AS-BUILT INFORMATION FOR BURIED UTILITIES SHALL INCLUDE, BUT NOT BE LIMITED TO, THE FOLLOWING:
1. CERTIFICATION THAT ALL BURIED UTILITIES MEET THE MINIMUM COVER AND SEPARATION REQUIREMENTS.
2. HORIZONTAL AND VERTICAL LOCATION OF ALL JOINT DEFLECTIONS, FITTINGS, VALVES, AND HYDRANTS.
3. HORIZONTAL AND VERTICAL LOCATION OF ALL PIPING AT 50-FOOT INTERVALS.
4.HORIZONTAL AND VERTICAL LOCATION DATA FOR ALL CONSTRUCTION THAT DEVIATES FROM THE APPROVED ENGINEERING PLANS.

44. CONTRACTOR SHALL PROVIDE POTABLE WATER TEST REPORTS IN ACCORDANCE WITH FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION REQUIREMENTS AFTER DISINFECTION OF THE SYSTEM.

45. WHERE THE DISTANCE BETWEEN AN EXISTING POWER POLE AND THE TOP OF UTILITY TRENCH IS LESS THAN THE TRENCH DEPTH, CONTRACTOR EITHER SHALL USE A TRENCH BOX OR SHALL COORDINATE WITH THE APPLICABLE ELECTRIC UTILITY PROVIDER TO SECURE THE POWER POLE DURING TRENCHING AND UTILITY CONSTRUCTION.

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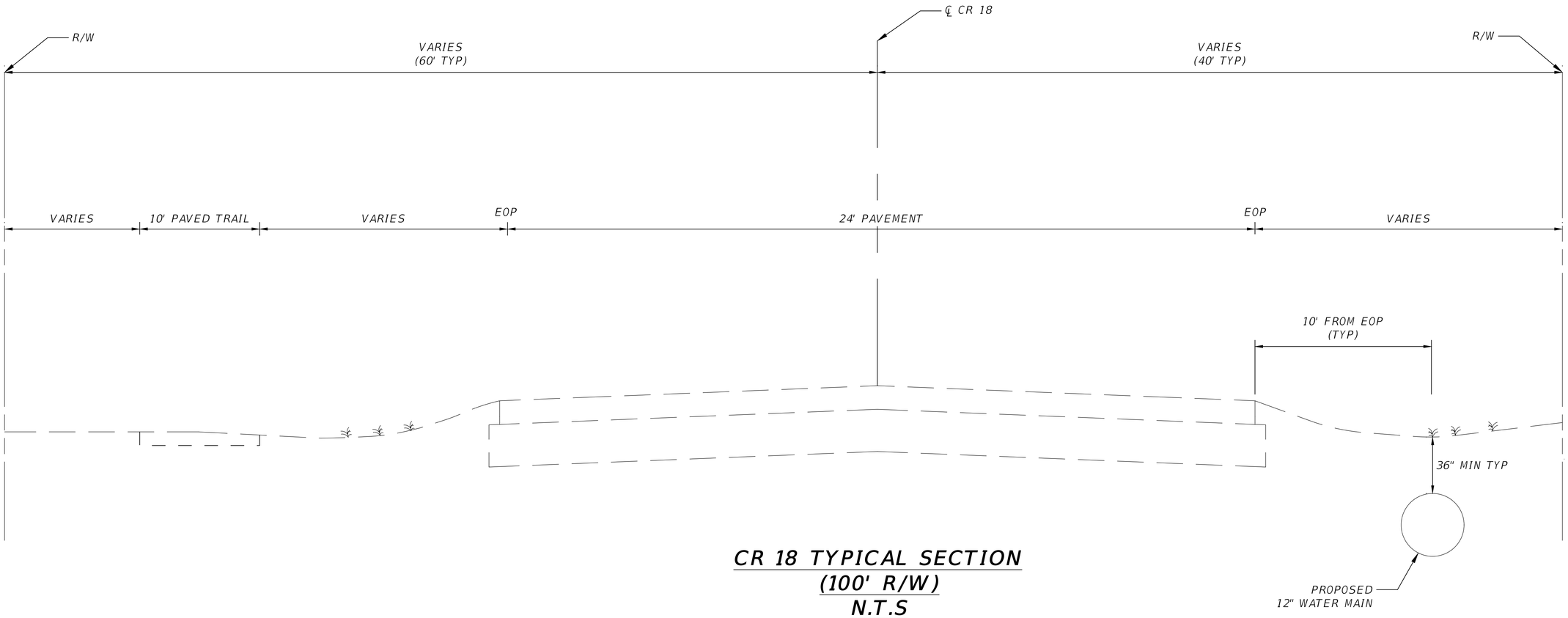
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P.E. NO.: 45239

WATER & SEWER NOTES
ELLISVILLE WATER MAIN EXTENSION
COLUMBIA COUNTY, FLORIDA

SHEET NO. 6



CR 18 TYPICAL SECTION
(100' R/W)
N.T.S

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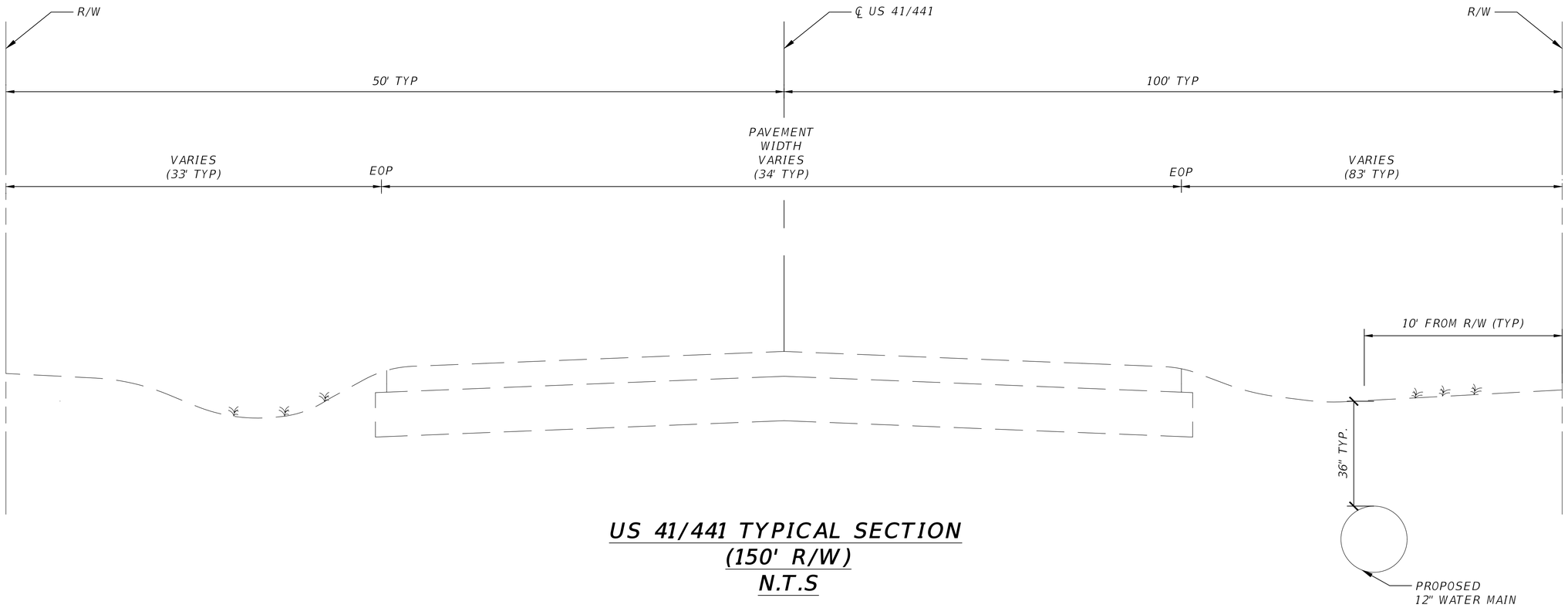
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TYPICAL SECTIONS
ELLISVILLE WATER MAIN EXTENSION
COLUMBIA COUNTY, FLORIDA

SHEET NO. 7

Cayden Sanders 11/28/2023 3:05:58 PM X:\2022\L220110CCB\H.CADD\Roadway\KEYSRD01_ELLISVILLE_WATERLINE.dwg 7 TYPICAL SECTIONS



US 41/441 TYPICAL SECTION
(150' R/W)
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TYPICAL SECTIONS
ELLISVILLE WATER MAIN EXTENSION
COLUMBIA COUNTY, FLORIDA

SHEET NO. 8

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KEY MAP

ELLISVILLE WATER MAIN EXTENSION
COLUMBIA COUNTY, FLORIDA

SHEET NO. 9

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KEY MAP

ELLISVILLE WATER MAIN EXTENSION
COLUMBIA COUNTY, FLORIDA

SHEET NO. 10

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KEY MAP

ELLISVILLE WATER MAIN EXTENSION
COLUMBIA COUNTY, FLORIDA

SHEET NO. 11

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KEY MAP
ELLISVILLE WATER MAIN EXTENSION
COLUMBIA COUNTY, FLORIDA

SHEET NO. 12

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KEY MAP

ELLISVILLE WATER MAIN EXTENSION
COLUMBIA COUNTY, FLORIDA

SHEET NO. 13

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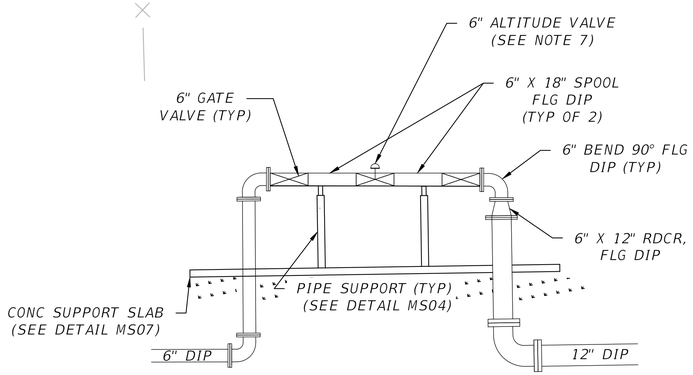
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P.E. NO.: 45239

KEY MAP

ELLISVILLE WATER MAIN EXTENSION
COLUMBIA COUNTY, FLORIDA

SHEET NO. 14

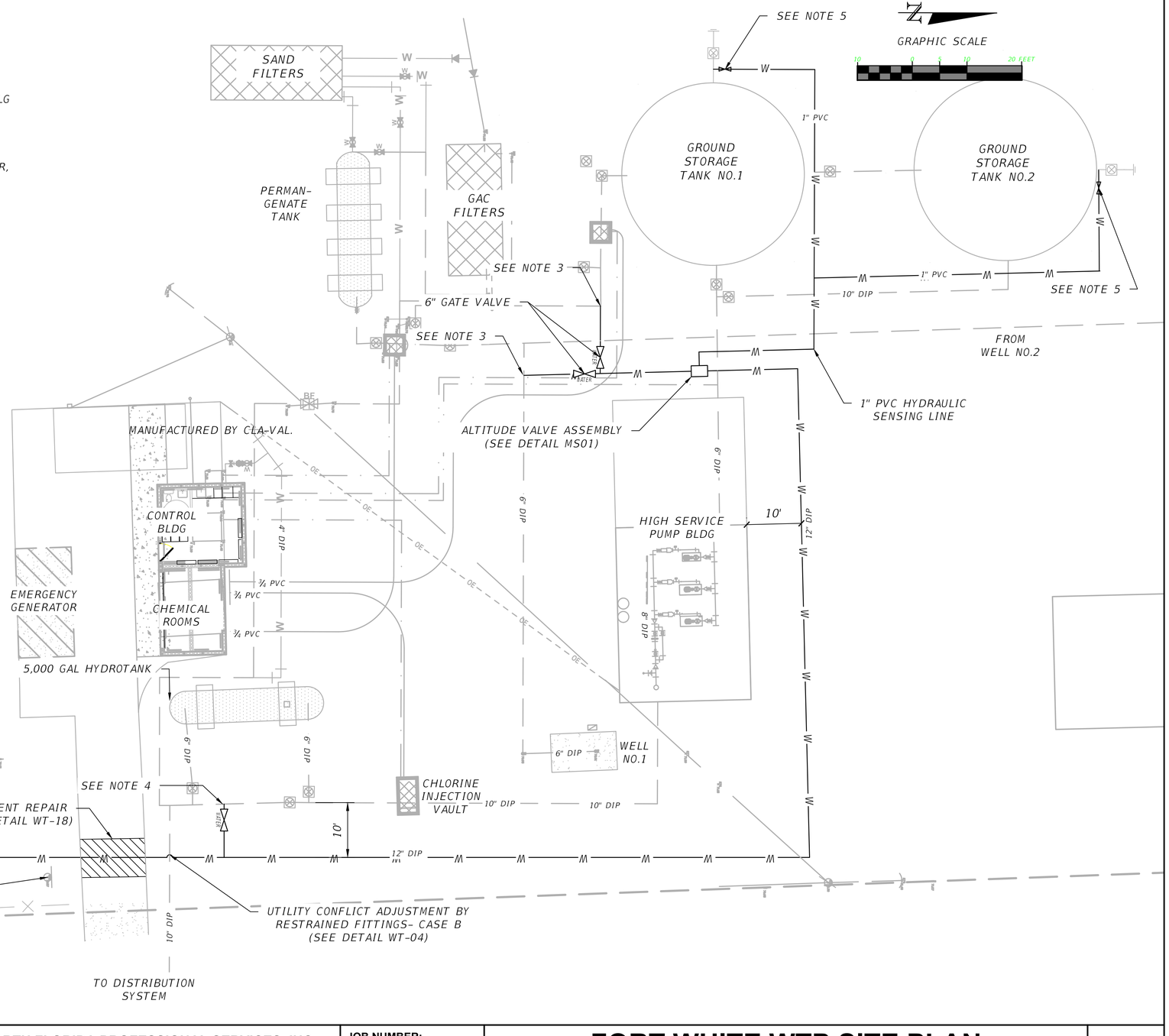
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MS01 ALTITUDE VALVE ASSEMBLY
SCALE: N.T.S

NOTES

1. LOCATION, SIZE AND MATERIALS OF EXISTING BURIED PIPING ARE BASED ON AVAILABLE RECORD DOCUMENTS. CONTRACTOR SHALL FIELD VERIFY AND SHALL PROVIDE ALL FITTINGS, RESTRAINTS AND OTHER MATERIALS OR ADJUSTMENTS REQUIRED FOR CONNECTIONS SHOWN.
2. TEMPORARILY REMOVE EXISTING SITE FENCING AND SIGNAGE AS NEEDED FOR CONSTRUCTION. REPLACE ALL DISTURBED ITEMS TO PRE-EXISTING CONDITIONS.
3. FURNISH AND INSTALL FULLY-RESTRAINED CONNECTION TO EXISTING RAW WATER MAIN WHERE SHOWN. PROVIDE REDUCING FITTINGS AS REQUIRED FOR CONNECTION
4. FURNISH AND INSTALL 10 X 10" MJ FABRICATED STEEL TAPPING SLEEVE ON EXISTING 10" DIP WATER MAIN. PROVIDE WET TAP WITH 10" GATE VALVE, BOX AND COVER.
5. FURNISH AND INSTALL 4" X 1" TAPPING SLEEVE ON EXISTING 4" DIP TANK DRAIN PIPE (TYP 2 PLACES). PROVIDE 1" WET TAP WITH 1" BALL VALVE 1" PVC (SCH 80) SENSING LINE.
6. YARD PIPING 4" DIAMETER AND LARGER WITHIN FT WHITE WTP SITE SHALL BE DIP (NOT HDPE). BURIED DUCTILE IRON PIPING, FITTINGS AND VALVES SHALL BE ENCASED IN POLYETHYLENE (PE), AS PER SPECIFICATION SECTION 331413.
7. PRESSURE SUSTAINING (ALTITUDE) CONTROL VALVE SHALL BE MODEL 210-09 AS MANUFACTURED BY CLA-VAL.



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P.E. NO.: 45239

FORT WHITE WTP SITE PLAN
ELLISVILLE WATER MAIN EXTENSION
COLUMBIA COUNTY, FLORIDA

SHEET NO. 15

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NOTES

1. FURNISH & INSTALL FINISHED WATER FLOWMETER WITH BURIED PRECAST VAULT AS SHOWN.
2. EXISTING PIPING LOCATIONS ARE APPROXIMATE. FIELD VERIFY ALL BURIED PIPING AND CONDUIT IN THE VICINITY OF THE PROPOSED WORK PRIOR TO EXCAVATION. INSTALL ALL EQUIPMENT PER MFR RECOMMENDATIONS.
3. ROUTE FLOWMETER CABLE (BY MFR) TO EXISTING CONTROL ROOM, AND TERMINATE AT EXISTING BREAKER PANEL WITH A 20-AMP, SINGLE-POLE BREAKER. UPDATE PANEL DIRECTORY.
4. COORDINATE LOCATION OF WALL-MOUNTED DISPLAY IN CONTROL ROOM WITH OWNER.



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2551 BLAIRSTONE PINES DR. — TALLAHASSEE, FL 32301 — WWW.NFPS.NET — CA# 29011

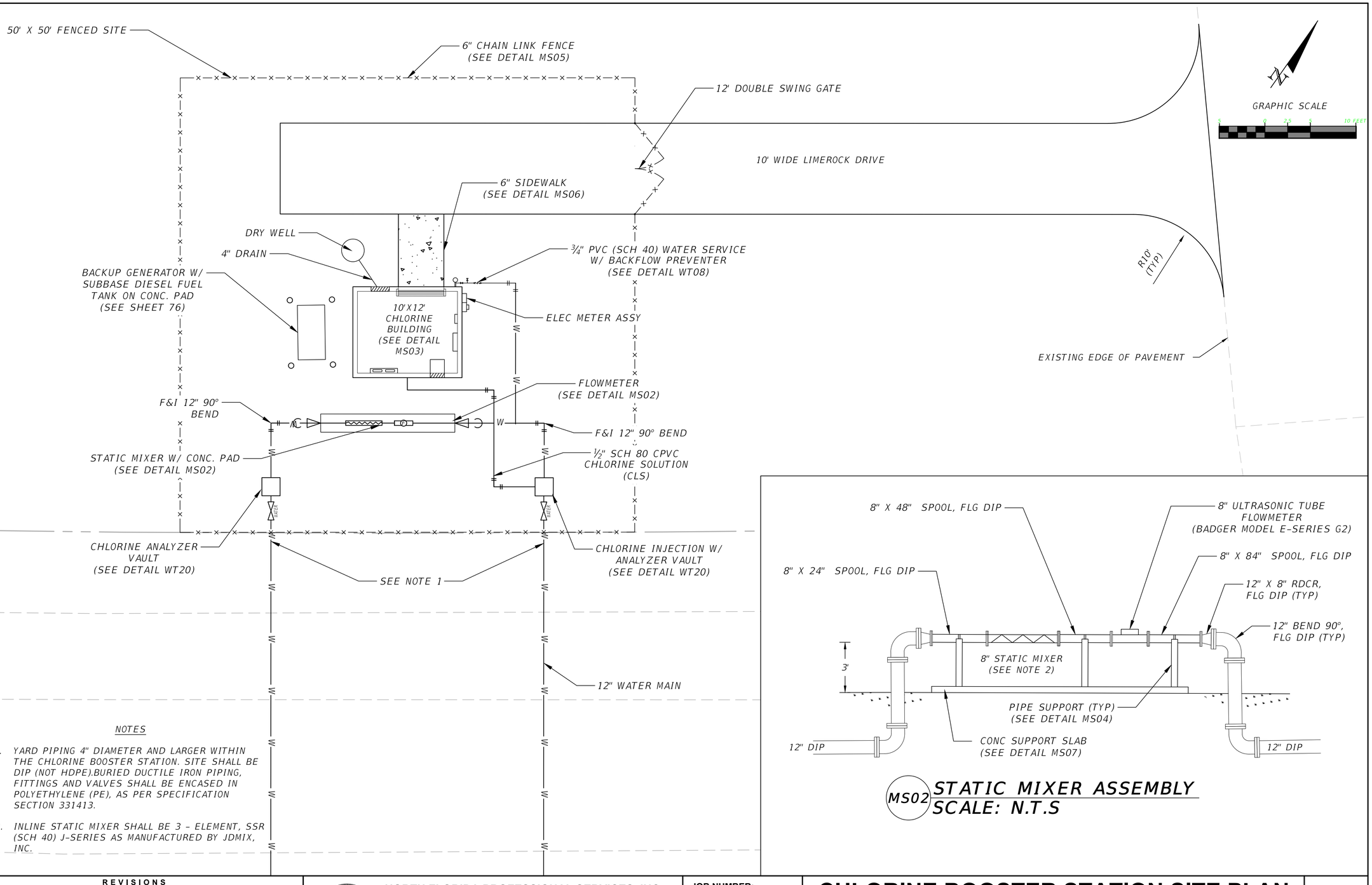
JOB NUMBER: L220110CCB
EOR: RICKY L. HENDRIX
P.E. NO.: 45239

ELLISVILLE WTP SITE PLAN

ELLISVILLE WATER MAIN EXTENSION
COLUMBIA COUNTY, FLORIDA

SHEET NO. 16

Cayden Sanders 11/28/2023 3:06:33 PM X:\2022\L220110CCB\H.CADD\Roadway\DSGNRD02_ELLISVILLE_WATERLINE(ADENDUM5).dwg



MS02 **STATIC MIXER ASSEMBLY**
SCALE: N.T.S

NOTES

1. YARD PIPING 4" DIAMETER AND LARGER WITHIN THE CHLORINE BOOSTER STATION. SITE SHALL BE DIP (NOT HDPE).BURIED DUCTILE IRON PIPING, FITTINGS AND VALVES SHALL BE ENCASED IN POLYETHYLENE (PE), AS PER SPECIFICATION SECTION 331413.
2. INLINE STATIC MIXER SHALL BE 3 – ELEMENT, SSR (SCH 40) J-SERIES AS MANUFACTURED BY JDMIX, INC.

REVISIONS	
DATE	DESCRIPTION

NORTH FLORIDA PROFESSIONAL SERVICES, INC.
P.O. BOX 3823
LAKE CITY, FL 32056
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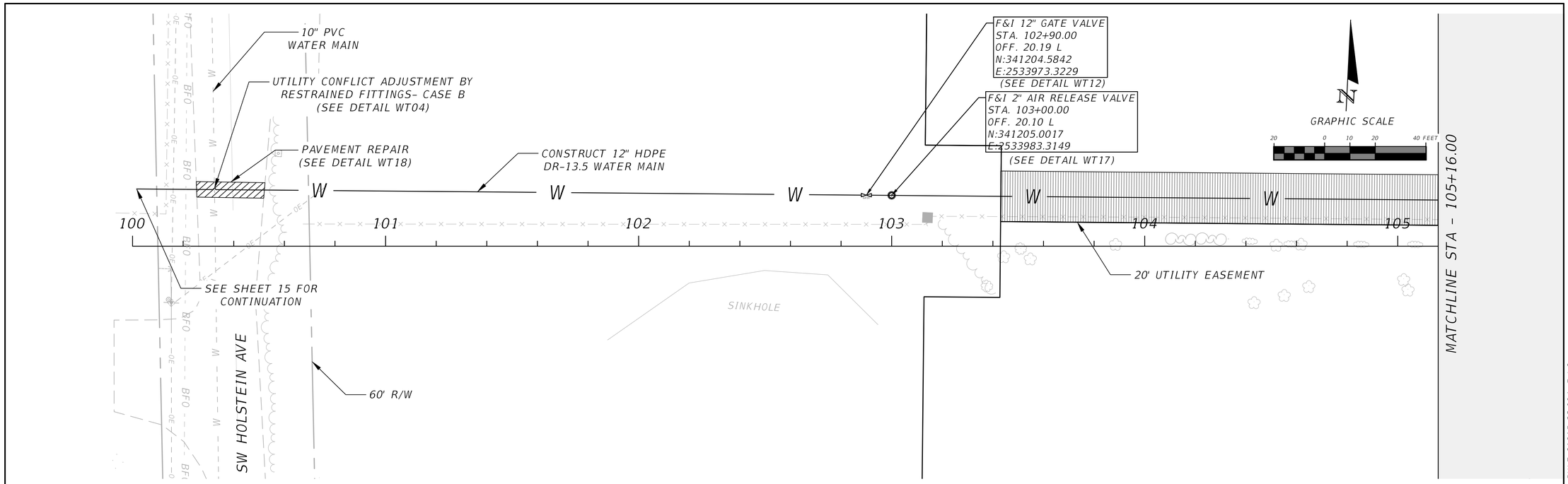
JOB NUMBER: L220110CCB
EOR: RICKY L. HENDRIX
P.E. NO.: 45239

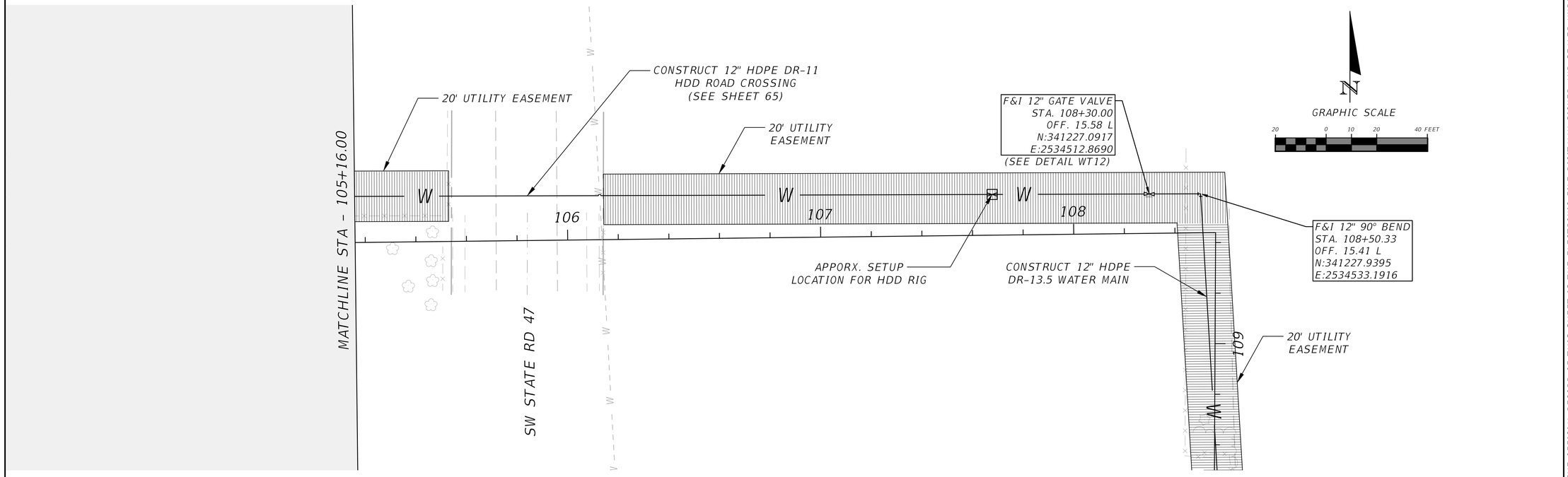
CHLORINE BOOSTER STATION SITE PLAN

ELLISVILLE WATER MAIN EXTENSION
COLUMBIA COUNTY, FLORIDA

SHEET NO. 17

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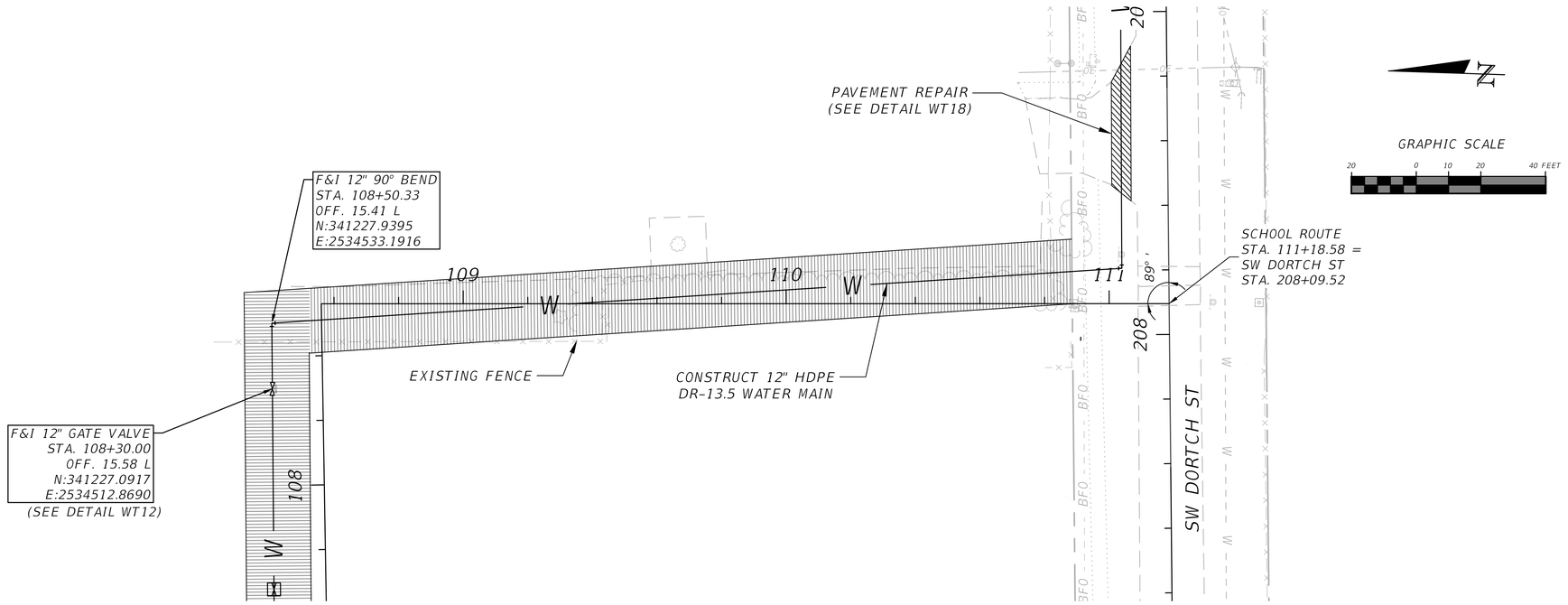
SCHOOL ROUTE PLAN1

ELLISVILLE WATER MAIN EXTENSION
COLUMBIA COUNTY, FLORIDA

SHEET NO. 18

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JOB NUMBER: L220110CCB
EOR: RICKY L. HENDRIX
P.E. NO.: 45239

SCHOOL ROUTE PLAN
ELLISVILLE WATER MAIN EXTENSION
COLUMBIA COUNTY, FLORIDA

SHEET NO. 19

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HYDRANT NOTES:
1. CLEAR VEGETATION IN A 20'-WIDE PATH FROM EOP TO R/W LINE, CENTERED ON HYDRANT.
2. INSTALL BLUE RAISED PAVEMENT MARKER (RPM) FOR EACH HYDRANT PER FDOT STANDARD INDEX 706-001.

F&I 12" 90° BEND
STA. 208+20.62
OFF. 14.54 L
N:340965.4853
E:2534559.0089

PAVEMENT REPAIR (SEE DETAIL WT18)

EXISTING FENCE

60' R/W

CONSTRUCT 12" HDPE DR-13.5 WATER MAIN

SIDEWALK REPAIR (SEE DETAIL WT18)

F&I FIRE HYDRANT ASSEMBLY
STA. 211+15.00
OFF. 19.96 L
N:340982.8560
E:2534853.1075
(SEE HYDRANT NOTES)

F&I 12" GATE VALVE
STA. 211+20.00
OFF. 13.81 L
N:340976.8788
E:2534858.3084
(SEE DETAIL WT12)

SW HORTON DR

UTILITY CONFLICT ADJUSTMENT BY RESTRAINED FITTINGS- CASE B (SEE DETAIL WT04)

PAVEMENT REPAIR (SEE DETAIL WT18)

208 111 89° 209 210 211 212 213

SW DORTCH ST

SCHOOL ROUTE
STA. 111+18.58 = SW DORTCH ST STA. 208+09.52

EXISTING FENCE

EXISTING WATER MAIN

SW BRYANT AVE

60' R/W

EXISTING FENCE

SW DONNELY AVE

MATCHLINE STA - 213+36.00

GRAPHIC SCALE
20 0 10 20 40 FEET

MATCHLINE STA - 213+36.00

SW DONNELY AVE

GRAPHIC SCALE
20 0 10 20 40 FEET

F&I 12" GATE VALVE
STA. 216+40.00
OFF. 15.11 L
N:340996.6446
E:2535377.8075
(SEE DETAIL WT12)

EXISTING FENCE

CONSTRUCT 12" HDPE DR-13.5 WATER MAIN

60' R/W

HYDRANT NOTES:
1. CLEAR VEGETATION IN A 20'-WIDE PATH FROM EOP TO R/W LINE, CENTERED ON HYDRANT.
2. INSTALL BLUE RAISED PAVEMENT MARKER (RPM) FOR EACH HYDRANT PER FDOT STANDARD INDEX 706-001.

F&I FIRE HYDRANT ASSEMBLY
STA. 219+10.00
OFF. 20.00 L
N:341012.7335
E:2535647.3720
(SEE HYDRANT NOTES)

SW DORTCH ST

F&I 12" GATE VALVE
STA. 219+15.00
OFF. 14.16 L
N:341007.1029
E:2535652.6101
(SEE DETAIL WT12)

EXISTING WATER MAIN

EXISTING HYDRANT

60' R/W

MATCHLINE STA - 219+22.00

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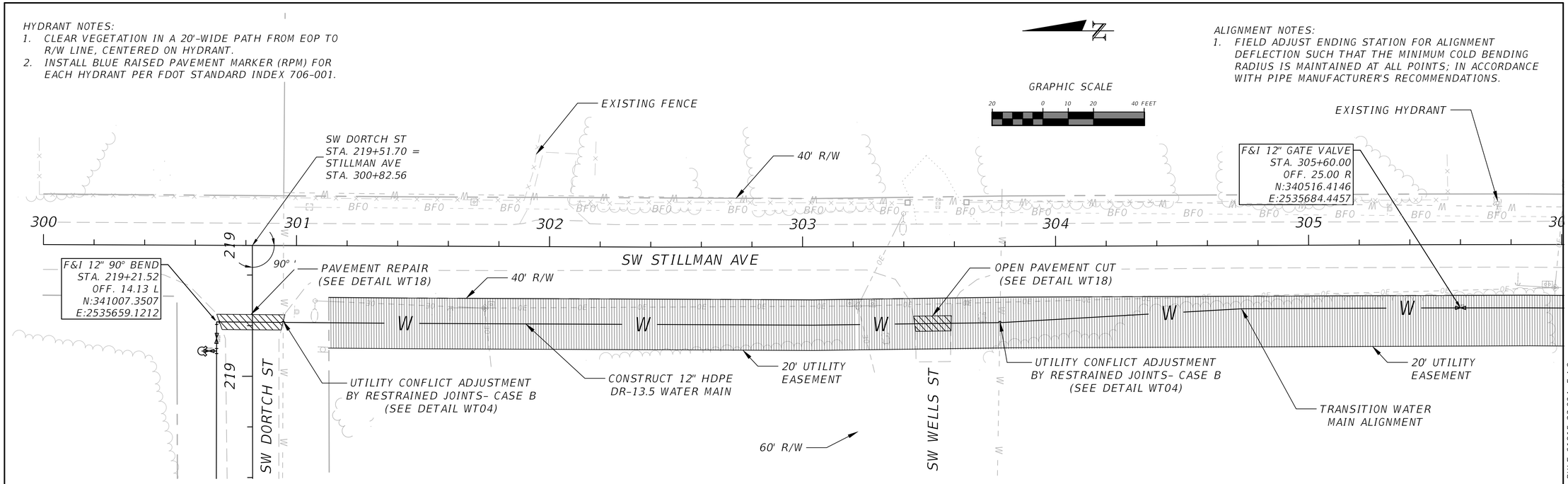
DORTCH ST PLAN
ELLISVILLE WATER MAIN EXTENSION
COLUMBIA COUNTY, FLORIDA

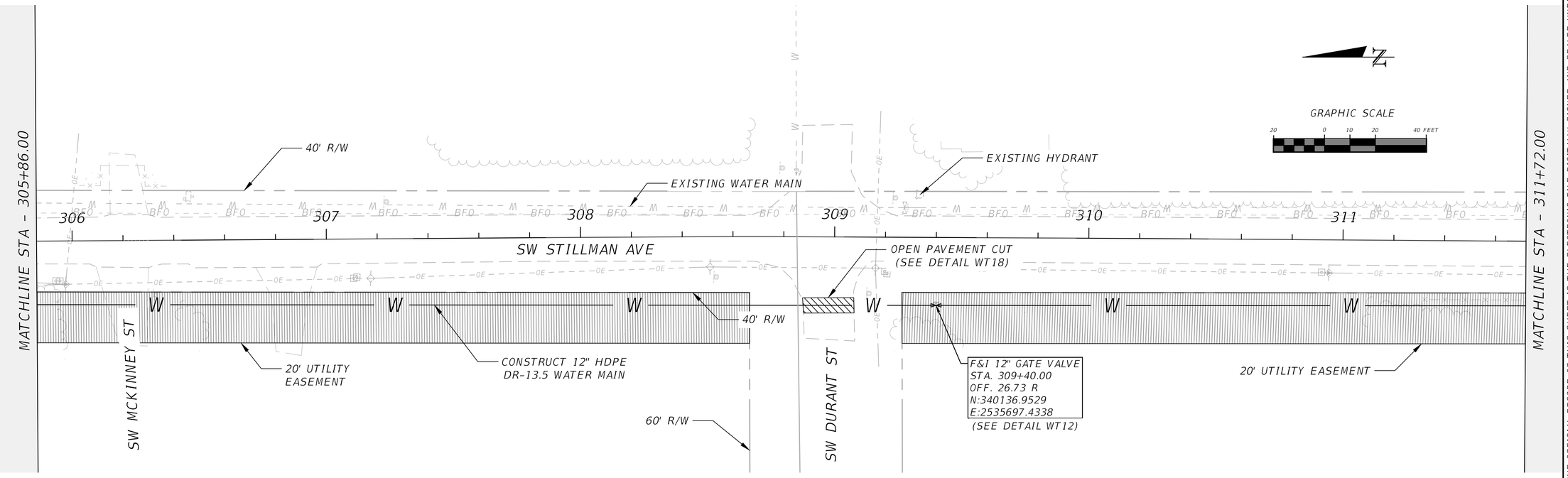
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HYDRANT NOTES:
1. CLEAR VEGETATION IN A 20'-WIDE PATH FROM EOP TO R/W LINE, CENTERED ON HYDRANT.
2. INSTALL BLUE RAISED PAVEMENT MARKER (RPM) FOR EACH HYDRANT PER FDOT STANDARD INDEX 706-001.

ALIGNMENT NOTES:
1. FIELD ADJUST ENDING STATION FOR ALIGNMENT DEFLECTION SUCH THAT THE MINIMUM COLD BENDING RADIUS IS MAINTAINED AT ALL POINTS; IN ACCORDANCE WITH PIPE MANUFACTURER'S RECOMMENDATIONS.





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P.E. NO.: 45239

STILLMAN AVE PLAN
ELLISVILLE WATER MAIN EXTENSION
COLUMBIA COUNTY, FLORIDA

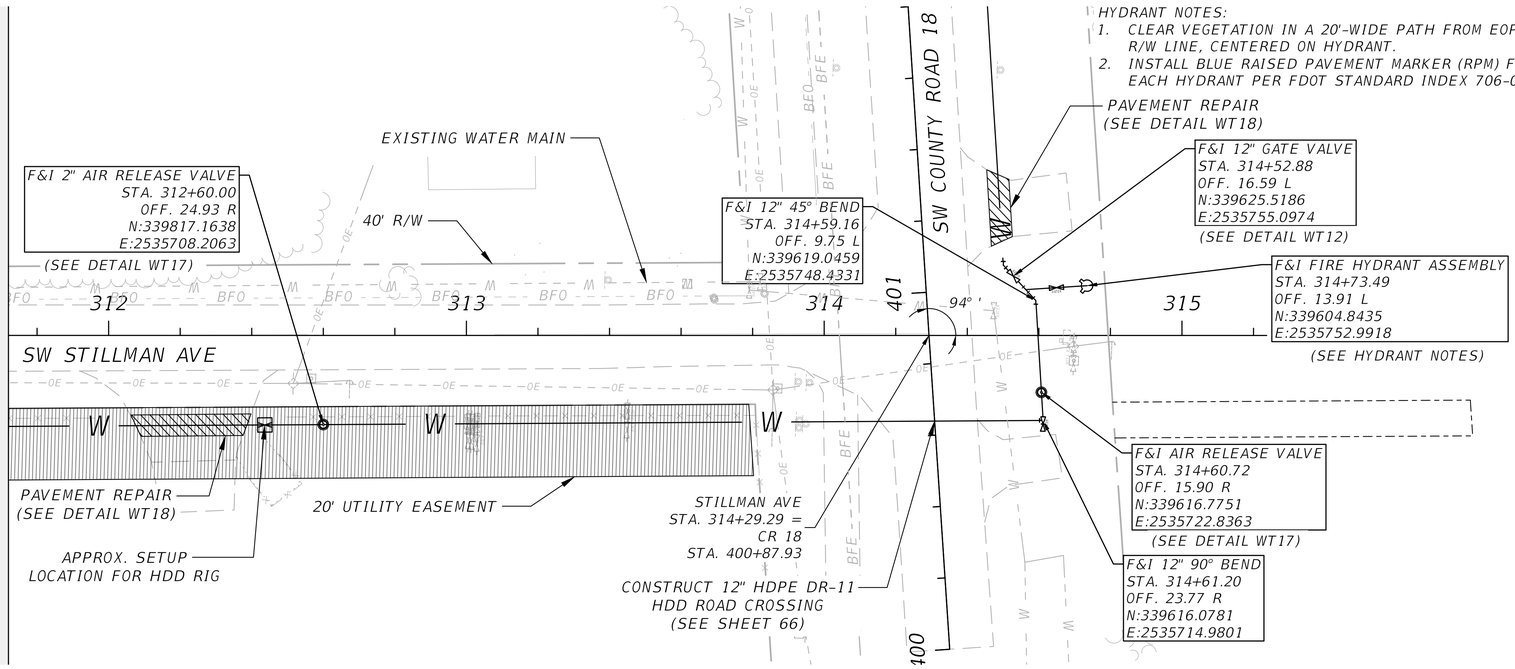
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GRAPHIC SCALE

20 0 10 20 40 FEET

MATCHLINE STA - 311+72.00



HYDRANT NOTES:
1. CLEAR VEGETATION IN A 20'-WIDE PATH FROM EOP TO R/W LINE, CENTERED ON HYDRANT.
2. INSTALL BLUE RAISED PAVEMENT MARKER (RPM) FOR EACH HYDRANT PER FDOT STANDARD INDEX 706-001.

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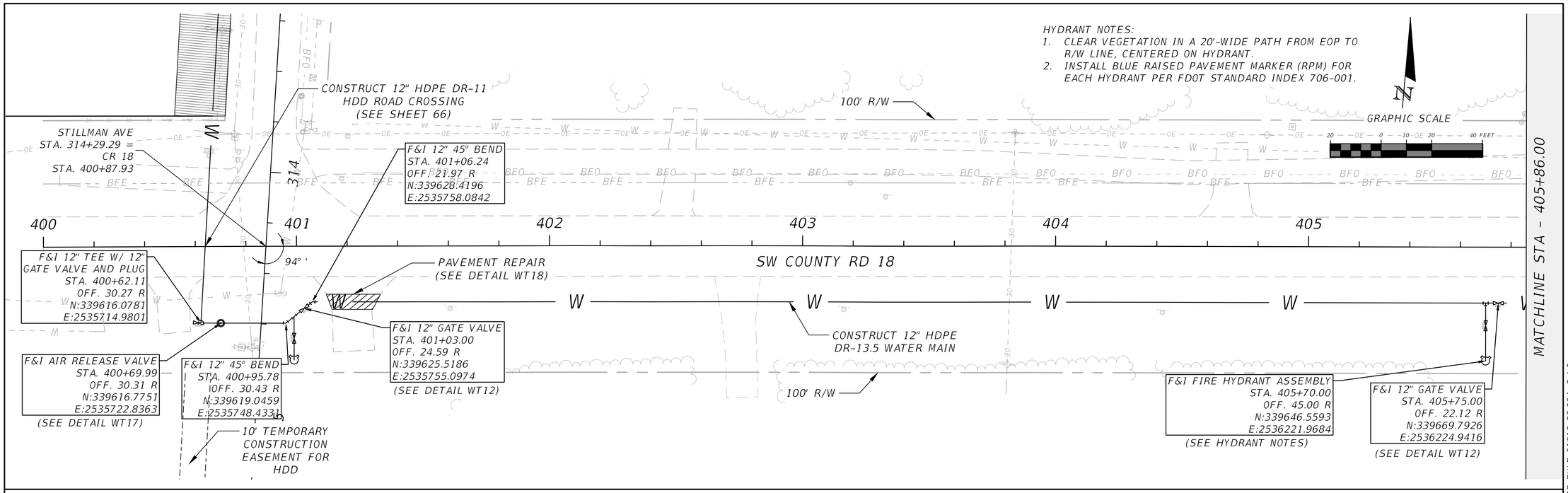
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WWW.NFPS.NET
CA# 29011

JOB NUMBER: L220110CCB
EOR: RICKY L. HENDRIX
P.E. NO.: 45239

STILLMAN AVE PLAN
ELLISVILLE WATER MAIN EXTENSION
COLUMBIA COUNTY, FLORIDA

SHEET NO. 22



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CA# 29011

JOB NUMBER: L220110CCB
EOR: RICKY L. HENDRIX
P.E. NO.: 45239

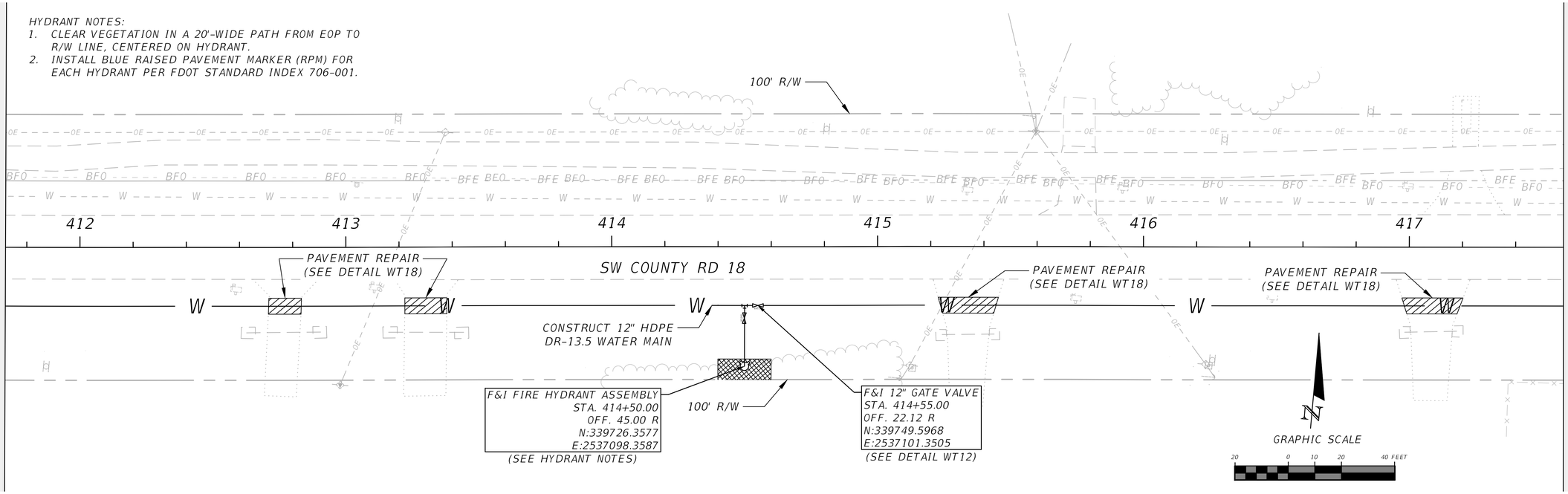
CR 18 PLAN

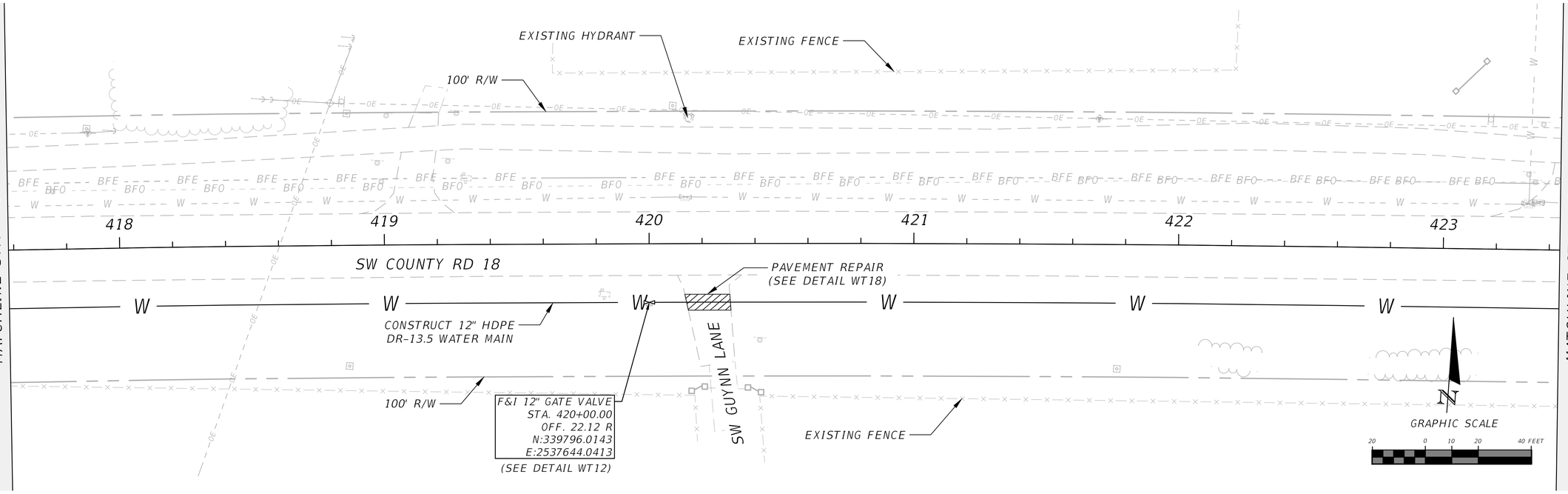
ELLISVILLE WATER MAIN EXTENSION
COLUMBIA COUNTY, FLORIDA

SHEET NO. 23

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HYDRANT NOTES:
1. CLEAR VEGETATION IN A 20'-WIDE PATH FROM EOP TO R/W LINE, CENTERED ON HYDRANT.
2. INSTALL BLUE RAISED PAVEMENT MARKER (RPM) FOR EACH HYDRANT PER FDOT STANDARD INDEX 706-001.





REVISIONS	
DATE	DESCRIPTION
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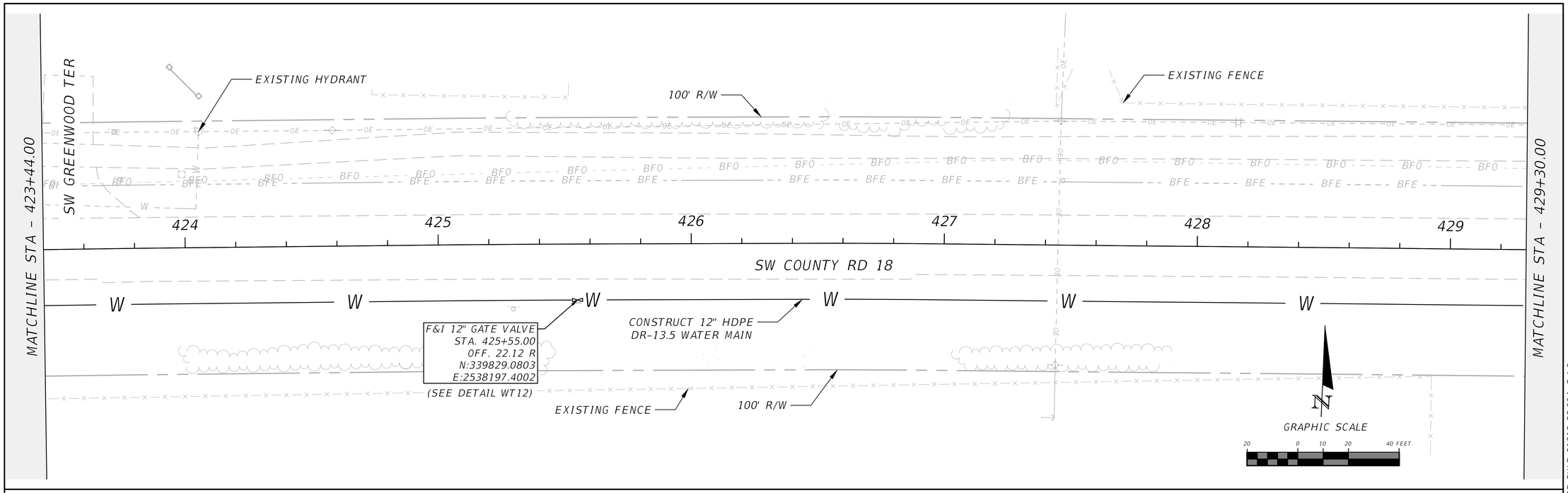
NORTH FLORIDA PROFESSIONAL SERVICES, INC.
P.O. BOX 3823
LAKE CITY, FL 32056
PH. 386-752-4675
LIC NO. LB8356
2551 BLAIRSTONE PINES DR.
TALLAHASSEE, FL 32301
WWW.NFPS.NET
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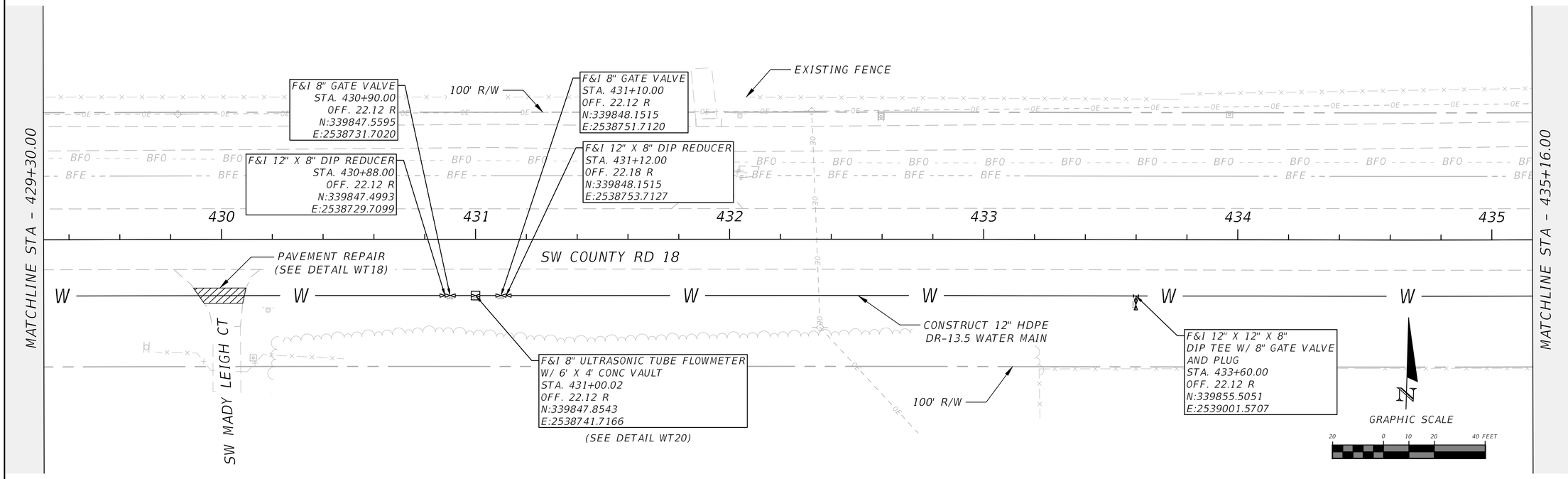
JOB NUMBER: L220110CCB
EOR: RICKY L. HENDRIX
P.E. NO.: 45239

CR 18 PLAN
ELLISVILLE WATER MAIN EXTENSION
COLUMBIA COUNTY, FLORIDA

SHEET NO. 24

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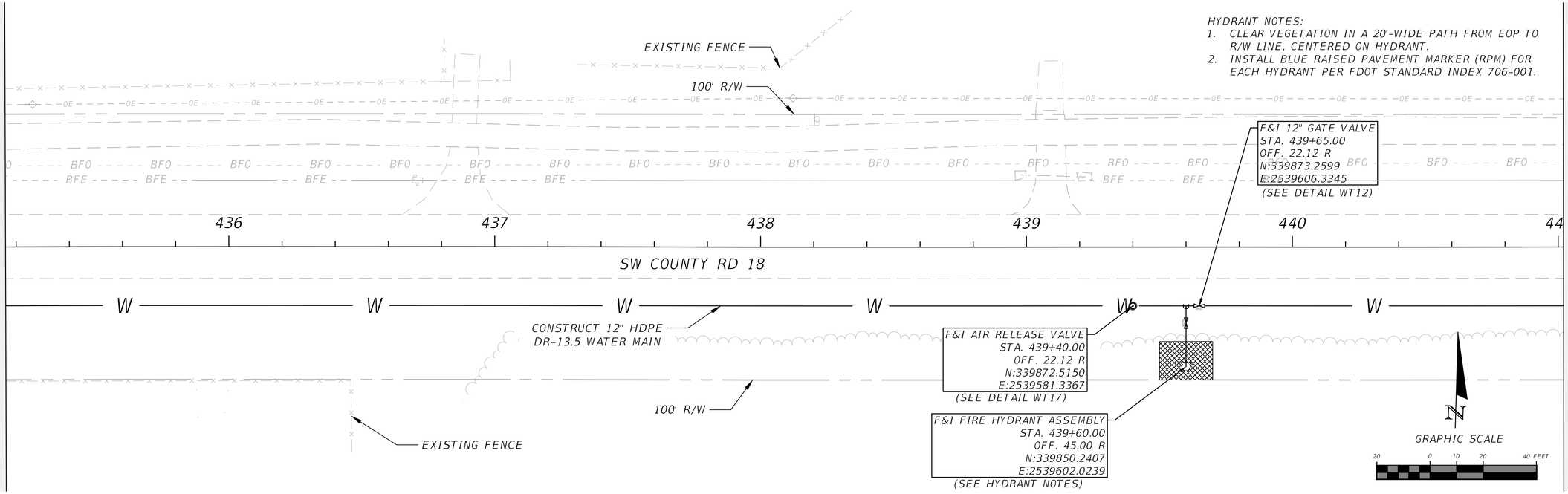
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P.E. NO.: 45239

CR 18 PLAN
ELLISVILLE WATER MAIN EXTENSION
COLUMBIA COUNTY, FLORIDA

SHEET NO. 25

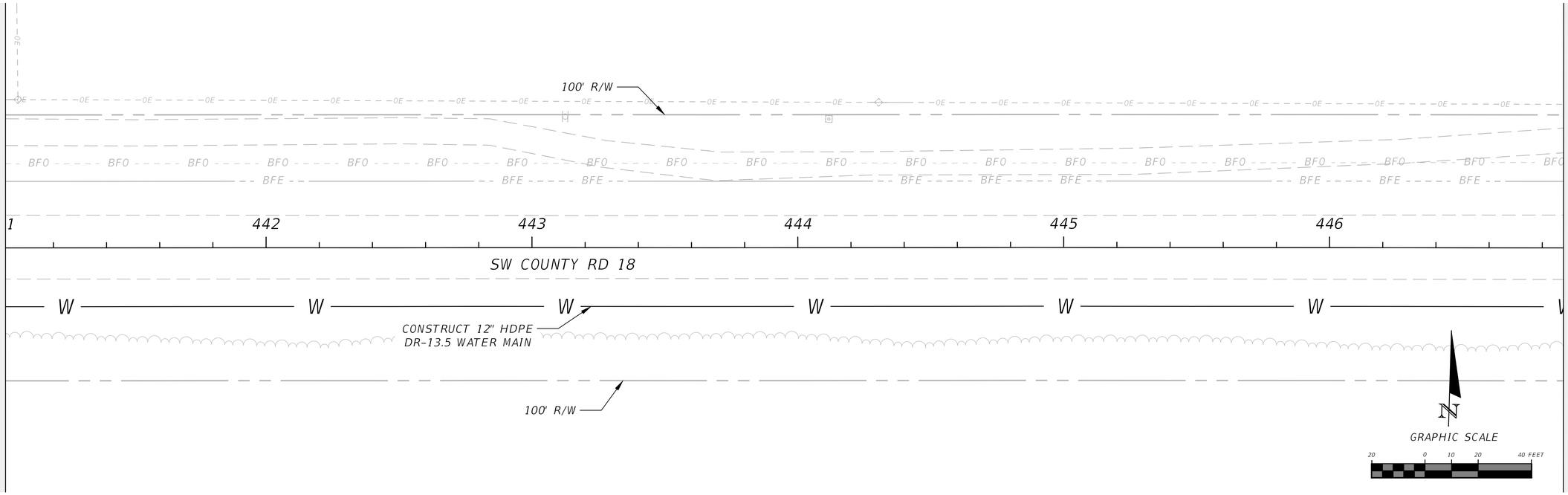
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MATCHLINE STA - 435+16.00



MATCHLINE STA - 441+02.00

MATCHLINE STA - 446+88.00



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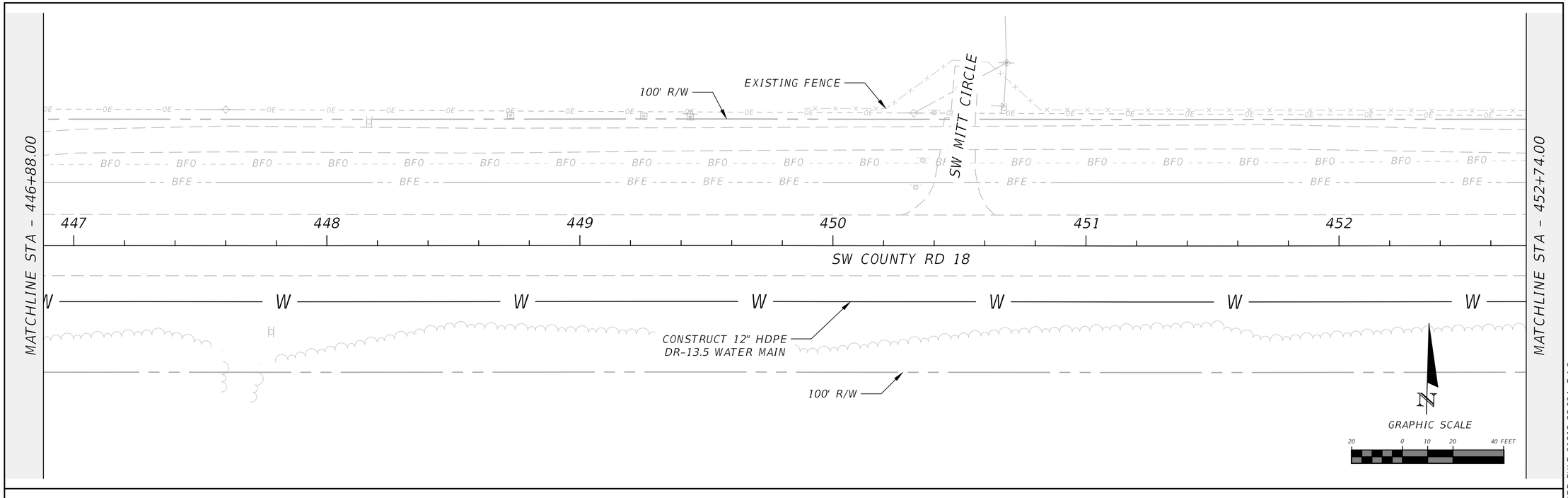
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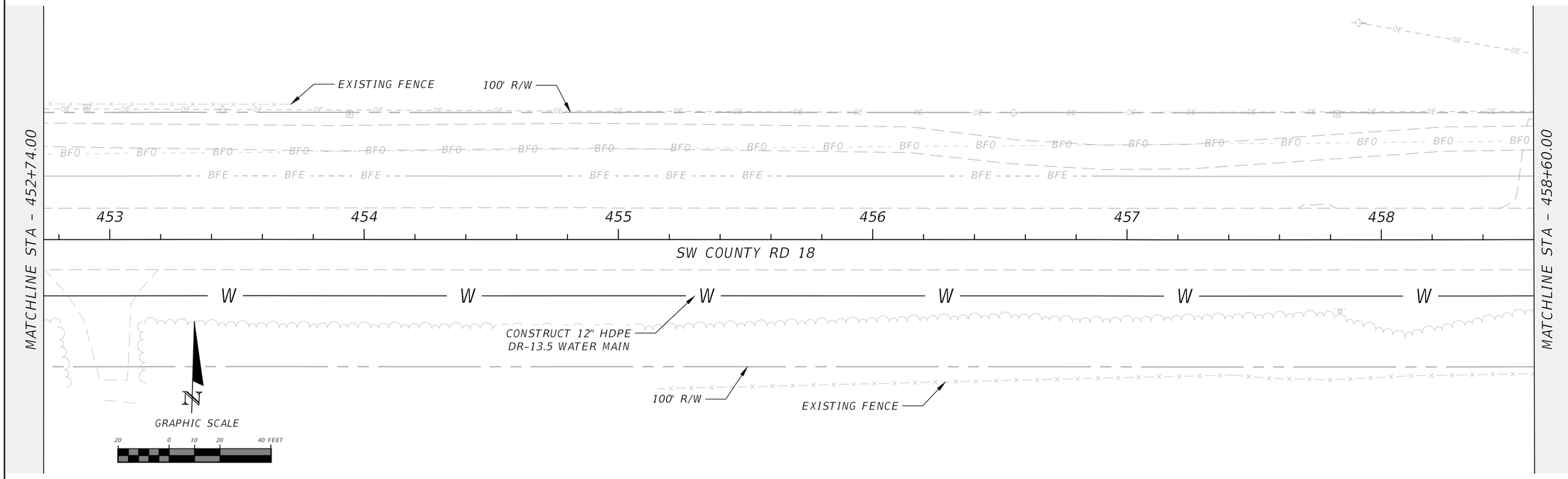
JOB NUMBER: L220110CCB
EOR: RICKY L. HENDRIX
P.E. NO.: 45239

CR 18 PLAN
ELLISVILLE WATER MAIN EXTENSION
COLUMBIA COUNTY, FLORIDA

SHEET NO. 26

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WWW.NFPS.NET
CA# 29011

JOB NUMBER: L220110CCB
EOR: RICKY L. HENDRIX
P.E. NO.: 45239

CR 18 PLAN
ELLISVILLE WATER MAIN EXTENSION
COLUMBIA COUNTY, FLORIDA

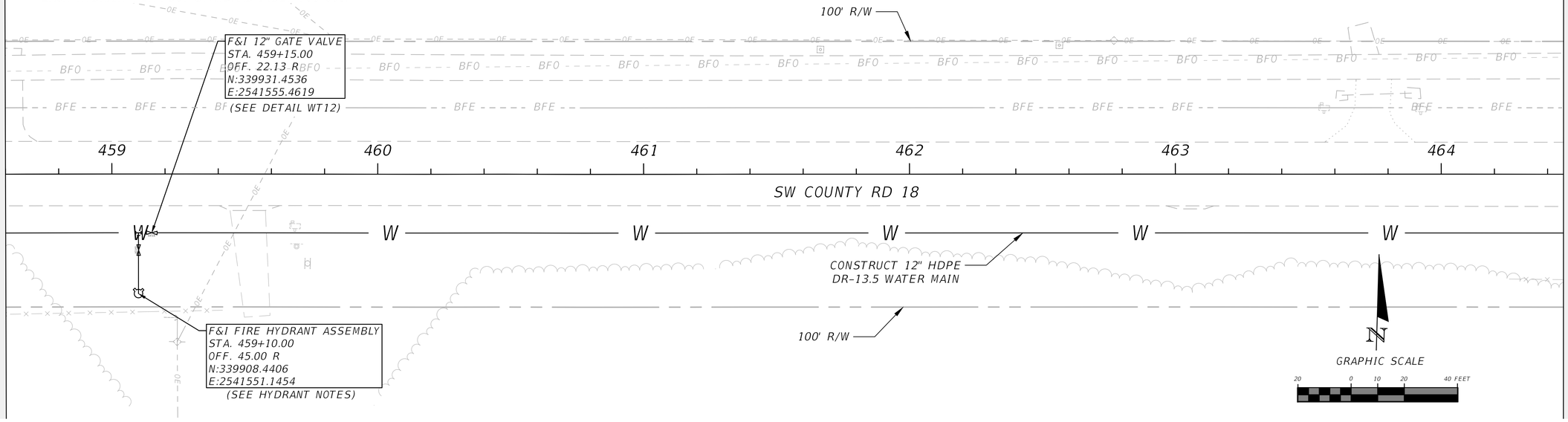
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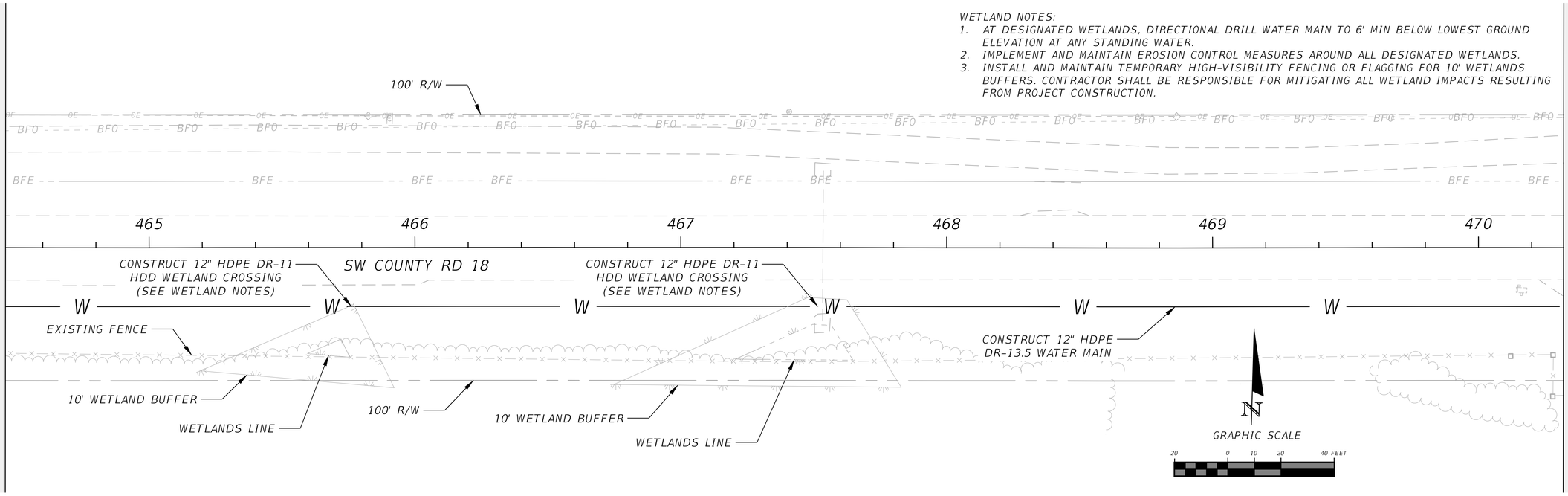
EOP TO

PM) FOR
06-001.

HYDRANT NOTES:
1. CLEAR VEGETATION IN A 20'-WIDE PATH FROM EOP TO R/W LINE, CENTERED ON HYDRANT.
2. INSTALL BLUE RAISED PAVEMENT MARKER (RPM) FOR EACH HYDRANT PER FDOT STANDARD INDEX 706-001.



WETLAND NOTES:
1. AT DESIGNATED WETLANDS, DIRECTIONAL DRILL WATER MAIN TO 6' MIN BELOW LOWEST GROUND ELEVATION AT ANY STANDING WATER.
2. IMPLEMENT AND MAINTAIN EROSION CONTROL MEASURES AROUND ALL DESIGNATED WETLANDS.
3. INSTALL AND MAINTAIN TEMPORARY HIGH-VISIBILITY FENCING OR FLAGGING FOR 10' WETLANDS BUFFERS. CONTRACTOR SHALL BE RESPONSIBLE FOR MITIGATING ALL WETLAND IMPACTS RESULTING FROM PROJECT CONSTRUCTION.



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CR 18 PLAN
ELLISVILLE WATER MAIN EXTENSION
COLUMBIA COUNTY, FLORIDA

SHEET NO. 28

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MATCHLINE STA - 470+32.00

MATCHLINE STA - 476+18.00

100' R/W

471 472 473 474 475 476

SW COUNTY RD 18

PAVEMENT REPAIR (SEE DETAIL WT18)

PAVEMENT REPAIR (SEE DETAIL WT18)

PAVEMENT REPAIR (SEE DETAIL WT18)

CONSTRUCT 12" HDPE DR 13.5 WATER MAIN

EXISTING FENCE

100' R/W

SW RED CEDAR CT

GRAPHIC SCALE

20 0 10 20 40 FEET

HYDRANT NOTES:
1. CLEAR VEGETATION IN A 20'-WIDE PATH FROM EOP TO R/W LINE, CENTERED ON HYDRANT.
2. INSTALL BLUE RAISED PAVEMENT MARKER (RPM) FOR EACH HYDRANT PER FDOT STANDARD INDEX 706-001.

MATCHLINE STA - 476+18.00

MATCHLINE STA - 482+04.00

100' R/W

EXISTING FENCE

477 478 479 480 481 482

SW COUNTY RD 18

CONSTRUCT 12" HDPE DR 13.5 WATER MAIN

F&I 12" GATE VALVE
STA. 478+65.00
OFF. 22.12 R
N:339989.3718
E:2543504.5597
(SEE DETAIL WT12)

F&I FIRE HYDRANT ASSEMBLY
STA. 478+60.00
OFF. 45.00 R
N:339966.3609
E:2543500.1976
(SEE HYDRANT NOTES)

100' R/W

GRAPHIC SCALE

20 0 10 20 40 FEET

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P.E. NO.: 45239

CR 18 PLAN

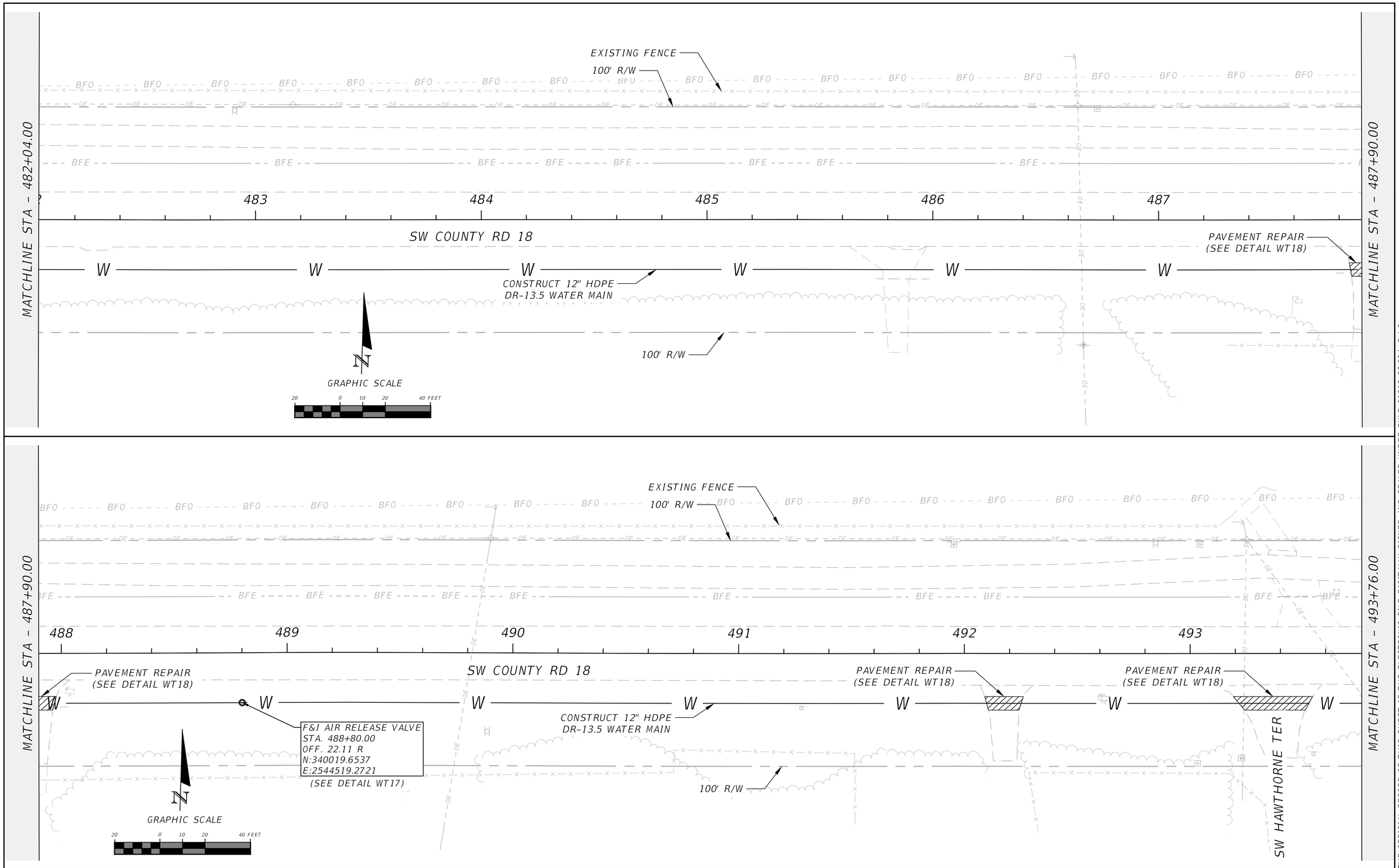
ELLISVILLE WATER MAIN EXTENSION
COLUMBIA COUNTY, FLORIDA

SHEET NO. 29

Cayden Sanders 11/28/2023 3:09:06 PM X:\2022\L220110CCB\H.CADD\Utils\UTPRUW01.dwg 29 CR 18 PLAN

OP TO

1) FOR
5-001.



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NORTH FLORIDA PROFESSIONAL SERVICES, INC.

P.O. BOX 3823
LAKE CITY, FL 32056
PH. 386-752-4675
LIC NO. LB8356

2551 BLAIRSTONE PINES DR.
TALLAHASSEE, FL 32301
WWW.NFPS.NET
CA# 29011

JOB NUMBER: L220110CCB
EOR: RICKY L. HENDRIX
P.E. NO.: 45239

CR 18 PLAN

ELLISVILLE WATER MAIN EXTENSION
COLUMBIA COUNTY, FLORIDA

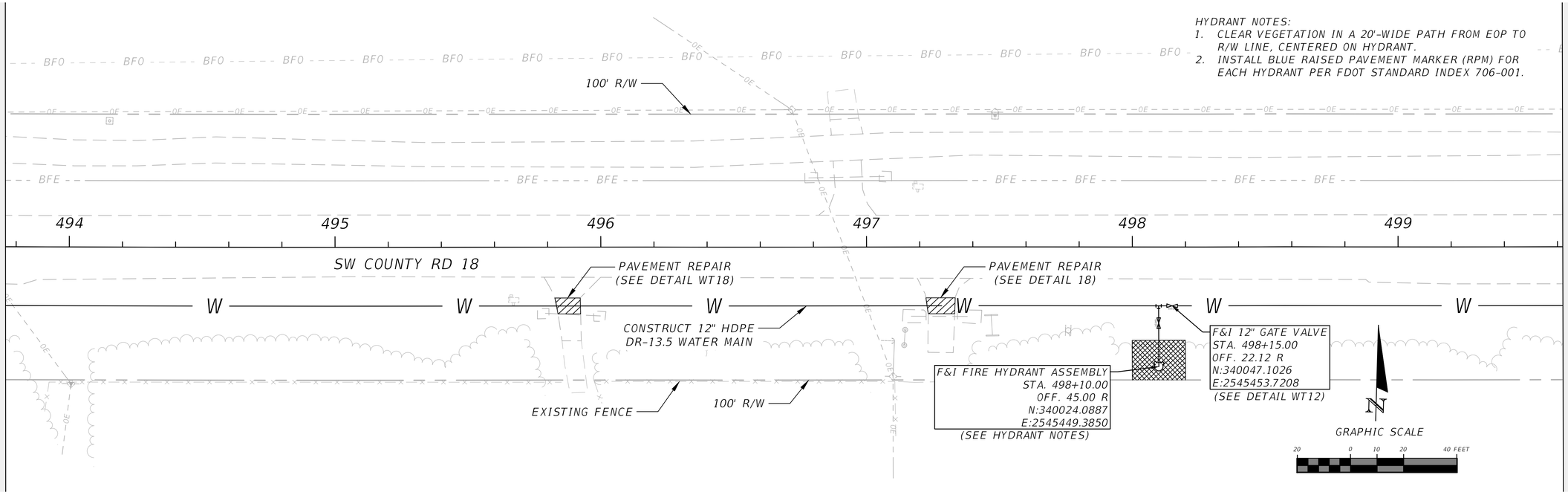
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MATCHLINE STA - 493+76.00

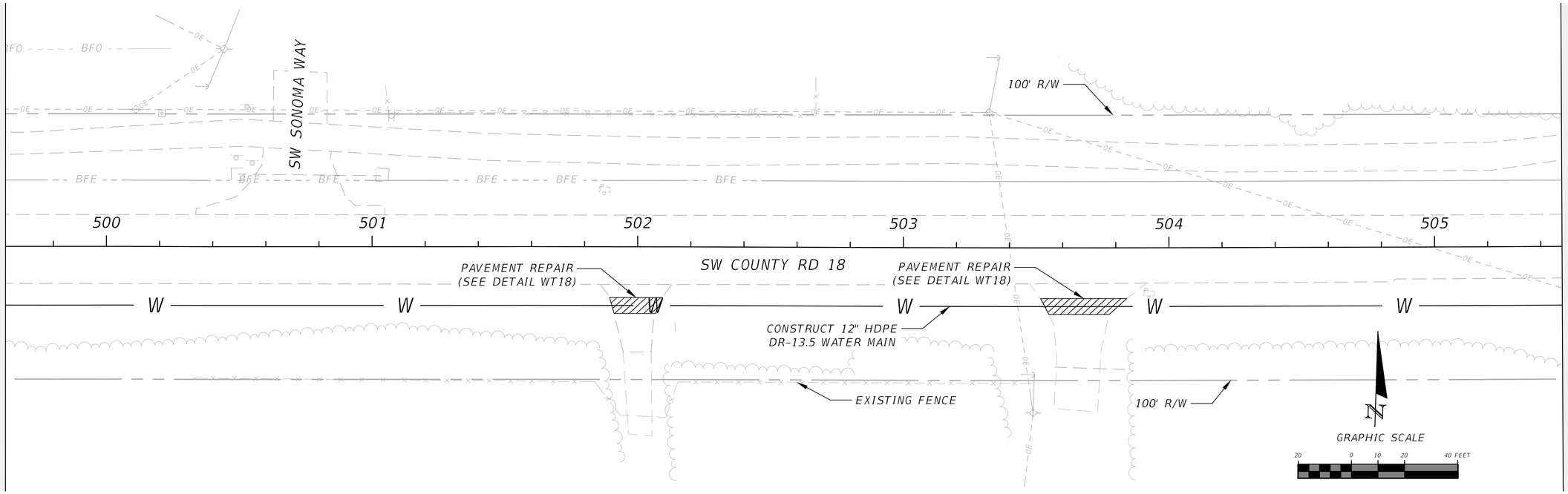
MATCHLINE STA - 499+62.00

HYDRANT NOTES:
1. CLEAR VEGETATION IN A 20'-WIDE PATH FROM EOP TO R/W LINE, CENTERED ON HYDRANT.
2. INSTALL BLUE RAISED PAVEMENT MARKER (RPM) FOR EACH HYDRANT PER FDOT STANDARD INDEX 706-001.



MATCHLINE STA - 499+62.00

MATCHLINE STA - 505+48.00



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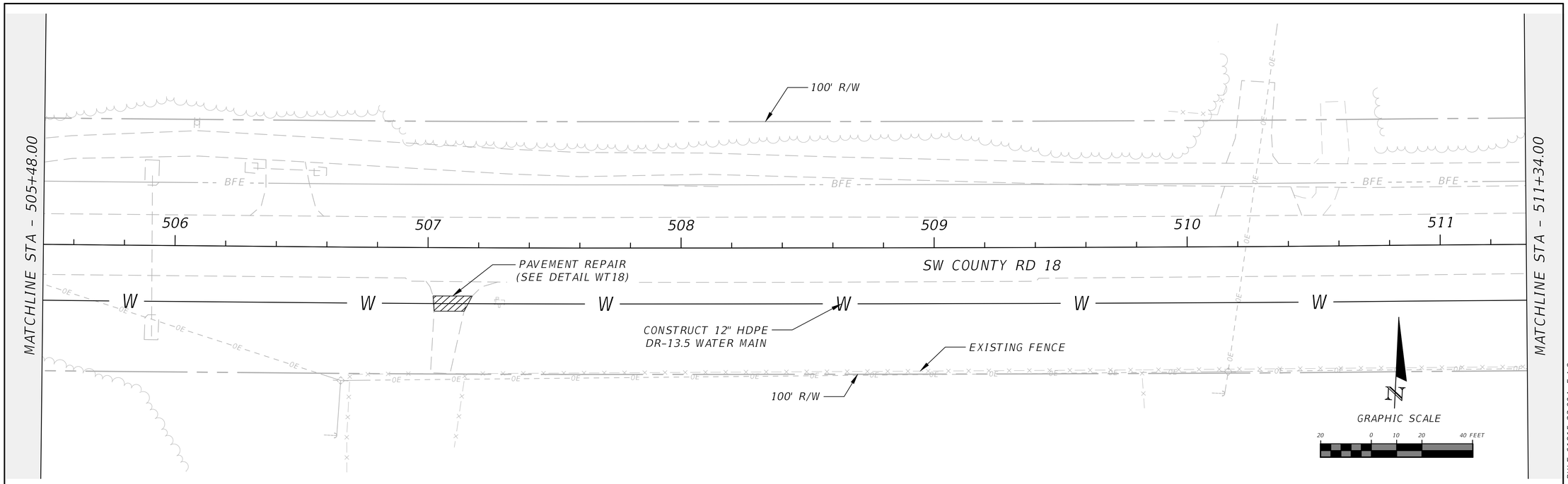
NORTH FLORIDA PROFESSIONAL SERVICES, INC.
P.O. BOX 3823
LAKE CITY, FL 32056
PH. 386-752-4675
LIC NO. LB8356
2551 BLAIRSTONE PINES DR.
TALLAHASSEE, FL 32301
WWW.NFPS.NET
CA# 29011

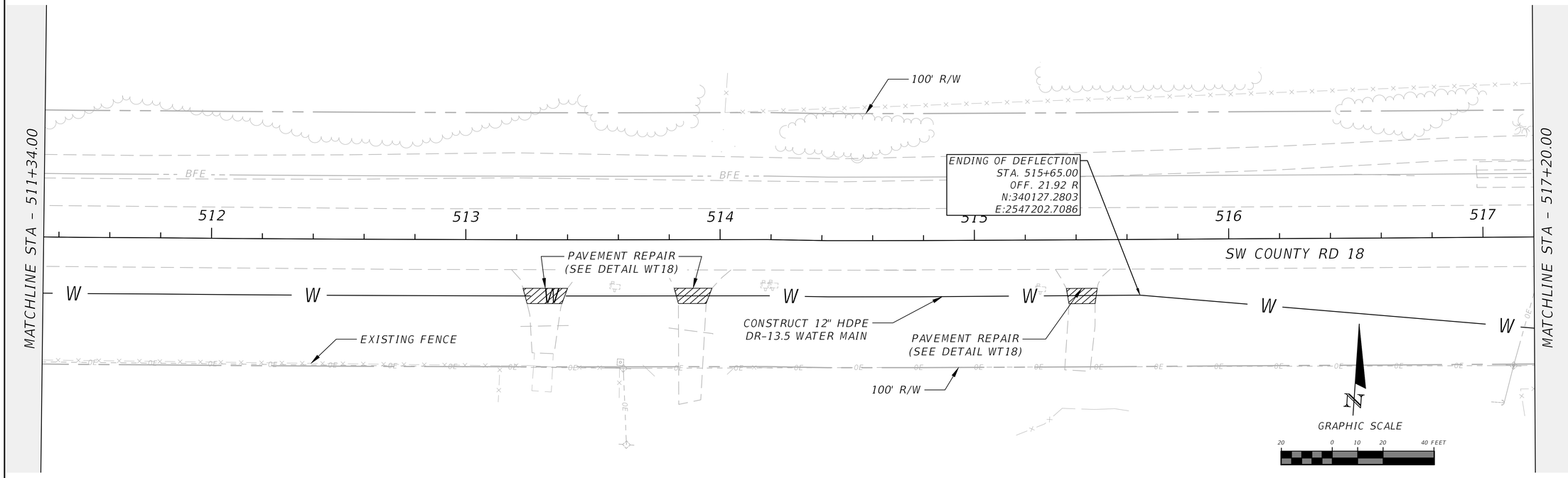
JOB NUMBER: L220110CCB
EOR: RICKY L. HENDRIX
P.E. NO.: 45239

CR 18 PLAN
ELLISVILLE WATER MAIN EXTENSION
COLUMBIA COUNTY, FLORIDA

SHEET NO. 31

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LIC NO. LB8356

2551 BLAIRSTONE PINES DR.
TALLAHASSEE, FL 32301
WWW.NFPS.NET
CA# 29011

JOB NUMBER: L220110CCB
EOR: RICKY L. HENDRIX
P.E. NO.: 45239

CR 18 PLAN

ELLISVILLE WATER MAIN EXTENSION
COLUMBIA COUNTY, FLORIDA

SHEET NO. 32

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HYDRANT NOTES:
1. CLEAR VEGETATION IN A 20'-WIDE PATH FROM EOP TO R/W LINE, CENTERED ON HYDRANT.
2. INSTALL BLUE RAISED PAVEMENT MARKER (RPM) FOR EACH HYDRANT PER FDOT STANDARD INDEX 706-001.

MATCHLINE STA - 517+20.00

100' R/W

GRAPHIC SCALE
20 0 10 20 40 FEET

F&I 12" GATE VALVE
STA. 517+35.00
OFF. 37.28 R
N:340124.7325
E:2547373.3878

518 519 520 521 522 523

SW COUNTY RD 18

BEGINNING OF DEFLECTION
STA. 517+65.00
OFF. 40.00 R
N:340124.2892
E:2547403.5362

CONSTRUCT 12" HDPE
DR-13.5 WATER MAIN

PAVEMENT REPAIR
(SEE DETAIL WT18)

F&I FIRE HYDRANT ASSEMBLY
STA. 517+30.00
OFF. 45.00 R
N:340116.6593
E:2547368.9819
(SEE HYDRANT NOTES)

PAVEMENT REPAIR
(SEE DETAIL WT18)

100' R/W

EXISTING FENCE

BEGINNING OF DEFLECTION
STA. 522+00.00
OFF. 39.88 R
N:340158.0392
E:2547837.2442

MATCHLINE STA - 523+06.00

100' R/W

ENDING OF DEFLECTION
STA. 524+00.00
OFF. 22.12 R
N:340190.9216
E:2548035.3113

524 525 526 527 528

SW COUNTY RD 18

CONSTRUCT 12" HDPE
DR-13.5 WATER MAIN

F&I AIR RELEASE VALVE
STA. 525+80.00
OFF. 22.12 R
N:340204.8144
E:2548214.7994
(SEE DETAIL WT17)

PAVEMENT REPAIR
(SEE DETAIL WT18)

PAVEMENT REPAIR
(SEE DETAIL WT18)

100' R/W

EXISTING FENCE

GRAPHIC SCALE
20 0 10 20 40 FEET

MATCHLINE STA - 528+92.00

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LIC NO. LB8356
2551 BLAIRSTONE PINES DR.
TALLAHASSEE, FL 32301
WWW.NFPS.NET
CA# 29011

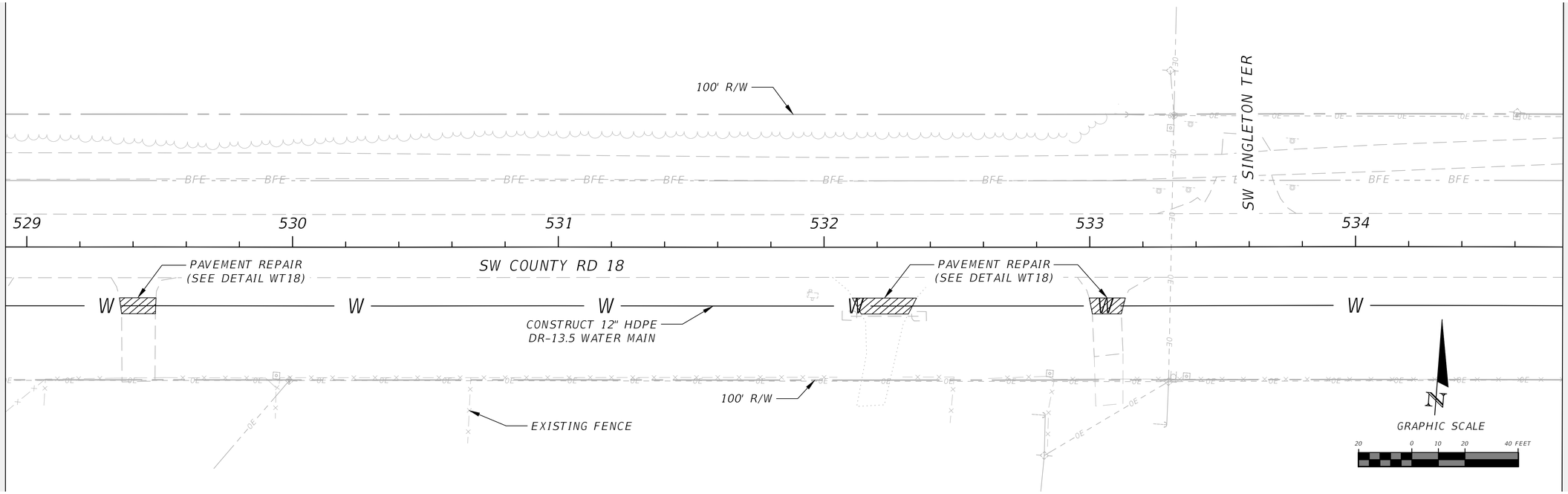
JOB NUMBER: L220110CCB
EOR: RICKY L. HENDRIX
P.E. NO.: 45239

CR 18 PLAN
ELLISVILLE WATER MAIN EXTENSION
COLUMBIA COUNTY, FLORIDA

SHEET NO. 33

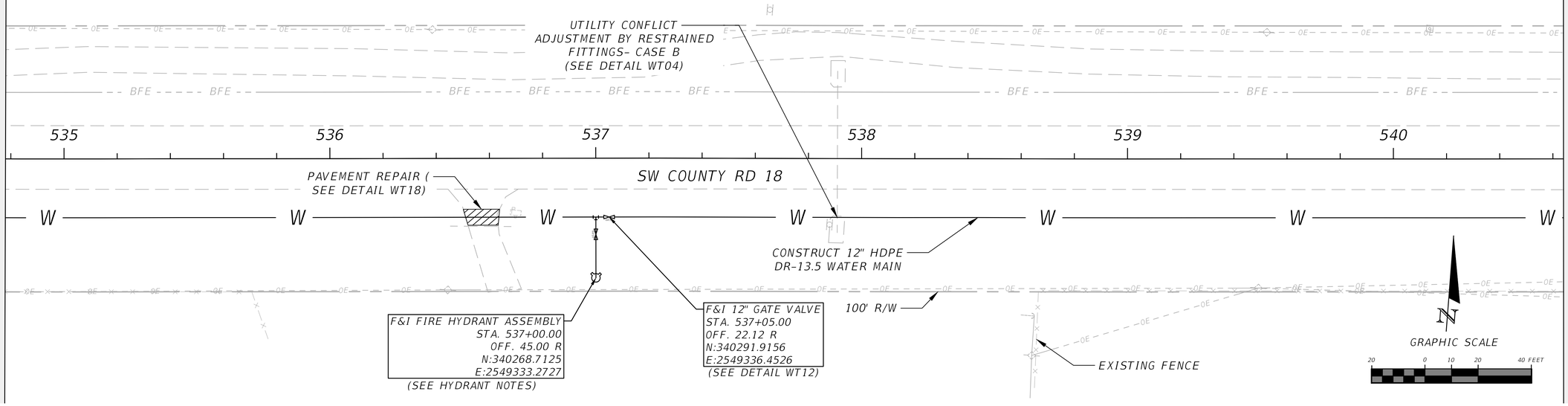
Cayden Sanders 11/28/2023 3:11:29 PM X:\2022\L220110CCB\H.CADD\Utils\UTPRUW01(ADENDUM2).dwg 330 CR 18 PLAN

MATCHLINE STA - 528+92.00



MATCHLINE STA - 534+78.00

HYDRANT NOTES:
1. CLEAR VEGETATION IN A 20'-WIDE PATH FROM EOP TO R/W LINE, CENTERED ON HYDRANT.
2. INSTALL BLUE RAISED PAVEMENT MARKER (RPM) FOR EACH HYDRANT PER FDOT STANDARD INDEX 706-001.



MATCHLINE STA - 540+64.00

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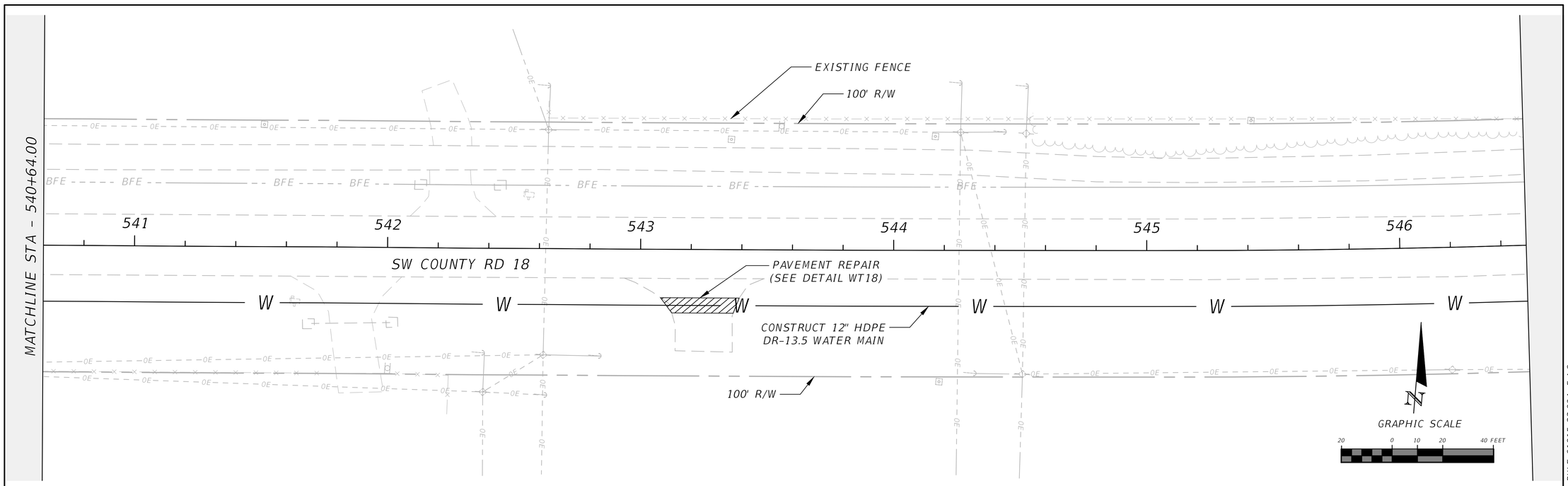
NORTH FLORIDA PROFESSIONAL SERVICES, INC.
P.O. BOX 3823
LAKE CITY, FL 32056
PH. 386-752-4675
LIC NO. LB8356
2551 BLAIRSTONE PINES DR.
TALLAHASSEE, FL 32301
WWW.NFPS.NET
CA# 29011

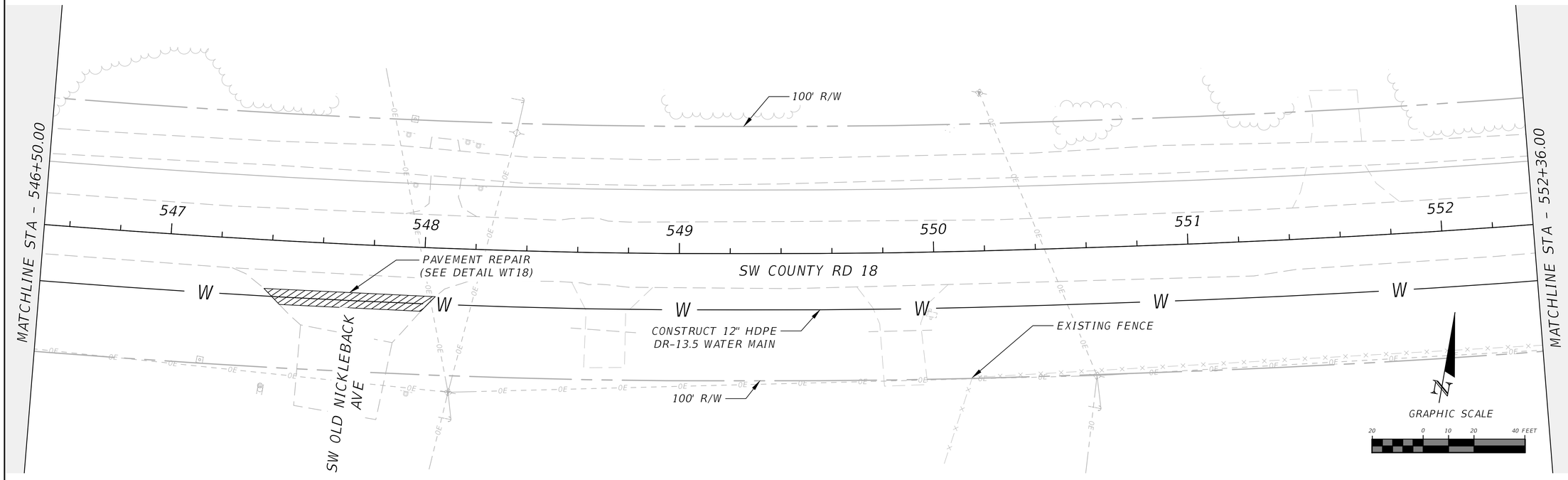
JOB NUMBER: L220110CCB
EOR: RICKY L. HENDRIX
P.E. NO.: 45239

CR 18 PLAN
ELLISVILLE WATER MAIN EXTENSION
COLUMBIA COUNTY, FLORIDA

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PH. 386-752-4675
LIC NO. LB8356
2551 BLAIRSTONE PINES DR.
TALLAHASSEE, FL 32301
WWW.NFPS.NET
CA# 29011

JOB NUMBER: L220110CCB
EOR: RICKY L. HENDRIX
P.E. NO.: 45239

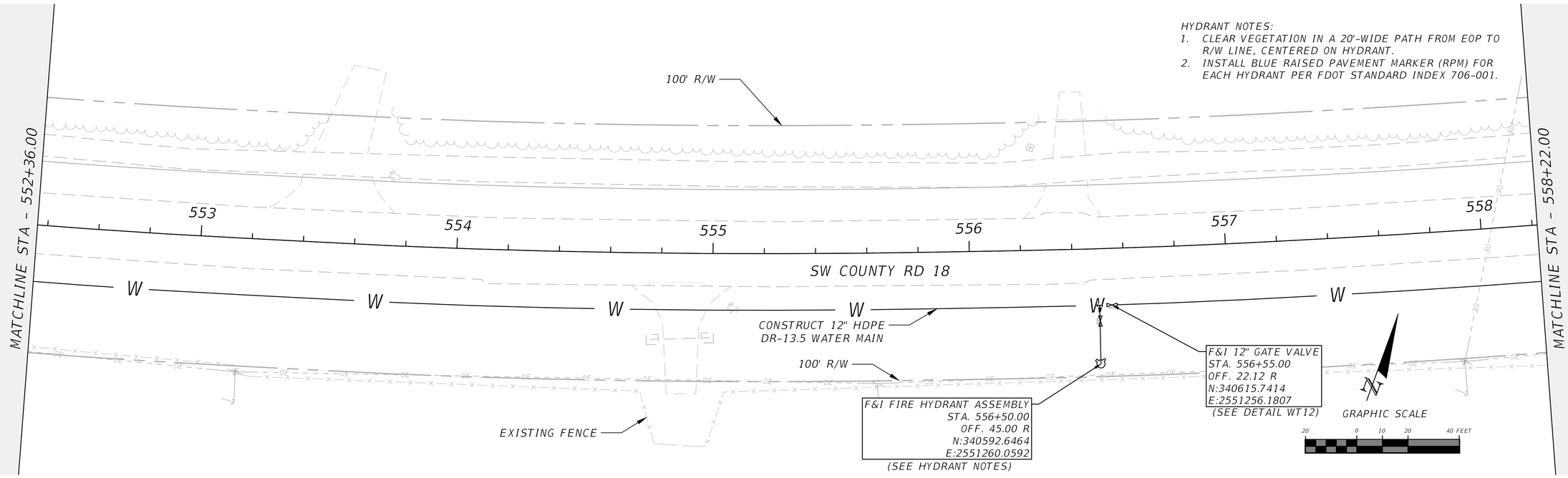
CR 18 PLAN

ELLISVILLE WATER MAIN EXTENSION
COLUMBIA COUNTY, FLORIDA

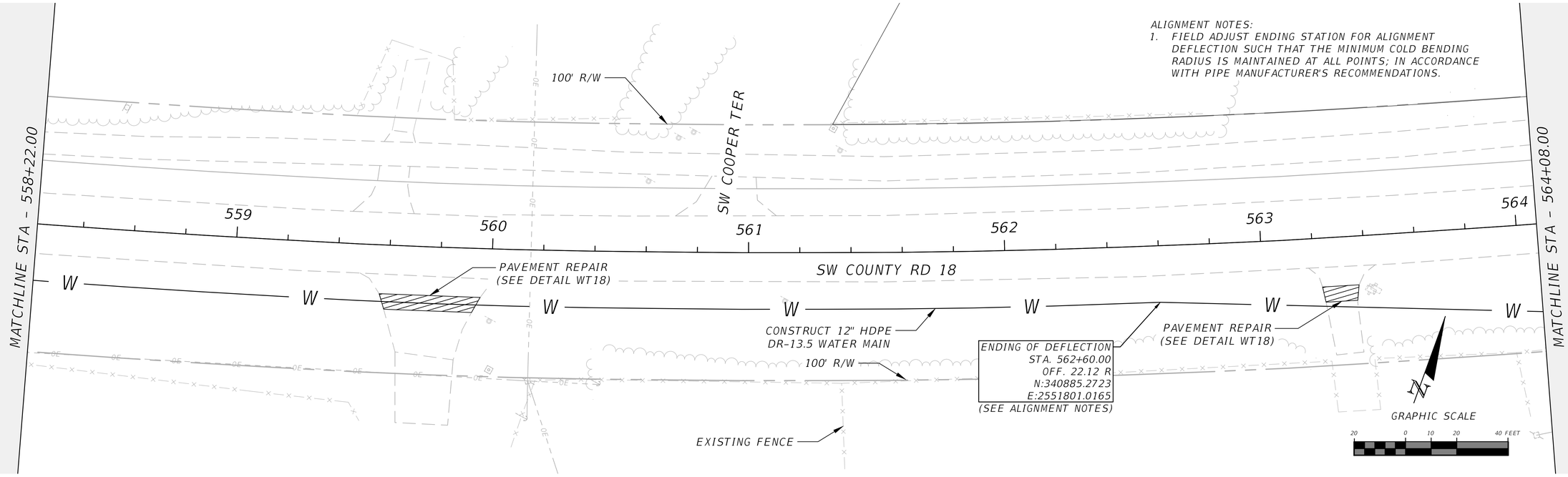
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HYDRANT NOTES:
1. CLEAR VEGETATION IN A 20'-WIDE PATH FROM EOP TO R/W LINE, CENTERED ON HYDRANT.
2. INSTALL BLUE RAISED PAVEMENT MARKER (RPM) FOR EACH HYDRANT PER FDOT STANDARD INDEX 706-001.



ALIGNMENT NOTES:
1. FIELD ADJUST ENDING STATION FOR ALIGNMENT DEFLECTION SUCH THAT THE MINIMUM COLD BENDING RADIUS IS MAINTAINED AT ALL POINTS; IN ACCORDANCE WITH PIPE MANUFACTURER'S RECOMMENDATIONS.



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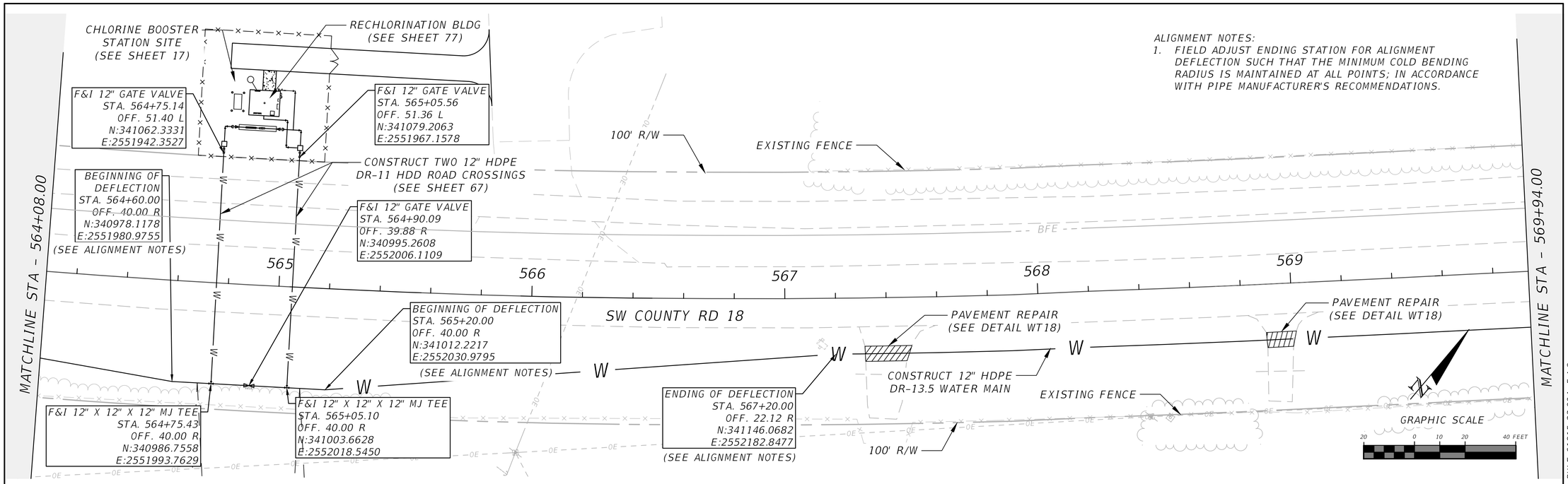
NORTH FLORIDA PROFESSIONAL SERVICES, INC.
P.O. BOX 3823
LAKE CITY, FL 32056
PH. 386-752-4675
LIC NO. LB8356
2551 BLAIRSTONE PINES DR.
TALLAHASSEE, FL 32301
WWW.NFPS.NET
CA# 29011

JOB NUMBER: L220110CCB
EOR: RICKY L. HENDRIX
P.E. NO.: 45239

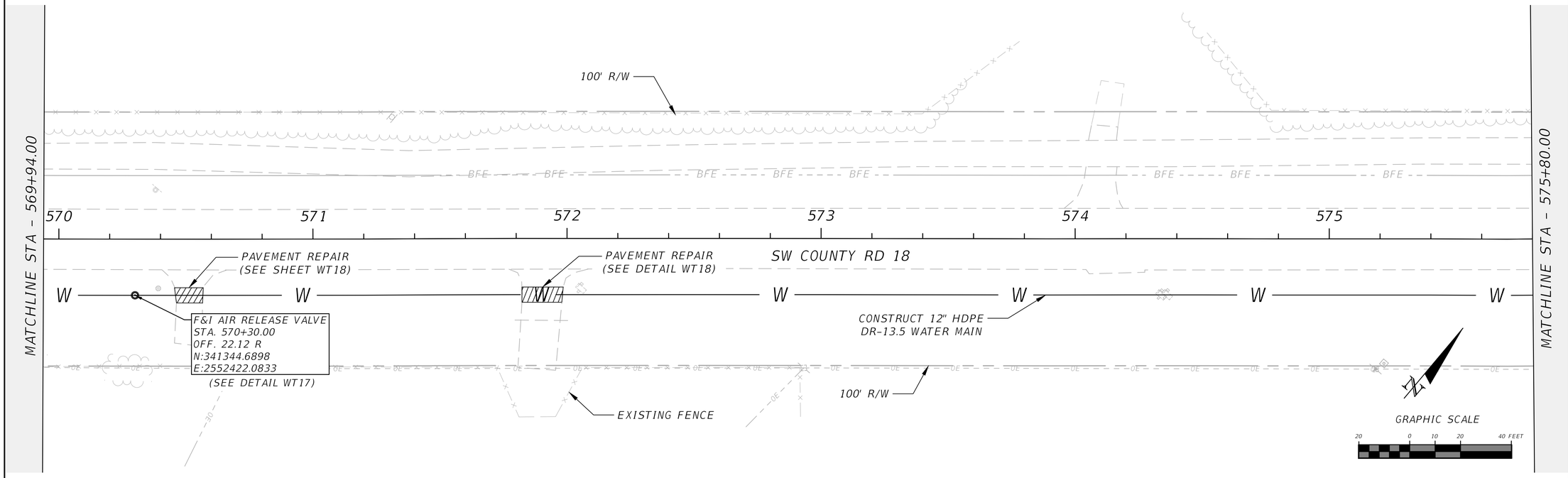
CR 18 PLAN
ELLISVILLE WATER MAIN EXTENSION
COLUMBIA COUNTY, FLORIDA

SHEET NO. 36

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ALIGNMENT NOTES:
1. FIELD ADJUST ENDING STATION FOR ALIGNMENT DEFLECTION SUCH THAT THE MINIMUM COLD BENDING RADIUS IS MAINTAINED AT ALL POINTS; IN ACCORDANCE WITH PIPE MANUFACTURER'S RECOMMENDATIONS.



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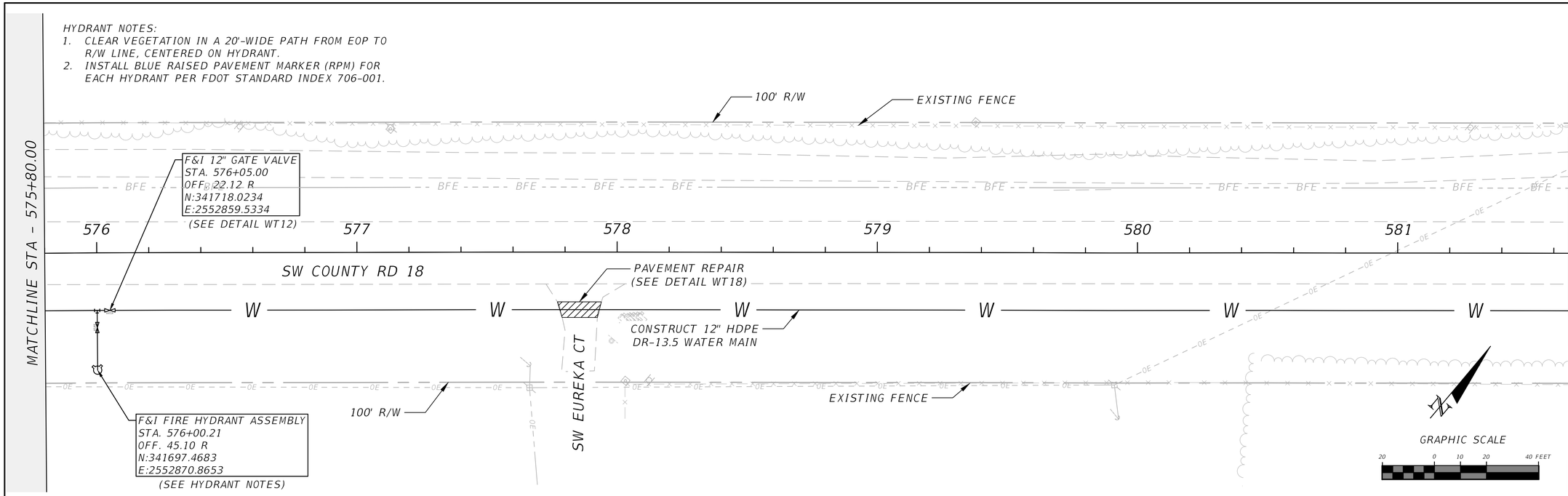
NORTH FLORIDA PROFESSIONAL SERVICES, INC.
P.O. BOX 3823
LAKE CITY, FL 32056
PH. 386-752-4675
LIC NO. LB8356
2551 BLAIRSTONE PINES DR.
TALLAHASSEE, FL 32301
WWW.NFPS.NET
CA# 29011

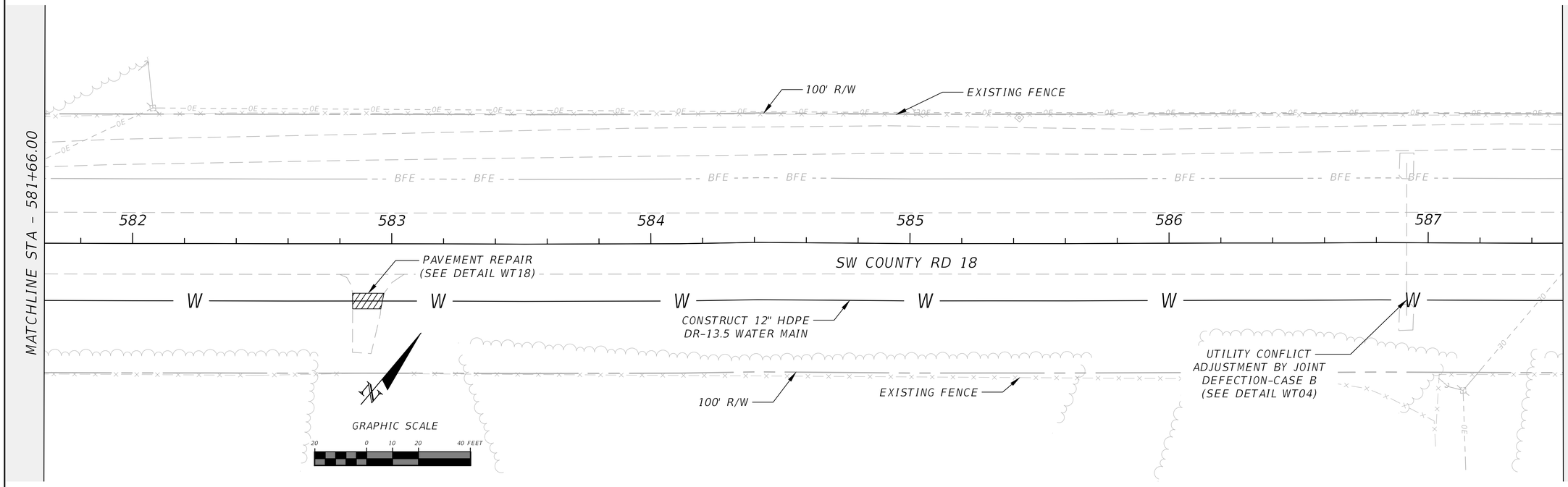
JOB NUMBER: L220110CCB
EOR: RICKY L. HENDRIX
P.E. NO.: 45239

CR 18 PLAN
ELLISVILLE WATER MAIN EXTENSION
COLUMBIA COUNTY, FLORIDA

SHEET NO. 37

HYDRANT NOTES:
1. CLEAR VEGETATION IN A 20'-WIDE PATH FROM EOP TO R/W LINE, CENTERED ON HYDRANT.
2. INSTALL BLUE RAISED PAVEMENT MARKER (RPM) FOR EACH HYDRANT PER FDOT STANDARD INDEX 706-001.





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LAKE CITY, FL 32056
PH. 386-752-4675
LIC NO. LB8356
2551 BLAIRSTONE PINES DR.
TALLAHASSEE, FL 32301
WWW.NFPS.NET
CA# 29011

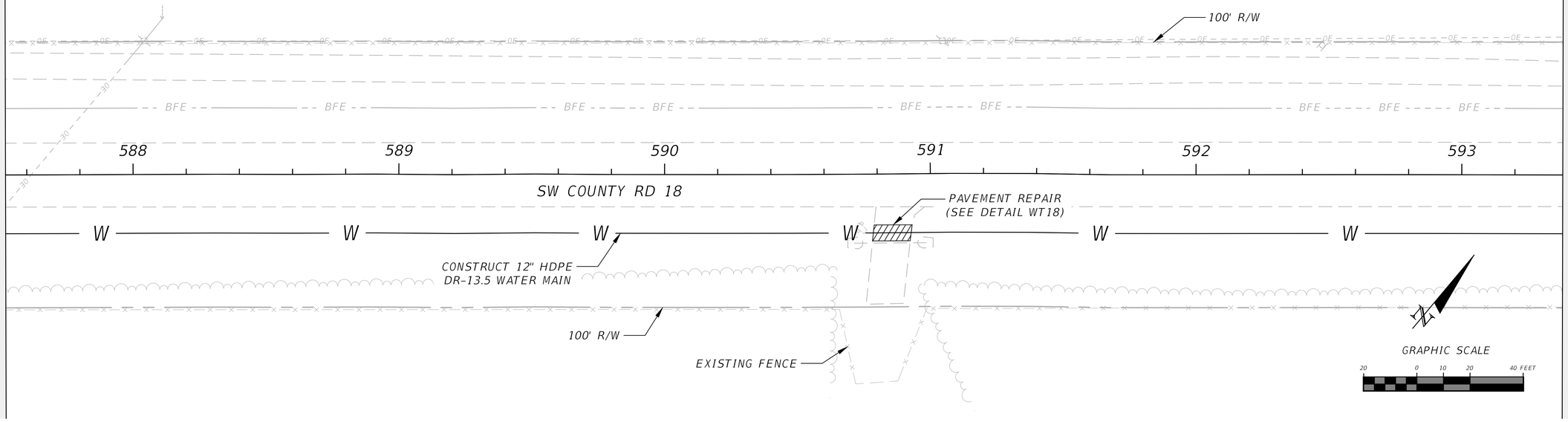
JOB NUMBER: L220110CCB
EOR: RICKY L. HENDRIX
P.E. NO.: 45239

CR 18 PLAN
ELLISVILLE WATER MAIN EXTENSION
COLUMBIA COUNTY, FLORIDA

SHEET NO. 38

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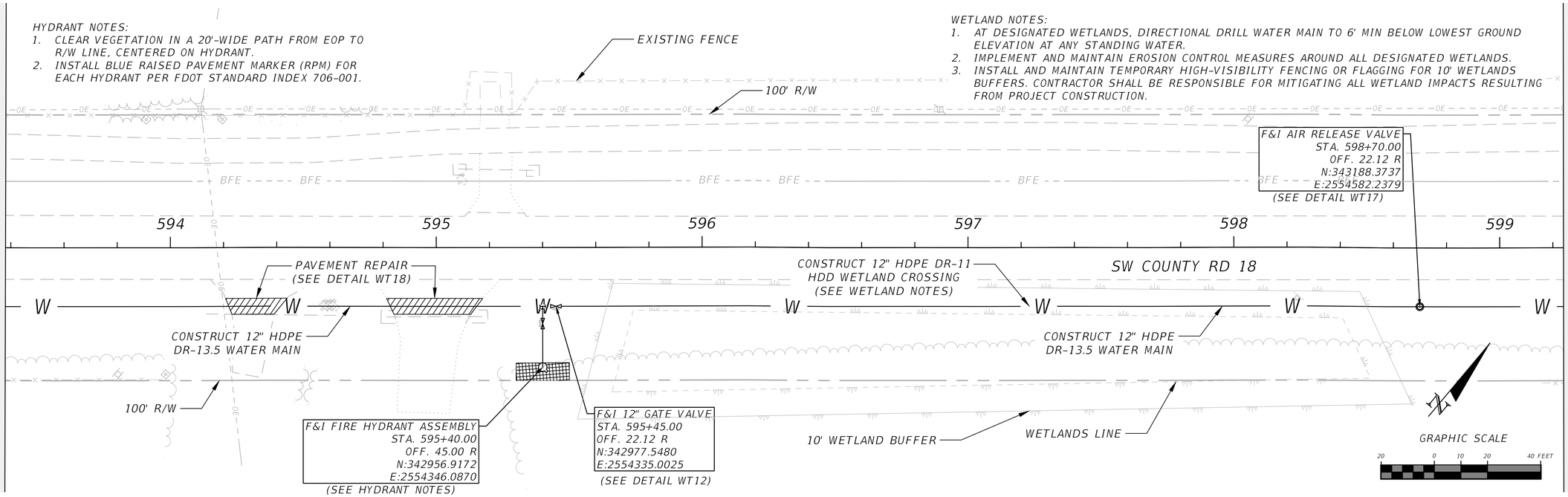
MATCHLINE STA – 587+52.00



MATCHLINE STA – 593+38.00

HYDRANT NOTES:
1. CLEAR VEGETATION IN A 20'-WIDE PATH FROM EOP TO R/W LINE, CENTERED ON HYDRANT.
2. INSTALL BLUE RAISED PAVEMENT MARKER (RPM) FOR EACH HYDRANT PER FDOT STANDARD INDEX 706-001.

WETLAND NOTES:
1. AT DESIGNATED WETLANDS, DIRECTIONAL DRILL WATER MAIN TO 6' MIN BELOW LOWEST GROUND ELEVATION AT ANY STANDING WATER.
2. IMPLEMENT AND MAINTAIN EROSION CONTROL MEASURES AROUND ALL DESIGNATED WETLANDS.
3. INSTALL AND MAINTAIN TEMPORARY HIGH-VISIBILITY FENCING OR FLAGGING FOR 10' WETLANDS BUFFERS. CONTRACTOR SHALL BE RESPONSIBLE FOR MITIGATING ALL WETLAND IMPACTS RESULTING FROM PROJECT CONSTRUCTION.



MATCHLINE STA – 599+24.00

REVISIONS	
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NORTH FLORIDA PROFESSIONAL SERVICES, INC.
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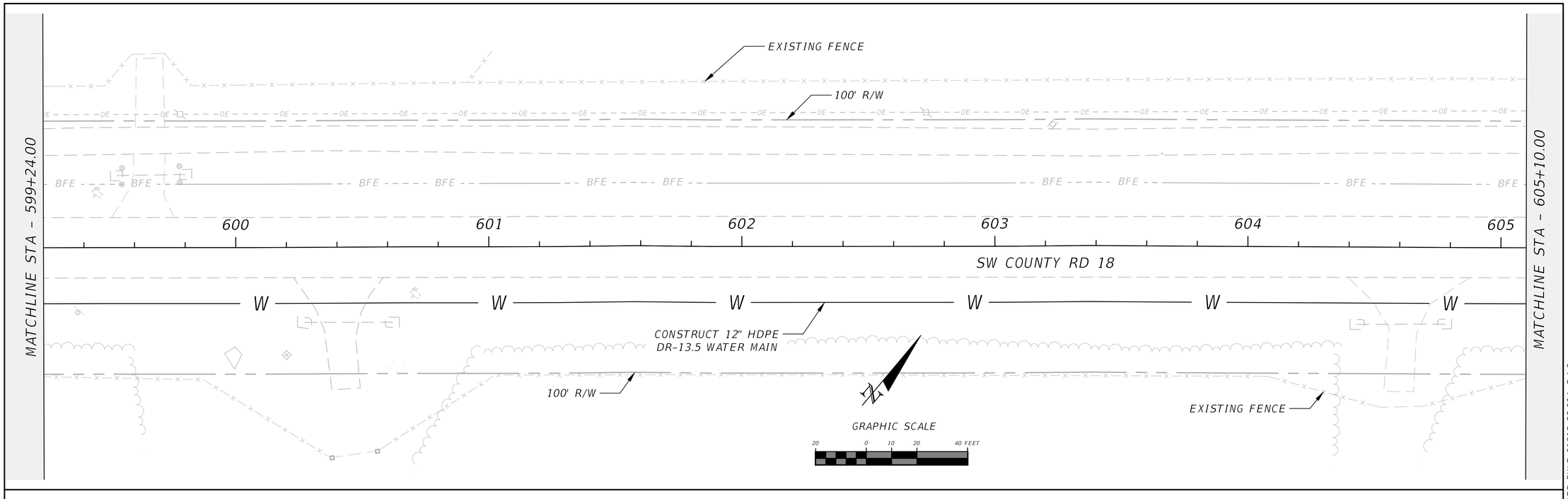
JOB NUMBER: L220110CCB
EOR: RICKY L. HENDRIX
P.E. NO.: 45239

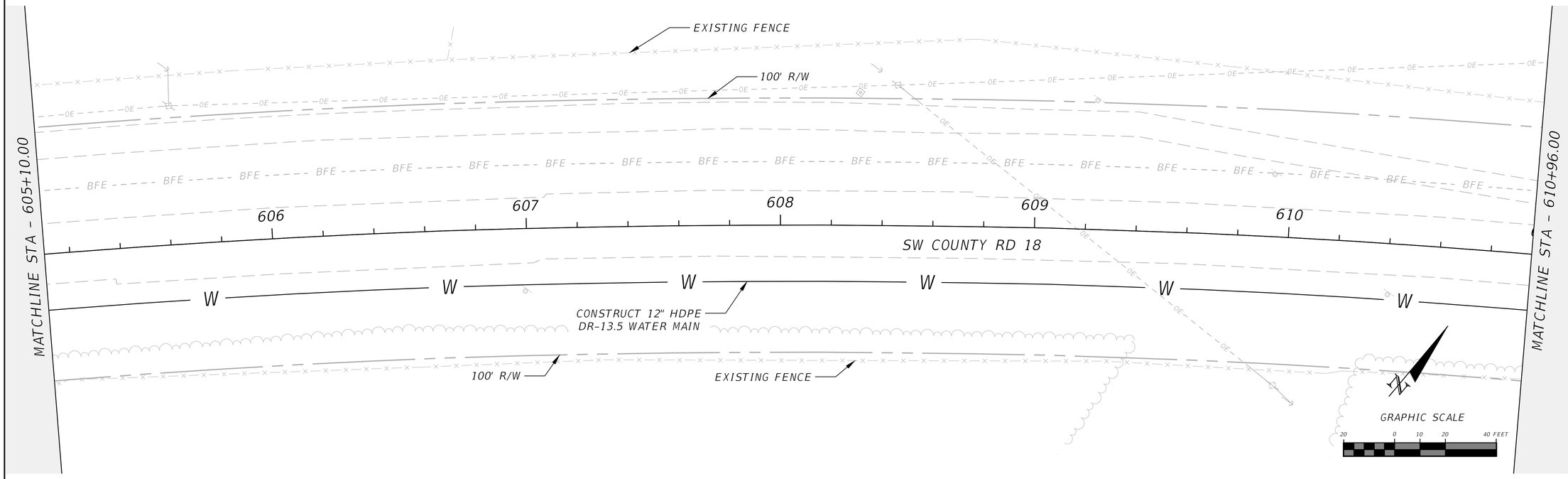
CR 18 PLAN
ELLISVILLE WATER MAIN EXTENSION
COLUMBIA COUNTY, FLORIDA

SHEET NO. 39

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2551 BLAIRSTONE PINES DR.
TALLAHASSEE, FL 32301
WWW.NFPS.NET
CA# 29011

JOB NUMBER: L220110CCB
EOR: RICKY L. HENDRIX
P.E. NO.: 45239

CR 18 PLAN
ELLISVILLE WATER MAIN EXTENSION
COLUMBIA COUNTY, FLORIDA

SHEET NO. 40

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HYDRANT NOTES:
1. CLEAR VEGETATION IN A 20'-WIDE PATH FROM EOP TO R/W LINE, CENTERED ON HYDRANT.
2. INSTALL BLUE RAISED PAVEMENT MARKER (RPM) FOR EACH HYDRANT PER FDOT STANDARD INDEX 706-001.

MATCHLINE STA - 610+96.00

EXISTING FENCE

100' R/W

F&I 12" GATE VALVE
STA. 614+55.00
0FF. 22.12 R
N:344113.5918
E:2555855.0205
(SEE DETAIL WT12)

F&I 12" GATE VALVE W/ PLUG
STA. 615+40.21
0FF. 70.00 L
N:344233.2934
E:2555892.6760

CONSTRUCT 12" HDPE DR-11
HDD ROAD CROSSING
(SEE SHEET 68)

611 612 613 614 615 616

SW COUNTY RD 18

CONSTRUCT 12" HDPE
DR-13.5 WATER MAIN

100' R/W

EXISTING FENCE

F&I FIRE HYDRANT ASSEMBLY
STA. 614+50.00
0FF. 45.00 R
N:344090.7735
E:2555860.2809
(SEE HYDRANT NOTES)

SW TUSTENUGGEE AVE

F&I 12" X 12" X 12" MJ TEE
STA. 615+39.05
0FF. 22.12 R
N:344149.5199
E:2555931.0090

PAVEMENT REPAIR
(SEE DETAIL WT18)

MATCHLINE STA - 616+82.00

GRAPHIC SCALE
20 0 10 20 40 FEET

MATCHLINE STA - 616+82.00

EXISTING FENCE

100' R/W

617 618 619 620 621 622

SW COUNTY RD 18

CONSTRUCT 12" HDPE
DR-13.5 WATER MAIN

100' R/W

EXISTING FENCE

MATCHLINE STA - 622+68.00

GRAPHIC SCALE
20 0 10 20 40 FEET

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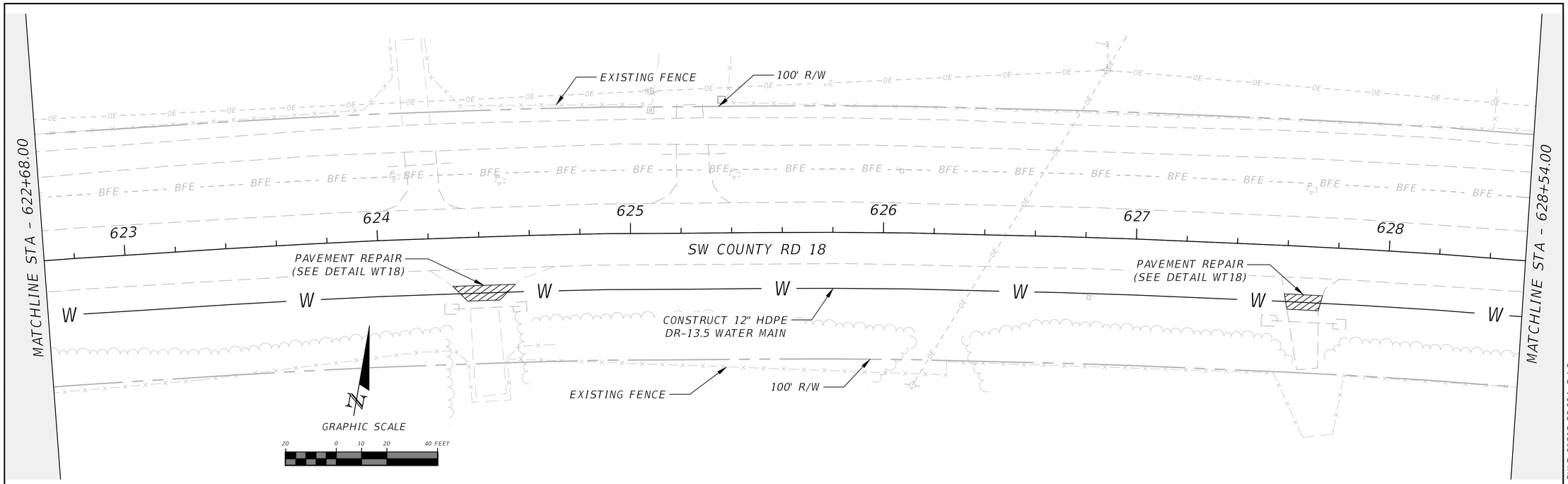
NORTH FLORIDA PROFESSIONAL SERVICES, INC.
P.O. BOX 3823
LAKE CITY, FL 32056
PH. 386-752-4675
LIC NO. LB8356
2551 BLAIRSTONE PINES DR.
TALLAHASSEE, FL 32301
WWW.NFPS.NET
CA# 29011

JOB NUMBER: L220110CCB
EOR: RICKY L. HENDRIX
P.E. NO.: 45239

CR 18 PLAN
ELLISVILLE WATER MAIN EXTENSION
COLUMBIA COUNTY, FLORIDA

SHEET NO. 41

Cayden Sanders 11/28/2023 3:13:24 PM X:\2022\L220110CCB\H.CADD\Utils\UTPRUW01.dwg 41 CR 18 PLAN

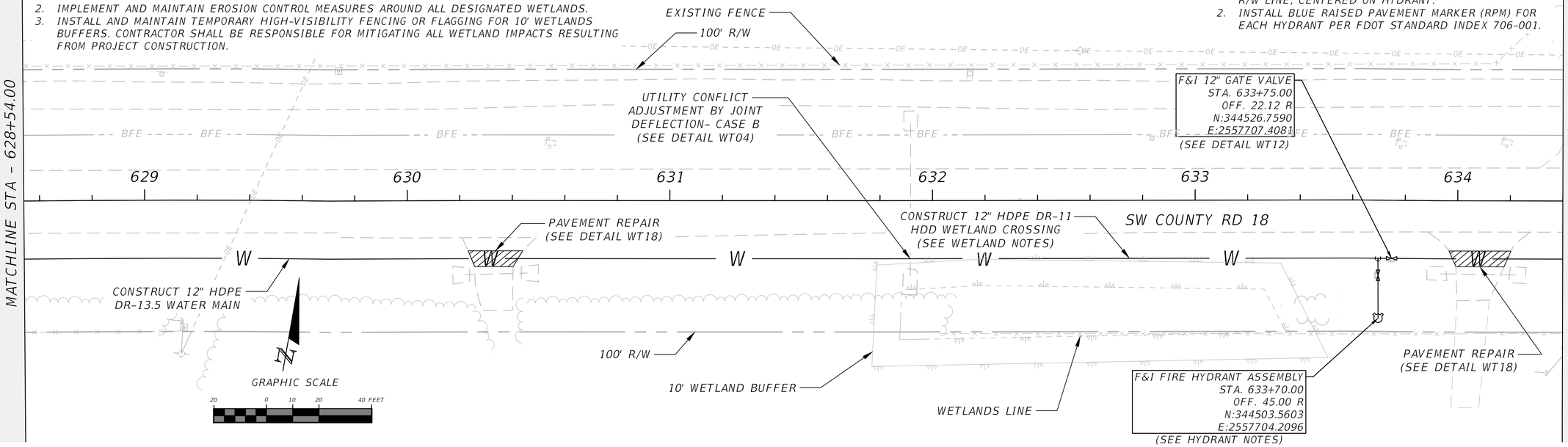


WETLAND NOTES:

1. AT DESIGNATED WETLANDS, DIRECTIONAL DRILL WATER MAIN TO 6' MIN BELOW LOWEST GROUND ELEVATION AT ANY STANDING WATER.
2. IMPLEMENT AND MAINTAIN EROSION CONTROL MEASURES AROUND ALL DESIGNATED WETLANDS.
3. INSTALL AND MAINTAIN TEMPORARY HIGH-VISIBILITY FENCING OR FLAGGING FOR 10' WETLANDS BUFFERS. CONTRACTOR SHALL BE RESPONSIBLE FOR MITIGATING ALL WETLAND IMPACTS RESULTING FROM PROJECT CONSTRUCTION.

HYDRANT NOTES:

1. CLEAR VEGETATION IN A 20'-WIDE PATH FROM EOP TO R/W LINE, CENTERED ON HYDRANT.
2. INSTALL BLUE RAISED PAVEMENT MARKER (RPM) FOR EACH HYDRANT PER FDOT STANDARD INDEX 706-001.



REVISIONS	
DATE	DESCRIPTION
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NORTH FLORIDA PROFESSIONAL SERVICES, INC.
P.O. BOX 3823
LAKE CITY, FL 32056
PH. 386-752-4675
LIC NO. LB8356
2551 BLAIRSTONE PINES DR.
TALLAHASSEE, FL 32301
WWW.NFPS.NET
CA# 29011

JOB NUMBER: L220110CCB
EOR: RICKY L. HENDRIX
P.E. NO.: 45239

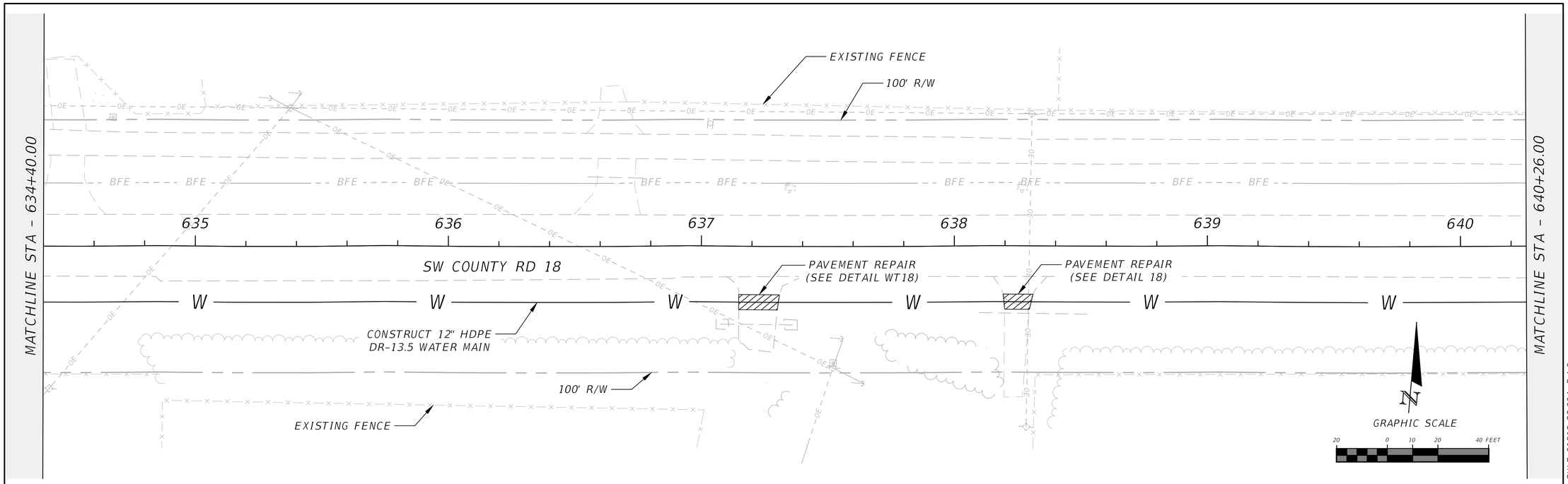
CR 18 PLAN

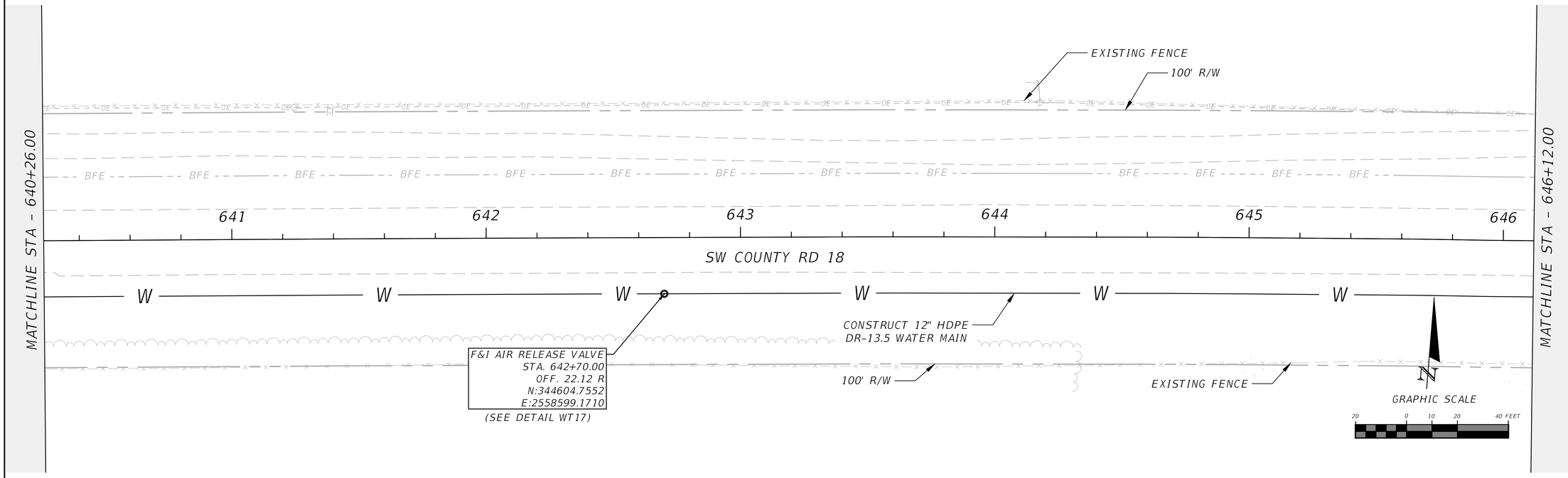
ELLISVILLE WATER MAIN EXTENSION
COLUMBIA COUNTY, FLORIDA

SHEET NO. 42

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LAKE CITY, FL 32056
PH. 386-752-4675
LIC NO. LB8356

2551 BLAIRSTONE PINES DR.
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WWW.NFPS.NET
CA# 29011

JOB NUMBER: L220110CCB
EOR: RICKY L. HENDRIX
P.E. NO.: 45239

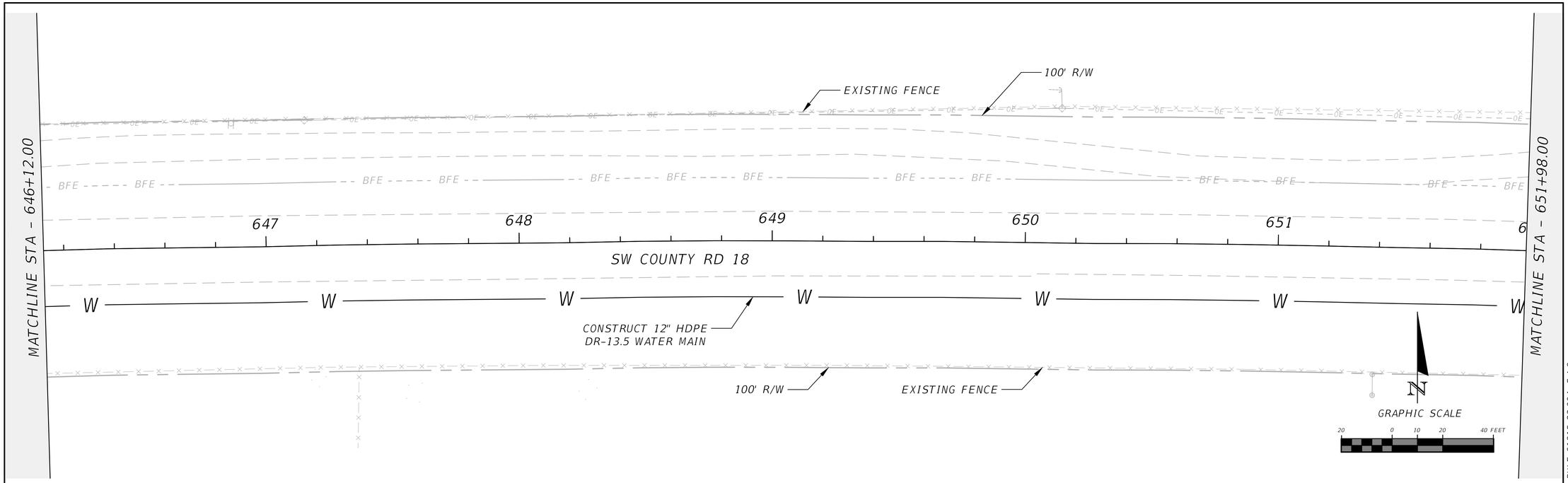
CR 18 PLAN

ELLISVILLE WATER MAIN EXTENSION
COLUMBIA COUNTY, FLORIDA

SHEET NO. 43

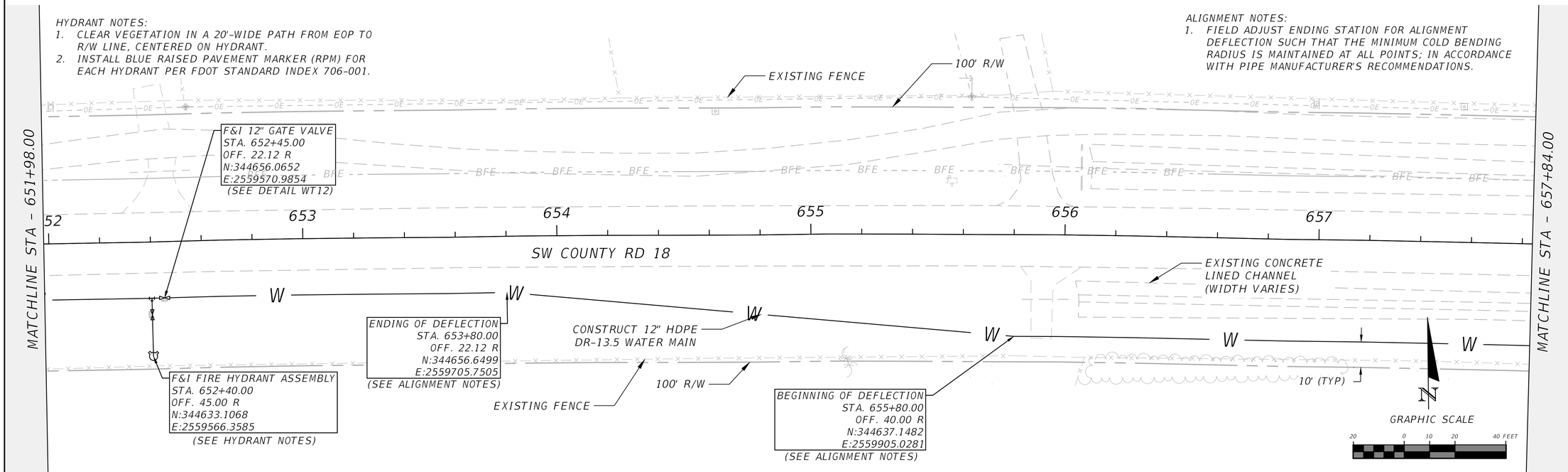
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HYDRANT NOTES:
1. CLEAR VEGETATION IN A 20'-WIDE PATH FROM EOP TO R/W LINE, CENTERED ON HYDRANT.
2. INSTALL BLUE RAISED PAVEMENT MARKER (RPM) FOR EACH HYDRANT PER FDOT STANDARD INDEX 706-001.

ALIGNMENT NOTES:
1. FIELD ADJUST ENDING STATION FOR ALIGNMENT DEFLECTION SUCH THAT THE MINIMUM COLD BENDING RADIUS IS MAINTAINED AT ALL POINTS; IN ACCORDANCE WITH PIPE MANUFACTURER'S RECOMMENDATIONS.



REVISIONS	
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NORTH FLORIDA PROFESSIONAL SERVICES, INC.
P.O. BOX 3823
LAKE CITY, FL 32056
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LIC NO. LB8356
2551 BLAIRSTONE PINES DR.
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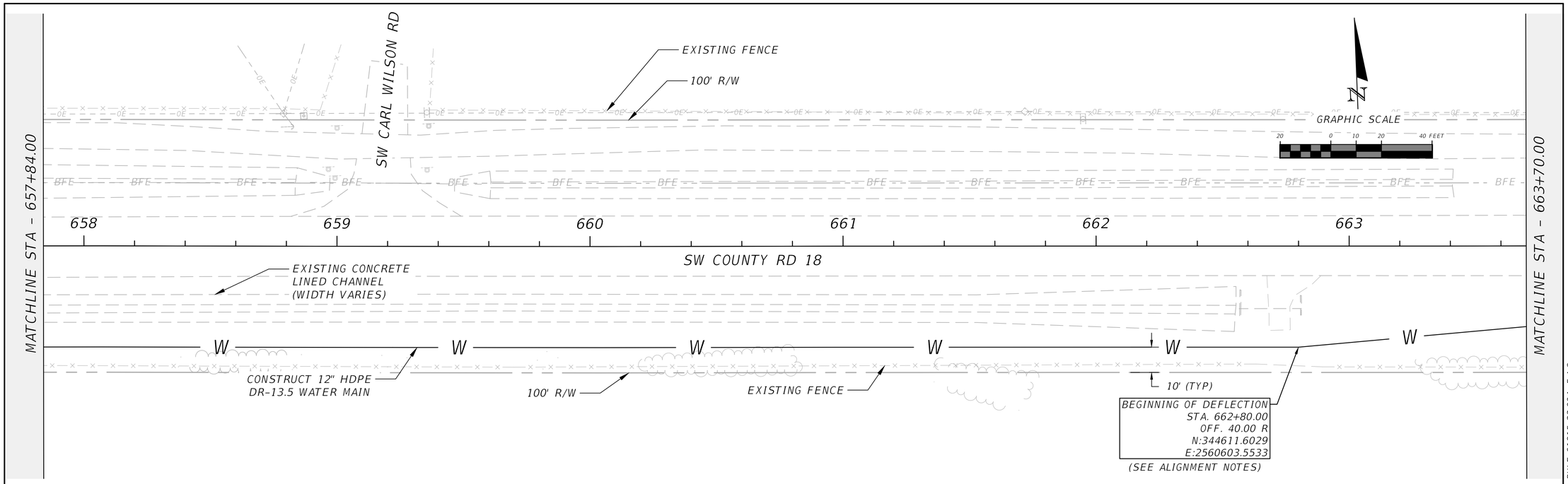
JOB NUMBER: L220110CCB
EOR: RICKY L. HENDRIX
P.E. NO.: 45239

CR 18 PLAN
ELLISVILLE WATER MAIN EXTENSION
COLUMBIA COUNTY, FLORIDA

SHEET NO. 44

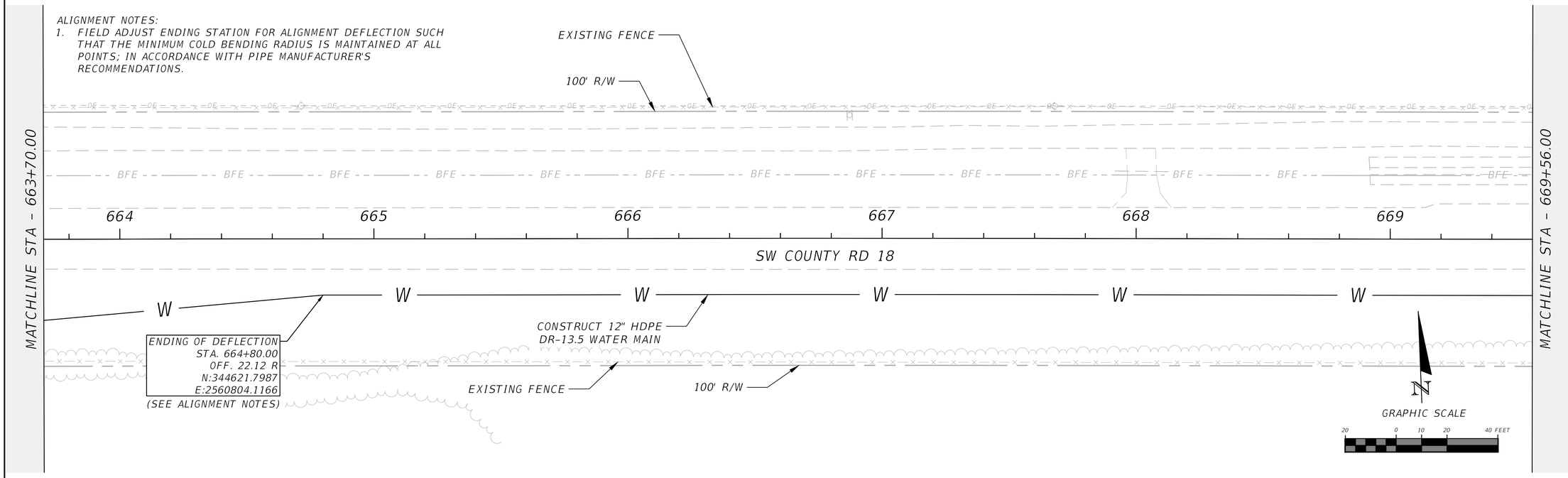
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ALIGNMENT NOTES:

1. FIELD ADJUST ENDING STATION FOR ALIGNMENT DEFLECTION SUCH THAT THE MINIMUM COLD BENDING RADIUS IS MAINTAINED AT ALL POINTS; IN ACCORDANCE WITH PIPE MANUFACTURER'S RECOMMENDATIONS.



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DATE	DESCRIPTION
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NORTH FLORIDA PROFESSIONAL SERVICES, INC.

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CA# 29011

JOB NUMBER: L220110CCB
EOR: RICKY L. HENDRIX
P.E. NO.: 45239

CR 18 PLAN

ELLISVILLE WATER MAIN EXTENSION

COLUMBIA COUNTY, FLORIDA

SHEET NO. 45

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HYDRANT NOTES:
1. CLEAR VEGETATION IN A 20'-WIDE PATH FROM EOP TO R/W LINE, CENTERED ON HYDRANT.
2. INSTALL BLUE RAISED PAVEMENT MARKER (RPM) FOR EACH HYDRANT PER FDOT STANDARD INDEX 706-001.

MATCHLINE STA - 669+56.00

EXISTING FENCE

100' R/W

F&I 12" GATE VALVE
STA. 669+75.00
OFF. 22.12 R
N:344601.9851
E:2561298.7276
(SEE DETAIL WT12)

670 671 672 673 674 675

SW COUNTY RD 18

CONSTRUCT 12" HDPE
DR-13.5 WATER MAIN

100' R/W

F&I FIRE HYDRANT ASSEMBLY
STA. 669+70.00
OFF. 45.00 R
N:344579.3166
E:2561292.8426
(SEE HYDRANT NOTES)

GRAPHIC SCALE
20 0 10 20 40 FEET

MATCHLINE STA - 675+42.00

WETLAND NOTES:
1. AT DESIGNATED WETLANDS, DIRECTIONAL DRILL WATER MAIN TO 6' MIN BELOW LOWEST GROUND ELEVATION AT ANY STANDING WATER.
2. IMPLEMENT AND MAINTAIN EROSION CONTROL MEASURES AROUND ALL DESIGNATED WETLANDS.
3. INSTALL AND MAINTAIN TEMPORARY HIGH-VISIBILITY FENCING OR FLAGGING FOR 10' WETLANDS BUFFERS. CONTRACTOR SHALL BE RESPONSIBLE FOR MITIGATING ALL WETLAND IMPACTS RESULTING FROM PROJECT CONSTRUCTION.

MATCHLINE STA - 675+42.00

EXISTING FENCE

100' R/W

676 677 678 679 680 681

SW COUNTY RD 18

PAVEMENT REPAIR
(SEE DETAIL WT18)

SW MCCLINTON DR

CONSTRUCT 12" HDPE
DR-13.5 WATER MAIN

EXISTING FENCE

100' R/W

CONSTRUCT 12" HDPE DR-11
HDD WETLAND CROSSING
(SEE WETLAND NOTES)

10' WETLAND BUFFER

WETLANDS LINE

GRAPHIC SCALE
20 0 10 20 40 FEET

MATCHLINE STA - 681+28.00

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LIC NO. LB8356

2551 BLAIRSTONE PINES DR.
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WWW.NFPS.NET
CA# 29011

JOB NUMBER: L220110CCB
EOR: RICKY L. HENDRIX
P.E. NO.: 45239

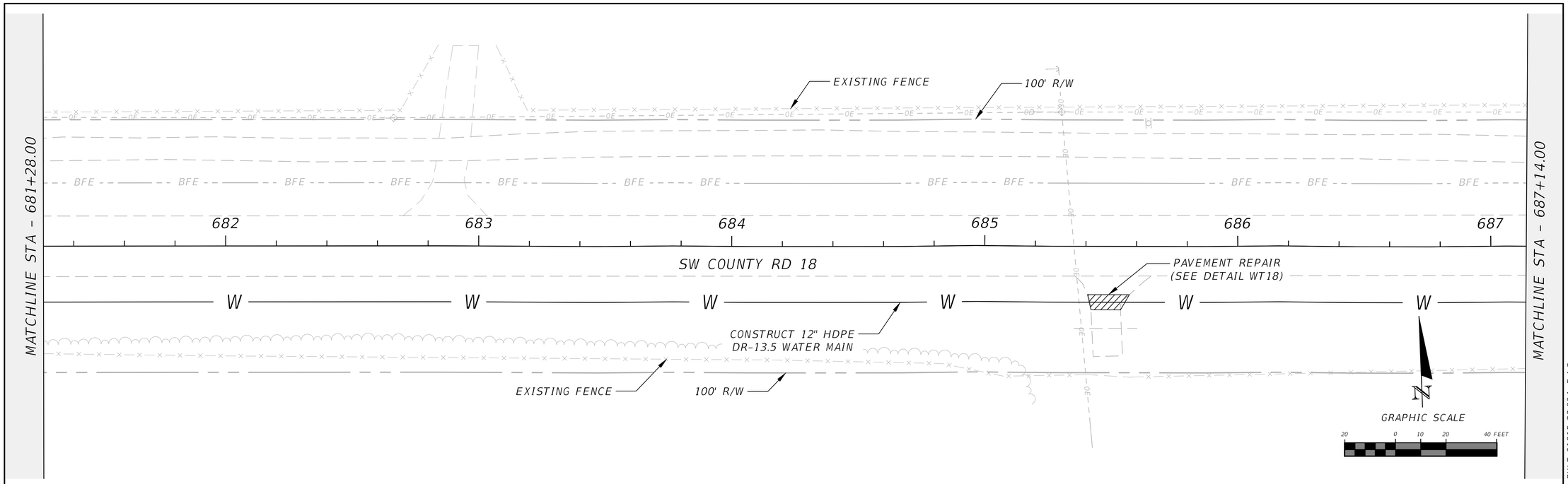
CR 18 PLAN

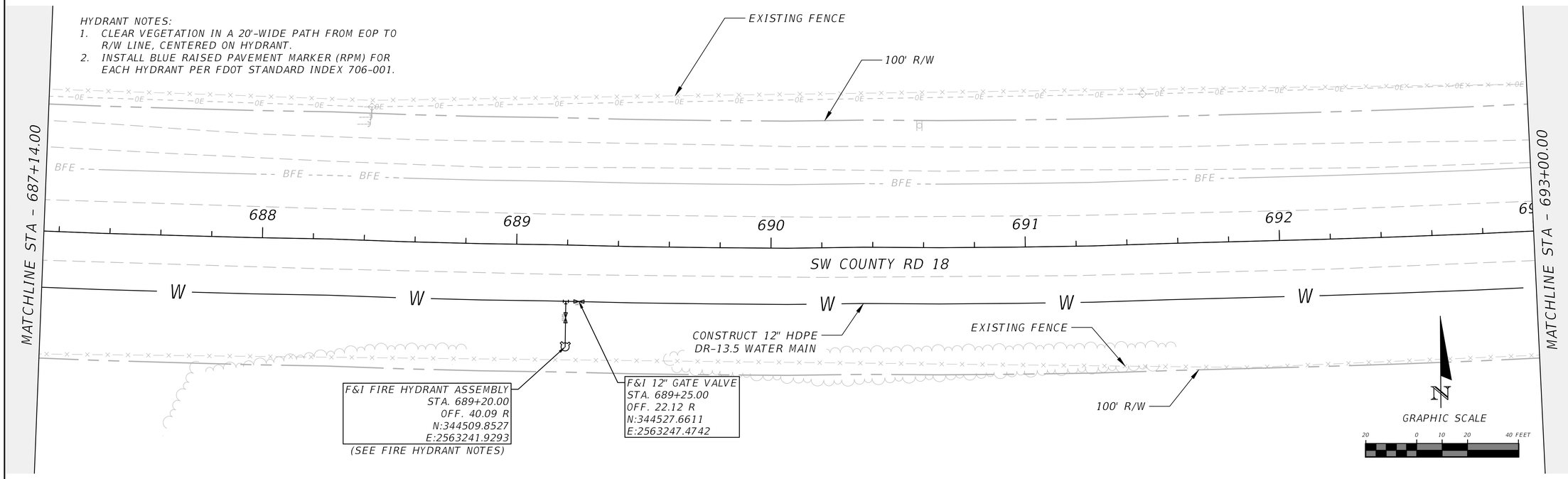
ELLISVILLE WATER MAIN EXTENSION

COLUMBIA COUNTY, FLORIDA

SHEET NO. 46

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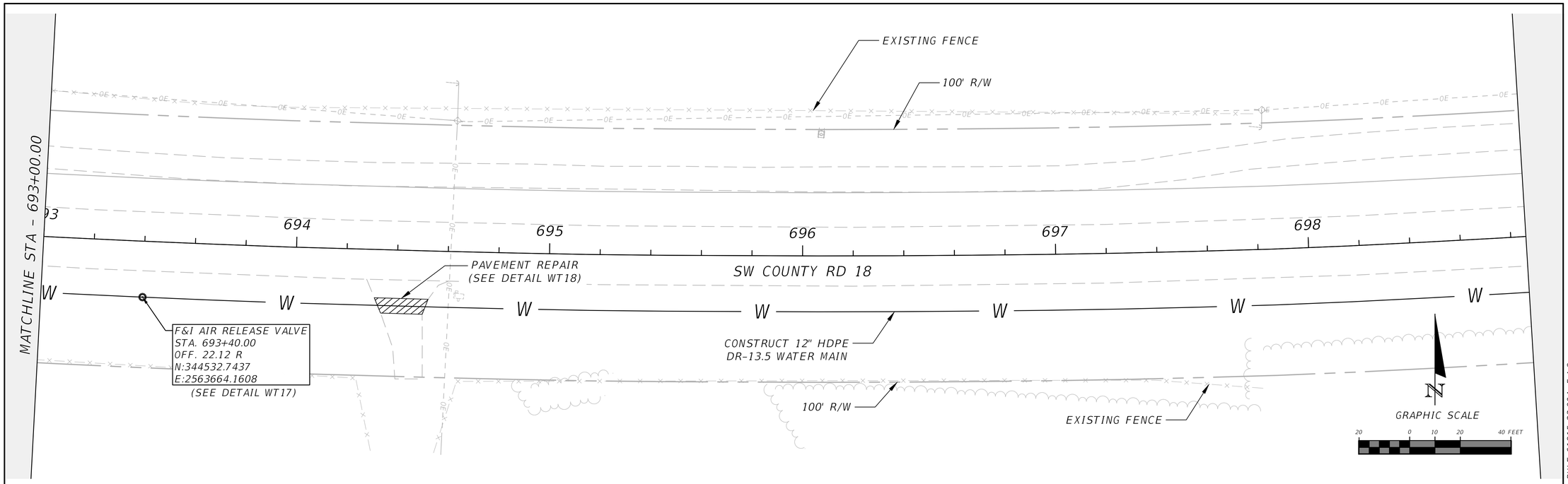
NORTH FLORIDA PROFESSIONAL SERVICES, INC.
P.O. BOX 3823
LAKE CITY, FL 32056
PH. 386-752-4675
LIC NO. LB8356
2551 BLAIRSTONE PINES DR.
TALLAHASSEE, FL 32301
WWW.NFPS.NET
CA# 29011

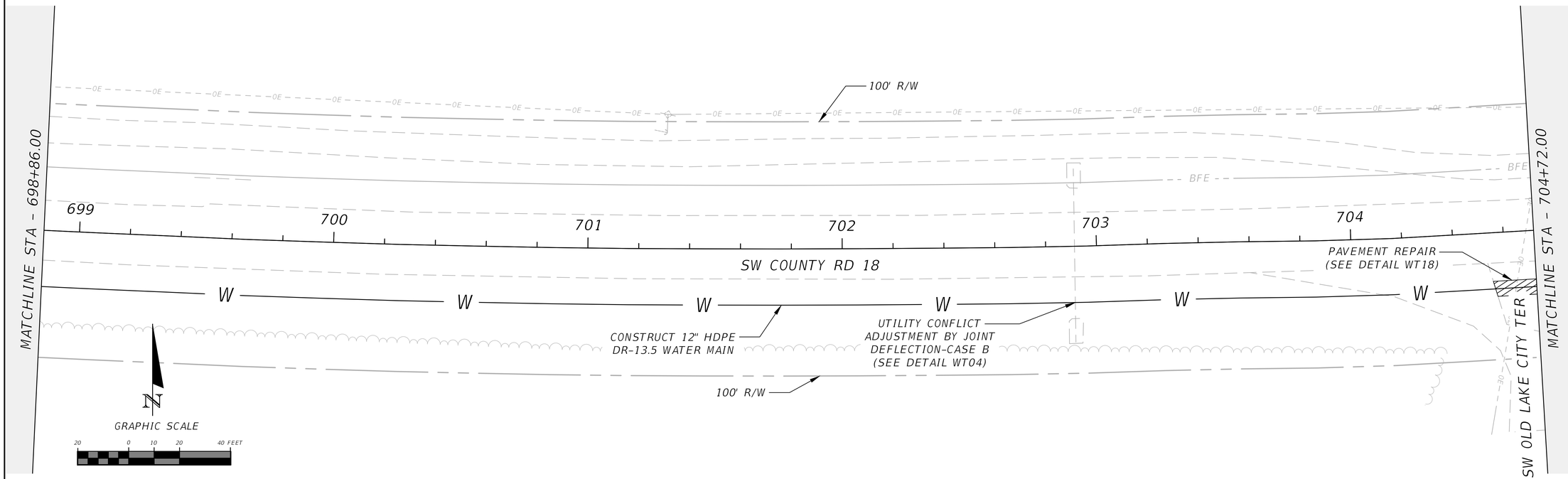
JOB NUMBER: L220110CCB
EOR: RICKY L. HENDRIX
P.E. NO.: 45239

CR 18 PLAN

ELLISVILLE WATER MAIN EXTENSION
COLUMBIA COUNTY, FLORIDA

SHEET NO. 47





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NORTH FLORIDA PROFESSIONAL SERVICES, INC.
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LAKE CITY, FL 32056
PH. 386-752-4675
LIC NO. LB8356
2551 BLAIRSTONE PINES DR.
TALLAHASSEE, FL 32301
WWW.NFPS.NET
CA# 29011

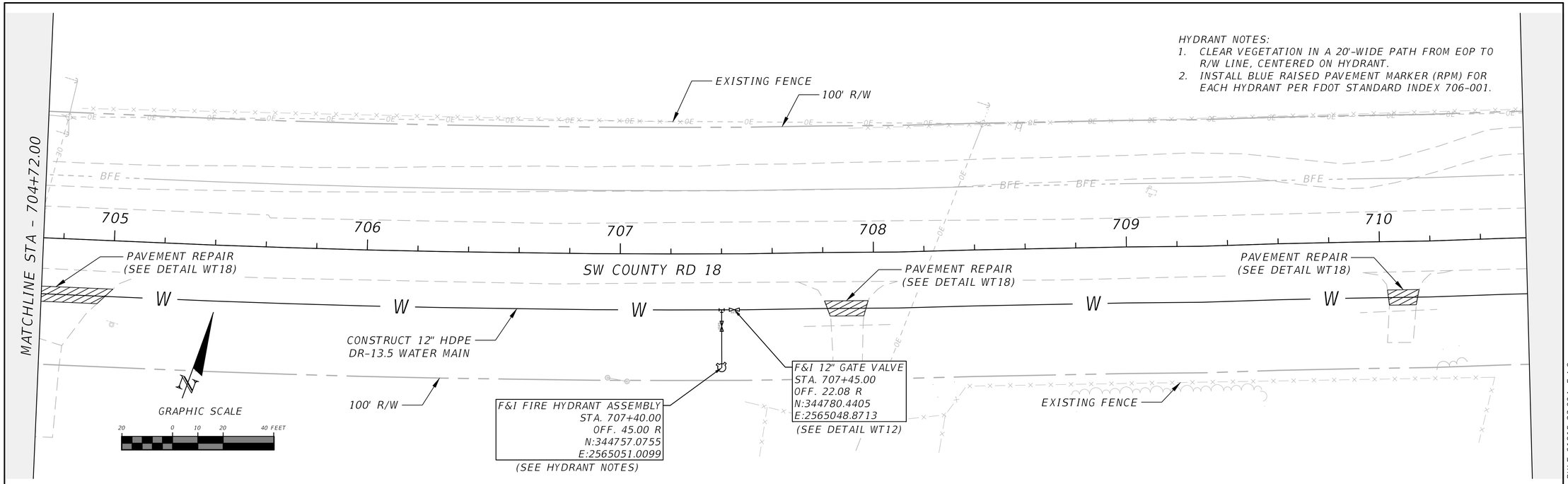
JOB NUMBER: L220110CCB
EOR: RICKY L. HENDRIX
P.E. NO.: 45239

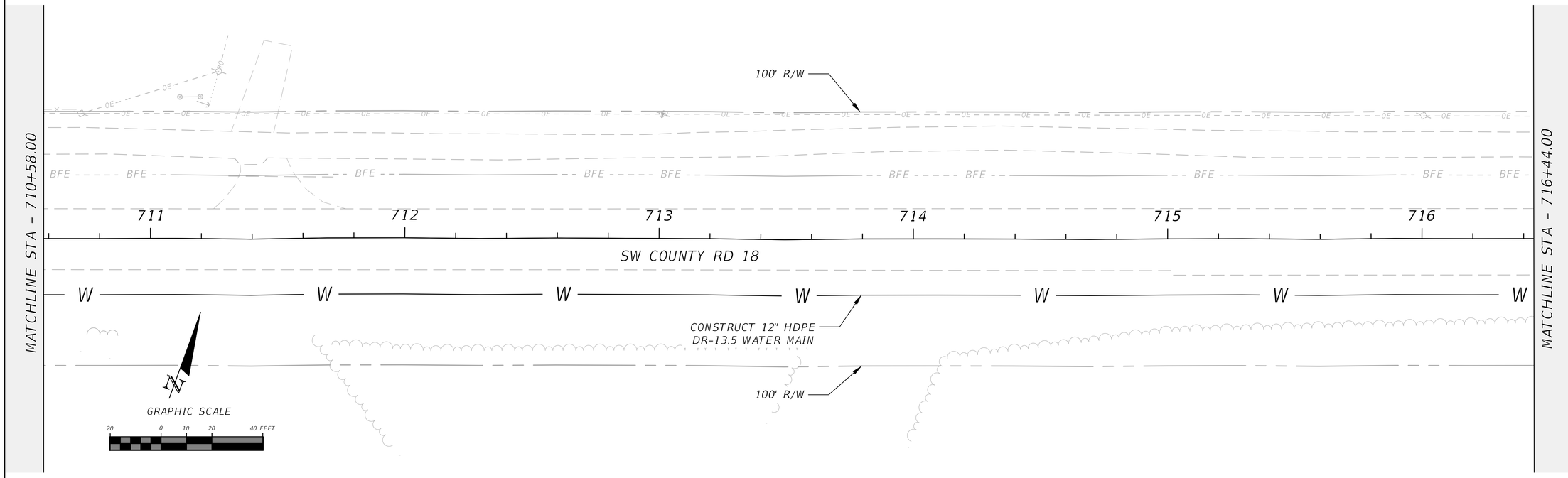
CR 18 PLAN
ELLISVILLE WATER MAIN EXTENSION
COLUMBIA COUNTY, FLORIDA

SHEET NO. 48

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HYDRANT NOTES:
1. CLEAR VEGETATION IN A 20'-WIDE PATH FROM EOP TO R/W LINE, CENTERED ON HYDRANT.
2. INSTALL BLUE RAISED PAVEMENT MARKER (RPM) FOR EACH HYDRANT PER FDOT STANDARD INDEX 706-001.





REVISIONS	
DATE	DESCRIPTION
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NORTH FLORIDA PROFESSIONAL SERVICES, INC.
P.O. BOX 3823
LAKE CITY, FL 32056
PH. 386-752-4675
LIC NO. LB8356
2551 BLAIRSTONE PINES DR.
TALLAHASSEE, FL 32301
WWW.NFPS.NET
CA# 29011

JOB NUMBER: L220110CCB
EOR: RICKY L. HENDRIX
P.E. NO.: 45239

CR 18 PLAN
ELLISVILLE WATER MAIN EXTENSION
COLUMBIA COUNTY, FLORIDA

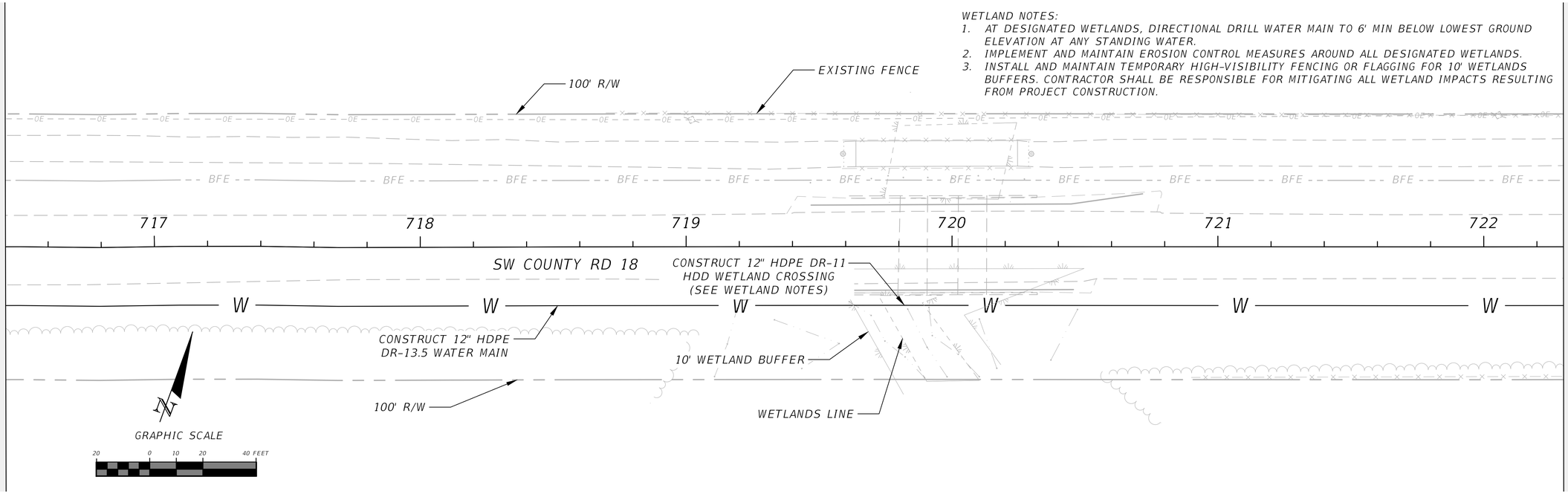
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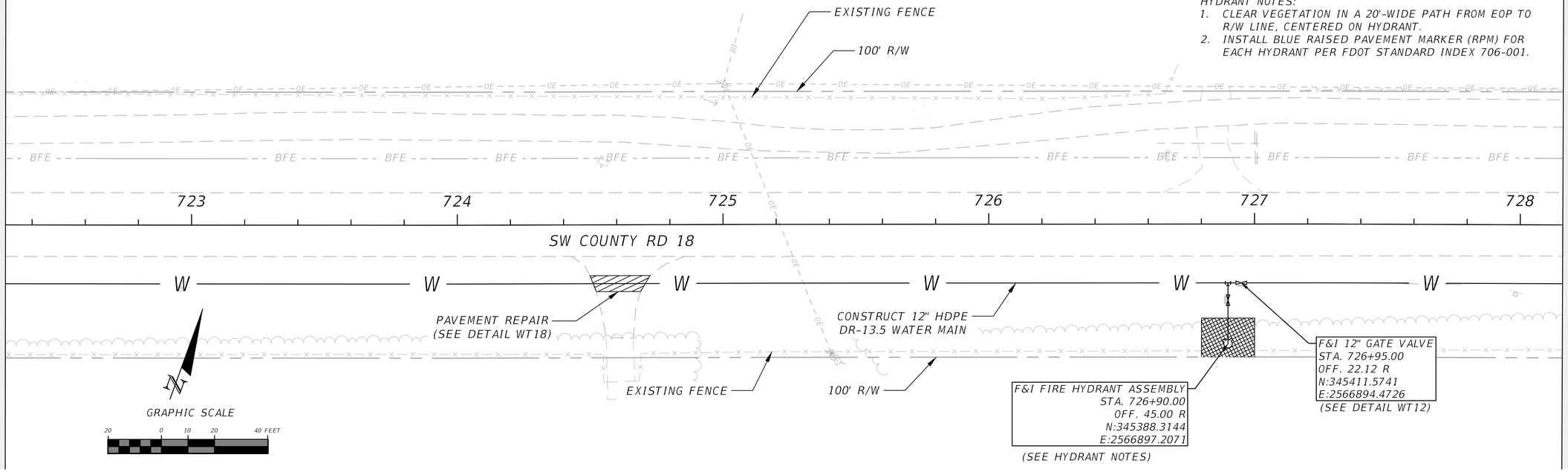
MATCHLINE STA - 716+44.00

WETLAND NOTES:
1. AT DESIGNATED WETLANDS, DIRECTIONAL DRILL WATER MAIN TO 6' MIN BELOW LOWEST GROUND ELEVATION AT ANY STANDING WATER.
2. IMPLEMENT AND MAINTAIN EROSION CONTROL MEASURES AROUND ALL DESIGNATED WETLANDS.
3. INSTALL AND MAINTAIN TEMPORARY HIGH-VISIBILITY FENCING OR FLAGGING FOR 10' WETLANDS BUFFERS. CONTRACTOR SHALL BE RESPONSIBLE FOR MITIGATING ALL WETLAND IMPACTS RESULTING FROM PROJECT CONSTRUCTION.



MATCHLINE STA - 722+30.00

HYDRANT NOTES:
1. CLEAR VEGETATION IN A 20'-WIDE PATH FROM EOP TO R/W LINE, CENTERED ON HYDRANT.
2. INSTALL BLUE RAISED PAVEMENT MARKER (RPM) FOR EACH HYDRANT PER FDOT STANDARD INDEX 706-001.



MATCHLINE STA - 728+16.00

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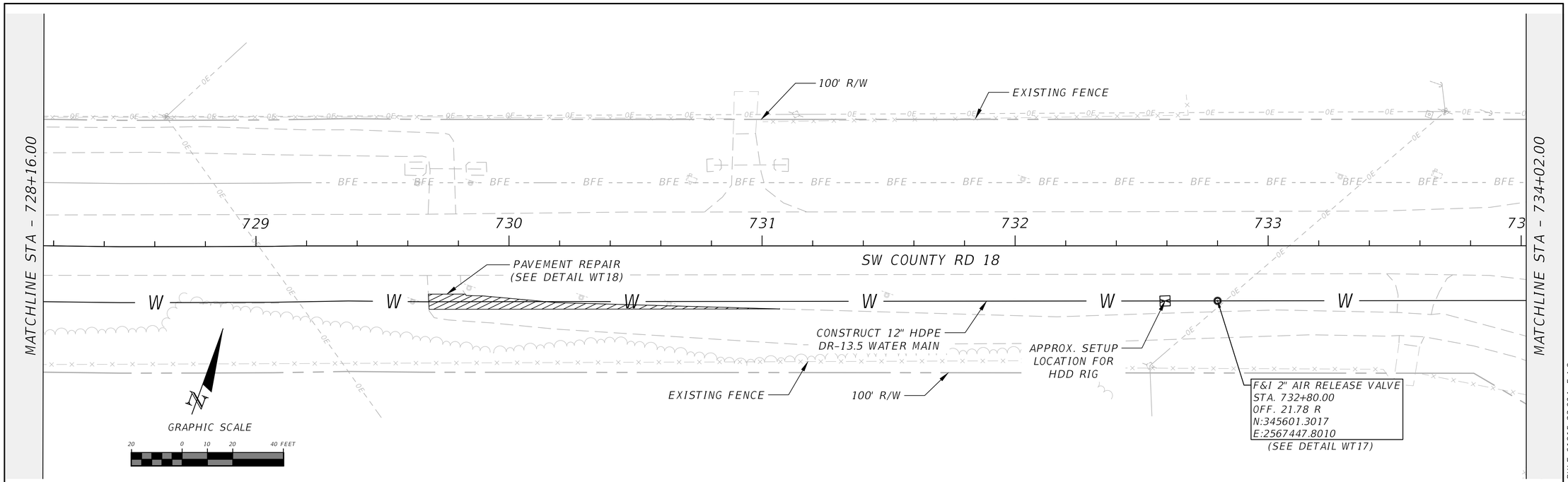
NORTH FLORIDA PROFESSIONAL SERVICES, INC.
P.O. BOX 3823
LAKE CITY, FL 32056
PH. 386-752-4675
LIC NO. LB8356
2551 BLAIRSTONE PINES DR.
TALLAHASSEE, FL 32301
WWW.NFPS.NET
CA# 29011

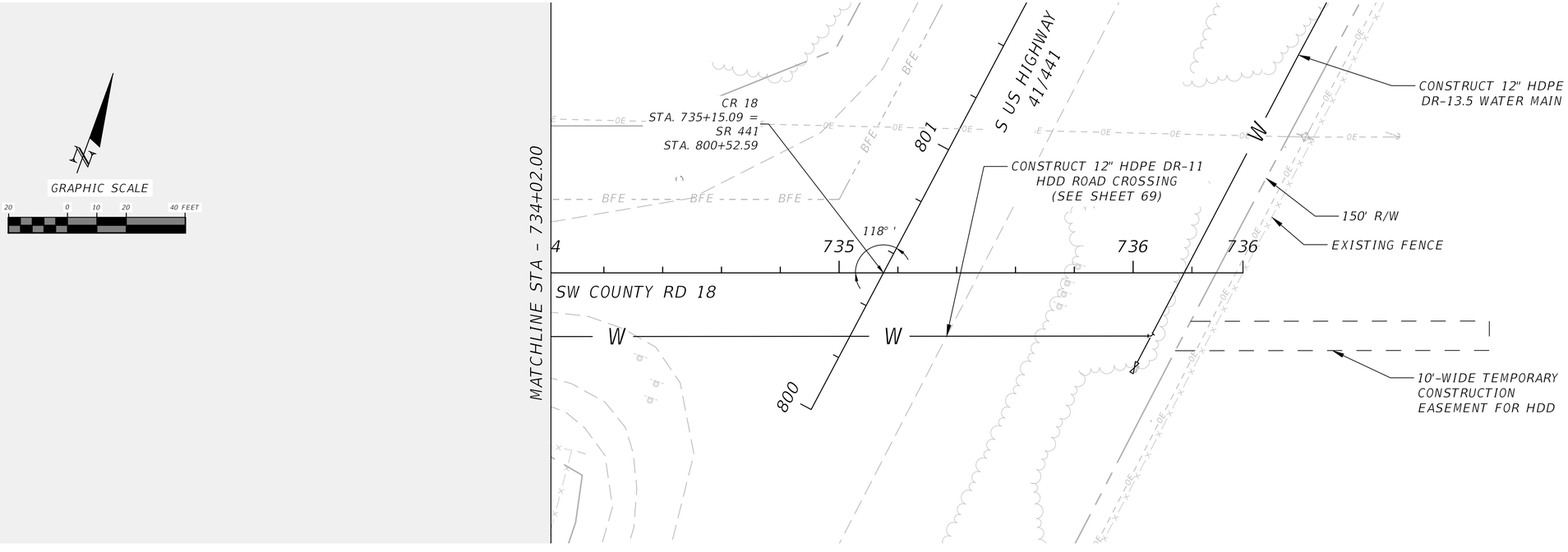
JOB NUMBER: L220110CCB
EOR: RICKY L. HENDRIX
P.E. NO.: 45239

CR 18 PLAN
ELLISVILLE WATER MAIN EXTENSION
COLUMBIA COUNTY, FLORIDA

SHEET NO. 50

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P.O. BOX 3823
LAKE CITY, FL 32056
PH. 386-752-4675
LIC NO. LB8356
2551 BLAIRSTONE PINES DR.
TALLAHASSEE, FL 32301
WWW.NFPS.NET
CA# 29011

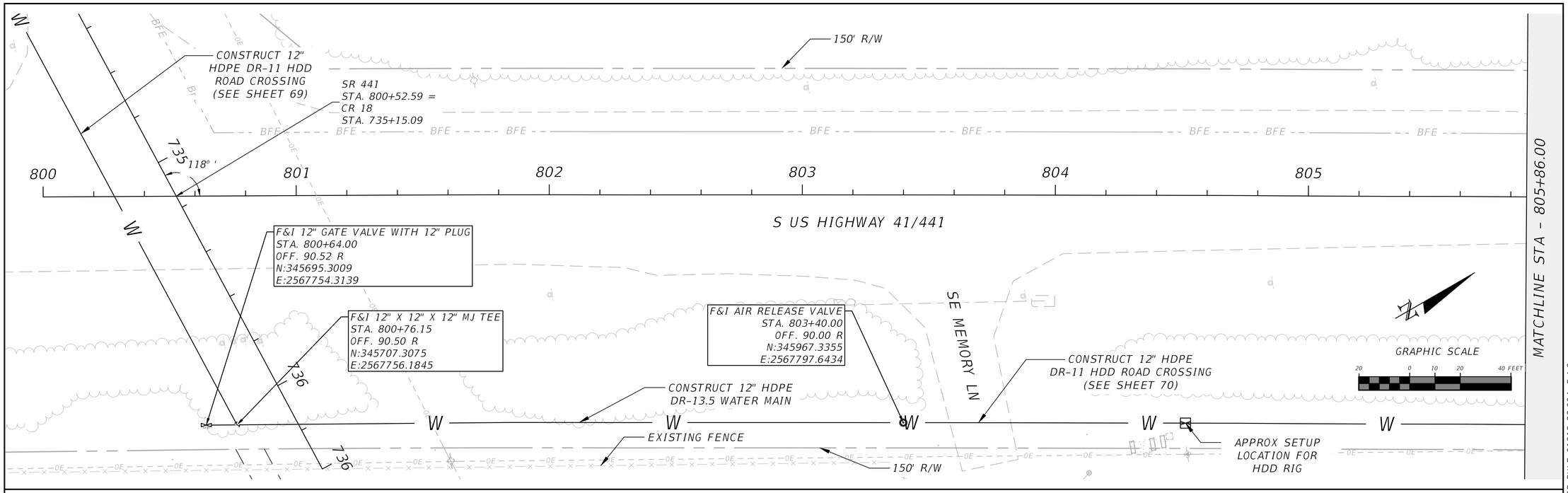
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EOR: RICKY L. HENDRIX
P.E. NO.: 45239

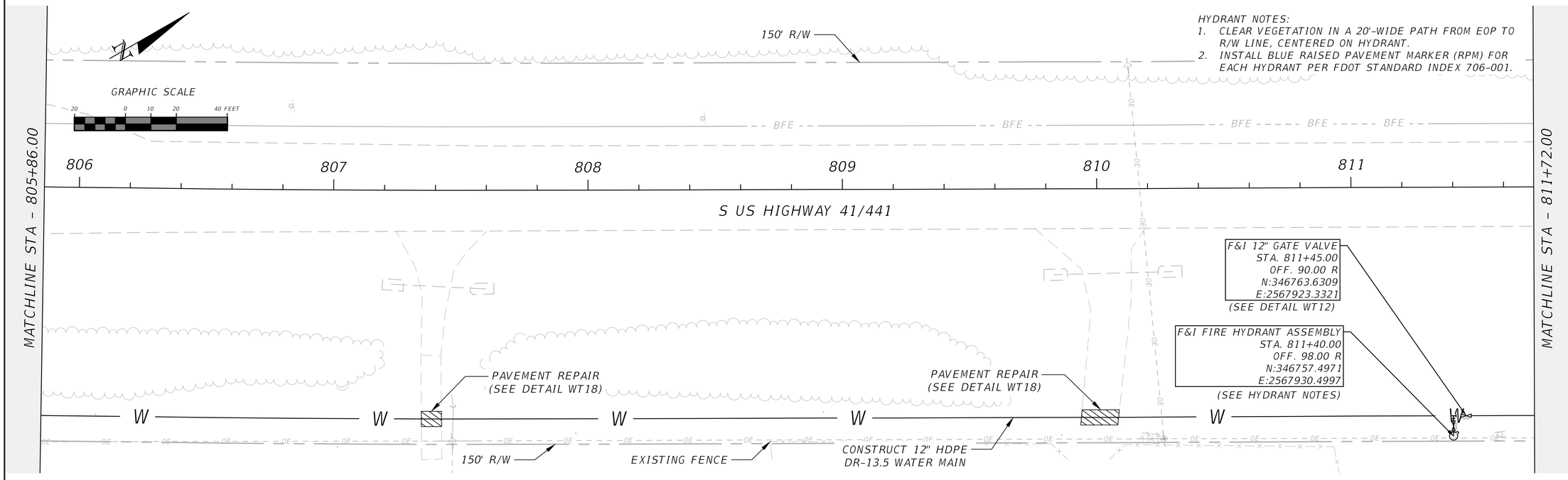
CR 18 PLAN

ELLISVILLE WATER MAIN EXTENSION
COLUMBIA COUNTY, FLORIDA

SHEET NO. 51

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HYDRANT NOTES:
1. CLEAR VEGETATION IN A 20'-WIDE PATH FROM EOP TO R/W LINE, CENTERED ON HYDRANT.
2. INSTALL BLUE RAISED PAVEMENT MARKER (RPM) FOR EACH HYDRANT PER FDOT STANDARD INDEX 706-001.

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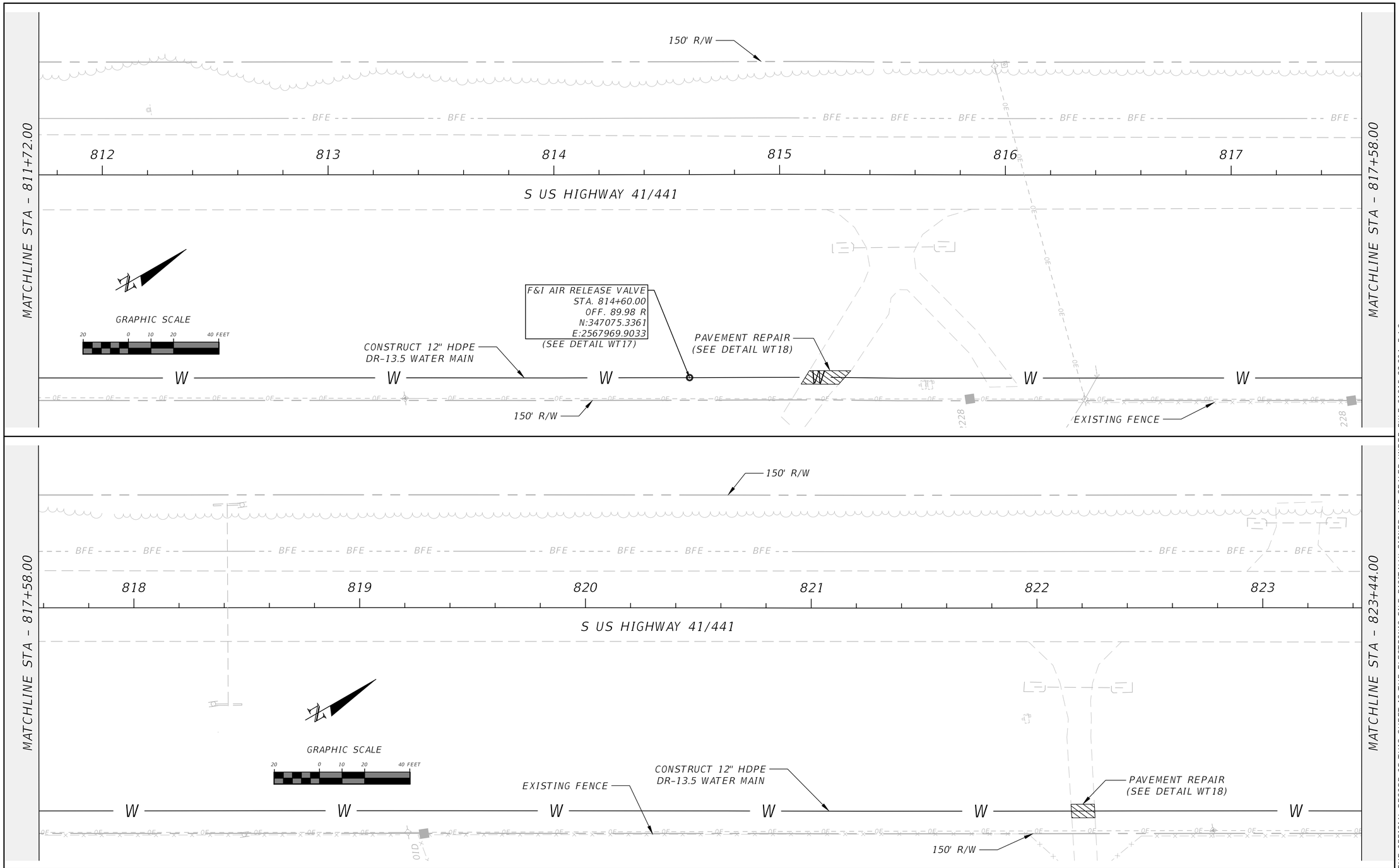
NORTH FLORIDA PROFESSIONAL SERVICES, INC.
P.O. BOX 3823
LAKE CITY, FL 32056
PH. 386-752-4675
LIC NO. LB8356
2551 BLAIRSTONE PINES DR.
TALLAHASSEE, FL 32301
WWW.NFPS.NET
CA# 29011

JOB NUMBER: L220110CCB
EOR: RICKY L. HENDRIX
P.E. NO.: 45239

US 41-441 PLAN
ELLISVILLE WATER MAIN EXTENSION
COLUMBIA COUNTY, FLORIDA

SHEET NO. 52

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NORTH FLORIDA PROFESSIONAL SERVICES, INC.
P.O. BOX 3823
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TALLAHASSEE, FL 32301
WWW.NFPS.NET
CA# 29011

JOB NUMBER: L220110CCB
EOR: RICKY L. HENDRIX
P.E. NO.: 45239

US 41-441 PLAN
ELLISVILLE WATER MAIN EXTENSION
COLUMBIA COUNTY, FLORIDA

SHEET NO. 53

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MATCHLINE STA - 823+44.00

150' R/W

BFE

824 825 826 827 828 829

S US HIGHWAY 41/441

GRAPHIC SCALE

20 0 10 20 40 FEET

CONSTRUCT 12" HDPE
DR-13.5 WATER MAIN

W

OE

228

EXISTING FENCE

150' R/W

MATCHLINE STA - 829+30.00

HYDRANT NOTES:
1. CLEAR VEGETATION IN A 20'-WIDE PATH FROM EOP TO R/W LINE, CENTERED ON HYDRANT.
2. INSTALL BLUE RAISED PAVEMENT MARKER (RPM) FOR EACH HYDRANT PER FDOT STANDARD INDEX 706-001.

150' R/W

GRAPHIC SCALE

20 0 10 20 40 FEET

BFE

830 831 832 833 834 835

S US HIGHWAY 41/441

SE MOONLIGHT PL

CONSTRUCT 12" HDPE
DR-11 HDD ROAD CROSSING
(SEE SHEET 71)

F&I FIRE HYDRANT ASSEMBLY
STA. 831+20.00
OFF. 98.00 R
N:348715.5381
E:2568224.6428
(SEE HYDRANT NOTES)

F&I 12" GATE VALVE
STA. 831+25.00
OFF. 90.00 R
N:348721.6709
E:2568217.4743
(SEE DETAIL WT12)

CONSTRUCT 12" HDPE
DR-13.5 WATER MAIN

W

OE

150' R/W

APPROX. SETUP
LOCATION FOR HDD RIG

EXISTING FENCE

079

MATCHLINE STA - 835+16.00

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REVISIONS	
DATE	DESCRIPTION
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NORTH FLORIDA PROFESSIONAL SERVICES, INC.
P.O. BOX 3823
LAKE CITY, FL 32056
PH. 386-752-4675
LIC NO. LB8356
2551 BLAIRSTONE PINES DR.
TALLAHASSEE, FL 32301
WWW.NFPS.NET
CA# 29011

JOB NUMBER: L220110CCB
EOR: RICKY L. HENDRIX
P.E. NO.: 45239

US 41-441 PLAN

ELLISVILLE WATER MAIN EXTENSION

COLUMBIA COUNTY, FLORIDA

SHEET NO. 54

Cayden Sanders 11/28/2023 3:16:15 PM X:\2022\L220110CCB\H.CADD\Utils\UTPRUW01.dwg 54 US 41-441 PLAN

MATCHLINE STA - 835+16.00

150' R/W

EXISTING FENCE

WETLAND NOTES:
1. AT DESIGNATED WETLANDS, DIRECTIONAL DRILL WATER MAIN TO 6' MIN BELOW LOWEST GROUND ELEVATION AT ANY STANDING WATER.
2. IMPLEMENT AND MAINTAIN EROSION CONTROL MEASURES AROUND ALL DESIGNATED WETLANDS.
3. INSTALL AND MAINTAIN TEMPORARY HIGH-VISIBILITY FENCING OR FLAGGING FOR 10' WETLANDS BUFFERS. CONTRACTOR SHALL BE RESPONSIBLE FOR MITIGATING ALL WETLAND IMPACTS RESULTING FROM PROJECT CONSTRUCTION.

4"X4" CMF L.L. LEE

BFE

836 837 838 839 840 84

S US HIGHWAY 41/411

10' WETLAND BUFFER

WETLANDS LINE

GRAPHIC SCALE

20 0 10 20 40 FEET

CONSTRUCT 12" HDPE DR-11 HDD WETLAND CROSSING (SEE WETLAND NOTES)

SE CLUBHOUSE LN

CONSTRUCT 12": HDPE DR-11 HDD ROAD CROSSING (SEE SHEET 72)

APPROX. SETUP LOCATION FOR HDD RIG

CONSTRUCT 12" HDPE DR-13.5 WATER MAIN

W

OE

150' R/W

EXISTING FENCE

PLS

MATCHLINE STA - 841+02.00

EXISTING FENCE

150' R/W

4"X4" CMF

BFE

1 842 843 844 845 846

S US HIGHWAY 41/411

GRAPHIC SCALE

20 0 10 20 40 FEET

CONSTRUCT 12" HDPE DR-13.5 WATER MAIN

W

OE

150' R/W

MATCHLINE STA - 846+88.00

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CA# 29011

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EOR: RICKY L. HENDRIX
P.E. NO.: 45239

US 41-441 PLAN
ELLISVILLE WATER MAIN EXTENSION
COLUMBIA COUNTY, FLORIDA

SHEET NO. 55

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HYDRANT NOTES:
1. CLEAR VEGETATION IN A 20'-WIDE PATH FROM EOP TO R/W LINE, CENTERED ON HYDRANT.
2. INSTALL BLUE RAISED PAVEMENT MARKER (RPM) FOR EACH HYDRANT PER FDOT STANDARD INDEX 706-001.

MATCHLINE STA - 846+88.00

MATCHLINE STA - 852+74.00

150' R/W

BFE

847 848 849 850 851 852

S US HIGHWAY 41/441

GRAPHIC SCALE

20 0 10 20 40 FEET

CONSTRUCT 12" HDPE DR-13.5 WATER MAIN

F&I FIRE HYDRANT ASSEMBLY
STA. 850+10.00
0FF. 98.00 R
N:350585.2997
E:2568507.3085
(SEE HYDRANT NOTES)

F&I 12" GATE VALVE
STA. 850+15.00
0FF. 90.00 R
N:350591.3583
E:2568500.0771

WETLANDS LINE

10' WETLAND BUFFER

W

OE

150' R/W

WETLAND NOTES:
1. AT DESIGNATED WETLANDS, DIRECTIONAL DRILL WATER MAIN TO 6' MIN BELOW LOWEST GROUND ELEVATION AT ANY STANDING WATER.
2. IMPLEMENT AND MAINTAIN EROSION CONTROL MEASURES AROUND ALL DESIGNATED WETLANDS.
3. INSTALL AND MAINTAIN TEMPORARY HIGH-VISIBILITY FENCING OR FLAGGING FOR 10' WETLANDS BUFFERS. CONTRACTOR SHALL BE RESPONSIBLE FOR MITIGATING ALL WETLAND IMPACTS RESULTING FROM PROJECT CONSTRUCTION.

MATCHLINE STA - 852+74.00

MATCHLINE STA - 858+60.00

150' R/W

BFE

853 854 855 856 857 858

S US HIGHWAY 41/441

10' WETLAND BUFFER

CONSTRUCT 12" HDPE DR-11 HDD WETLAND CROSSING (SEE WETLAND NOTES)

WETLANDS LINE

F&I 2" AIR RELEASE VALVE
STA. 855+80.00
0FF. 90.00 R
N:351149.6172
E:2568582.2878
(SEE DETAIL WT17)

CONSTRUCT 12" HDPE DR-11 HDD ROAD CROSSING (SEE SHEET 73)

SE COUNTY RD 18

CONSTRUCT 12" HDPE DR-13.5 WATER MAIN

GRAPHIC SCALE

20 0 10 20 40 FEET

W

OE

150' R/W

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CA# 29011

JOB NUMBER: L220110CCB
EOR: RICKY L. HENDRIX
P.E. NO.: 45239

US 41-441 PLAN

ELLISVILLE WATER MAIN EXTENSION

COLUMBIA COUNTY, FLORIDA

SHEET NO. 56

MATCHLINE STA - 858+60.00

150' R/W

BFE

859 860 861 862 863 864

S US HIGHWAY 41/441

GRAPHIC SCALE

20 0 10 20 40 FEET

CONSTRUCT 12" HDPE
DR-13.5 WATER MAIN

PAVEMENT REPAIR
(SEE DETAIL WT18)

W

150' R/W

EXISTING FENCE

MATCHLINE STA - 864+46.00

EXISTING FENCE

150' R/W

HYDRANT NOTES:
1. CLEAR VEGETATION IN A 20'-WIDE PATH FROM EOP TO R/W LINE, CENTERED ON HYDRANT.
2. INSTALL BLUE RAISED PAVEMENT MARKER (RPM) FOR EACH HYDRANT PER FDOT STANDARD INDEX 706-001.

MATCHLINE STA - 864+46.00

BFE

865 866 867 868 869 870

S US HIGHWAY 41/441

GRAPHIC SCALE

20 0 10 20 40 FEET

F&I AIR RELEASE VALVE
STA. 869+00.00
OFF. 89.96 R
N:352454.2095
E:2568780.6421
(SEE DETAIL WT17)

CONSTRUCT 12" HDPE
DR-13.5 WATER MAIN

F&I FIRE HYDRANT ASSEMBLY
STA. 869+60.00
OFF. 98.00 R
N:352512.1947
E:2568797.5887
(SEE HYDRANT NOTES)

F&I 12" GATE VALVE
STA. 869+65.00
OFF. 90.00 R
N:352518.3526
E:2568790.4402

W

150' R/W

EXISTING FENCE

MATCHLINE STA - 870+32.00

OE

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CA# 29011

JOB NUMBER: L220110CCB
EOR: RICKY L. HENDRIX
P.E. NO.: 45239

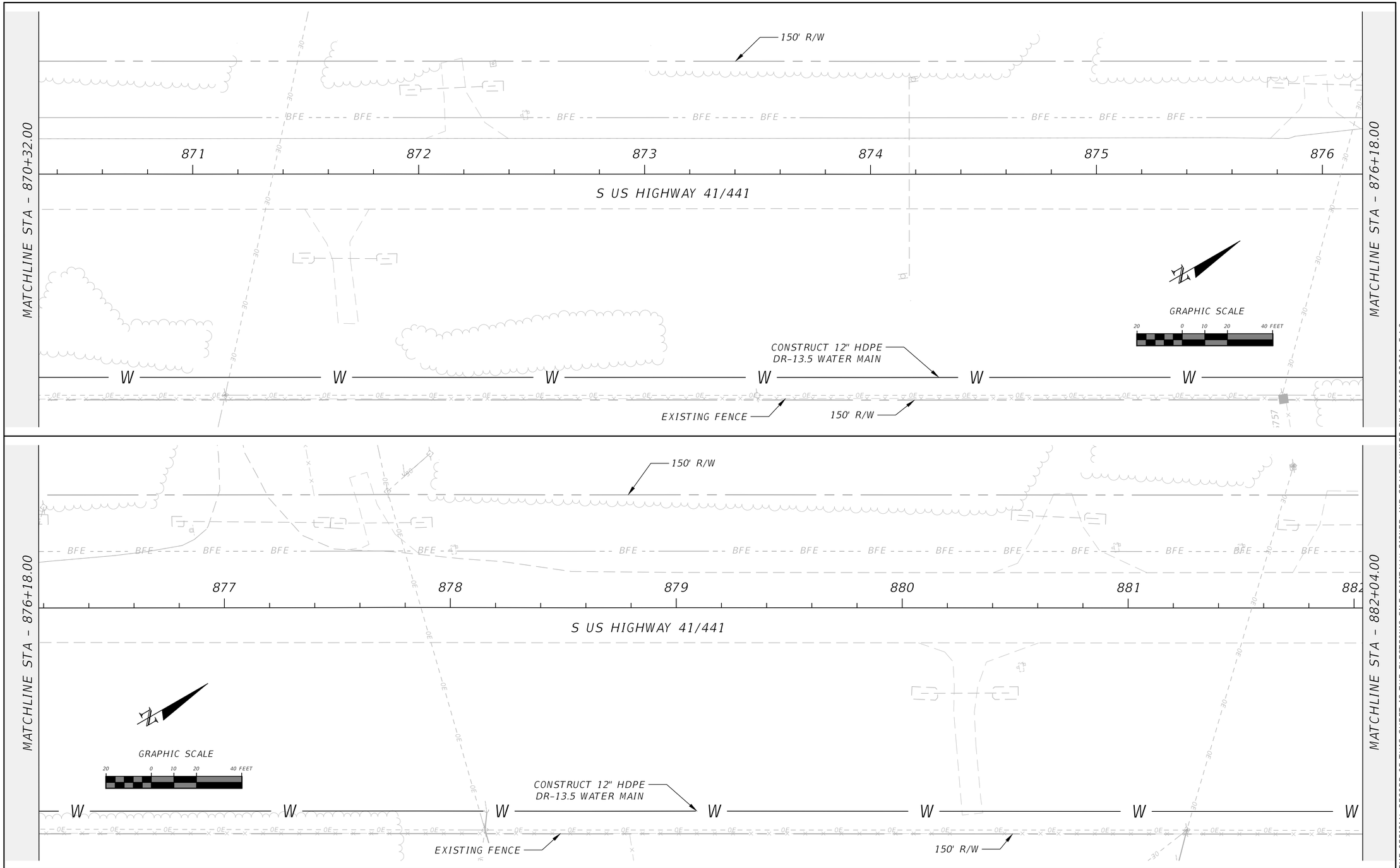
US 41-441 PLAN

ELLISVILLE WATER MAIN EXTENSION

COLUMBIA COUNTY, FLORIDA

SHEET NO. 57

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CA# 29011

JOB NUMBER: L220110CCB
EOR: RICKY L. HENDRIX
P.E. NO.: 45239

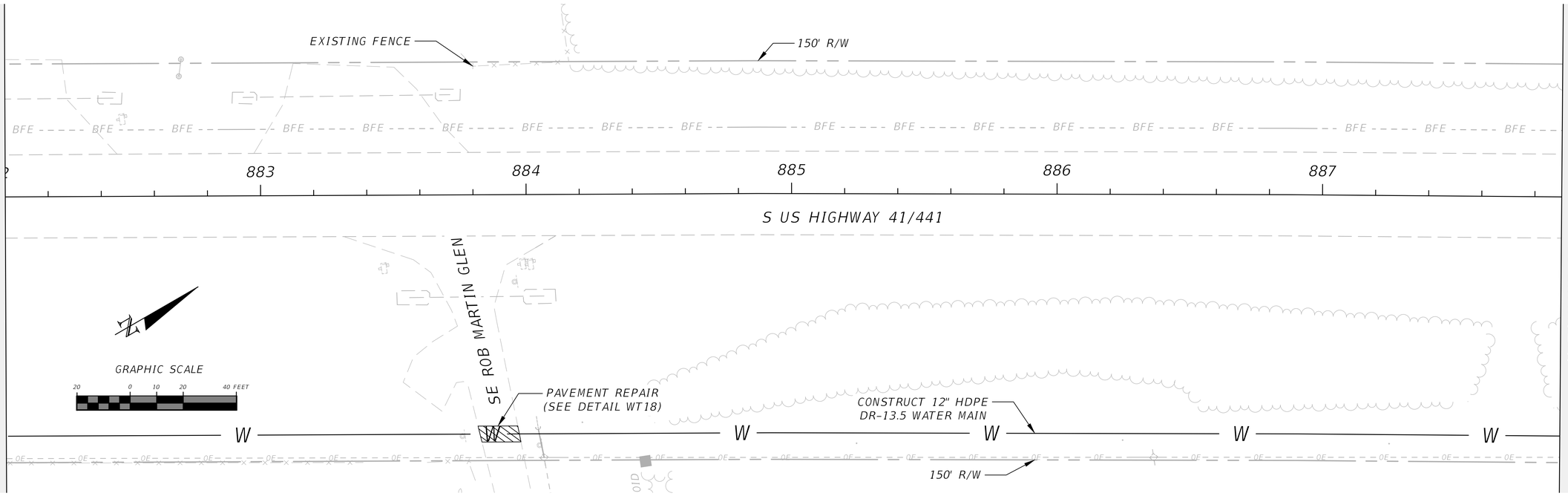
US 41-441 PLAN

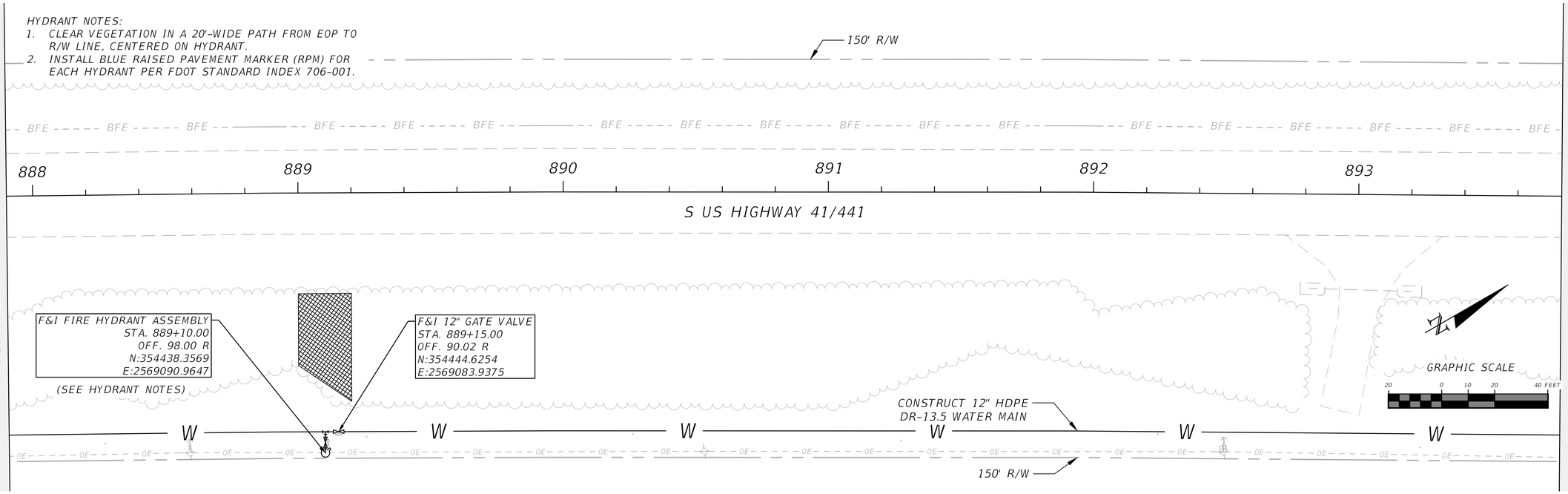
ELLISVILLE WATER MAIN EXTENSION
COLUMBIA COUNTY, FLORIDA

SHEET NO. 58

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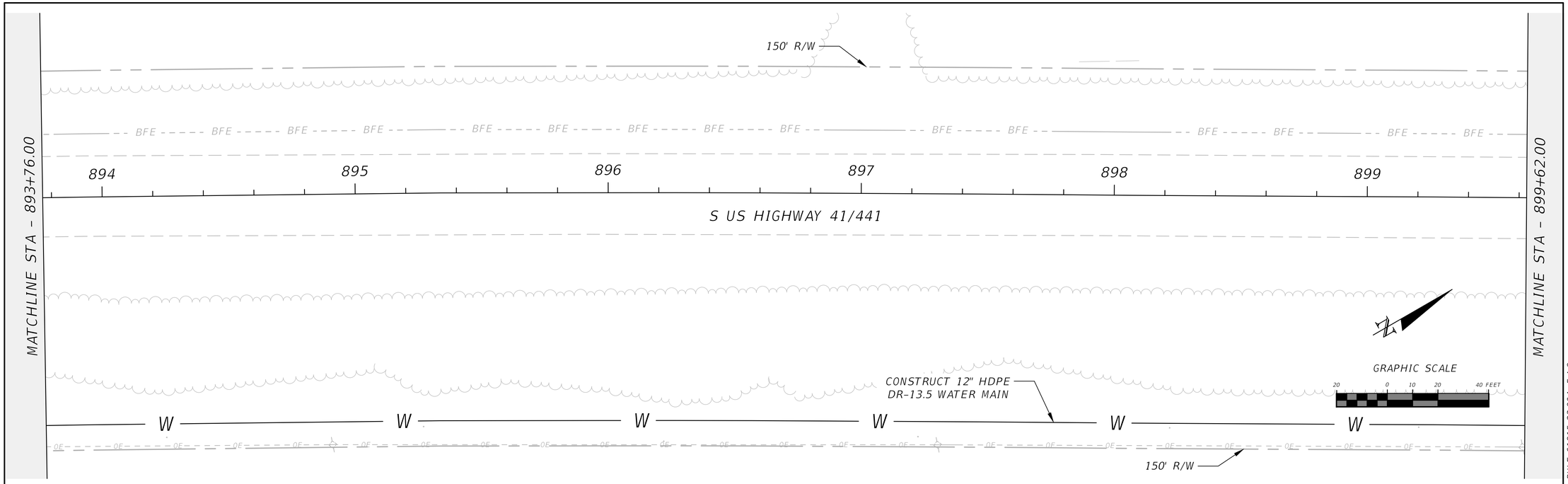
NORTH FLORIDA PROFESSIONAL SERVICES, INC.
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PH. 386-752-4675
LIC NO. LB8356
2551 BLAIRSTONE PINES DR.
TALLAHASSEE, FL 32301
WWW.NFPS.NET
CA# 29011

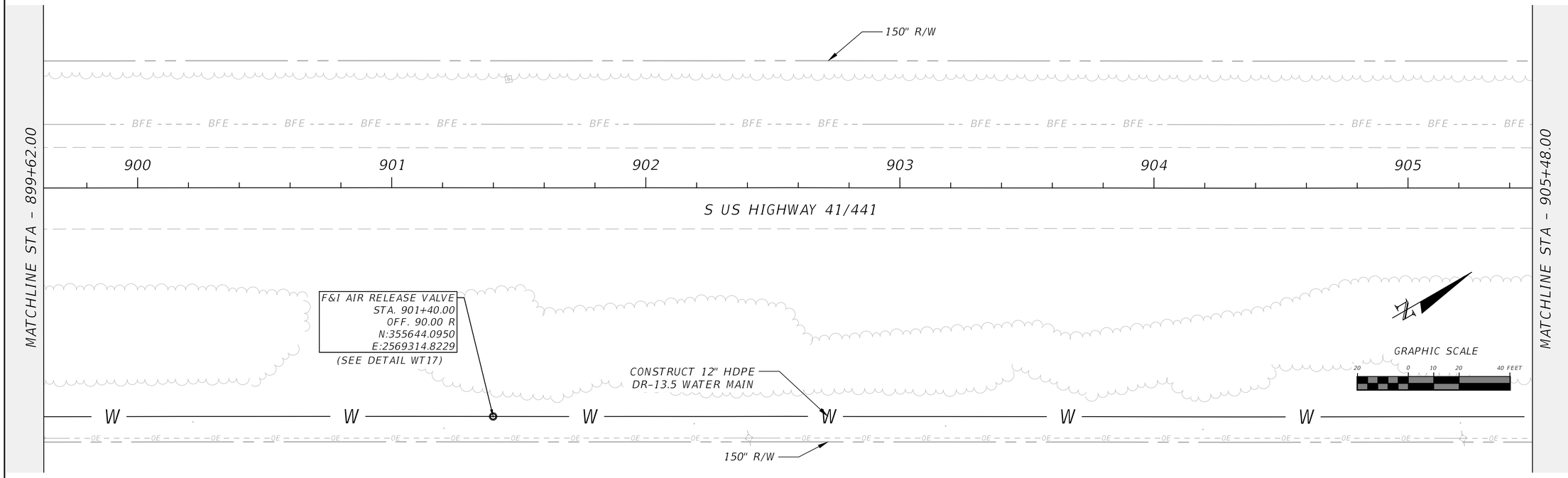
JOB NUMBER: L220110CCB
EOR: RICKY L. HENDRIX
P.E. NO.: 45239

US 41-441 PLAN
ELLISVILLE WATER MAIN EXTENSION
COLUMBIA COUNTY, FLORIDA

SHEET NO. 59

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CA# 29011

JOB NUMBER: L220110CCB
EOR: RICKY L. HENDRIX
P.E. NO.: 45239

US 41-441 PLAN

ELLISVILLE WATER MAIN EXTENSION

COLUMBIA COUNTY, FLORIDA

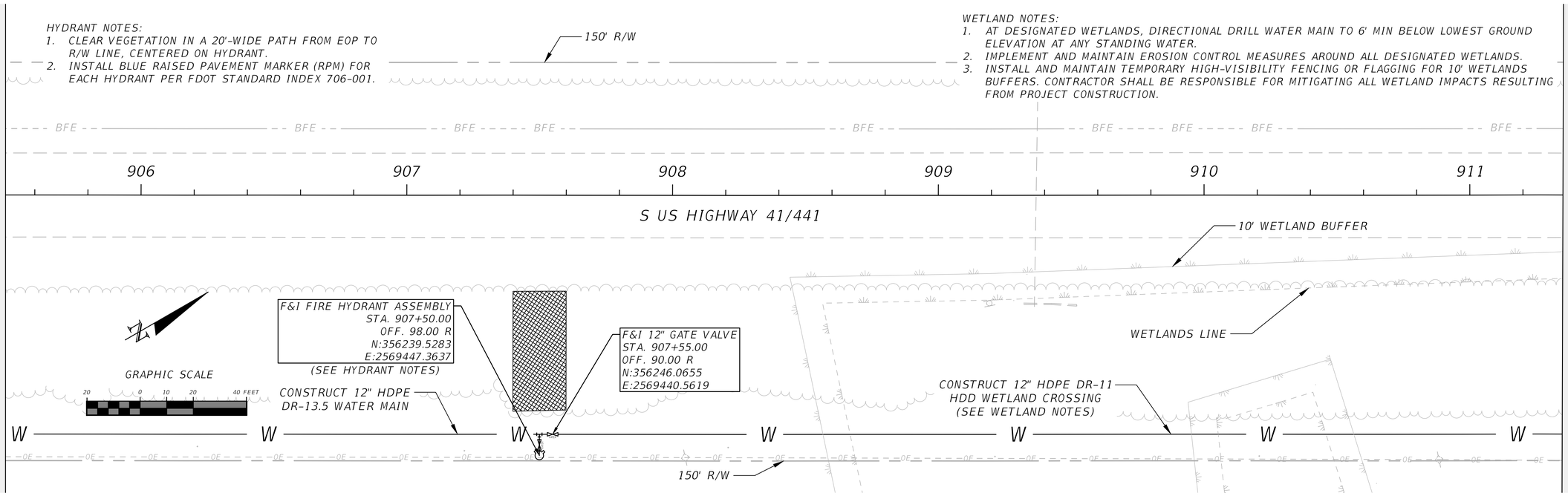
SHEET NO. 60

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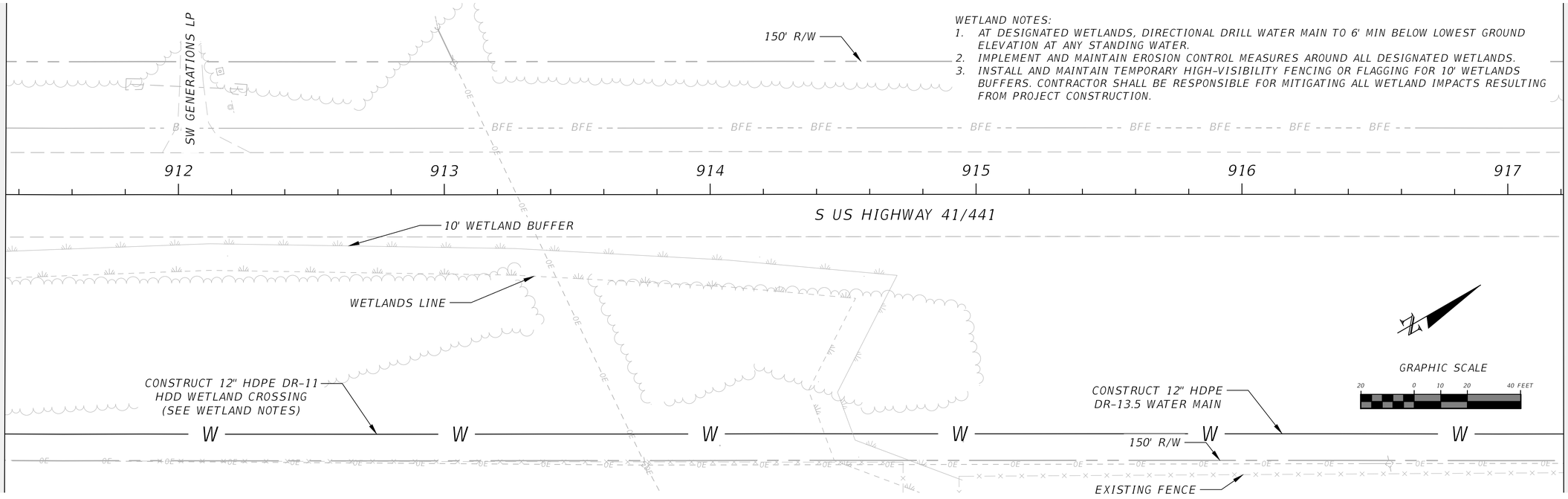
MATCHLINE STA - 905+48.00

HYDRANT NOTES:
1. CLEAR VEGETATION IN A 20'-WIDE PATH FROM EOP TO R/W LINE, CENTERED ON HYDRANT.
2. INSTALL BLUE RAISED PAVEMENT MARKER (RPM) FOR EACH HYDRANT PER FDOT STANDARD INDEX 706-001.

WETLAND NOTES:
1. AT DESIGNATED WETLANDS, DIRECTIONAL DRILL WATER MAIN TO 6' MIN BELOW LOWEST GROUND ELEVATION AT ANY STANDING WATER.
2. IMPLEMENT AND MAINTAIN EROSION CONTROL MEASURES AROUND ALL DESIGNATED WETLANDS.
3. INSTALL AND MAINTAIN TEMPORARY HIGH-VISIBILITY FENCING OR FLAGGING FOR 10' WETLANDS BUFFERS. CONTRACTOR SHALL BE RESPONSIBLE FOR MITIGATING ALL WETLAND IMPACTS RESULTING FROM PROJECT CONSTRUCTION.



MATCHLINE STA - 911+34.00



MATCHLINE STA - 917+20.00

WETLAND NOTES:
1. AT DESIGNATED WETLANDS, DIRECTIONAL DRILL WATER MAIN TO 6' MIN BELOW LOWEST GROUND ELEVATION AT ANY STANDING WATER.
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LIC NO. LB8356
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CA# 29011

JOB NUMBER: L220110CCB
EOR: RICKY L. HENDRIX
P.E. NO.: 45239

US 41-441 PLAN
ELLISVILLE WATER MAIN EXTENSION
COLUMBIA COUNTY, FLORIDA

SHEET NO. 61

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MATCHLINE STA - 917+20.00

SW GENERATIONS LP

150' R/W

BFE BFE BFE BFE BFE BFE BFE BFE

918 919 920 921 922 923

S US HIGHWAY 41/441

GRAPHIC SCALE

20 0 10 20 40 FEET

CONSTRUCT 12" HDPE
DR-13.5 WATER MAIN

W W W W W W

150' R/W

EXISTING FENCE

MATCHLINE STA - 923+06.00

HYDRANT NOTES:
1. CLEAR VEGETATION IN A 20'-WIDE PATH FROM EOP TO R/W LINE, CENTERED ON HYDRANT.
2. INSTALL BLUE RAISED PAVEMENT MARKER (RPM) FOR EACH HYDRANT PER FDOT STANDARD INDEX 706-001.

MATCHLINE STA - 923+06.00

SW TOMMY LITES ST

EXISTING FENCE

150' R/W

BFE BFE BFE BFE BFE BFE BFE BFE BFE BFE BFE BFE BFE BFE

924 925 926 927 928

S US HIGHWAY 41/441

SE WARD CRAWFORD CT

MATCHLINE STA - 928+92.00

GRAPHIC SCALE

20 0 10 20 40 FEET

F&I FIRE HYDRANT ASSEMBLY
STA. 925+30.00
OFF. 98.00 R
N:357982.3027
E:2569810.1546
(SEE HYDRANT NOTES)

F&I 12" GATE VALVE
STA. 925+35.00
OFF. 90.00 R
N:357988.8304
E:2569803.3437

CONSTRUCT 12" HDPE
DR-13.5 WATER MAIN

CONSTRUCT 12" HDPE DR-11
HDD ROAD CROSSING
(SEE SHEET 74)

W W W W W W

PAVEMENT REPAIR
(SEE DETAIL WT18)

150' R/W

150' R/W

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JOB NUMBER: L220110CCB
EOR: RICKY L. HENDRIX
P.E. NO.: 45239

US 41-441 PLAN

ELLISVILLE WATER MAIN EXTENSION

COLUMBIA COUNTY, FLORIDA

SHEET NO. 62

MATCHLINE STA - 928+92.00

150' R/W

WETLAND NOTES:
1. AT DESIGNATED WETLANDS, DIRECTIONAL DRILL WATER MAIN TO 6' MIN BELOW LOWEST GROUND ELEVATION AT ANY STANDING WATER.
2. IMPLEMENT AND MAINTAIN EROSION CONTROL MEASURES AROUND ALL DESIGNATED WETLANDS.
3. INSTALL AND MAINTAIN TEMPORARY HIGH-VISIBILITY FENCING OR FLAGGING FOR 10' WETLANDS BUFFERS. CONTRACTOR SHALL BE RESPONSIBLE FOR MITIGATING ALL WETLAND IMPACTS RESULTING FROM PROJECT CONSTRUCTION.

BFE

929 930 931 932 933 934

MATCHLINE STA - 934+78.00

S US HIGHWAY 41/441

10' WETLAND BUFFER

F&I AIR RELEASE VALVE
STA. 933+30.00
0FF. 90.00 R
N:358766.7549
E:2569965.3449
(SEE DETAIL WT17)

WETLANDS LINE

APPROX. SETUP LOCATION FOR HDD RIG

CONSTRUCT 12" HDPE DR-13.5 WATER MAIN

CONSTRUCT 12" HDPE DR-11 HDD WETLAND CROSSING (SEE WETLANDS NOTES)

W OE

150' R/W

GRAPHIC SCALE
20 0 10 20 40 FEET

MATCHLINE STA - 934+78.00

EXISTING FENCE

BFE

935 936 937 938 939 940

MATCHLINE STA - 940+64.00

S US HIGHWAY 41/441

CONSTRUCT 12" HDPE DR-13.5 WATER MAIN

150' R/W

EXISTING FENCE

GRAPHIC SCALE
20 0 10 20 40 FEET

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US 41-441 PLAN
ELLISVILLE WATER MAIN EXTENSION
COLUMBIA COUNTY, FLORIDA

SHEET NO. 63

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HYDRANT NOTES:
1. CLEAR VEGETATION IN A 20'-WIDE PATH FROM EOP TO R/W LINE, CENTERED ON HYDRANT.
2. INSTALL BLUE RAISED PAVEMENT MARKER (RPM) FOR EACH HYDRANT PER FDOT STANDARD INDEX 706-001.

WETLAND NOTES:
1. AT DESIGNATED WETLANDS, DIRECTIONAL DRILL WATER MAIN TO 6' MIN BELOW LOWEST GROUND ELEVATION AT ANY STANDING WATER.
2. IMPLEMENT AND MAINTAIN EROSION CONTROL MEASURES AROUND ALL DESIGNATED WETLANDS.
3. INSTALL AND MAINTAIN TEMPORARY HIGH-VISIBILITY FENCING OR FLAGGING FOR 10' WETLANDS BUFFERS. CONTRACTOR SHALL BE RESPONSIBLE FOR MITIGATING ALL WETLAND IMPACTS RESULTING FROM PROJECT CONSTRUCTION.

MATCHLINE STA - 940+64.00

150' R/W

BFE

S US HIGHWAY 41/441

F&I FIRE HYDRANT ASSEMBLY
STA. 942+90.00
OFF. 98.00 R
N:359705.2373
E:2570169.1464
(SEE HYDRANT NOTES)

F&I 12" GATE VALVE
STA. 942+95.00
OFF. 90.00 R
N:359711.7693
E:2570162.3395

GRAPHIC SCALE
20 0 10 20 40 FEET

CONSTRUCT 12" HDPE DR-13.5 WATER MAIN

W

150' R/W

EXISTING FENCE

10' WETLAND BUFFER

WETLANDS LINE

CONSTRUCT 12" HDPE DR-11 HDD WETLANDS CROSSING (SEE WETLAND NOTES)

MATCHLINE STA - 946+50.00

MATCHLINE STA - 946+50.00

150' R/W

F & I 12" X 12" MJ FABRICATED STEEL TAPPING SLEEVE ON EXISTING 12" DIP WATER MAIN. PROVIDE WET TAP WITH 12" GATE VALVE, BOX AND COVER.

BFE

947 948 949 950 951 952

S US HIGHWAY 41/441

F&I 12" 90° BEND
STA. 951+83.27
OFF. 90.00 R
N:360581.3877
E:2570343.8383

F&I 12" GATE VALVE W/ PLUG
STA. 951+83.27
OFF. 95.31 R
N:360580.3058
E:2570349.0348

SE BAILEY ST

EXISTING WATER MAIN

CONSTRUCT 12" HDPE DR-11 HDD ROAD CROSSING (SEE SHEET 75)

GRAPHIC SCALE
20 0 10 20 40 FEET

CONSTRUCT 12" HDPE DR-13.5 WATER MAIN

W

150' R/W

EXISTING FENCE

APPROX. SETUP LOCATION FOR HDD RIG

MATCHLINE STA - 952+36.00

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DATE	DESCRIPTION

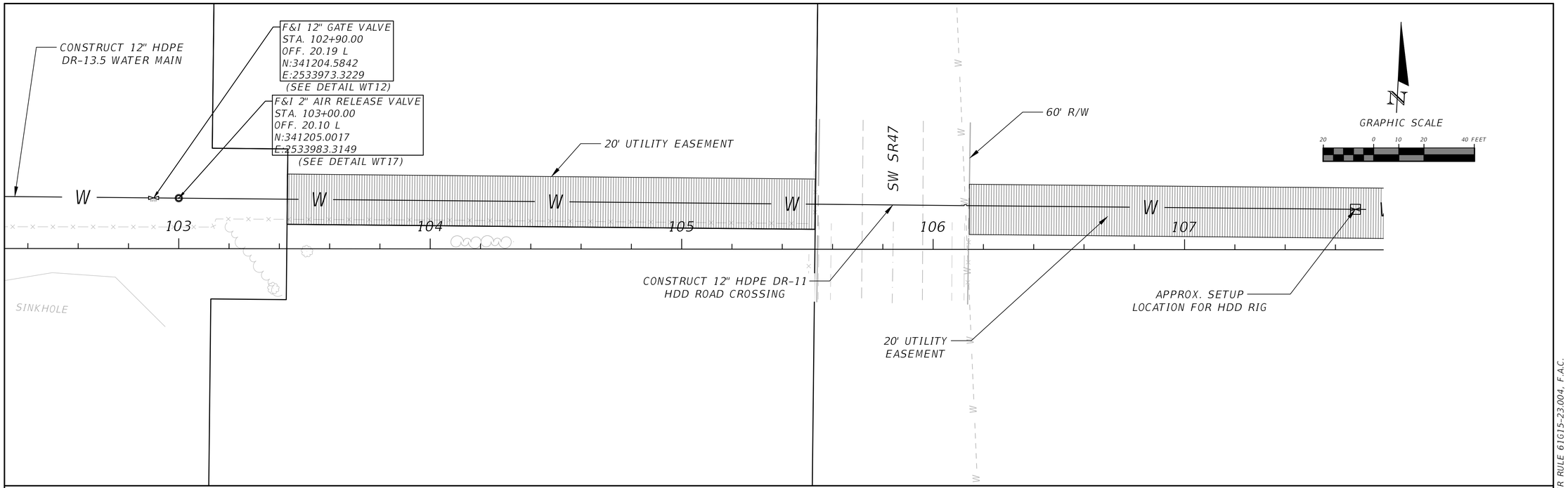
NORTH FLORIDA PROFESSIONAL SERVICES, INC.
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LIC NO. LB8356
2551 BLAIRSTONE PINES DR.
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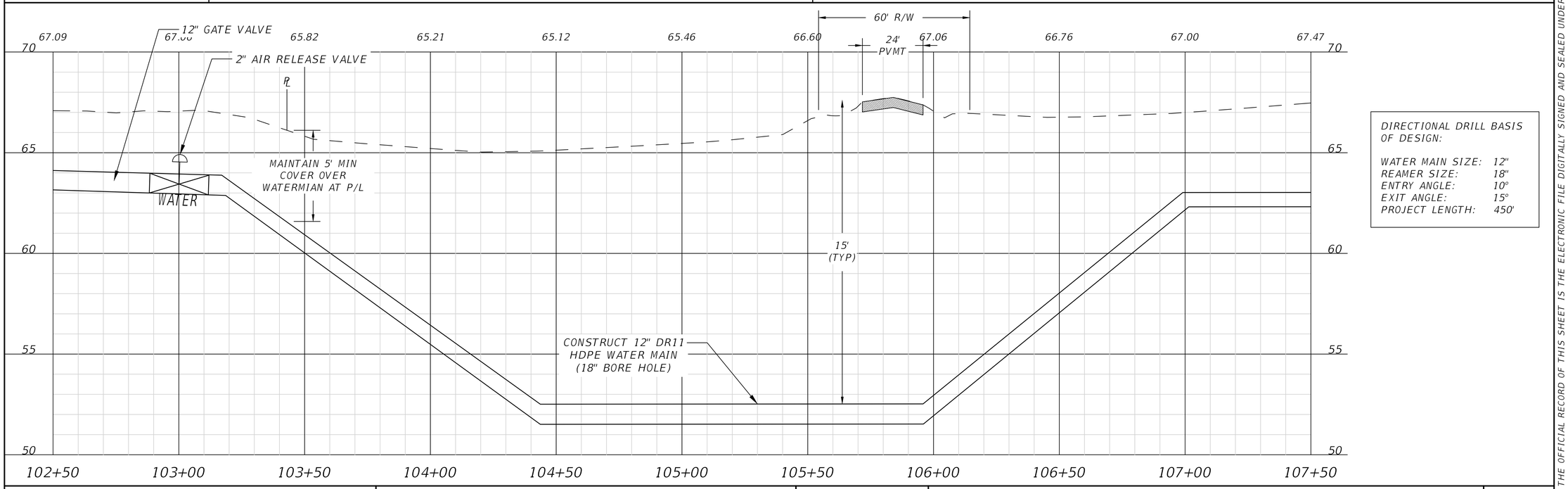
JOB NUMBER: L220110CCB
EOR: RICKY L. HENDRIX
P.E. NO.: 45239

US 41-441 PLAN

ELLISVILLE WATER MAIN EXTENSION
COLUMBIA COUNTY, FLORIDA

SHEET NO. 64





DIRECTIONAL DRILL BASIS OF DESIGN:

WATER MAIN SIZE:	12"
REAMER SIZE:	18"
ENTRY ANGLE:	10°
EXIT ANGLE:	15°
PROJECT LENGTH:	450'

REVISIONS	
DATE	DESCRIPTION
----	----

NORTH FLORIDA PROFESSIONAL SERVICES, INC.
P.O. BOX 3823
LAKE CITY, FL 32056
PH. 386-752-4675
LIC NO. LB8356
2551 BLAIRSTONE PINES DR.
TALLAHASSEE, FL 32301
WWW.NFPS.NET
CA# 29011

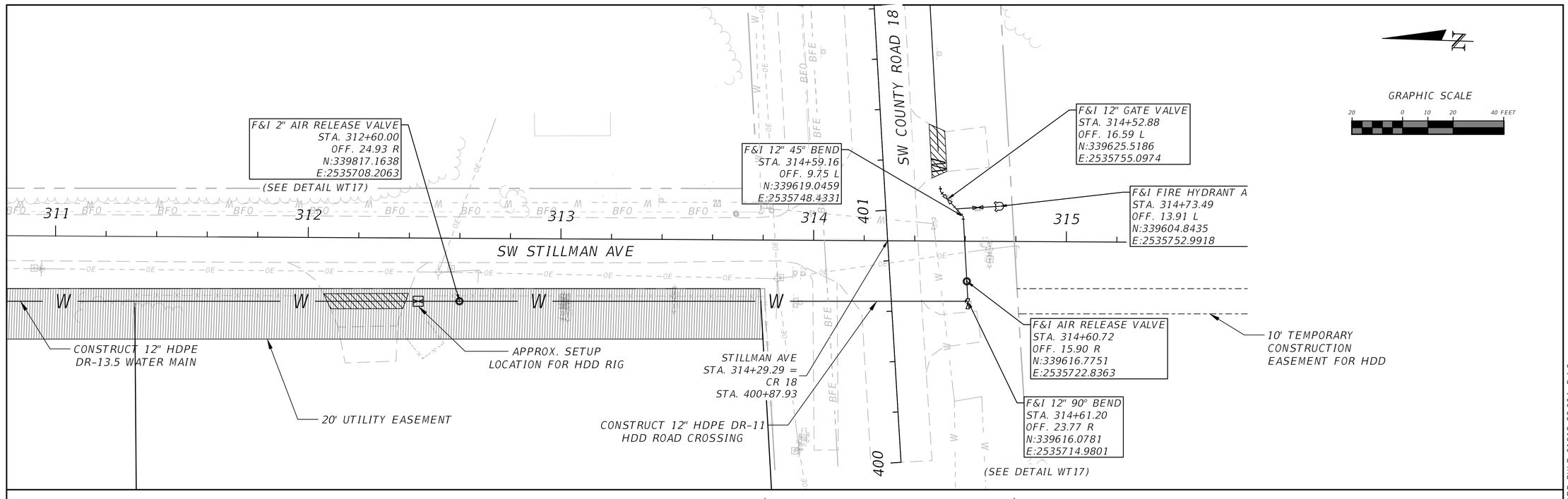
JOB NUMBER: L220110CCB
EOR: RICKY L. HENDRIX
P.E. NO.: 45239

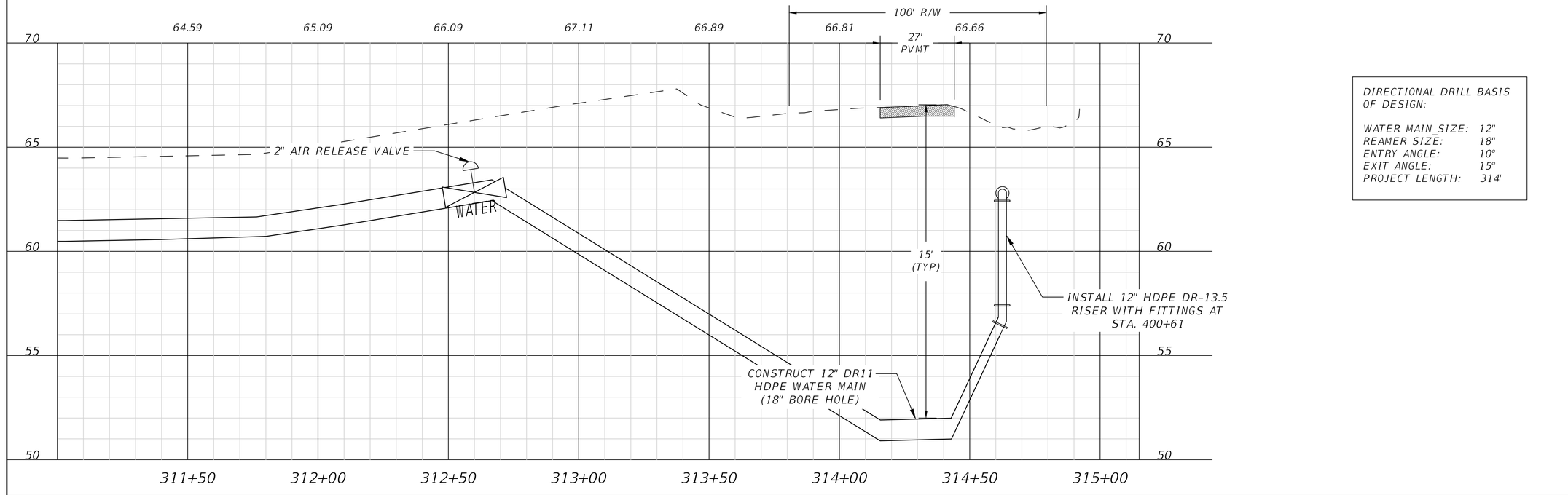
SW SR47 CROSSING
ELLISVILLE WATER MAIN EXTENSION
COLUMBIA COUNTY, FLORIDA

SHEET NO. 65

Cayden Sanders 11/28/2023 3:18:12 PM X:\2022\L220110CCB\H.CADD\Utils\UTPRUW01.dwg 65 SW SR47 CROSSING

THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.





DIRECTIONAL DRILL BASIS OF DESIGN:

WATER MAIN SIZE:	12"
REAMER SIZE:	18"
ENTRY ANGLE:	10°
EXIT ANGLE:	15°
PROJECT LENGTH:	314'

REVISIONS	
DATE	DESCRIPTION
----	----

NORTH FLORIDA PROFESSIONAL SERVICES, INC.
P.O. BOX 3823, LAKE CITY, FL 32056, PH. 386-752-4675, LIC NO. LB8356
2551 BLAIRSTONE PINES DR., TALLAHASSEE, FL 32301, WWW.NFPS.NET, CA# 29011

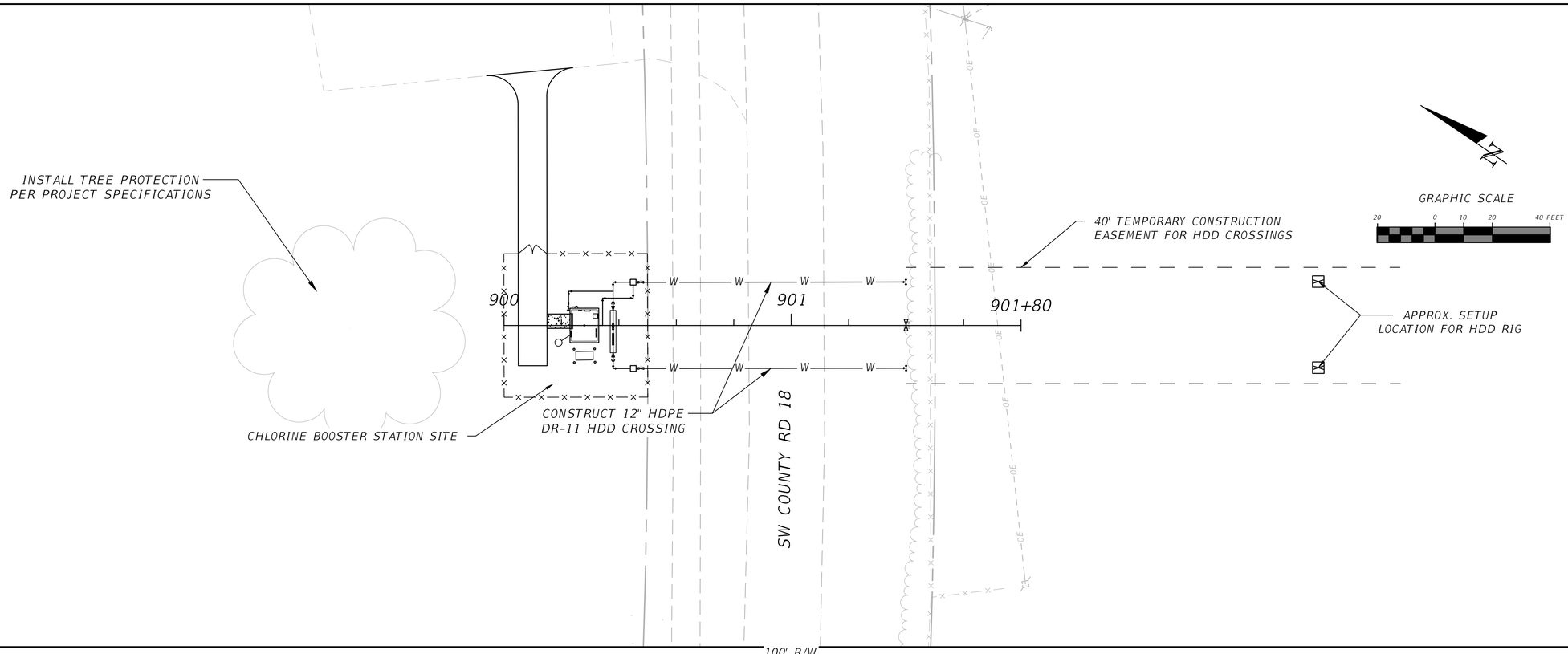
JOB NUMBER: L220110CCB
EOR: RICKY L. HENDRIX
P.E. NO.: 45239

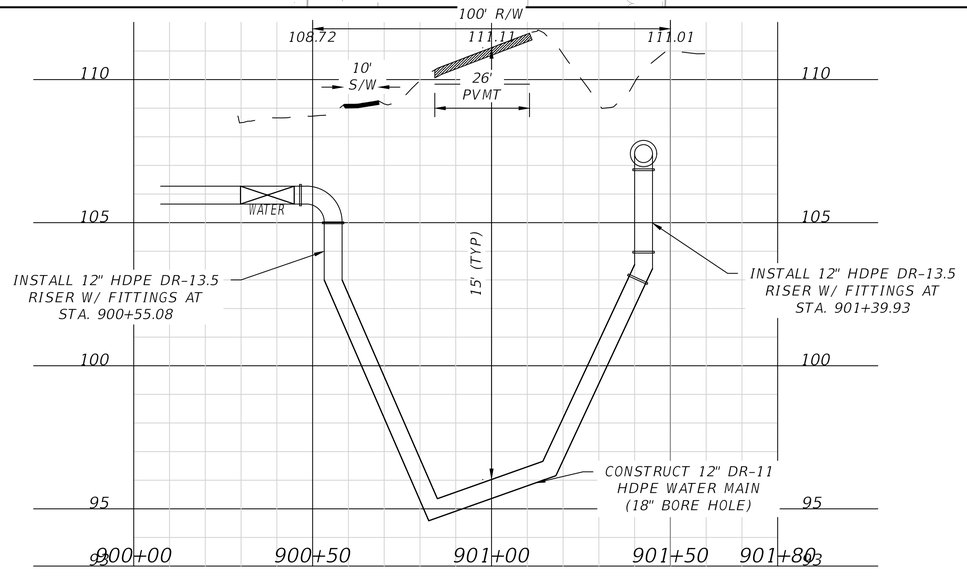
SW CR 18 CROSSING AT STILLMAN
ELLISVILLE WATER MAIN EXTENSION
COLUMBIA COUNTY, FLORIDA

SHEET NO. 66

Cayden Sanders 11/28/2023 3:18:20 PM X:\2022\L220110CCB\H.CADD\Utils\UTPRUW01.dwg 66 SW CR 18 CROSSING AT STILLMAN

THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.





DIRECTIONAL DRILL BASIS OF DESIGN:

WATER MAIN SIZE:	12"
REAMER SIZE:	18"
ENTRY ANGLE:	10°
EXIT ANGLE:	15°
PROJECT LENGTH:	314'

NOTE: PROFILE AS SHOWN IS APPLICABLE TO BOTH HDD CROSSINGS FOR CHLORINE BOOSTER STATION

THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.

REVISIONS	
DATE	DESCRIPTION
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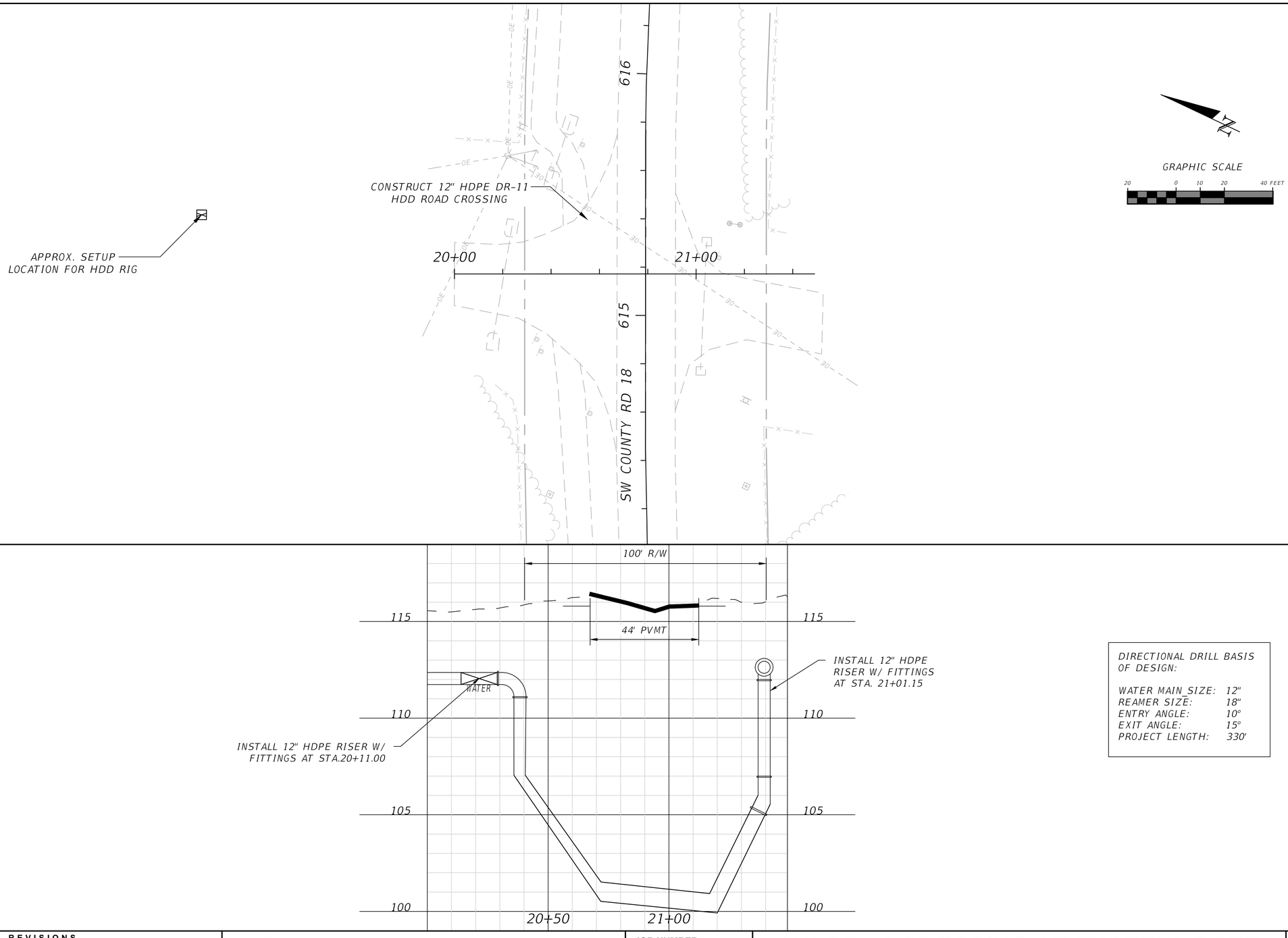
NORTH FLORIDA PROFESSIONAL SERVICES, INC.
P.O. BOX 3823
LAKE CITY, FL 32056
PH. 386-752-4675
LIC NO. LB8356
2551 BLAIRSTONE PINES DR.
TALLAHASSEE, FL 32301
WWW.NFPS.NET
CA# 29011

JOB NUMBER: L220110CCB
EOR: RICKY L. HENDRIX
P.E. NO.: 45239

SW CR 18 CROSSING AT CHLORINE SITE
ELLISVILLE WATER MAIN EXTENSION
COLUMBIA COUNTY, FLORIDA

SHEET NO. 67

Cayden Sanders 11/28/2023 3:18:25 PM X:\2022\L220110CCB\H.CADD\Utils\UTPRUW02.dwg 67 SW CR 18 CROSSING AT CHLORINE SITE



DIRECTIONAL DRILL BASIS OF DESIGN:

WATER MAIN SIZE:	12"
REAMER SIZE:	18"
ENTRY ANGLE:	10°
EXIT ANGLE:	15°
PROJECT LENGTH:	330'

REVISIONS	
DATE	DESCRIPTION
----	----

NORTH FLORIDA PROFESSIONAL SERVICES, INC.
P.O. BOX 3823
LAKE CITY, FL 32056
PH. 386-752-4675
LIC NO. LB8356
2551 BLAIRSTONE PINES DR.
TALLAHASSEE, FL 32301
WWW.NFPS.NET
CA# 29011

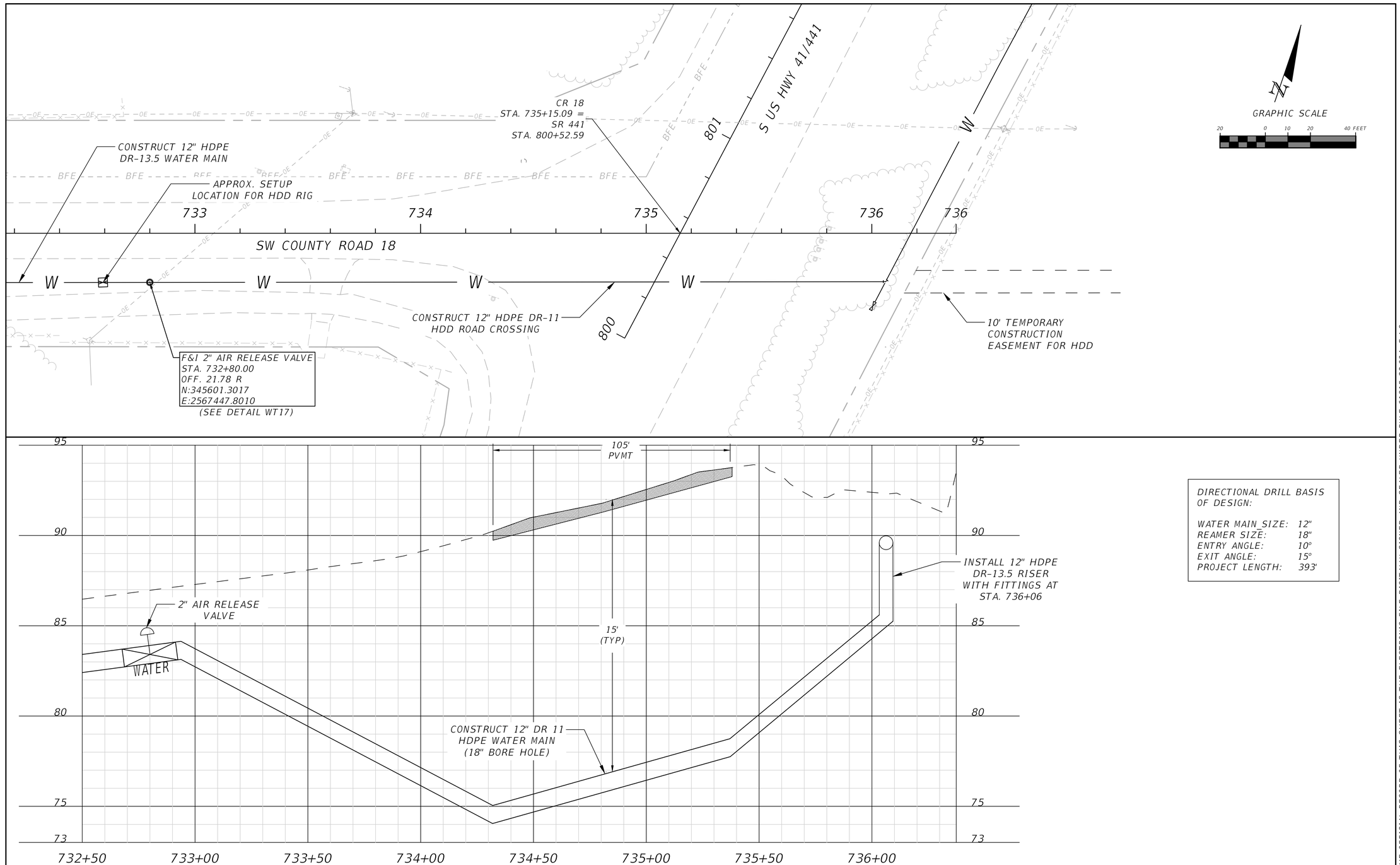
JOB NUMBER: L220110CCB
EOR: RICKY L. HENDRIX
P.E. NO.: 45239

SW CR 18 CROSSING AT TUSTENUGGEE
ELLISVILLE WATER MAIN EXTENSION
COLUMBIA COUNTY, FLORIDA

SHEET NO. 68

Cayden Sanders 11/28/2023 3:18:31 PM X:\2022\L220110CCB\H.CADD\Utils\UTPRUW02.dwg 68 SW CR 18 CROSSING AT TUSTENUGGEE

THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.



DIRECTIONAL DRILL BASIS OF DESIGN:

WATER MAIN SIZE:	12"
REAMER SIZE:	18"
ENTRY ANGLE:	10°
EXIT ANGLE:	15°
PROJECT LENGTH:	393'

THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.

REVISIONS	
DATE	DESCRIPTION
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NORTH FLORIDA PROFESSIONAL SERVICES, INC.
P.O. BOX 3823
LAKE CITY, FL 32056
PH. 386-752-4675
LIC NO. LB8356
2551 BLAIRSTONE PINES DR.
TALLAHASSEE, FL 32301
WWW.NFPS.NET
CA# 29011

JOB NUMBER: L220110CCB
EOR: RICKY L. HENDRIX
P.E. NO.: 45239

S US 41-441 CROSSING
ELLISVILLE WATER MAIN EXTENSION
COLUMBIA COUNTY, FLORIDA

SHEET NO. 69

Cayden Sanders 11/28/2023 3:18:42 PM X:\2022\L220110CCB\H.CADD\Utils\UTPRUW01.dwg 69 S US 41-441 CROSSING

441
800+52.59 =
18
735+15.09

BFE BFE BFE BFE BFE BFE BFE

802 803 804 805 806

CONSTRUCT 12" HDPE DR-11
HDD ROAD CROSSING

S US HWY 41/441

F&I AIR RELEASE VALVE
STA. 803+40.00
0FF. 90.00 R
N:345967.3355
E:2567797.6434

SE MEMORY LN

CONSTRUCT 12" HDPE
DR-13.5 WATER MAIN

W W W W W W W

APPROX. SETUP
LOCATION FOR HDD RIG

GRAPHIC SCALE
20 0 10 20 40 FEET

97.78 98.72 99.62 100.79 101.74

105 100 95 90

24'
PVMT

2" AIR RELEASE
VALVE

6'
(TYP)

WATER

BORE HOLE
DIA. 18"

CONSTRUCT 12" DR11
HDPE WATER MAIN

802+50 803+00 803+50 804+00 804+50 805+00
97.78 98.72 99.62 100.79 101.74 102.70

DIRECTIONAL DRILL BASIS
OF DESIGN:

WATER MAIN SIZE:	12"
REAMER SIZE:	18"
ENTRY ANGLE:	10°
EXIT ANGLE:	15°
PROJECT LENGTH:	140'

THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.

REVISIONS	
DATE	DESCRIPTION
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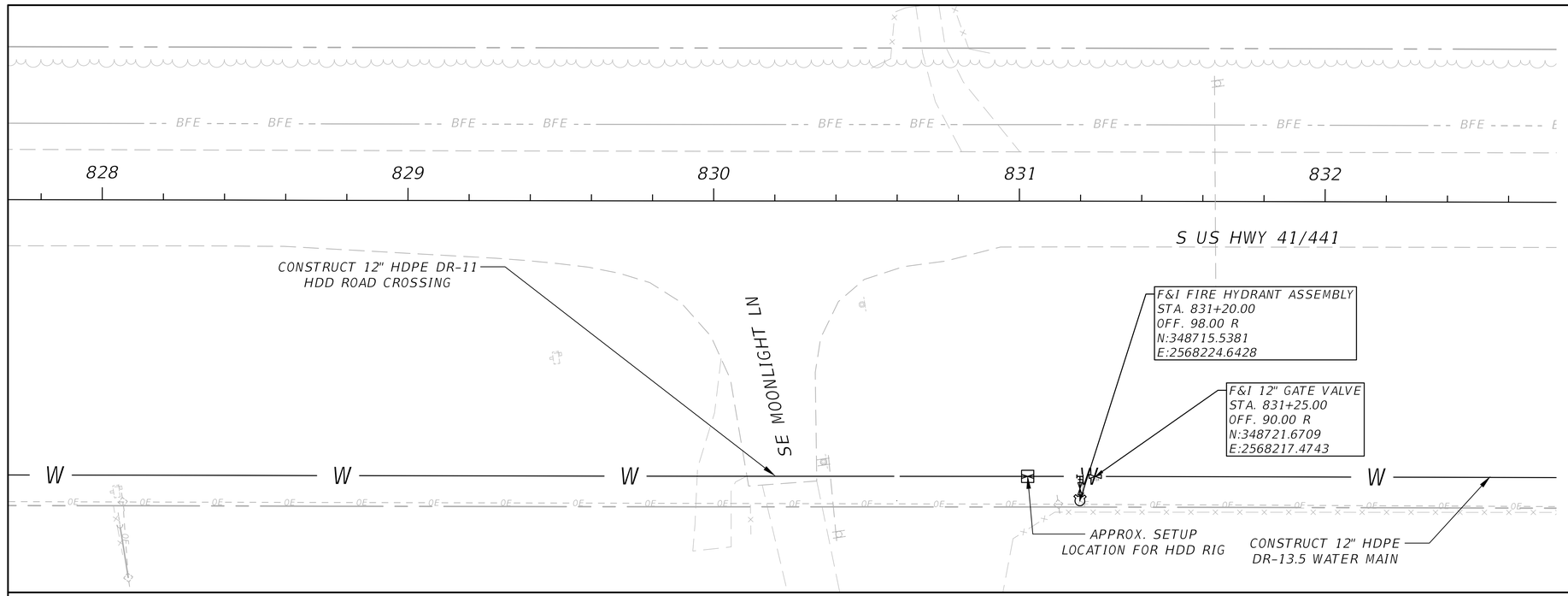
NORTH FLORIDA PROFESSIONAL SERVICES, INC.
P.O. BOX 3823
LAKE CITY, FL 32056
PH. 386-752-4675
LIC NO. LB8356
2551 BLAIRSTONE PINES DR.
TALLAHASSEE, FL 32301
WWW.NFPS.NET
CA# 29011

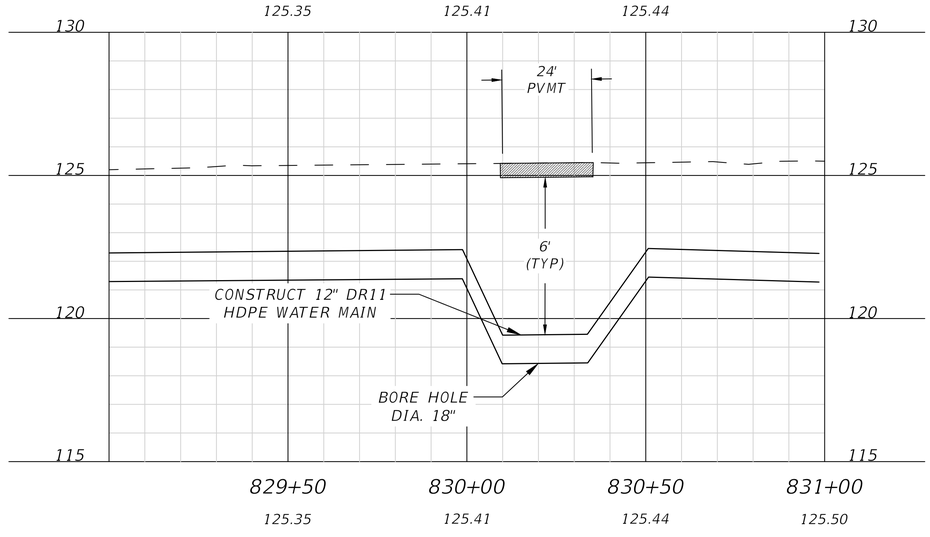
JOB NUMBER: L220110CCB
EOR: RICKY L. HENDRIX
P.E. NO.: 45239

SE MEMORY LN CROSSING
ELLISVILLE WATER MAIN EXTENSION
COLUMBIA COUNTY, FLORIDA

SHEET NO. 70

Cayden Sanders 11/28/2023 3:18:48 PM X:\2022\L220110CCB\H.CADD\Utils\UTPRUW01.dwg 70 SE MEMORY LN CROSSING





GRAPHIC SCALE

20 0 10 20 40 FEET

DIRECTIONAL DRILL BASIS OF DESIGN:

WATER MAIN SIZE:	12"
REAMER SIZE:	18"
ENTRY ANGLE:	10°
EXIT ANGLE:	15°
PROJECT LENGTH:	140'

THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.

REVISIONS	
DATE	DESCRIPTION
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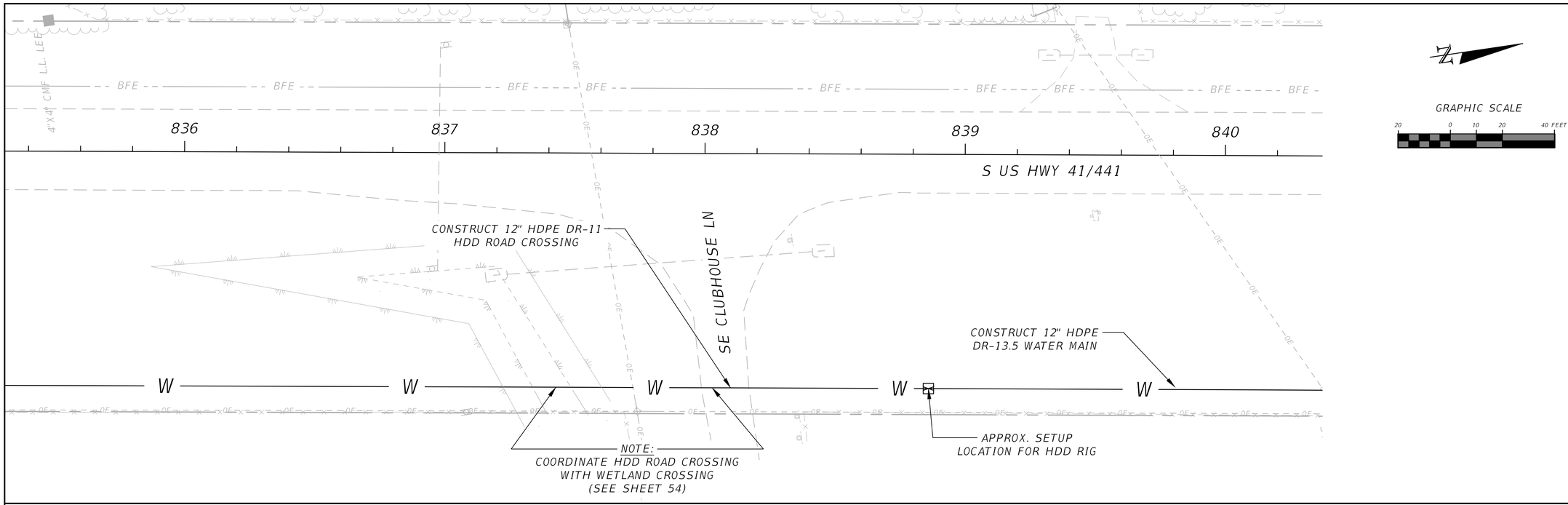
NORTH FLORIDA PROFESSIONAL SERVICES, INC.
P.O. BOX 3823
LAKE CITY, FL 32056
PH. 386-752-4675
LIC NO. LB8356
2551 BLAIRSTONE PINES DR.
TALLAHASSEE, FL 32301
WWW.NFPS.NET
CA# 29011

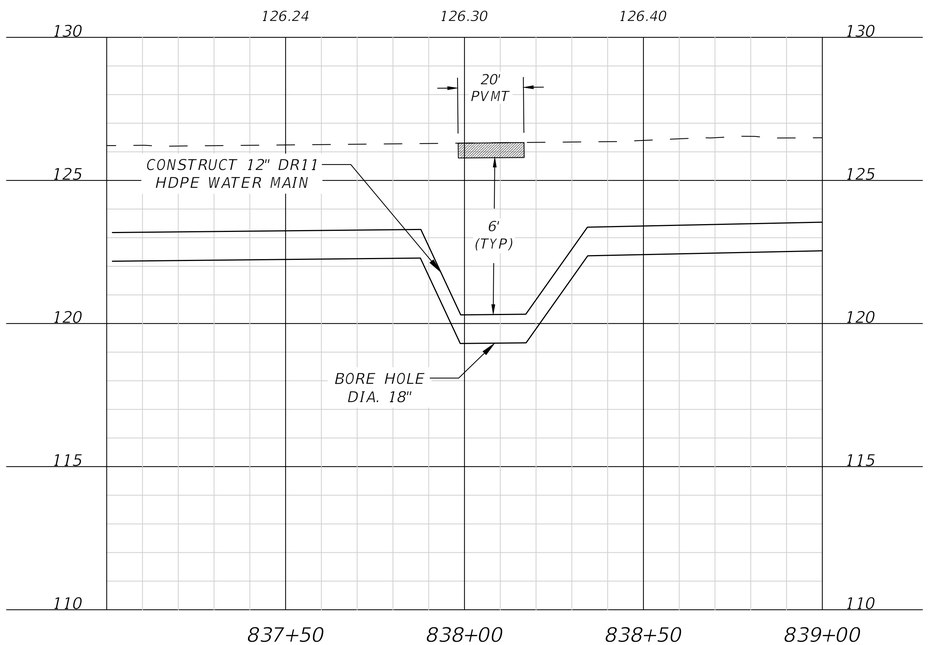
JOB NUMBER: L220110CCB
EOR: RICKY L. HENDRIX
P.E. NO.: 45239

SE MOONLIGHT PL CROSSING
ELLISVILLE WATER MAIN EXTENSION
COLUMBIA COUNTY, FLORIDA

SHEET NO. 71

Cayden Sanders 11/28/2023 3:18:54 PM X:\2022\L220110CCB\H.CADD\Utils\UTPRUW01.dwg 71 SE MOONLIGHT PL CROSSING





DIRECTIONAL DRILL BASIS OF DESIGN:

WATER MAIN SIZE:	12"
REAMER SIZE:	18"
ENTRY ANGLE:	10°
EXIT ANGLE:	15°
PROJECT LENGTH:	135'

THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.

REVISIONS	
DATE	DESCRIPTION
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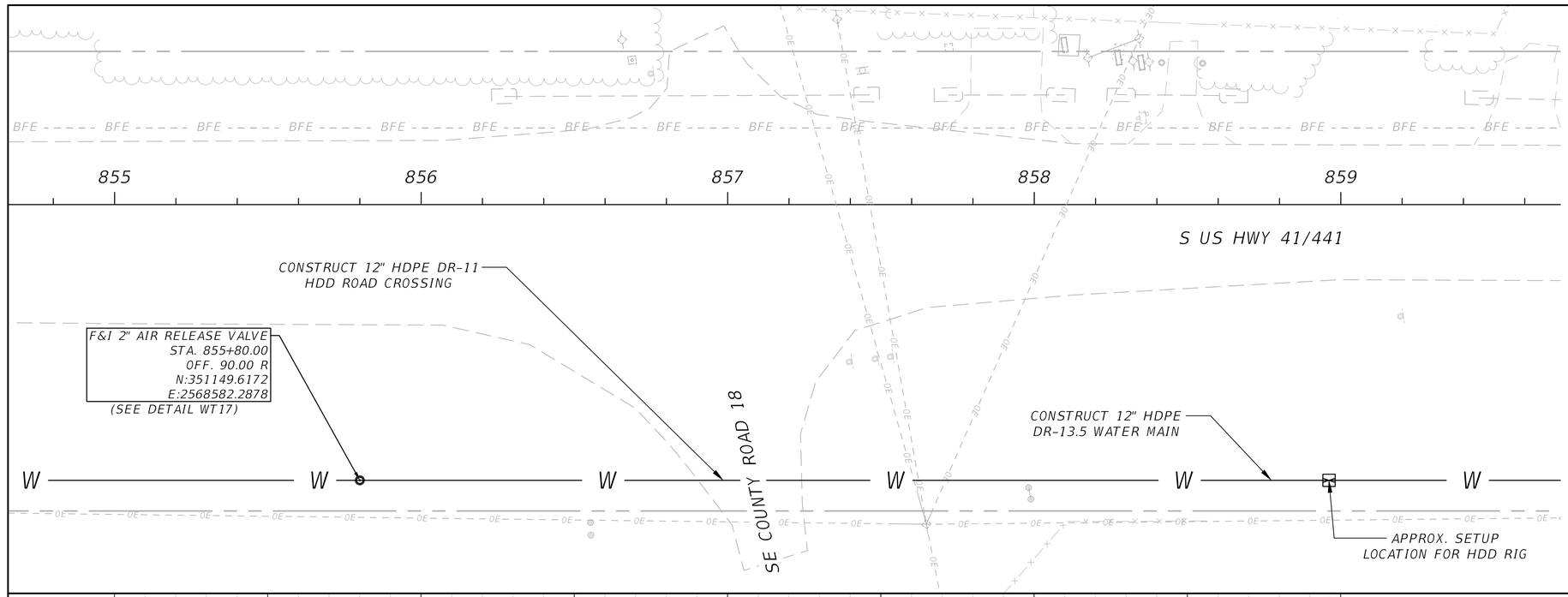
NORTH FLORIDA PROFESSIONAL SERVICES, INC.
P.O. BOX 3823
LAKE CITY, FL 32056
PH. 386-752-4675
LIC NO. LB8356
2551 BLAIRSTONE PINES DR.
TALLAHASSEE, FL 32301
WWW.NFPS.NET
CA# 29011

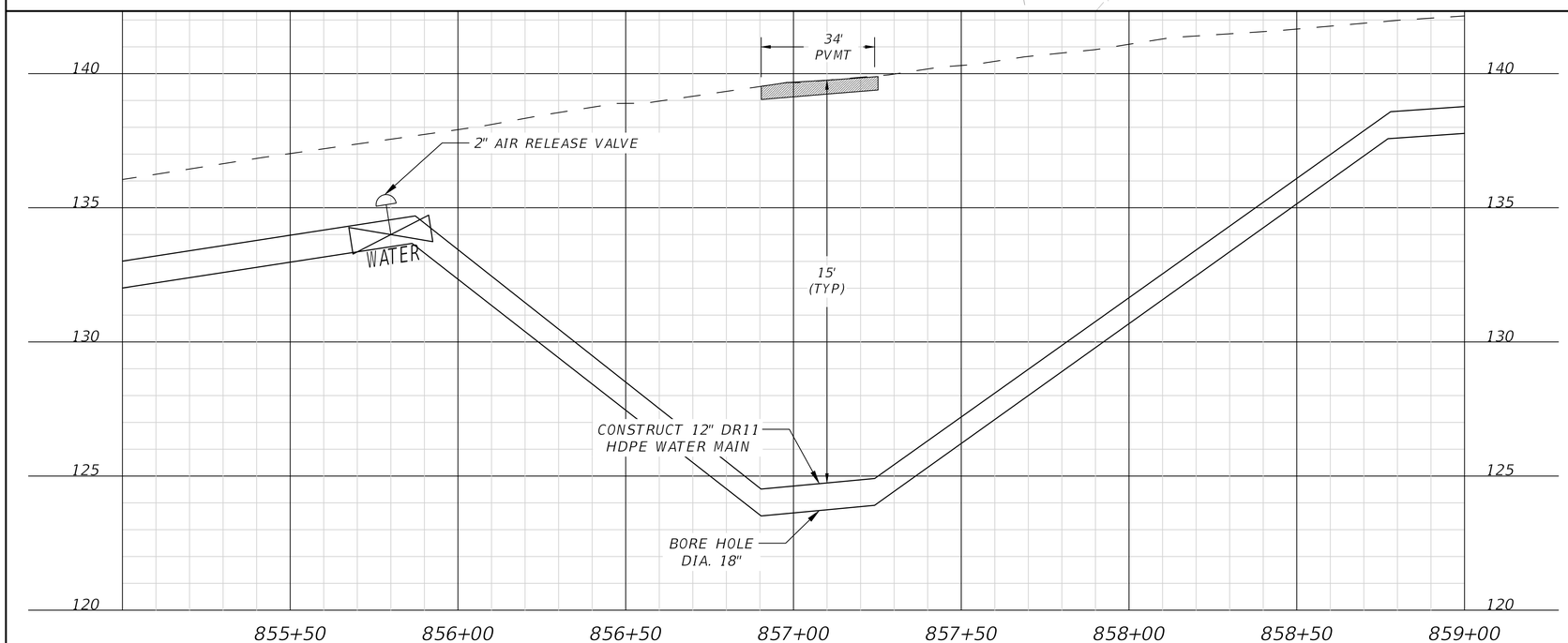
JOB NUMBER: L220110CCB
EOR: RICKY L. HENDRIX
P.E. NO.: 45239

SE CLUBHOUSE LN CROSSING
ELLISVILLE WATER MAIN EXTENSION
COLUMBIA COUNTY, FLORIDA

SHEET NO. 72

Cayden Sanders 11/28/2023 3:19:01 PM X:\2022\L220110CCB\H.CADD\Utils\UTPRUW01.dwg 72 SE CLUBHOUSE LN CROSSING





GRAPHIC SCALE

20 0 10 20 40 FEET

DIRECTIONAL DRILL BASIS OF DESIGN:

WATER MAIN SIZE:	12"
REAMER SIZE:	18"
ENTRY ANGLE:	10°
EXIT ANGLE:	15°
PROJECT LENGTH:	322'

THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.

REVISIONS	
DATE	DESCRIPTION
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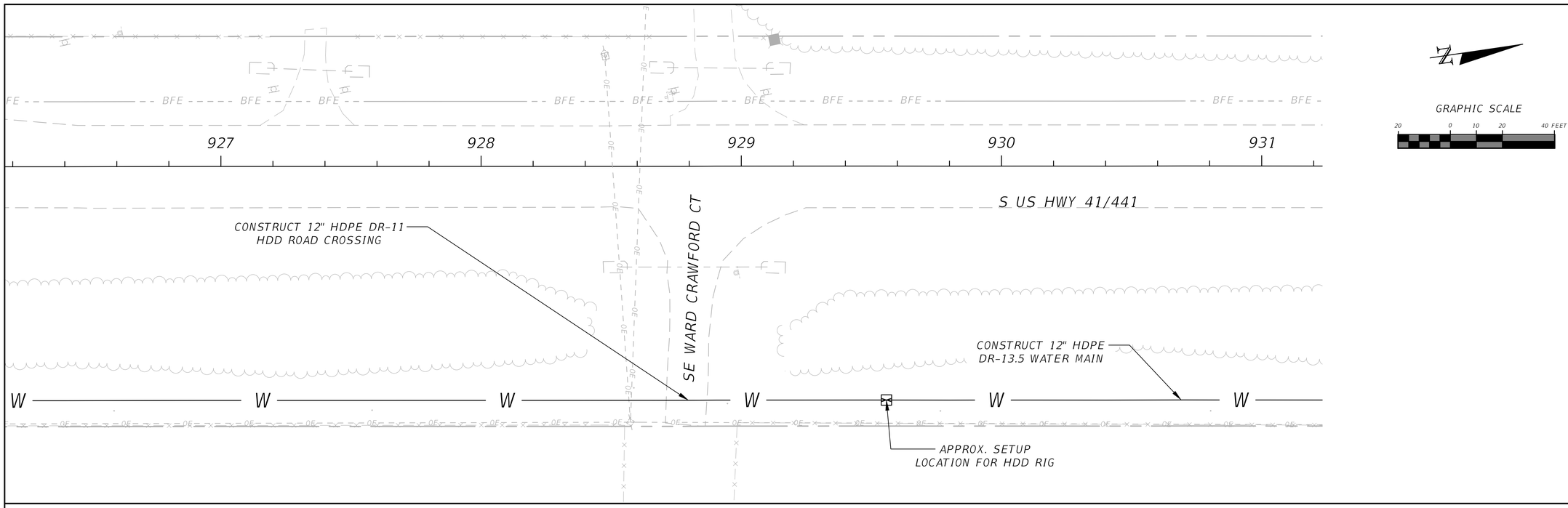
NORTH FLORIDA PROFESSIONAL SERVICES, INC.
P.O. BOX 3823
LAKE CITY, FL 32056
PH. 386-752-4675
LIC NO. LB8356
2551 BLAIRSTONE PINES DR.
TALLAHASSEE, FL 32301
WWW.NFPS.NET
CA# 29011

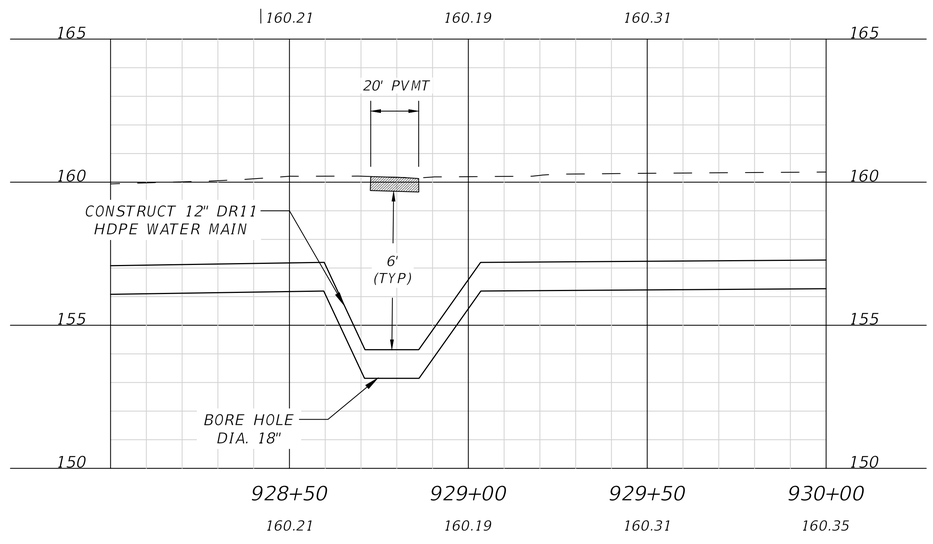
JOB NUMBER: L220110CCB
EOR: RICKY L. HENDRIX
P.E. NO.: 45239

SE CR 18 CROSSING
ELLISVILLE WATER MAIN EXTENSION
COLUMBIA COUNTY, FLORIDA

SHEET NO. 73

Cayden Sanders 11/28/2023 3:19:08 PM X:\2022\L220110CCB\H.CADD\Utils\UTPRUW01.dwg 73 SE CR 18 CROSSING





DIRECTIONAL DRILL BASIS OF DESIGN:

WATER MAIN SIZE:	12"
REAMER SIZE:	18"
ENTRY ANGLE:	10°
EXIT ANGLE:	15°
PROJECT LENGTH:	135'

THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.

REVISIONS	
DATE	DESCRIPTION
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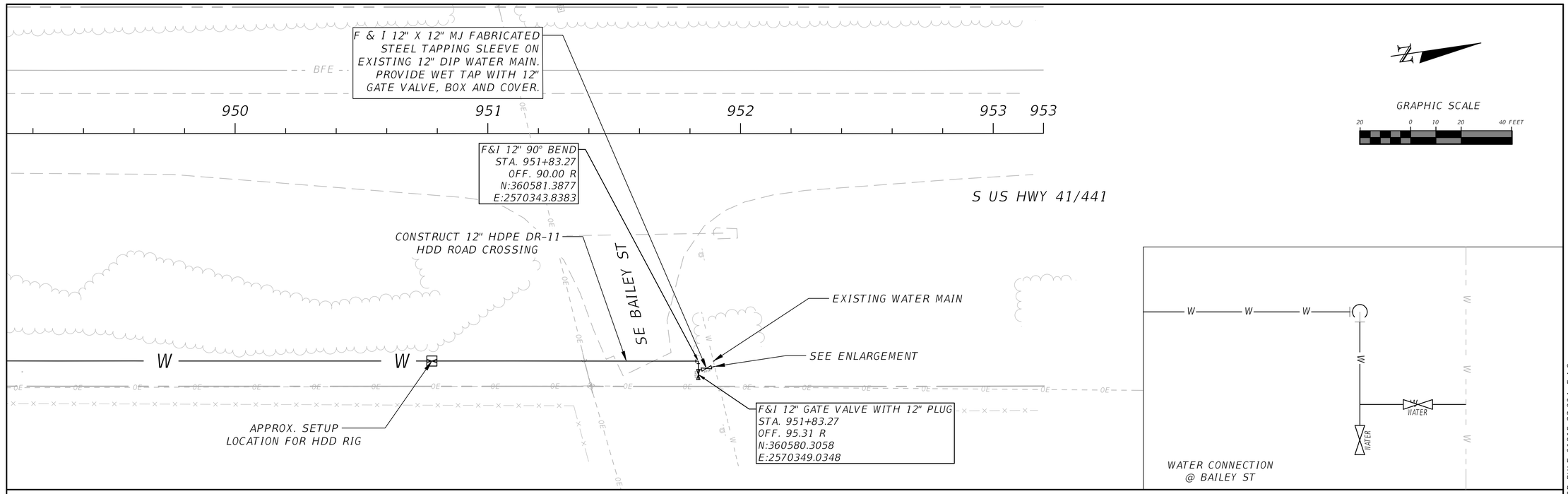
NORTH FLORIDA PROFESSIONAL SERVICES, INC.
P.O. BOX 3823
LAKE CITY, FL 32056
PH. 386-752-4675
LIC NO. LB8356
2551 BLAIRSTONE PINES DR.
TALLAHASSEE, FL 32301
WWW.NFPS.NET
CA# 29011

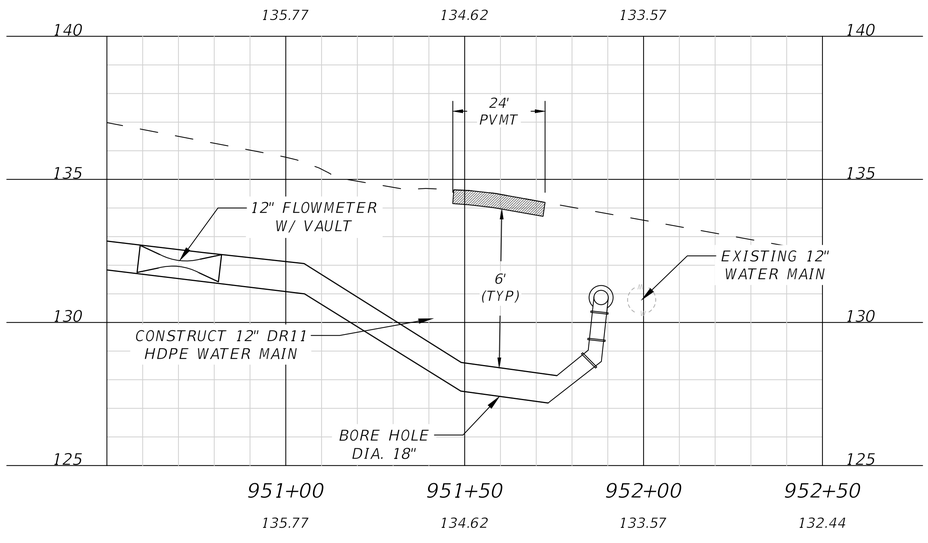
JOB NUMBER: L220110CCB
EOR: RICKY L. HENDRIX
P.E. NO.: 45239

SE WARD CRAWFORD CT CROSSING
ELLISVILLE WATER MAIN EXTENSION
COLUMBIA COUNTY, FLORIDA

SHEET NO. 74

Cayden Sanders 11/28/2023 3:19:14 PM X:\2022\L220110CCB\H.CADD\Utils\UTPRUW01.dwg 74 SE WARD CRAWFORD CT CROSSING





DIRECTIONAL DRILL BASIS OF DESIGN:

WATER MAIN SIZE:	12"
REAMER SIZE:	18"
ENTRY ANGLE:	10°
EXIT ANGLE:	15°
PROJECT LENGTH:	140'

THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.

REVISIONS	
DATE	DESCRIPTION
----	----

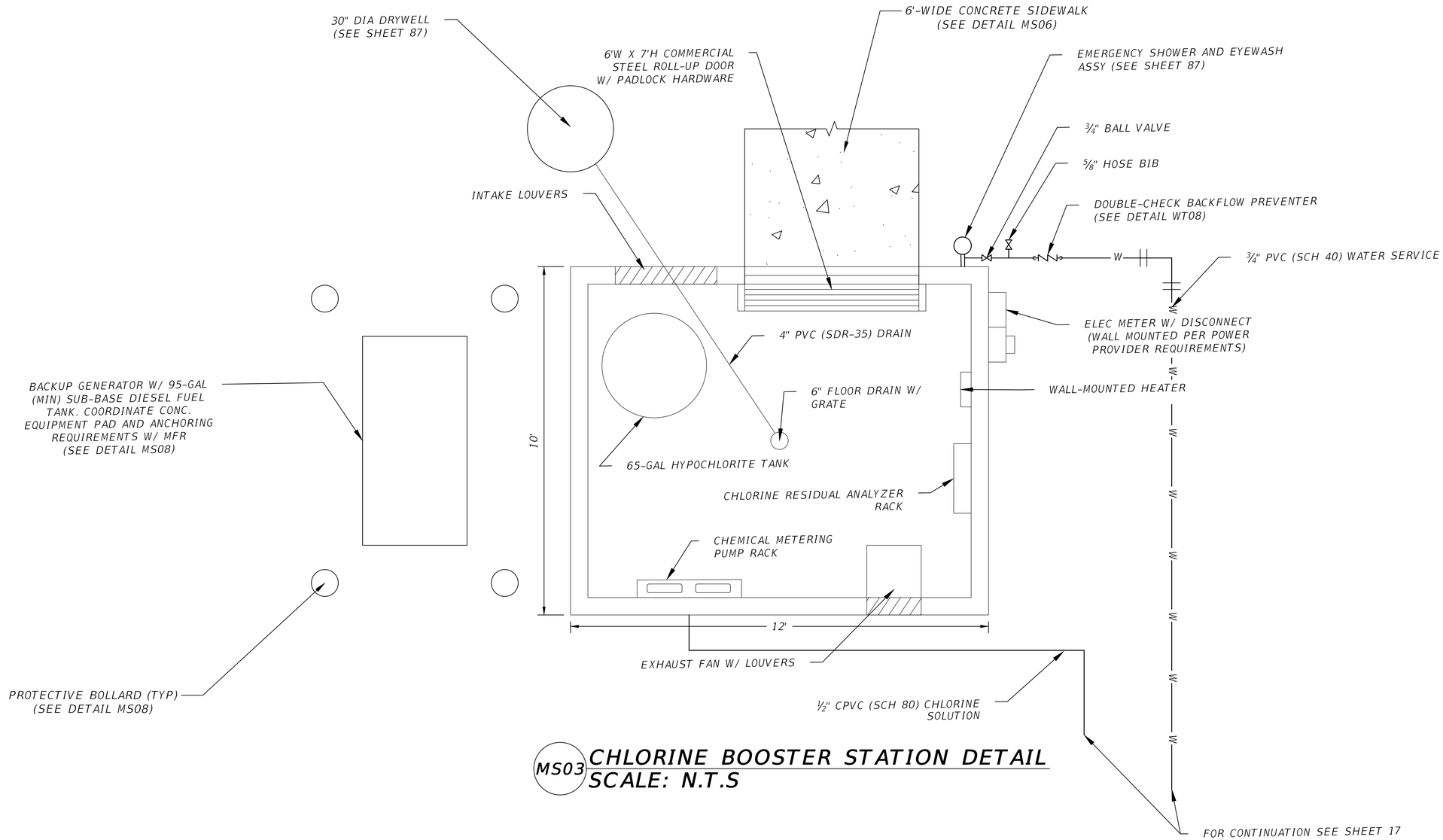
NORTH FLORIDA PROFESSIONAL SERVICES, INC.
P.O. BOX 3823
LAKE CITY, FL 32056
PH. 386-752-4675
LIC NO. LB8356
2551 BLAIRSTONE PINES DR.
TALLAHASSEE, FL 32301
WWW.NFPS.NET
CA# 29011

JOB NUMBER: L220110CCB
EOR: RICKY L. HENDRIX
P.E. NO.: 45239

SE BAILEY ST CROSSING
ELLISVILLE WATER MAIN EXTENSION
COLUMBIA COUNTY, FLORIDA

SHEET NO. 75

Cayden Sanders 11/28/2023 3:19:21 PM X:\2022\L220110CCB\H.CADD\Utils\UTPRUW01.dwg 75 SE BAILEY ST CROSSING



MS03 CHLORINE BOOSTER STATION DETAIL
SCALE: N.T.S

REVISIONS	
DATE	DESCRIPTION

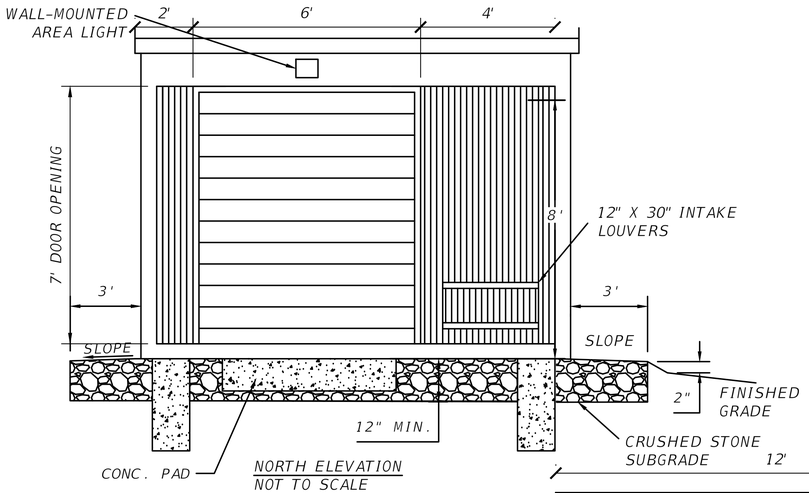
NORTH FLORIDA PROFESSIONAL SERVICES, INC.
P.O. BOX 3823
LAKE CITY, FL 32056
PH. 386-752-4675
LIC NO. LB8356
2551 BLAIRSTONE PINES DR.
TALLAHASSEE, FL 32301
WWW.NFPS.NET
CA# 29011

JOB NUMBER: L220110CCB
EOR: RICKY L. HENDRIX
P.E. NO.: 45239

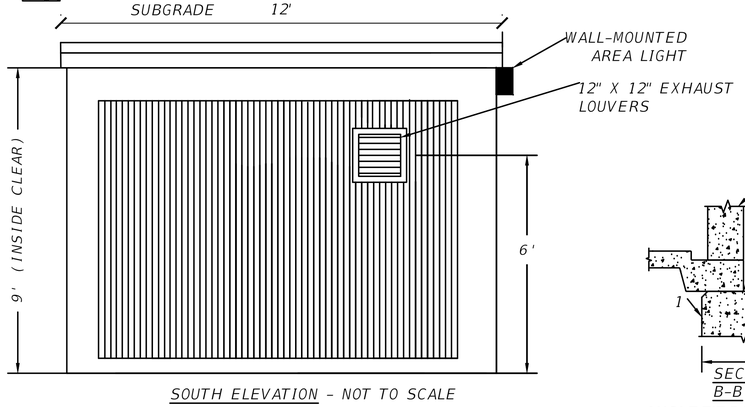
CHLORINE BOOSTER STATION DETAIL

ELLISVILLE WATER MAIN EXTENSION
COLUMBIA COUNTY, FLORIDA

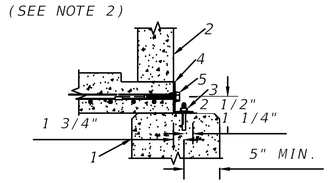
SHEET NO. 76



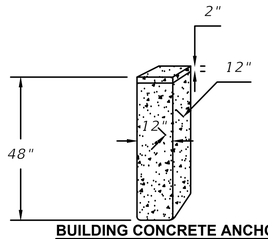
NORTH ELEVATION
NOT TO SCALE



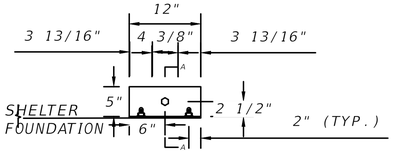
SOUTH ELEVATION - NOT TO SCALE



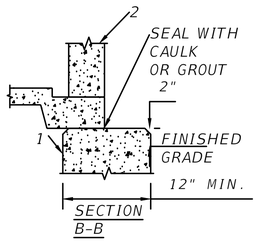
USING LIFTING INSERTS
SECTION A-A



BUILDING CONCRETE ANCHOR DETAIL
NOT TO SCALE



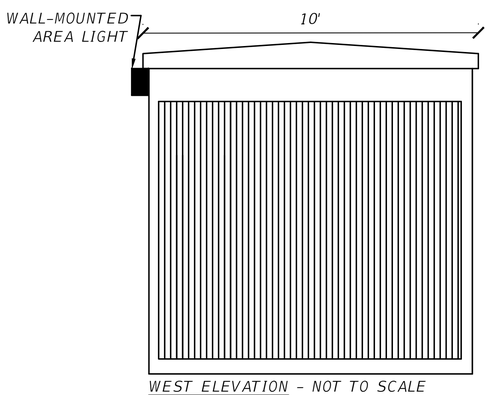
BUILDING ANCHOR ANGLE
VIEW "C"



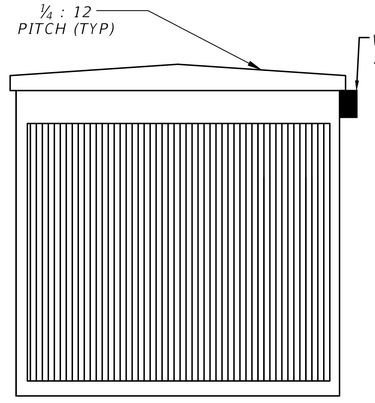
SECTION
B-B

ANGLE TIE DOWN DETAILS
NOT TO SCALE

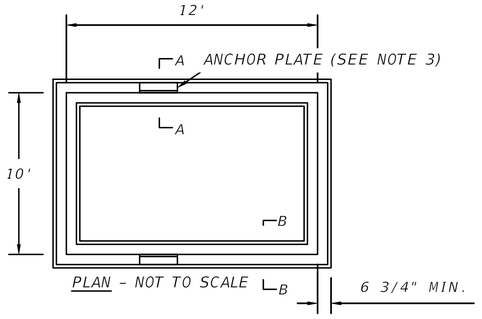
ITEM	DESCRIPTION
1	FOUNDATION (BY GENERAL CONTRACTOR)
2	PRECAST CONCRETE BUILDING
3	3/4" X 4 1/4" RAWL BOLT EXPANSION ANCHOR, OR EQ.
4	SHELTER ANCHOR ANGLE L (GALVANIZED)
5	1" X 7" COIL BOLT, ASTM A490 OR A354BD
6	1" FLAT WASHER (9997-180)



WEST ELEVATION - NOT TO SCALE



EAST ELEVATION - NOT TO SCALE



PLAN - NOT TO SCALE

NOTES:
1. ANCHOR ANGLE INSTALLATION (ITEMS 3 THROUGH 6):
   1.1 INSTALL ANCHOR ANGLE (ITEM 4) IN PLACE USING 1" BOLTS & WASHERS (ITEMS 5 & 6).
   1.2 DRILL FOUNDATION WALL USING ANCHOR ANGLE (ITEM 4) AS A TEMPLATE. USE 3/4" DRILL AND DRILL 4 1/2" DEEP.
   1.3 INSTALL ANCHOR BOLT, NUT, AND WASHER PER MANUFACTURER'S INSTRUCTIONS.
2. PERIMETER GRADE BEAM FOUNDATION BY GENERAL CONTRACTOR. MINIMUM WIDTH OF 6 3/4" IS REQUIRED FOR ANCHORING ON EACH SIDE WHERE ANGLES ARE TO BE LOCATED.
3. LOCATION OF TIE-DOWN HARDWARE SHALL COINCIDE WITH THE LOCATION OF THE BUILDING'S THEADED LIFTING INSERTS/COIL LOOPS.

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REVISIONS	
DATE	DESCRIPTION
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NORTH FLORIDA PROFESSIONAL SERVICES, INC.
P.O. BOX 3823
LAKE CITY, FL 32056
PH. 386-752-4675
LIC NO. LB8356
2551 BLAIRSTONE PINES DR.
TALLAHASSEE, FL 32301
WWW.NFPS.NET
CA# 29011

JOB NUMBER: L220110CCB
EOR: RICKY L. HENDRIX
P.E. NO.: 45239

CHLORINE BUILDING DETAILS
ELLISVILLE WATER MAIN EXTENSION
COLUMBIA COUNTY, FLORIDA

SHEET NO. 77

General Notes

1. Signed and sealed plans are on file with a third party agency
2. Plan review inspection required by chapter 633 F.S. shall be done on site by local fire safety inspector
3. Reinforcement to be 1 1/2" clear from all perimeter edges and in center of thickness unless shown otherwise
4. Welded wire fabric may be substituted for rebar mat

Site installed items not by precaster

1. Foundation system
2. Plumbing, mechanical, electrical systems
3. Fire alarm systems
5. Gutters and downspouts

1. Code standard requirements
   - 1.1 2020 Florida Building Code 7th Edition
   - 1.2 2020 Accessibility Code Florida 6th Edition
   - 1.3 2020 Mechanical, Plumbing Code
   - 1.4 2020 Florida Fire Prevention Code
   - 1.5 2017 NEC
   - 1.6 ASCE 7-16
   - 1.7 ASI318-14
   - 1.8 PPCI 8th Edition
   - 1.9 Steel Construction Manual
   - 1.10 Florida Energy Code Exemption
   - 1.11 FBC C101.4.2.4 Buildings
2. Loads
   - 2.1 Roof Live Load: 60 PSF
   - 2.2 Wind Loading: 143 MPH (ASD)/ 185 MPH (Ultimate)
   - 2.3 Seismic Design Catagory A
   - 2.4 Blasting Pressure: 8 PSI
3. Wind Design Criteria
   - 3.1 Risk Catagory II
   - 3.2 Exposure Catagory D
4. Materials
   - 4.1 Concrete = 150 PCF
   - 4.1.1 Release = 2,500 PSI
   - 4.1.2 28 Day = 5,000 PSI
   - 4.2 Rebar: ASTM A615, Grade 60
   - 4.3 Welded Wire Fabric: ASTM A185, Grade 60 (WWR W4 x W4 - 3x3)
5. Utility
   - 5.1 Construction Type IIB
6. Occupancy
   - 6.1 Utility

Building Notes

1. Building is Assembled In-plant and Delivered as One Pod
2. Exterior Wall Finish: TBD
3. Exterior Roof: TBD
4. Interior and Exterior Paint: H&C Concrete Stain
   - a. Exterior Wall Color: TBD
   - b. Exterior Trim Color: TBD
   - c. Interior Ceiling Color: TBD
   - d. Interior Wall Color: TBD
   - e. Concrete Roof Color: TBD
   - f. Concrete Floor Color: TBD
   - g. Door Color: TBD

NOTE: COORDINATE ABOVE TBD ITEMS WITH OWNER DURING SHOP DRAWING REVIEW.

Basis of Design

1. Type: precast Concrete Modular Building
2. Manufacturer: Leesburg Concrete Company
   Website: www.leesburgconcrete.com
3. Contact: Tom Ely
   Phone: 352.408.4637
   Email: TomE@leesburgconcrete.com

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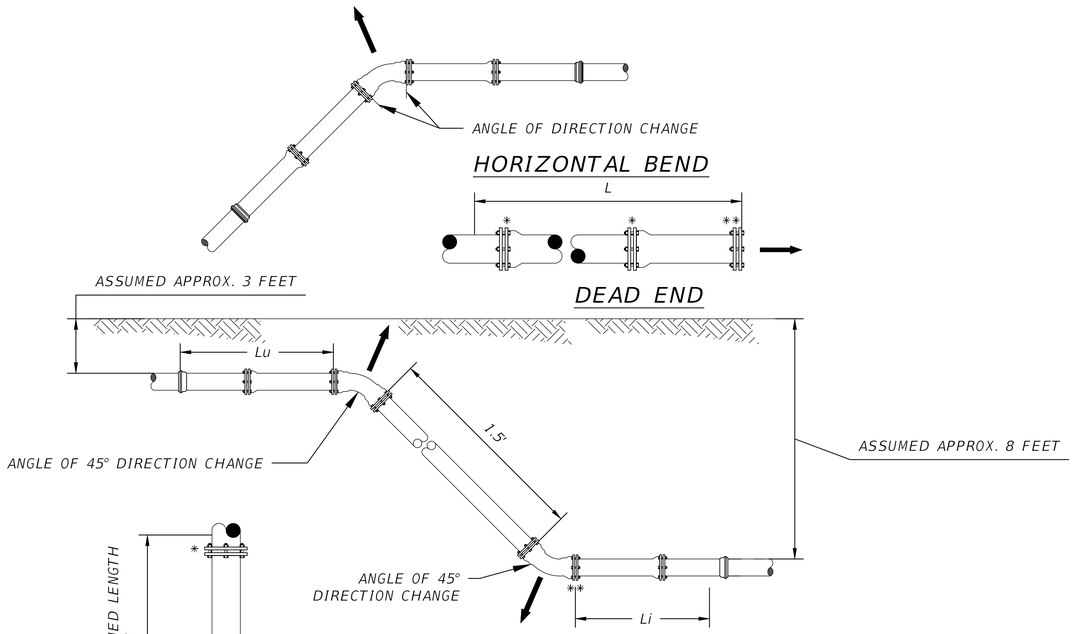
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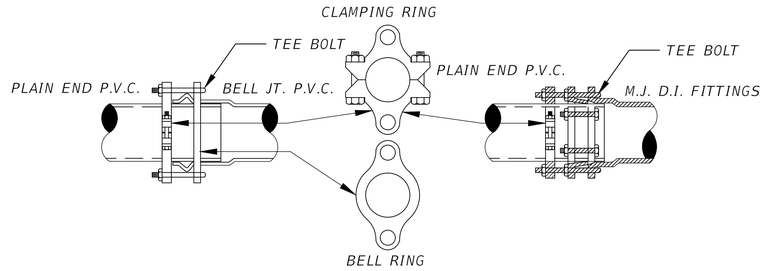
CHLORINE BUILDING NOTES

ELLISVILLE WATER MAIN EXTENSION
COLUMBIA COUNTY, FLORIDA

SHEET NO. 78



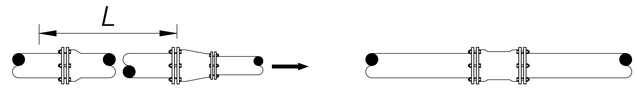
NOTES:
1. TOTAL LENGTH BETWEEN FIRST JOINTS OR RESTRAINED LENGTH ON EITHER SIDE OF TEE (RUN) SHALL BE A TOTAL DISTANCE OF 30 FEET (MIN.).



TYPICAL PROFILE
BELLJOINT TO PLAIN END W/ MECHANICAL RESTRAINERS

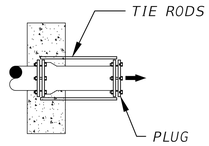
SECTION
MECHANICAL JOINT TO PLAIN END W/ MECHANICAL RESTRAINERS

TYPICAL PROFILE
MECHANICAL JOINT TO PLAIN END W/ MECHANICAL RESTRAINERS



REDUCER

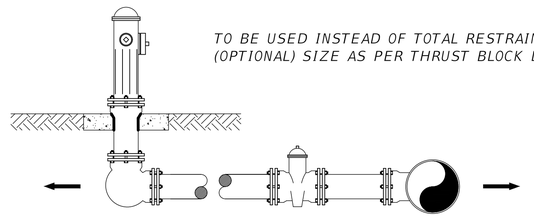
MECHANICAL JOINT SLEEVES



NO. OF TIE RODS REQUIRED

3" - 8"	DIAMETER MAIN - 2 TIE RODS REQUIRED PER JOINT (3/4" ROD)
10" - 12"	DIAMETER MAIN - 4 TIE RODS REQUIRED PER JOINT (3/4" ROD)
14" - 16"	DIAMETER MAIN - 6 TIE RODS REQUIRED PER JOINT (3/4" ROD)
18" - 20"	DIAMETER MAIN - 8 TIE RODS REQUIRED PER JOINT (3/4" ROD)
24"	DIAMETER MAIN - 12 TIE RODS REQUIRED PER JOINT (3/4" ROD)
30" - 36"	DIAMETER MAIN - 14 TIE RODS REQUIRED PER JOINT (1" ROD)
42" - 48"	DIAMETER MAIN - 16 TIE RODS REQUIRED PER JOINT (1 1/4" ROD)
54"	DIAMETER MAIN - 18 TIE RODS REQUIRED PER JOINT (1 1/4" ROD)

DEAD - END THRUST COLLAR ANCHOR



TO BE USED INSTEAD OF TOTAL RESTRAINED LENGTH (OPTIONAL) SIZE AS PER THRUST BLOCK DETAIL.

FIRE HYDRANT LATERAL

WT01 MECHANICAL RESTRAINT
SCALE: N.T.S

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JOB NUMBER: L220110CCB
EOR: RICKY L. HENDRIX
P.E. NO.: 45239

WATER DETAILS
ELLISVILLE WATER MAIN EXTENSION
COLUMBIA COUNTY, FLORIDA

SHEET NO. 79

LENGTH (L) TO BE RESTRAINED							
NOMINAL PIPE SIZE (IN.)	HORIZONTAL BENDS				VERTICAL OFFSETS 45° BENDS (SEE NOTE 4)		VALVES OR DEAD ENDS
	90° BENDS L (FT.)	45° BENDS L (FT.)	22.5° BENDS L (FT.)	11.25° BENDS L (FT.)	UPPER L (FT.)	LOWER L (FT.)	L (FT.)
4	21	9	5	3	17	3	47
6	30	13	6	3	23	4	66
8	38	16	8	4	30	6	86
10	45	19	9	5	36	7	103
12	53	22	11	6	43	8	121
14	61	26	13	6	50	9	140
16	66	28	14	7	55	10	154
18	73	30	15	8	60	11	170
20	79	33	16	8	66	12	186
24	79	33	16	8	77	15	185
30	93	39	19	10	97	17	222
36	106	39	21	11	107	20	257
42	117	49	24	12	120	24	289
48	114	53	26	13	133	26	321

REDUCERS	
SIZE (IN.)	L (FT.)
6X4	34
8X6	36
8X4	62
10X8	35
10X6	63
12X10	36
12X8	64
16X12	66
16X10	92
20X18	35
20X16	66
20X12	117
24X20	56
24X18	80
24X16	101
30X24	78
30x20	121
36x30	78
36x24	141
42X36	75
42X30	140
48X42	75
48X36	139

PVC PIPE RESTRAINT NOTES:

1. THIS SCHEDULE SHALL BE UTILIZED ON ALL WATER, SEWER FORCE MAIN OR RECLAIMED WATER SYSTEMS. ALL FITTINGS SHALL BE RESTRAINED TO LENGTHS INDICATED ON THE ABOVE SCHEDULE, AT A MINIMUM.
2. ASSUMPTIONS: PVC PIPE, SAFETY FACTOR=1.5, TEST PRESSURE=150PSI, SOIL=GM OR SM, TRENCH TYPE 3, DEPTH OF COVER=30 INCHES FOR 20" AND SMALLER PIPE SIZE OR 36" FOR 24" AND LARGER PIPE SIZE.
3. BENDS AND VALVES: SHALL BE RESTRAINED ON EACH SIDE OF FITTING.
4. VERTICAL OFFSETS: ARE APPROX. 3 FEET COVER ON TOP AND APPROX. 8 FEET COVER ON BOTTOM. PER THE DETAILS, Lu IS THE RESTRAINED LENGTH FOR THE UPPER (TOP) LEVEL. Li IS THE RESTRAINED LENGTH FOR THE LOWER (DEEPER) LEVEL. ASSUME 45 DEGREE BENDS.
5. TEES: TOTAL LENGTH BETWEEN FIRST JOINTS OR RESTRAINED LENGTH ON EITHER SIDE OF TEE (RUN) SHALL BE A TOTAL DISTANCE OF 30 FEET (MIN). SEE SCHEDULE ABOVE FOR RESTRAINT LENGTH ON TEE "BRANCH" LINE.
6. HDPE TO PVC TRANSITIONS: THE PVC PIPE SIDE SHALL BE RESTRAINED 35 FT (MIN).
7. THE INSTALLATION OF BELL HARNESS RESTRAINTS AT PVC JOINTS (DR-18 & 25 PIPE) SHALL BE COMPLETED PER THE MANUFACTURERS RECOMMENDATION, WHICH INCLUDES NOT OVER TIGHTENING THE PARALLEL RODS/NUTS. THESE NUTS SHOULD ONLY BE SNUG TIGHT. THE HOME MARKS ON THE PIPE SHOULD ALWAYS BE VISIBLE AFTER THE RESTRAINT IS INSTALLED. OVERHOMING THE JOINT MAY CAUSE A FAILURE AT THE BELL RESULTING IN A SERVICE OUTAGE.

TEES SEE NOTE 5		
RUN SIZE (IN.)	BRANCH SIZE (IN.)	L (FT.)
4	4	F.O.
4	6 4<LESS	10 F.O.
8	8 6<LESS	29 F.O.
10	10 8 6<LESS	45 13 F.O.
12	12 10 8<LESS	62 32 F.O.
16	16 12 10 10<LESS	94 39 5 F.O.
20	20 16 12 10<LESS	125 76 14 F.O.
24	24 20 16 16<LESS	124 84 36 F.O.
30	30 24 20 16 16<LESS	159 104 60 5 F.O.
36	36 30 24 20 16<LESS	192 142 83 33 F.O.
42	42 36 30 24 20 16<LESS	223 178 124 59 5 F.O.
48	48 42 26 30 24 20<LESS	253 209 162 104 34 F.O.

F.O.= FITTING ONLY

WT02 PVC PIPE RESTRAINT JOINT SCHEDULE
SCALE: N.T.S

DUCTILE IRON PIPE RESTRAINT NOTES:

1. THIS SCHEDULE SHALL BE UTILIZED ON ALL WATER, SEWER FORCE MAIN OR RECLAIMED WATER SYSTEMS. ALL FITTINGS SHALL BE RESTRAINED TO LENGTHS INDICATED ON THE ABOVE SCHEDULE, AT A MINIMUM.
2. ASSUMPTIONS: DUCTILE IRON PIPE (WITHOUT POLY WRAP), SAFETY FACTOR=1.5, TEST PRESSURE=150PSI, SOIL=GM OR SM, TRENCH TYPE 3, DEPTH OF COVER=30" FOR 20" AND SMALLER PIPE SIZE OR 36 INCHES FOR 24" AND LARGER PIPE SIZE. FOR D.I.P. W/POLY WRAP, USE RESTRAINT JOINT SCHEDULE FOR PVC PIPE.
3. BENDS AND VALVES: SHALL BE RESTRAINED ON EACH SIDE OF FITTING.
4. VERTICAL OFFSETS: ARE APPROX. 3 FEET COVER ON TOP AND APPROX. 8 FEET COVER ON BOTTOM. PER THE DETAILS, Lu IS THE RESTRAINED LENGTH FOR THE UPPER (TOP) LEVEL. Li IS THE RESTRAINED LENGTH FOR THE LOWER (DEEPER) LEVEL. ASSUME 45 DEGREE BENDS.
5. TEES: TOTAL LENGTH BETWEEN FIRST JOINTS OR RESTRAINED LENGTH ON EITHER SIDE OF TEE (RUN) SHALL BE A TOTAL DISTANCE OF 30 FEET (MIN). SEE SCHEDULE ABOVE FOR RESTRAINT LENGTH ON TEE "BRANCH" LINE.
6. HDPE TO D.I.P. TRANSITIONS: THE D.I.P. PIPE SIDE SHALL BE RESTRAINED 35 FT (MIN).

TEES SEE NOTE 5		
RUN SIZE (IN.)	BRANCH SIZE (IN.)	L(FT.)
4	4	F.O.
4	6 4<LESS	6 F.O.
8	8 6<LESS	19 F.O.
10	10 8 6<LESS	29 9 F.O.
12	12 10 8<LESS	40 21 F.O.
16	16 12 10 10<LESS	60 25 3 F.O.
20	20 16 12 10<LESS	79 48 9 F.O.
24	24 20 16 12<LESS	79 54 23 F.O.
30	30 24 20 16 16<LESS	101 66 38 4 F.O.
36	36 30 24 20 16<LESS	122 90 53 21 1 F.O.
42	42 36 30 24 20 16<LESS	141 113 79 38 3 1 F.O.
48	48 42 36 30 24 20<LESS	160 133 103 66 22 F.O.

F.O.= FITTING ONLY

LENGTH (L) TO BE RESTRAINED							
NOMINAL PIPE SIZE (IN.)	HORIZONTAL BENDS				VERTICAL OFFSETS 45° BENDS (SEE NOTE 4)		VALVES OR DEAD ENDS
	90° BENDS L (FT.)	45° BENDS L (FT.)	22.5° BENDS L (FT.)	11.25° BENDS L (FT.)	UPPER L (FT.)	LOWER L (FT.)	L (FT.)
4	17	7	4	2	11	3	30
6	24	15	5	3	15	4	42
8	31	13	6	3	20	5	55
10	36	15	8	4	23	6	65
12	42	18	9	5	27	7	77
14	48	20	10	5	31	7	87
16	53	22	11	6	35	8	97
18	58	24	12	6	39	9	107
20	63	27	13	6	42	10	118
24	63	27	13	7	49	12	118
30	75	31	15	8	59	14	141
36	86	36	17	9	68	17	163
42	95	40	19	10	76	19	183
48	117	43	21	11	84	21	203

REDUCERS	
SIZE (IN.)	L (FT.)
6X4	22
8X6	23
8X4	39
10X8	22
10X6	40
12X10	23
12X8	41
16X12	42
16X10	58
20X18	22
20X16	42
20X12	74
24X20	36
24X18	51
24X16	64
30X24	50
30x20	77
36x30	50
36x24	89
42X36	48
42X30	89
48X42	48
48X36	88

WT03 DUCTILE IRON RESTRAINT JOINT SCHEDULE
SCALE: N.T.S

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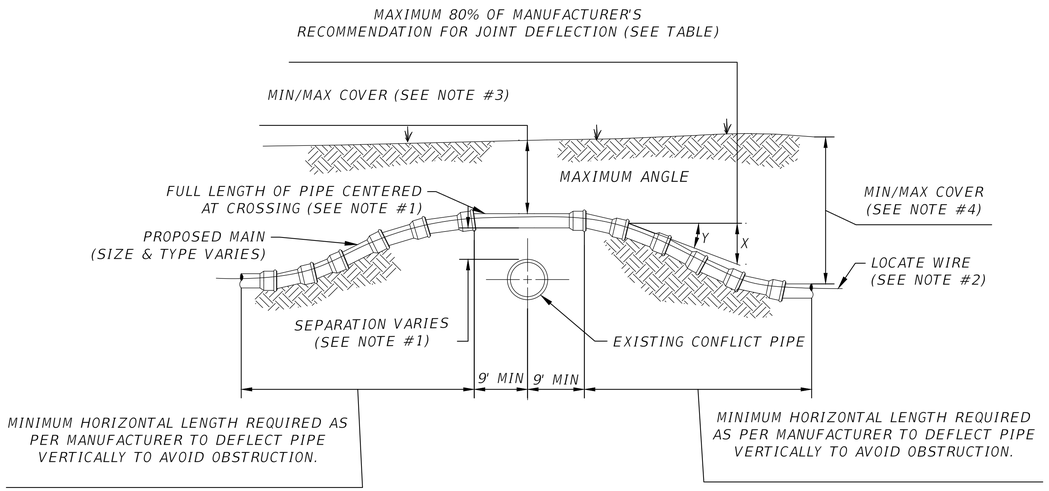
REVISIONS	
DATE	DESCRIPTION

NORTH FLORIDA PROFESSIONAL SERVICES, INC.
P.O. BOX 3823, LAKE CITY, FL 32056, PH. 386-752-4675, LIC NO. LB8356
2551 BLAIRSTONE PINES DR., TALLAHASSEE, FL 32301, WWW.NFPS.NET, CA# 29011

JOB NUMBER: L220110CCB
EOR: RICKY L. HENDRIX
P.E. NO.: 45239

WATER DETAILS
ELLISVILLE WATER MAIN EXTENSION
COLUMBIA COUNTY, FLORIDA

SHEET NO. 80



NOTES:

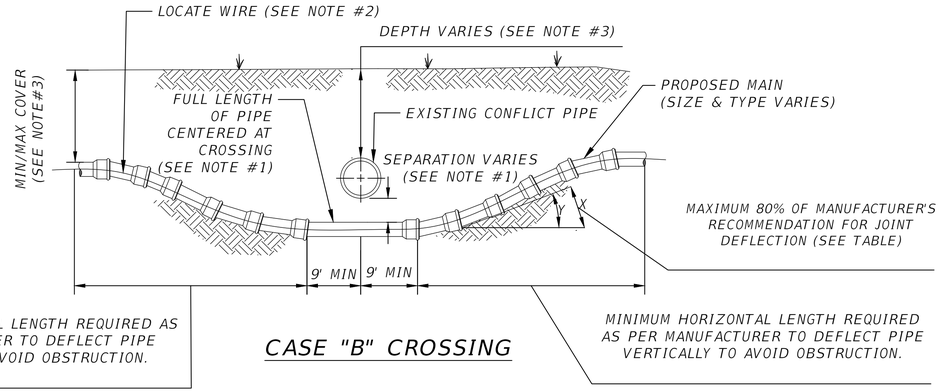
1. FOR MINIMUM VERTICAL SEPARATION REQUIREMENTS SEE SHEET 13. A FULL LENGTH OF PIPE SHALL BE CENTERED OVER EXISTING UTILITY MAIN TO PROVIDE MAXIMUM JOINT SPACING FOR ALL CROSSING.
2. LOCATING WIRE REQUIRED.
3. THE COVER OVER ALL PIPING LESS THAN 24" SIZE SHALL BE A MINIMUM OF 30" IN UNPAVED AREAS AND 36" IN PAVED AREAS WITH A MAXIMUM COVER OF 60". COVER FOR PIPING 24" SIZE AND LARGER SHALL BE MINIMUM OF 36" (PAVED AND UNPAVED) AND MAXIMUM OF 84". THE SOILS BETWEEN THE NEW MAIN AND THE CONFLICT PIPE SHALL BE COMPACTED TO 98% OF THE MAXIMUM DENSITY AS DETERMINED BY THE LABORATORY MODIFIED PROCTOR TEST ASTM D 1557.

MAXIMUM ALLOWED OFFSET FOR PIPE BY JOINT DEFLECTION

PVC PIPE			
PIPE SIZE (IN.)	(X) MAX. OFFSET (IN.)	(Y) ANGLE AT ONE BELL	RESULTING RADIUS OF CURVE WITH 20FT. LENGTHS
2	30	7"	158 FT
4	10	2.4000"	480 FT
6	10	2.4000"	480 FT
8	10	2.4000"	480 FT
10	10	2.4000"	480 FT
12	8.5000	2"	564 FT
14-24	5	1/2"	960 FT
30-48	3.2500	.8000"	1477 FT

DUCTILE IRON PIPE (Mechanical Joint)			
PIPE SIZE (IN.)	(X) MAX. OFFSET (IN.)	(Y) ANGLE AT ONE BELL	RESULTING RADIUS OF CURVE WITH 20FT. LENGTHS
4	27	6.5°	177 FT
6	24	5.7°	200 FT
8-12	17	4.2°	273 FT
14-16	12	2.9°	400 FT
18-20	10	2.4°	477 FT
24-30	8.0000	1.9°	600 FT
36	7	1.7°	687 FT
42-48	6.7000	1.6°	716 FT

WT04 UTILITY CONFLICT ADJUSTMENT BY JOINT DEFLECTION - CASE A
SCALE: N.T.S



CASE "B" CROSSING

NOTES:

1. FOR MINIMUM VERTICAL SEPARATION REQUIREMENTS SEE SHEET 13. A FULL LENGTH OF PIPE SHALL BE CENTERED UNDER EXISTING UTILITY MAIN TO PROVIDE MAXIMUM JOINT SPACING FOR ALL CROSSING.
2. LOCATING WIRE REQUIRED.
3. THE COVER OVER ALL PIPING LESS THAN 24" SIZE SHALL BE A MINIMUM OF 30" IN UNPAVED AREAS AND 36" IN PAVED AREAS WITH A MAXIMUM COVER OF 60". COVER FOR PIPING 24" SIZE AND LARGER SHALL BE MINIMUM OF 36" (PAVED AND UNPAVED) AND MAXIMUM OF 84". THE SOILS BETWEEN THE NEW MAIN AND THE CONFLICT PIPE SHALL BE COMPACTED TO 98% OF THE MAXIMUM DENSITY AS DETERMINED BY THE LABORATORY MODIFIED PROCTOR TEST ASTM D 1557.

MAXIMUM ALLOWED OFFSET FOR PIPE BY JOINT DEFLECTION

PVC PIPE			
PIPE SIZE (IN.)	(X) MAX. OFFSET (IN.)	(Y) ANGLE AT ONE BELL	RESULTING RADIUS OF CURVE WITH 20FT. LENGTHS
2	30	7"	158 FT
4	10	2.4000"	480 FT
6	10	2.4000"	480 FT
8	10	2.4000"	480 FT
10	10	2.4000"	480 FT
12	8.5000	2"	564 FT
14-24	5	1/2"	960 FT
30-48	3.2500	.8000"	1477 FT

DUCTILE IRON PIPE (Mechanical Joint)			
PIPE SIZE (IN.)	(X) MAX. OFFSET (IN.)	(Y) ANGLE AT ONE BELL	RESULTING RADIUS OF CURVE WITH 20FT. LENGTHS
4	27	6.5°	177 FT
6	24	5.7°	200 FT
8-12	17	4.2°	273 FT
14-16	12	2.9°	400 FT
18-20	10	2.4°	477 FT
24-30	8.0000	1.9°	600 FT
36	7	1.7°	687 FT
42-48	6.7000	1.6°	716 FT

PIPE JOINT DEFLECTION

WT05 UTILITY CONFLICT ADJUSTMENT BY JOINT DEFLECTION - CASE B
SCALE: N.T.S

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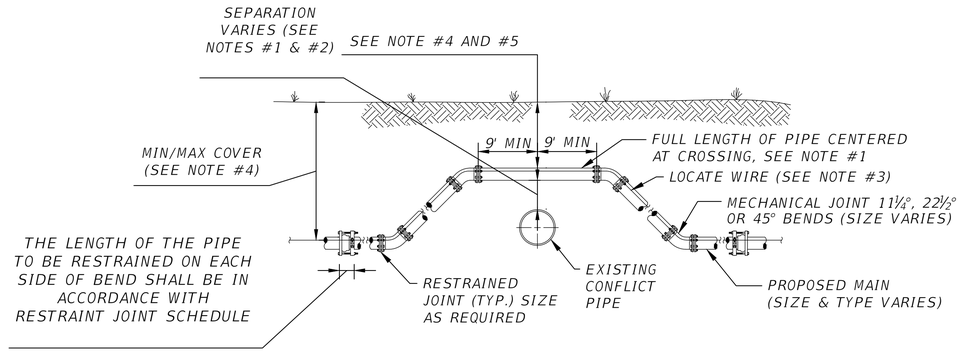
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JOB NUMBER: L220110CCB
EOR: RICKY L. HENDRIX
P.E. NO.: 45239

WATER DETAILS
ELLISVILLE WATER MAIN EXTENSION
COLUMBIA COUNTY, FLORIDA

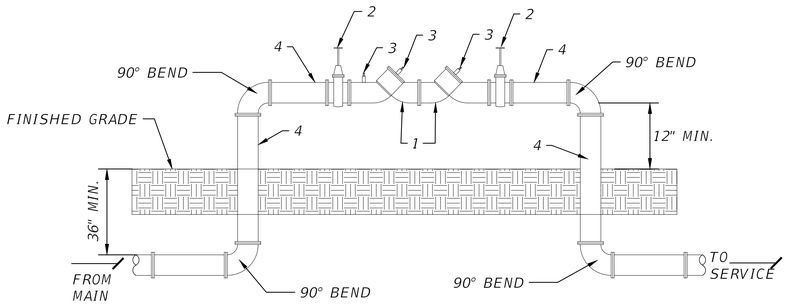
SHEET NO. 81

Cayden Sanders 11/28/2023 3:19:25 PM X:\2022\L220110CCB\H.CADD\Roadway\KEYSRD01_ELLISVILLE_WATERLINE.dwg



NOTES:
1. THE SOILS BETWEEN THE NEW MAIN AND THE CONFLICT PIPE SHALL BE COMPACTED TO 98% OF THE MAXIMUM DENSITY AS DETERMINED BY THE LABORATORY MODIFIED PROCTOR TEST, ASTM D 1557.
2. FOR MINIMUM VERTICAL SEPARATION REQUIREMENTS SEE SHEET 83.
3. LOCATING WIRE REQUIRED.
4. THE COVER FOR PIPING LESS THAN 24" SIZE SHALL BE 30" (MIN) IN UNPAVED AREAS, 36" (MIN) IN PAVED AREAS AND A MAXIMUM COVER OF 60", UNLESS APPROVED BY THE ENGINEER. THE COVER FOR PIPING 24" SIZE AND LARGER SHALL BE 36" (MIN) IN PAVED AND UNPAVED AREAS AND A MAXIMUM COVER OF 84".
5. IF UTILITY CONFLICT IS LOCATED IN A NON-TRAFFIC AREA (NO TRAFFIC LOADS) AND THE NEW PIPE IS D.I.P., THEN THE MINIMUM COVER MAY BE REDUCED TO 24 INCHES (ONLY IN THE AREA OF THE CONFLICT).

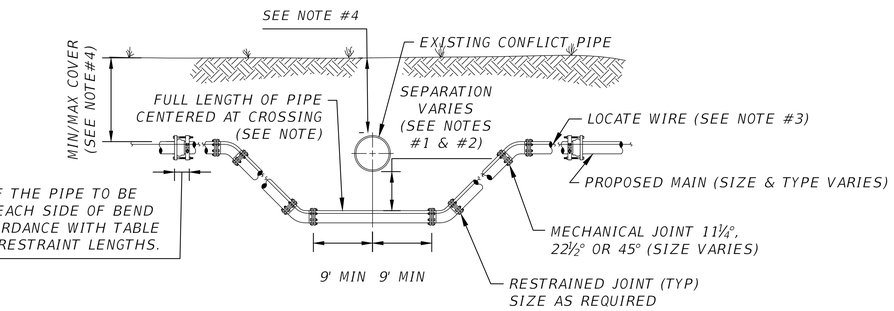
WT06 UTILITY CONFLICT ADJUSTMENT BY RESTRAINED FITTINGS - CASE A
SCALE: N.T.S



MATERIALS	
ITEM	DESCRIPTION
1	BACKFLOW PREVENTER
2	GATE VALVE
3	TEST COCKS
4	DUCTILE IRON PIPE – FLANGED END x FLANGED END

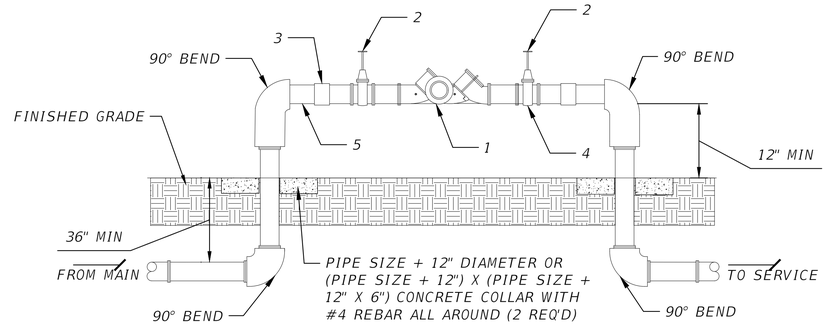
NOTES:
1. UNDER NO CONDITION WILL ANY CONNECTION BE ALLOWED BETWEEN THE SERVICE METER AND A BACKFLOW PREVENTER USED FOR SYSTEM CONTAINMENT. BACKFLOW PREVENTER SHALL ALWAYS BE INSTALLED DOWNSTREAM OF METER.
2. UNDER NO CIRCUMSTANCE, SHALL TEST PORTS BE MODIFIED OR UTILIZED FOR THIS OR OTHER APPLICATION OTHER THAN BACKFLOW DEVICE TESTING.
3. PROVIDE AND INSTALL COVER OVER BACKFLOW PREVENTER IF REQ'D BY SUWANNEE COUNTY.

WT07 UTILITY CONFLICT ADJUSTMENT BY RESTRAINED FITTINGS - CASE B
SCALE: N.T.S



NOTES:
1. THE SOILS BETWEEN THE NEW MAIN AND THE CONFLICT PIPE SHALL BE COMPACTED TO 98% OF THE MAXIMUM DENSITY AS DETERMINED BY THE LABORATORY MODIFIED PROCTOR TEST, ASTM D 1557
2. FOR MINIMUM VERTICAL SEPARATION REQUIREMENTS SEE SHEET 83.
3. LOCATING WIRE REQUIRED.
4. THE COVER FOR PIPING LESS THAN 24" SIZE SHALL BE 30" (MIN) IN UNPAVED AREA, 36" (MIN) IN PAVED AREAS AND A MAXIMUM COVER OF 60", UNLESS APPROVED BY THE ENGINEER. THE COVER FOR PIPING 24" SIZE AND LARGER SHALL BE 36" (MIN) IN PAVED AND UNPAVED AREAS AND A MAXIMUM COVER OF 84".

WT08 DOUBLE-CHECK BACKFLOW PREVENTER
SCALE: N.T.S



MATERIALS	
ITEM	DESCRIPTION
1	BACKFLOW PREVENTER
2	GATE VALVE
3	UNION
4	TEST COCKS
5	THREADED NIPPLE

NOTES:
1. UNDER NO CONDITION WILL ANY CONNECTION BE ALLOWED BETWEEN THE SERVICE METER AND A BACKFLOW PREVENTER USED FOR SYSTEM CONTAINMENT. BACKFLOW PREVENTER SHALL ALWAYS BE INSTALLED DOWNSTREAM OF METER.
2. IF A PRESSURE MONITOR IS TO BE INSTALLED, ADD A TEE, VALVE FITTINGS, AND MOUNT ON SUPPLY SIDE PRIOR TO BACKFLOW PREVENTION DEVICE: UNDER NO CIRCUMSTANCE, SHALL TEST PORTS BE MODIFIED OR UTILIZED FOR THIS OR OTHER APPLICATION OTHER THAN BACKFLOW DEVICE TESTING.
3. A CONBRACO SERIES 40-000 FREEZE PROTECTION VALVE SHALL BE INCLUDED.
4. PROVIDE AND INSTALL COVER OVER BACKFLOW PREVENTER IF REQ'D BY SUWANNEE COUNTY.

WT09 REDUCED PRESSURE BACKFLOW PREVENTER
SCALE: N.T.S

REVISIONS	
DATE	DESCRIPTION

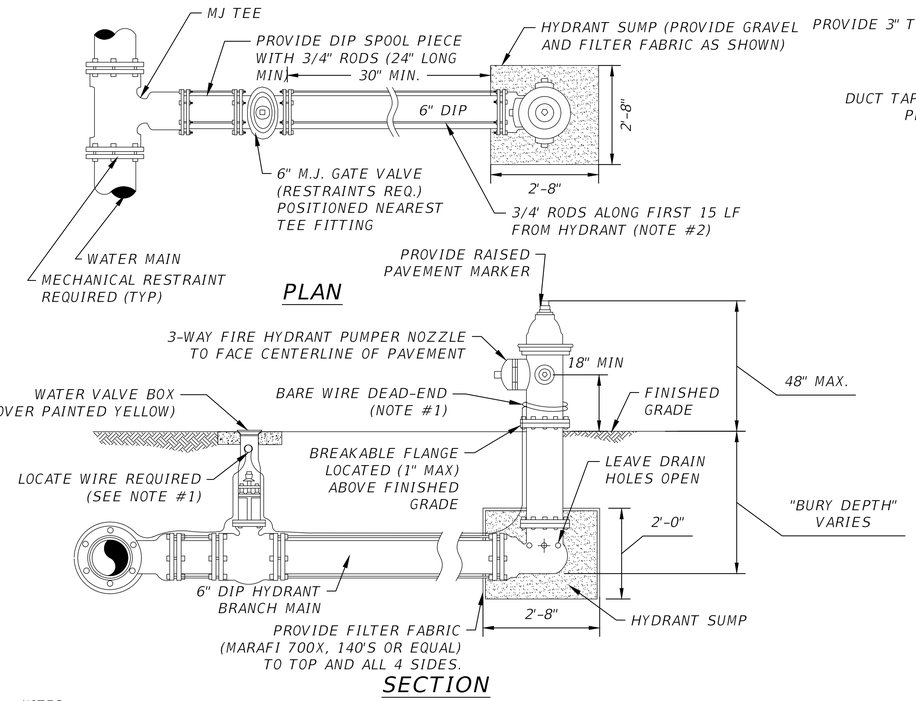
NORTH FLORIDA PROFESSIONAL SERVICES, INC.
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2551 BLAIRSTONE PINES DR., TALLAHASSEE, FL 32301, WWW.NFPS.NET, CA# 29011

JOB NUMBER: L220110CCB
EOR: RICKY L. HENDRIX
P.E. NO.: 45239

WATER DETAILS
ELLISVILLE WATER MAIN EXTENSION
COLUMBIA COUNTY, FLORIDA

SHEET NO. 82

THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.

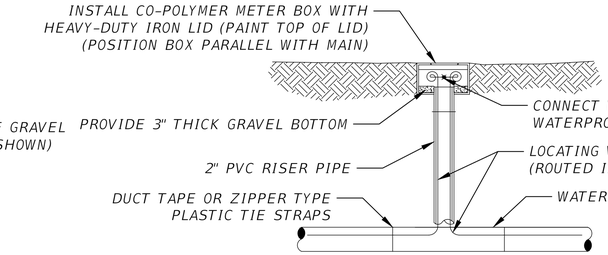


PLAN

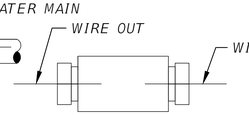
SECTION

NOTES:
1. LOCATE WIRE SHALL BE ROUTED FROM THE VALVE TO THE HYDRANT AS SHOWN ABOVE LEAVING ENOUGH SLACK TO REACH 4' ABOVE FINAL GRADE. THE END OF THE WIRE SHALL BE SECURED TO THE PIPE MAIN.
2. FIRE HYDRANTS SHALL BE INSTALLED BETWEEN BACK OF CURB AND FACE OF SIDEWALK AND NOT WITHIN SWALE/DITCH AREAS. THE DISTANCE RANGE FROM EDGE OF ADJACENT PAVEMENT, BACK OF CURB AND FACE OF SIDEWALK SHALL BE IN COMPLIANCE WITH LOCAL COUNTY FIRE DEPARTMENT RULES AND AS APPROVED BY APPLICABLE PERMITTING AGENCIES. DISTANCE SHALL BE MEASURED TO THE CLOSEST PART OF THE FIRE HYDRANT (I.E. THE PUMPER NOZZLE).THE MAXIMUM DISTANCE (BACK OF CURB) SHALL BE IN COMPLIANCE WITH LOCAL COUNTY FIRE DEPARTMENT RULES. FOR OTHER LOCATION LIMITATIONS. IF PIPING BETWEEN TEE AND HYDRANT IS LONGER THAN 80 LF, AN ADDITIONAL 6" GATE VALVE IS REQUIRED AT THE HYDRANT LOCATION (PROVIDE 30" SEPARATION). ALL PIPING, VALVES AND FITTINGS ALONG THE HYDRANT BRANCH MAIN WHICH IS WITHIN 15 LF OF THE HYDRANT SHALL BE RESTRAINED UTILIZING ONLY TWO 3/4" DIA (THREADED ENDS) STEEL RODS AND EYE BOLTS (NO JOINT RESTRAINT DEVICES REQUIRED). A SPLIT SERRATED RING WITH RESTRAINT EARS (EBAA 15 PF06 or EQUAL) MAYBE USED IN THIS ASSEMBLY. ALL OTHER JOINTS ALONG THE HYDRANT BRANCH MAIN OUTSIDE OF THE FIRST 15 LF SHALL INCLUDE JOINT RESTRAINTS.
3. OPERATION OF THE FIRE HYDRANT SHALL BE EITHER FULL OPEN POSITION OR TOTALLY CLOSED POSITION. THE HYDRANT SHALL NOT BE UTILIZED TO THROTTLE OUTLET FLOW.
4. PRIOR TO PROJECT FINAL INSPECTION, THE HYDRANT AND ALL ABOVE GROUND PIPING SHALL BE RE-OILED, GREASED AND REPAINTED (RUS- KIL ENAMEL-INTERNATIONAL YELLOW OR EQUAL). PRIVATELY OWNED AND MAINTAINED FIRE HYDRANTS SHALL BE PAINTED RED.
5. FIRE HYDRANTS SHALL BE AVK SERIES 27 WITH (2) 2 ½" OUTLETS, 5" STEAMER, 5 ¼" BARREL, PAINTED YELLOW. NO EQUAL HYDRANT ALLOWED.

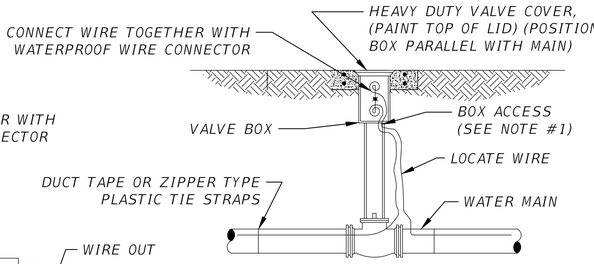
WT10 FIRE HYDRANT INSTALLATION USING MECHANICAL JOINT TEE
SCALE: N.T.S



LOCATE WIRE BOX UTILIZING METER BOX



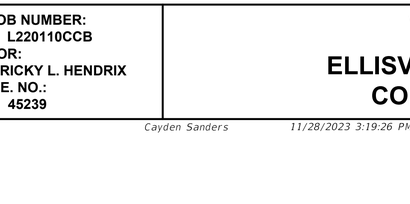
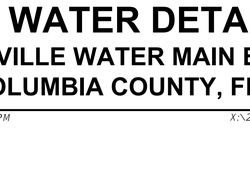
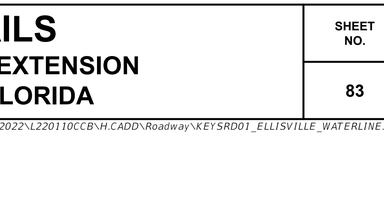
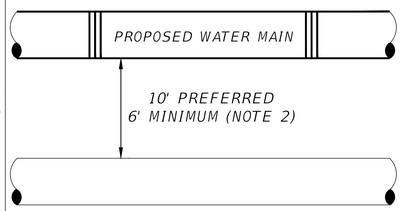
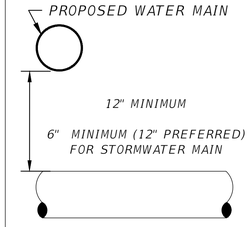
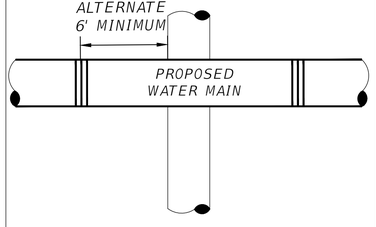
WATERPROOF WIRE CONNECTOR DETAIL



LOCATE WIRE BOX UTILIZING VALVE BOX

NOTES:
1. LOCATE WIRE SHALL ENTER THE VALVE BOX THROUGH A "V" CUT IN THE 6" PVC RISER PIPE
2. LOCATE WIRE SHALL HAVE ENOUGH SLACK TO REACH 4' ABOVE FINAL GRADE AND LOCATE POINTS.
3. LOCATE WIRE CONNECTION SHALL ONLY BE A 2 WAY CONNECTION.

WT10 LOCATE WIRE BOX
SCALE: N.T.S

OTHER UTILITY	HORIZONTAL SEPARATION	VERTICAL SEPARATION AT CROSSING (NOTE 1)	JOINT SPACING AT CROSSINGS (WATER MAIN SEGMENT TO BE CENTERED AT CROSSING IF POSSIBLE)
STORMWATER MAIN (GRAVITY OR PRESSURE) RECLAIMED WATER MAIN (PRESSURE)			
WASTEWATER MAIN (GRAVITY OR PRESSURE)			

NOTES:
1. WATER MAIN SHOULD CROSS ABOVE OTHER UTILITY WHENEVER POSSIBLE. WHEN WATER MAIN MUST CROSS BELOW OTHER UTILITY, THE MINIMUM SEPARATION IS 12".
2. 3' FOR GRAVITY SANITARY SEWER WHERE THE BOTTOM OF THE WATER MAIN IS LAID AT LEAST 6" ABOVE THE TOP OF THE GRAVITY SANITARY SEWER.
3. REFER TO WATER AND SEWER NOTES (SHEET 5) AND SPECIFICATIONS FOR ADDITIONAL CONSTRUCTION REQUIREMENTS.
4. THE LOCATION OF ALL WATER MAINS SHALL COMPLY WITH CHAPTER 62-555.314, F.A.C.
5. THE LOCATION AND TYPE OF PIPE FOR ALL PIPES CROSSING A WATER MAIN OR LAID WITHIN THREE FEET HORIZONTALLY OF A WATER MAIN SHALL COMPLY WITH RULE 62-555.314(5)(b), F.A.C. (REFER TO WATER AND SEWER NOTE # 28 ON SHEET 5).

WT11 TYPICAL UTILITY SEPARATION
SCALE: N.T.S

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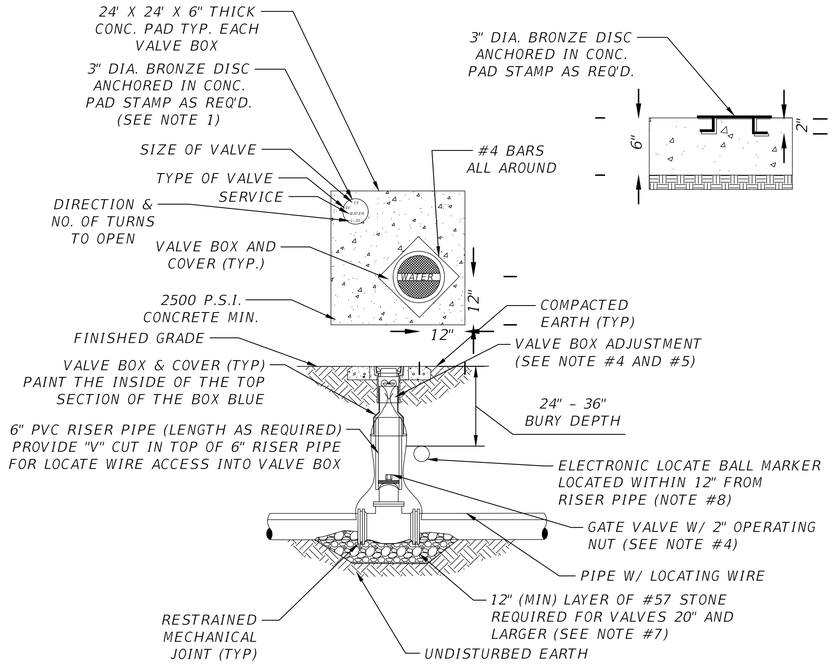
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NORTH FLORIDA PROFESSIONAL SERVICES, INC.
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WATER DETAILS
ELLISVILLE WATER MAIN EXTENSION
COLUMBIA COUNTY, FLORIDA

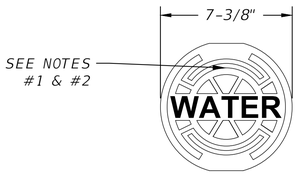
SHEET NO. 83



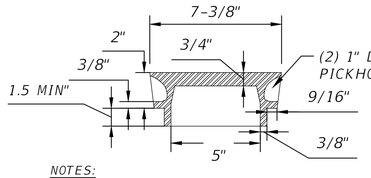
NOTES:

1. FOR UNPAVED LOCATIONS, A PRECAST CONCRETE VALVE PAD SHALL BE PROVIDED AND INSTALLED FLUSH WITH GRADE. CONCRETE PAD IS NOT REQUIRED FOR VALVE LOCATED IN THE ROADWAY, UNLESS SHOWN OR NOTED OTHERWISE. IN LIEU OF PRECAST CONCRETE PAD, A 6" THICK X 24" (ROUND OR SQUARE) POURED CONCRETE PAD W/2 - #4 REBAR AROUND PERIMETER, MAY BE USED.
2. LOCATING WIRE IS REQUIRED ON ALL PRESSURE PIPING.
3. A "V" CUT SHALL BE CARVED IN THE CONCRETE CURB (ASPHALT IF NO CURB) CLOSEST/ADJACENT TO ALL BELOW GRADE VALVES. THE "V" CUT SHALL BE PAINTED BLUE (POTABLE WATER.) OR PURPLE (RECLAIMED WATER).
4. IN PAVED AREAS, INSTALL VALVE AT A DEPTH TO ALLOW A 12" MIN. DISTANCE BETWEEN THE VALVE COVER PLATE AND THE TOP OF THE VALVE OPERATING NUT. OUTSIDE OF PAVED AREAS (GRASS), INSTALL VALVE AT A DEPTH TO ALLOW A 6" MINIMUM DISTANCE BETWEEN THE VALVE COVER AND THE TOP OF THE VALVE OPERATING NUT. OPERATING NUT/STEM EXTENSION SHALL BE PROVIDED (WHERE APPLICABLE) SO THAT THE OPERATING NUT WILL BE NO MORE THAN 30 INCHES BELOW FINISHED GRADE.
5. FOR NEW CONSTRUCTION, THE VALVE BOX SHALL BE ADJUSTED TO MIDRANGE TO ALLOW FOR FUTURE BOX ADJUSTMENTS. ROUTE LOCATE WIRES THRU A "V" CUT IN THE TOP OF THE 6" PVC RISER PIPE FOR LOCATE WIRE ACCESS INTO VALVE BOX. THE LOCATE WIRES, WITH A 24" LONG PIG-TAIL AT THE TOP, SHALL BE CONNECTED TOGETHER WITH A WIRE NUT.
6. BRASS IDENTIFICATION TAG INDICATING "WATER", VALVE SIZE, DIRECTION AND TURNS TO OPEN & VALVE TYPE. PROVIDE A ¼" HOLE IN BRASS TAG AND ATTACH TAG (TWIST WIRE AROUND TAG) TO THE END OF THE LOCATE WIRE. TAGS ARE NOT REQUIRED ON VALVES INSTALLED ON FIRE HYDRANT BRANCH LINES.
7. GRAVEL SHALL BE PROVIDED UNDER ALL VALVES 20" AND LARGER. THE MINIMUM VERTICAL LIMIT OF GRAVEL IS 12" UNDER THE VALVE UP TO ⅓ THE OVERALL HEIGHT OF THE VALVE.
8. ALL VALVES SHALL BE INSTALLED WITH AN ELECTRIC LOCATE MARKER. MARKER SHALL BE 4" DIA. COLOR CODED BALL MARKER (3M-1403XR FOR WATER)

WT12 WATER VALVE INSTALLATION
SCALE: N.T.S



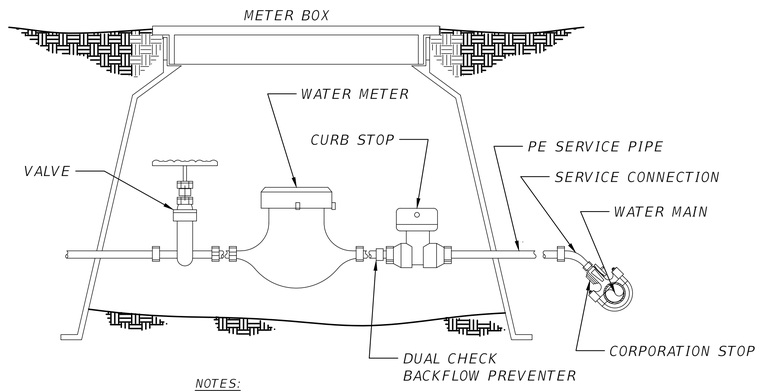
HEAVY DUTY RATING



NOTES:

1. PAINT TOP OF THE COVER WITH ENAMEL PAINT (BLUE COLOR) FOR WATER.
2. LID WEIGHT: APPROX. 12 LBS.

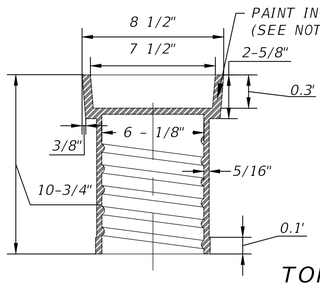
WT14 WATER VALVE BOX COVER
SCALE: N.T.S



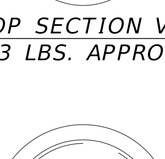
NOTES:

1. P.E. TUBING IS TO BE BACKFILLED BY HAND UP TO THE TOP OF THE SERVICE.

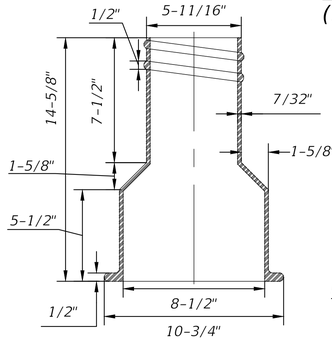
WT15 METER BOX ASSEMBLY
SCALE: N.T.S

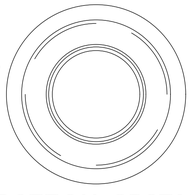


HEAVY DUTY RATING



TOP SECTION VIEW
(23 LBS. APPROX.)



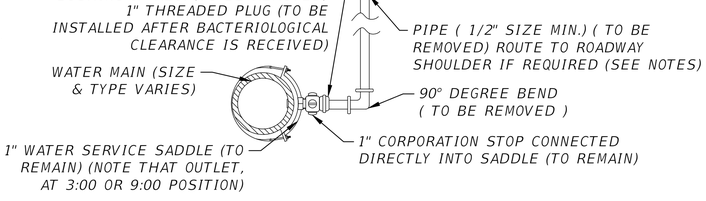


BOTTOM SECTION VIEW
(26 LBS. APPROX.)

NOTES:

1. PAINT THE INSIDE OF THE TOP SECTION OF THE BOX WITH APPLICABLE COLOR (BLUE)
2. HEAVY DUTY RATING (TOTAL WEIGHT APPROX. 50 LBS.).

WT13 WATER VALVE BOX
SCALE: N.T.S



NOTES:

1. LOCATION OF SAMPLE POINT BIBB SHALL NOT BE WITHIN THE ROADWAY BUT ROUTED TO THE ROADWAY SHOULDERS (NON-TRAFFIC AREAS).
2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE REMOVAL OF ALL TEMPORARY PIPING & FITTINGS (AS NOTED), AFTER BACTERIOLOGICAL CLEARANCE IS RECEIVED.
3. PIPE AND FITTINGS SHALL BE PVC (SCH. 40) OR GALV. MATERIAL.

WT16 TEMPORARY SAMPLE TAP
SCALE: N.T.S

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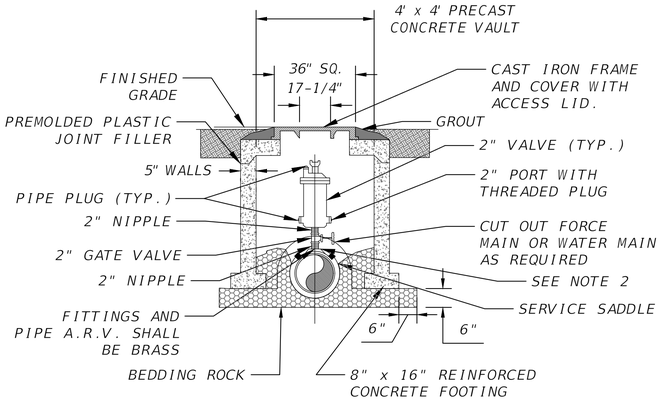
REVISIONS	
DATE	DESCRIPTION

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JOB NUMBER: L220110CCB
EOR: RICKY L. HENDRIX
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WATER DETAILS
ELLISVILLE WATER MAIN EXTENSION
COLUMBIA COUNTY, FLORIDA

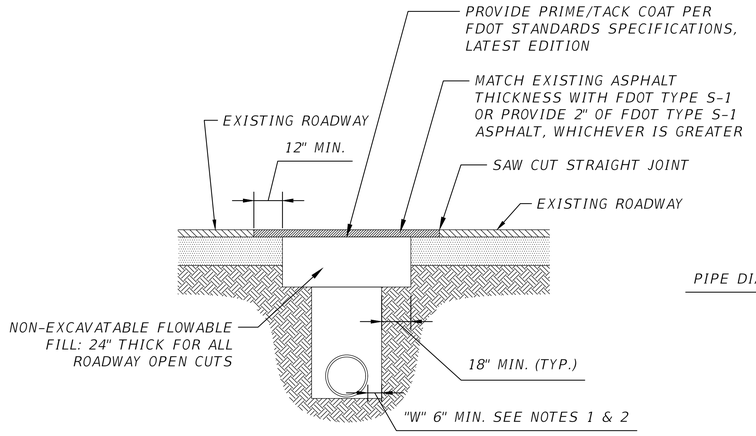
SHEET NO. 84



NOTES:

1. ABOVE DETAIL IS BASED ON 2" COMBINATION AIR/VACUUM RELEASE VALVE. CHANGE PIPE AND FITTINGS ACCORDINGLY FOR OTHER VALVE SIZES AND TYPES.
2. THE MINIMUM DIMENSION FROM TOP OF PIPE TO FINISHED GRADE SHALL BE 3.0 FEET.

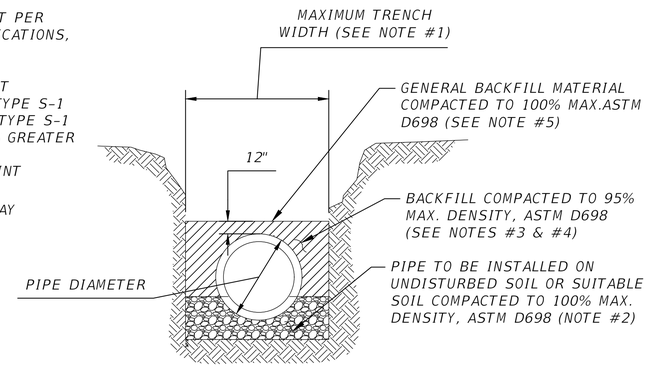
WT17 AIR AND/OR VACUUM RELEASE VALVE
SCALE: N.T.S



OPEN PAVEMENT CUT

NOTES:

1. "W" SHALL BE A MINIMUM OF 6" WIDE AND OF SUFFICIENT WIDTH TO ACCOMMODATE NECESSARY COMPACTION EFFORTS. IN THE EVENT THE REQUIRED MINIMUM DENSITY IS NOT ACHIEVED, LOOSE MATERIAL SHALL BE REMOVED, REPLACED AND COMPACTED TO THE REQUIRED DENSITY, OR REPLACED WITH FULL DEPTH FLOWABLE FILL. DENSITY TESTS BELOW THE SPRING LINE OF THE PIPE ARE REQUIRED IN ADDITION TO OTHER TESTING REQUIREMENTS. (IN THE EVENT FULL DEPTH FLOWABLE FILL IS USED AS BACKFILL, DENSITY REQUIREMENTS ARE WAIVED.)
2. CONTRACTOR SHALL EXCAVATE BOTTOM OF TRENCH TO ALLOW FOR BELL SECTION OF PIPE.
3. MINIMUM ALLOWABLE BACKFILL DENSITY SHALL BE 98% OF THE MAXIMUM DENSITY AT OPTIMUM MOISTURE PER AASHTO T-180.
4. FLOWABLE FILL SHALL COMPLY WITH FDOT STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION, SECTION 436-001, LATEST EDITION.
5. ALL OPEN CUTS SHALL HAVE FLOWABLE FILL AND TEMPORARY ASPHALT INSTALLED WITHIN 2 DAYS OF EXCAVATION. PERMANENT ASPHALT INCLUDING MILLING, IF NEEDED, SHALL BE COMPLETED WITHIN 30 DAYS OF EXCAVATION.
6. THESE ARE MINIMUM REQUIRMENTS. ADDITIONAL RESTRICTIONS MAY BE NECESSARY ON A CASE BY CASE BASIS.



STANDARD TRENCH

NOTES:

1. TRENCH SIDES SHALL BE APPROXIMATELY VERTICAL BETWEEN AN ELEVATION OF 1 FOOT ABOVE THE TOP OF THE PIPE AND THE CENTER LINE OF THE PIPE; OTHERWISE, TRENCH SIDES SHALL BE AS VERTICAL AS POSSIBLE OR AS REQUIRED BY OSHA STANDARDS. REFER TO THE MEASUREMENT AND PAYMENT SECTION TO DETERMINE MAXIMUM PAYLINE WIDTHS.
2. BELL HOLE SHALL BE DUG TO PERMIT THE ENTIRE STRAIGHT BARREL OF THE PIPE TO REST ON THE UNDISTURBED TRENCH BOTTOM. BOULDERS OR LOOSE ROCKS LARGER THAN 3/4 INCH IN SIZE WILL NOT BE PERMITTED IN BACKFILL UP TO 1 FOOT ABOVE THE TOP OF THE PIPE.
3. BACK FILL MATERIAL UP TO A LEVEL OF 1 FOOT OVER THE PIPE SHALL CONSIST OF AASHTO CLASS A-3 SOIL (SUITABLE SOIL) AND SHALL EXCLUDE CLAY MATERIALS AND LOOSE ROCKS LARGER THAN 3/4 INCH SIZE.
4. BACKFILL MATERIAL UP TO A LEVEL 1 FOOT OVER THE TOP OF PIPE OR BOTTOM OF STRUCTURES SHALL BE PLACED IN 6 INCH COMPACTED THICKNESS LAYERS AND SHALL BE COMPACTED TO 100% OF IT'S MAXIMUM DENSITY AS DETERMINED BY THE LABORATORY MODIFIED PROCTOR TEST, ASTM D698.
5. SEE SPEC. SECTION 02222 "EXCAVATIING, BACKFILLING, AND COMPACTING FOR UTILITIES" AND SPEC. SECTION 02300 "EARTHWORK", FOR ADDITIONAL REQUIREMENTS AND EXCEPTIONS INCLUDING REMOVAL AND REPLACEMENT OF UNSUITABLE SOILS, DEWATERING, COMPACTION REQUIREMENTS AND DENSITY TESTING OF COMPACTED SOILS.

WT18 TYPICAL TRENCH
SCALE: N.T.S

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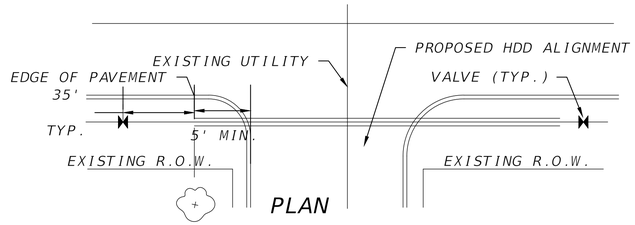
REVISIONS	
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JOB NUMBER: L220110CCB
EOR: RICKY L. HENDRIX
P.E. NO.: 45239

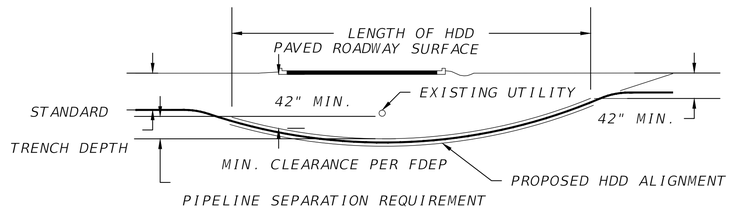
WATER DETAILS
ELLISVILLE WATER MAIN EXTENSION
COLUMBIA COUNTY, FLORIDA

SHEET NO. 85



PLAN

HORIZONTAL MINIMUM CLEARANCES



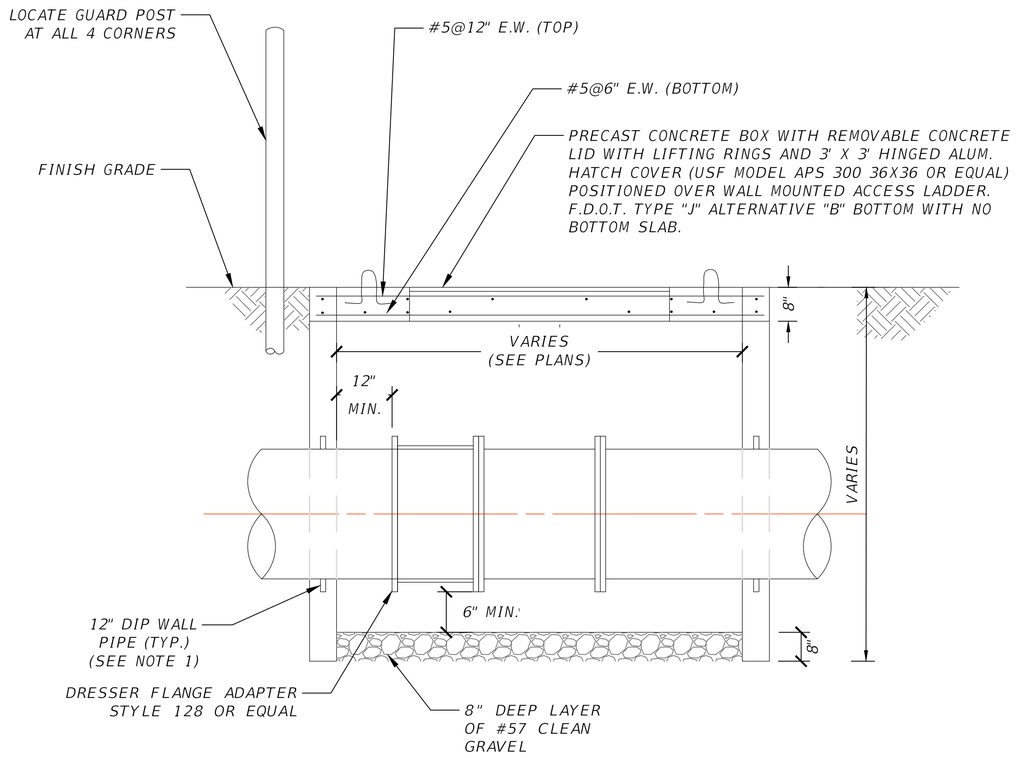
PROFILE

VERTICAL MINIMUM CLEARANCES

HDD INSTALLATION NOTES

1. ALL HDD INSTALLATION ACTIVITIES SHALL BE IN ACCORDANCE WITH THE FLORIDA D.O.T. UTILITY ACCOMMODATIONS MANUAL AND WITH CITY AND COUNTY UTILITIES STANDARDS AND PROCEDURES.
2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR NOTIFICATION OF AFFECTED AGENCIES AND COORDINATION WITH ALL UTILITIES PRIOR TO CONSTRUCTION.
3. ALL CONSTRUCTION MATERIALS, INCLUDING DRILLING FLUID, SHALL BE REMOVED FROM THE SITE PRIOR TO RESTORATION OF DISTURBED AREAS.
4. ALL RESTORATION WORK SHALL BE IN ACCORDANCE WITH D.O.T. AND CITY OR COUNTY REQUIREMENTS AS APPLICABLE.
5. EXCAVATIONS SHALL BE RESTORED IN ACCORDANCE WITH D.O.T. AND CITY OR COUNTY UTILITIES STANDARDS AS APPROPRIATE FOR TRENCH RESTORATION.
6. CASING DIAMETER SHALL BE IN ACCORDANCE WITH THE TECHNICAL SPECIFICATIONS.
7. NO SPACERS REQUIRED.
8. ALLOW 35' BETWEEN VALVE AND END OF CASING. DISTANCE LESS THAN 35' REQUIRES APPROVAL OF DEVIATION. THE 35' LENGTH SHALL NOT INCLUDE BRANCHES/TEES IN THE PIPING BETWEEN VALVE AND END OF CASING.
9. VALVES AT EACH END OF THE HDD AND CASING FOR THE HDD ARE REQUIRED FOR NUMBERED COUNTY ROADS, STATE ROADS AND AT INTERSECTIONS WITH NUMBER COUNTY ROADS AND STATE ROADS.

WT19 TYPICAL HORIZONTAL DIRECTIONAL DRILL (HDD)
SCALE: N.T.S



NOTES

1. WHERE "DOGHOUSE" VAULT IS SHOWN IN PLANS, PROVIDE PRECAST OPENINGS SIZED FOR INSTALLATION OVER THE EXISTING BURIED PIPE. SEAL OPENINGS AROUND PIPE WITH MORTAR TO PREVENT SOIL INFLOW.

WT20 CONCRETE VAULT
SCALE: N.T.S

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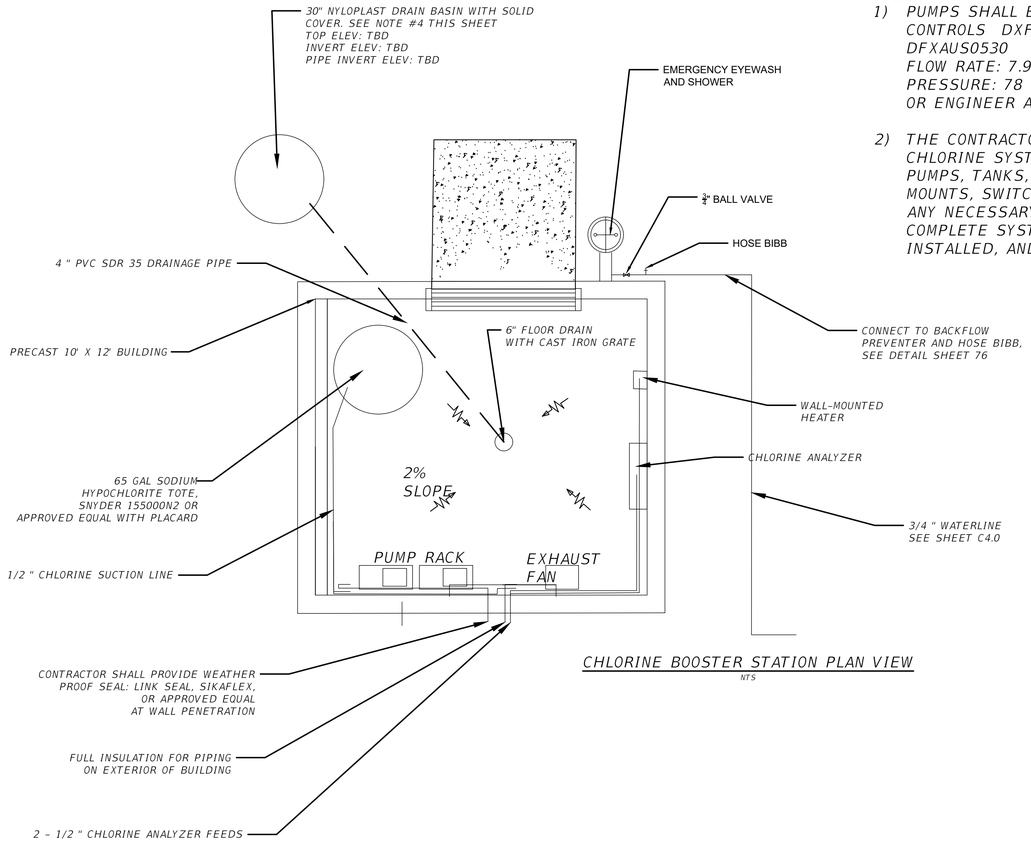
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WATER DETAILS
ELLISVILLE WATER MAIN EXTENSION
COLUMBIA COUNTY, FLORIDA

SHEET NO. 86



CHLORINE BOOSTER STATION PLAN VIEW
NTS

NOTES:

1) PUMPS SHALL BE PROMINENT FLUID CONTROLS DXFA SERIES MODEL DFXAUS0530
FLOW RATE: 7.93 GPH
PRESSURE: 78 PSIG
OR ENGINEER APPROVED EQUAL

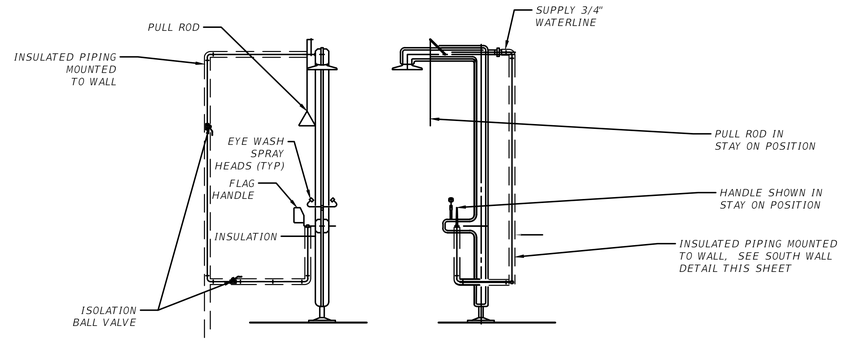
2) THE CONTRACTORS PROPOSED CHLORINE SYSTEM SHALL INCLUDE PUMPS, TANKS, GAUGES, FITTINGS, MOUNTS, SWITCHES, ANALYZER, AND ANY NECESSARY MATERIALS FOR THE COMPLETE SYSTEM TESTED, INSTALLED, AND READY TO USE.

3) FOR METERING SYSTEMS COMPONENTS, SEE SECTION 11261 OF THE SPECIFICATIONS

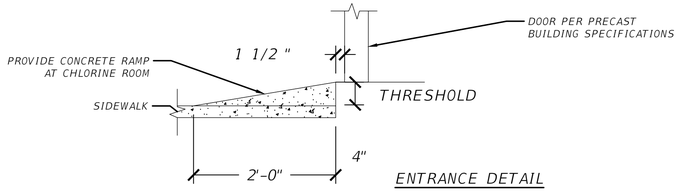
4) GRAVEL 24" BELOW THE DRAINAGE BASIN WILL BE FDOT #57 STONE WITH D-1 FILTER FABRIC.

5) EYEWASH STATION TO BE OSHA COMPLIANT

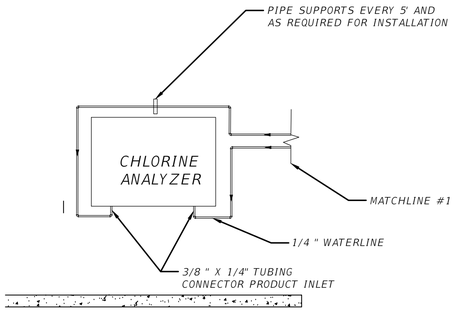
6) ALL CHLORINE VALVES SHALL BE HAYWARD Z-BALL PVC/VITON VENTED BALL VALVE.



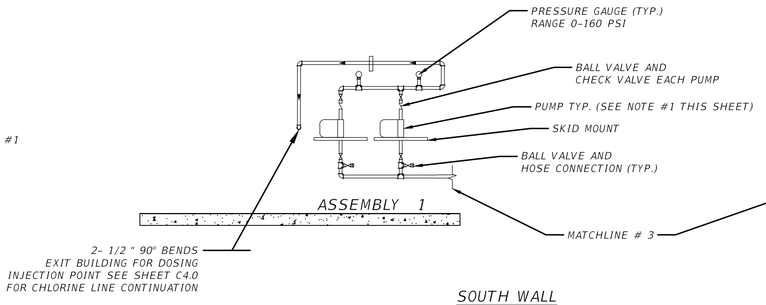
EMERGENCY EYE WASH/SHOWER
NTS



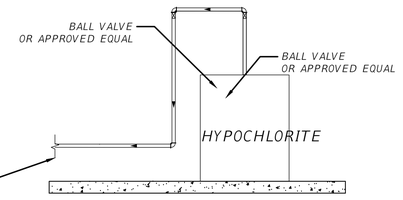
ENTRANCE DETAIL



EAST WALL
NTS



SOUTH WALL
NTS



WEST WALL
NTS

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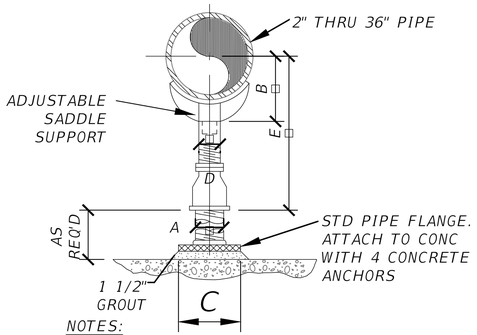
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P.E. NO.: 45239

MISCELLANEOUS DETAILS
ELLISVILLE WATER MAIN EXTENSION
COLUMBIA COUNTY, FLORIDA

SHEET NO. 87

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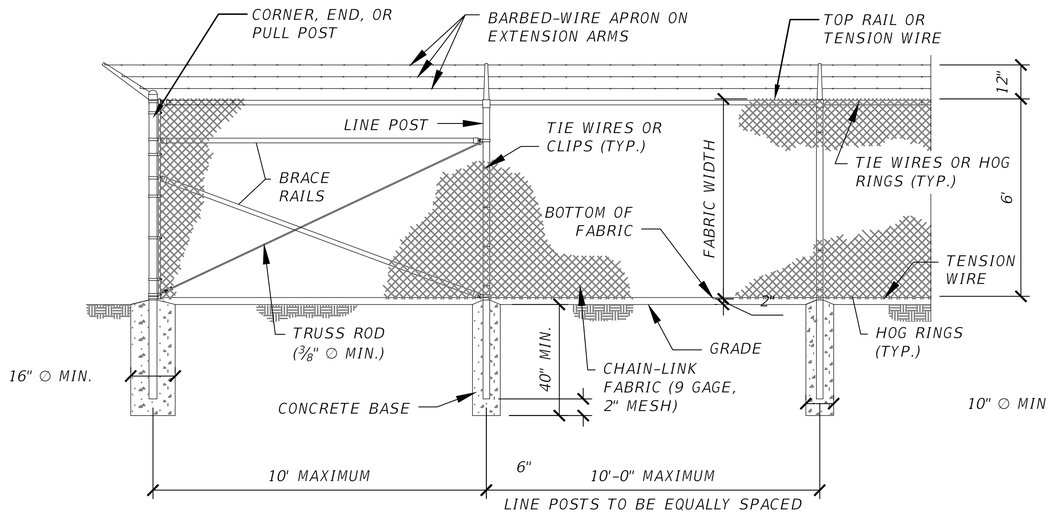


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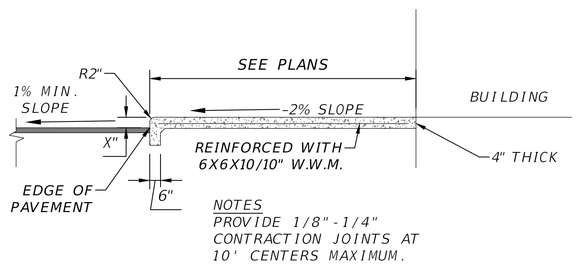
1. PROVIDE HALF ROUND RIGID INSULATION AND INSULATION PROTECTION SHIELD, WHERE PIPING IS INSULATED.
2. PROVIDE NEOPRENE WAFFLE ISOLATION PAD, UNDER SUPPORT FOOT WHEN PIPING IS ISOLATED OR SUPPORT IS ADJACENT TO MECHANICAL EQUIPMENT.
3. FOR BASE, HEIGHT AND FLANGE DIMENSIONS, SEE TABLE.

DIMENSION TABLE						
PIPE SIZE	A	B	C FLANGE DIA,MIN	D	E MIN	E MAX
2"	2-1/2"	3-1 1/2"	9"	1-1/2"	8"	13"
2-1/2"	2-1/2"	3-1/2"	9"	1-1/2"	8"	13"
3"	2-1/2"	3-3/4"	9"	1-1/2"	8-1/4"	13-1/4"
3-1/2"	2-1/2"	4"	9"	1-1/2"	8-1/2"	13-1/2"
4"	3"	4-1/4"	9"	2-1/2"	9-1/4"	14"
5"	3"	4-7/8"	9"	2-1/2"	10"	14-3/4"
6"	3"	5-1/2"	9"	2-1/2"	10-1/2"	15-1/4"
8"	3"	6-7/8"	9"	2-1/2"	11-3/4"	16-1/2"

MS04 PIPE SUPPORT DETAIL
SCALE: N.T.S



MS05 CHAIN LINK FENCE DETAIL
SCALE: N.T.S



MS06 SIDEWALK DETAIL "A"
SCALE: N.T.S

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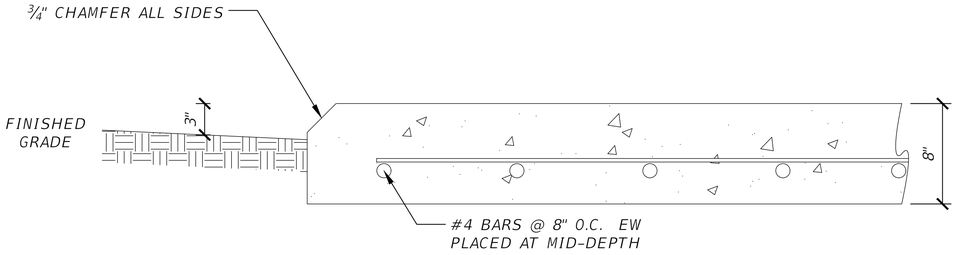
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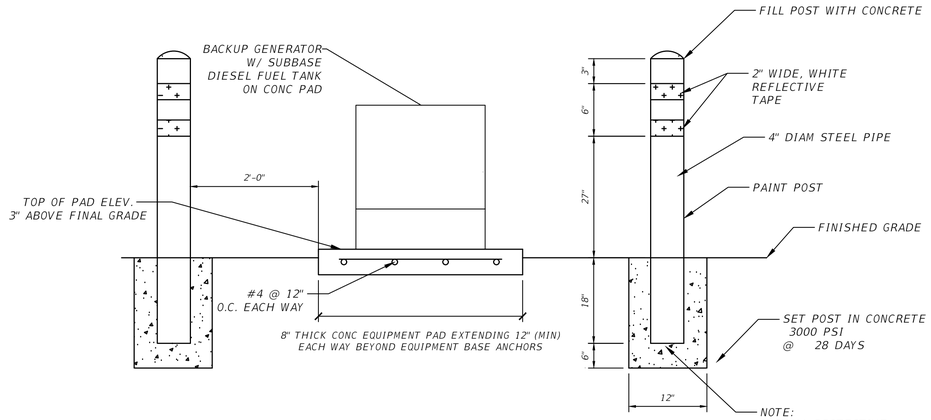
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NOTES:

1. CONCRETE MIX SHALL BE 4,000 PSI (28-DAY STRENGTH) AND SHALL MEET ASTM C150 AND C33 REQUIREMENTS.
2. SUPPORT SLAB SHALL EXTEND 12" (MIN.) EACH WAY BEYOND OUTER EDGES OF ANCHORED EQUIPMENT OR PIPE SUPPORTS.
3. PROVIDE 2" (MIN.) CLEAR COVER OVER ALL REQUIREMENT BARS OR WIRE.

MS07 CONCRETE SUPPORT SLAB
SCALE: N.T.S



REINFORCED CONCRETE EQUIPMENT PADS

1. PROVIDE BUILT-UP PAD AREA FOR NEW CONCRETE FOUNDATIONS TO ELEVATIONS AS SHOWN. USE CLEAN GRANULAR FILL IN 6-INCH LIFTS. GRANULAR FILL SHALL BE CLEAN SAND WITH NO MORE THAN 10% FINES PASSING THROUGH A NO.200 SIEVE. COMPACT TO 95% RELATIVE COMPACTION PER ASTM D1557. PROVIDE TEST REPORT FROM INDEPENDENT TEST LAB SATISFACTORY TO OWNER AND ENGINEER.
2. COORDINATE FORM PLACEMENT WITH PIPING AND ELECTRICAL CONDUITS AS SHOWN IN THESE DRAWINGS. FORMWORK FOR SLAB SHALL BE IN ACCORDANCE WITH ACI 347, FOR PLACEMENT OF CONCRETE IN ACCORDANCE WITH ACI 304R.
3. REINFORCING STEEL SHALL BE DEFORMED BARS IN ACCORDANCE WITH ASTM A615, GRADE 60, PLACED ON SUPPORTS IN ACCORDANCE WITH THE CRSI MANUAL OF STANDARD PRACTICE.
4. PROTECT SURFACES AND WET CURE CONCRETE FOR A MINIMUM OF 7 DAYS AFTER PLACEMENT.

MS08 GENERATOR SUPPORT DETAIL
SCALE: N.T.S

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MISCELLANEOUS DETAILS
ELLISVILLE WATER MAIN EXTENSION
COLUMBIA COUNTY, FLORIDA

SHEET NO. 89

ELECTRICAL LEGEND

GENERAL WIRING DEVICES:

- $ — TOGGLE SWITCH. MOUNT 48" AFF TO TOP UNLESS NOTED OTHERWISE.
- DUPLEX RECEPTACLE NEMA 5-20R. MOUNT 18" AFF UNLESS NOTED OTHERWISE. VERIFY DUPLEX MOUNTING REQUIREMENTS WITH ARCHITECTURAL DRAWINGS PRIOR TO ROUGH-IN. ALL GFI DEVICES AND DEVICES IN DAMP AND WET LOCATIONS SHALL BE WEATHER-RESISTANT "WR" TYPE. SUBSCRIPT INDICATES AS FOLLOWS:
  - G - GROUND FAULT CIRCUIT INTERRUPTER TYPE.
  - WP - GFI DEVICE WITH CLEAR WEATHERPROOF (IN-USE) COVERPLATE. IN EXTERIOR LOCATIONS MOUNT 30" AFG.
  - EWC - GFI, CONCEAL RECEPTACLE BEHIND EWC (COORDINATE WITH EWC PROVIDER).
  - 84" - MOUNTING HEIGHT OF DEVICE AFF.
- DUPLEX RECEPTACLE MOUNTED 42" AFF OR MOUNT 7" ABOVE COUNTER. VERIFY COUNTER HEIGHT PRIOR TO ROUGH-IN.
- 6-30 — SPECIAL NEMA TYPE RECEPTACLE, SUBSCRIPT INDICATES NEMA TYPE. VERIFY WITH EQUIPMENT BEING SUPPLIED. MOUNTED 18" AFF, UNLESS NOTED OTHERWISE.
- QUADRAPLEX RECEPTACLE (TWO NEMA 5-20R) MOUNTED 18" AFF UNLESS NOTED OTHERWISE.
- QUADRAPLEX RECEPTACLE (TWO NEMA 5-20R) MOUNTED 42" AFF OR MOUNT 7" ABOVE COUNTER. VERIFY COUNTER HEIGHT PRIOR TO ROUGH-IN.

SITE EQUIPMENT:

- HH2 — HANDHOLE. SEE DETAIL. TAG INDICATES TYPE.
- PAD-MOUNTED TRANSFORMER.

LIGHTING FIXTURES:

- H22 — TYPICAL LIGHT FIXTURE SYMBOLS.

DISTRIBUTION & POWER EQUIPMENT:

- 2P1A — PANELBOARD.
- ENCLOSED MOTOR STARTER.
- COMBINATION ENCLOSED MOTOR STARTER DISCONNECT.
- ENCLOSED CIRCUIT BREAKER.
- HEAVY DUTY SAFETY SWITCH.
- ELECTRICITY METER.
- P — POWER RELAY IN ENCLOSURE.
- C — CONTACTOR IN ENCLOSURE.

MISCELLANEOUS EQUIPMENT:

- J — JUNCTION BOX.
- E — ELECTRICAL CONNECTION TO EQUIPMENT. VERIFY LOCATION WITH EQUIPMENT PROVIDER.

LIGHTNING PROTECTION:

- AIR TERMINAL
- BONDING CONDUCTOR
- DOWNCONDUCTOR & GROUND ROD

OTHER:

- CIRCUIT RUN CONCEALED BELOW FLOOR, ABOVE CEILING OR IN WALL.
- 2P2-9 — HOMERUN TO PANELBOARD. UNDERLINED TEXT INDICATES PANEL & CIRCUIT DESIGNATION.
- AHU-1 — MECHANICAL EQUIPMENT IDENTIFICATION TAG. SEE MECHANICAL EQUIPMENT ELECTRICAL SCHEDULE.
- 1 — KEY NOTE TAG.
- 2P1A — BOLD UNDERLINED TEXT ADJACENT TO PLAN SYMBOL INDICATES ELECTRICAL EQUIPMENT IDENTIFICATION TAG. TYPICAL FOR PANELS, LIGHT FIXTURES, FLOORBOXES, TRANSFORMERS, ETC.
- LEADER.
- LEADER.

SINGLE LINE AND POWER DIAGRAMS:

- CIRCUIT BREAKER.
- FUSE.
- SWITCH.
- OVERLOAD.
- CONTACT.
- TRANSFORMER.
- CURRENT TRANSFORMER.
- G — GENERATOR.
- M — MOTOR.

ABBREVIATIONS

A	AMPS
AC	ABOVE COUNTER
ACS	ACCESS CONTROL SYSTEM
AF	AMP FRAME
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
AHU	AIR HANDLING UNIT
AL	ALUMINUM
ARCH	ARCHITECT OR ARCHITECTURAL
AT	AMP TRIP
ATS	AUTOMATIC TRANSFER SWITCH
ATU	AIR TERMINAL UNIT
AWG	AMERICAN WIRE GAUGE
BAS	BUILDING AUTOMATION SYSTEM
BJ	BONDING JUMPER
BKR	CIRCUIT BREAKER
BLDG	BUILDING
BOD	BASIS OF DESIGN
C	CONDUIT
C/B, CB	CIRCUIT BREAKER
CL	CURRENT LIMITING
C/L	CENTERLINE
CLG	CEILING
CKT	CIRCUIT
CT	CURRENT TRANSFORMER
CU	COPPER
DDC	DIRECT DIGITAL CONTROL
DEMO	DEMOLISH
DIV	DIVISION
EC	ELECTRICAL CONTRACTOR
EGC	EQUIPMENT GROUNDING CONDUCTOR
ELCU	EMERGENCY LIGHTING CONTROL UNIT
ELEC	ELECTRICAL
EMGB	ELECTRICAL MAIN GROUNDING BUSBAR
EF	EXHAUST FAN
EX	EXISTING TO REMAIN
EXT	EXTERIOR
EWC	ELECTRIC WATER COOLER
EMT	ELECTRICAL METALLIC TUBING
EQUIP	EQUIPMENT
FMC	FLEXIBLE METAL CONDUIT
FACP	FIRE ALARM SYSTEM CONTROL PANEL
FU	FUSE
FA, F/A	FIRE ALARM
FLA	FULL LOAD AMPS
FLR	FLOOR
FSS	FUSED SAFETY SWITCH
FVNR	FULL VOLTAGE NON-REVERSING
GFI	GROUND FAULT INTERRUPTER
G	GROUND (OR GFI FOR RECEPTACLE SUBSCRIPT)
GC	GENERAL CONTRACTOR
GND	GROUND
GEC	GROUNDING ELECTRODE CONDUCTOR
GTD	GENERATOR TRANSFER DEVICE
HH	HANDHOLE
HOA	HAND-OFF-AUTOMATIC
HP	HEAT PUMP OR HORSEPOWER
HVAC	HEATING, VENTILATION & AIR-CONDITIONING
IG	ISOLATED GROUND
IMC	INTERMEDIATE METAL CONDUIT
JB, JBOX	JUNCTION BOX
K	KILO
KAIC	KILO-AMPERE INTERRUPTING CAPABILITY
KCMIL	THOUSAND CIRCULAR MILS
LCP	LIGHTING CONTROL PANEL
LTG	LIGHTING
LFMC	LIQUID TIGHT FLEXIBLE METAL CONDUIT
LV	LOW VOLTAGE
MAX	MAXIMUM
MC	MECHANICAL CONTRCATOR
MCA	MINIMUM CIRCUIT AMPACITY
MCC	MOTOR CONTROL CENTER
MCE	MAIN COMMUNICATIONS EQUIPMENT ROOM
MCM	THOUSAND CIRCULAR MILS
MH	MANHOLE
MIN	MINIMUM
MISC	MISCELLANEOUS
MLO	MAIN LUGS ONLY
MNT	MOUNTING HEIGHT
MTG	MOUNTING
MTS	MANUAL TRANSFER SWITCH
MV	MEDIUM VOLTAGE
NAC	NOTIFICATION APPLIANCE CIRCUIT
N1	NEMA 1
N3R	NEMA 3R
N/A, NA	NOT APPLICABLE
NEC	NATIONAL ELECTRICAL CODE
NESC	NATIONAL ELECTRICAL SAFETY CODE
N, NEU	NEUTRAL
NFPA	NATIONAL FIRE PROTECTION ASSOCIATION
NTS	NOT TO SCALE
OC	ON CENTER
OCPD	OVERCURRENT PROTECTION DEVICE
OFOI	OWNER FURNISHED OWNER INSTALLED
OFCI	OWNER FURNISHED CONTRACTOR INSTALLED
OH	OVERHEAD
OHE	OVERHEAD ELECTRIC
OHP	OVERHEAD PRIMARY
OHS	OVERHEAD SECONDARY
P	POLE OR PHASE
PBD	PANELBOARD
PEM	POWER ENERGY MONITOR
PF	POWER FACTOR
PNL	PANELBOARD
PQM	POWER QUALITY METER
PT	POTENTIAL TRANSFORMER
PWR	POWER
RCPT	RECEPTACLE
REQD	REQUIRED
RM	ROOM
RGS	RIGID GALVANIZED STEEL CONDUIT
RNC	RIGID NON-METALLIC CONDUIT
RVSS	REDUCED VOLTAGE SOLID STATE
SA	SURGE ARRESTER
SCA	SHORT CIRCUIT AMPS
SCCA	SHORT CIRCUIT CURRENT RATING
SF	SUPPLY FAN
SLC	SIGNALING LINE CIRCUIT
SPD	SURGE PROTECTIVE DEVICE
SPEC	SPECIFICATION
SS	SAFETY SWITCH
SWBD	SWITCHBOARD
SWGR	SWITCHGEAR
TBB	TELECOMMUNICATIONS BONDING BACKBONE
TCC	TIME CURRENT CURVE
TR	TELECOMMUNICATIONS ROOM
TGB	TELECOMMUNICATIONS GROUNDING BUSBAR
TMGB	TELECOMMUNICATIONS MAIN GROUNDING BUSBAR
TVSS	TRANSIENT VOLTAGE SURGE SUPPRESSION
TX	TRANSFORMER
TYP	TYPICAL
UFR	UNDERFLOOR RACEWAY
UG	UNDERGROUND
UGE	UNDERGROUND ELECTRIC
UGP	UNDERGROUND PRIMARY
UGS	UNDERGROUND SECONDARY
UL	UNDERWRITERS' LABORATORIES
UNO	UNLESS NOTED OTHERWISE
UPS	UNINTERRUPTIBLE POWER SUPPLY
V	VOLT
VA	VOLT-AMPERES
VAR	VOLT-AMPERES REACTIVE
VAV	VARIABLE AIR VOLUME UNIT
VFD	VARIABLE FREQUENCY DRIVE
W	WATTS OR WIRE
WAO	WORK AREA OUTLET
WP	WEATHERPROOF
WSR	WITHSTAND RATING
XD	EXISTING TO BE DEMOLISHED
XFMR	TRANSFORMER
XP	EXPLOSION PROOF
XR	EXISTING TO BE RELOCATED
Φ	PHASE
72°	DEGREES
Δ	DELTA
Ω	OHMS

CODES AND STANDARDS

THIS PROJECT WAS DESIGNED IN ACCORDANCE WITH AND SHALL COMPLY WITH THE FOLLOWING CODES:

1. FLORIDA BUILDING CODE (FBC)
   - A. BUILDING - 2020 7TH EDITION
   - B. TEST PROTOCOLS FOR HIGH VELOCITY HURRICANE ZONES - 2020 7TH EDITION
2. NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)
   - A. NATIONAL ELECTRIC CODE (NFPA 70) - 2017
   - B. NATIONAL FIRE ALARM CODE (NFPA 72) - 2016
3. FLORIDA FIRE PREVENTION CODE - 2020 7TH EDITION
   - A. FIRE CODE (NFPA 1) - 2018 FLORIDA EDITION
   - B. LIFE SAFETY CODE (NFPA 101) - 2018 FLORIDA EDITION

ALL EQUIPMENT & SYSTEMS SHALL MEET THE REQUIREMENTS OF THE FOLLOWING STANDARDS:

1. AMERICAN NATIONAL STANDARD INSTITUTES (ANSI)
2. ILLUMINATING ENGINEERING SOCIETY (IES)
3. INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)
4. NATIONAL ELECTRICAL MANUFACTURER'S ASSOCIATIONS (NEMA)
5. NATIONAL ELECTRICAL CONTRACTOR'S ASSOCIATION (NECA)
6. NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)
7. OCCUPATIONAL SAFETY AND HEALTH ACT (OSHA)
8. UNDERWRITER'S LABORATORIES, INC. (UL)
9. OWNER'S CONSTRUCTION STANDARDS

Akin Brooks Engineering

Akin Brooks Engineering, Inc.
14260 W Newberry Rd #115
Newberry, FL 32669

FL License 35307
352.281.7104
akinbrooks.com

REVISIONS	
DATE	DESCRIPTION

NORTH FLORIDA PROFESSIONAL SERVICES, INC.

P.O. BOX 3823
LAKE CITY, FL 32056
PH. 386-752-4675
LIC NO. LB8356

2551 BLAIRSTONE PINES DR.
TALLAHASSEE, FL 32301
WWW.NFPS.NET
CA# 29011

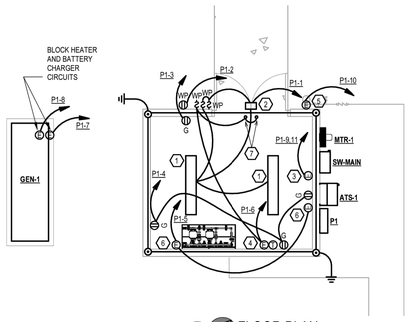
JOB NUMBER: L220110CCB
EOR: MARK R. AKIN
P.E. NO.: 59242

ELEC - LEGENDS, CODES & STANDARDS

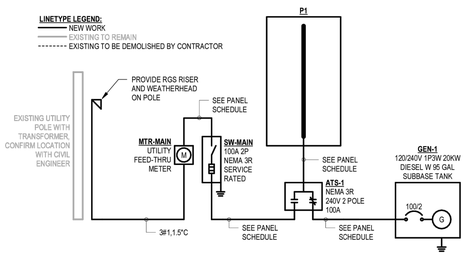
ELLISVILLE WATER MAIN EXTENSION
COLUMBIA COUNTY, FLORIDA

SHEET NO. 90

THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.



1 FLOOR PLAN
SCALE: 1/4" = 1'-0"



2 SINGLE LINE DIAGRAM
NOT TO SCALE

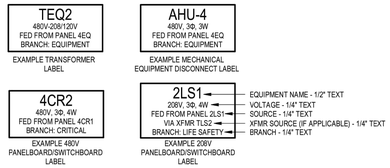
PANELBOARD SCHEDULE: P1

BASIS OF DESIGN: QO		**BUSS RATING:** 100				**FEEDER**			
SUPPLY FROM: ATS-1		**MCB:** MLO				**PHASES:** 2#1			
MOUNTING: SURFACE		**IF MLO, UPSTREAM OCPD:** 100				**NEUTRAL:** #1			
ENCLOSURE: NEMA 3R		**NEUTRAL RATING:** 100%				**GROUND:** #8			
VOLTS: 120/240		**PQM:** NO				**CONDUIT:** 1.5"			
PHASES: 1		**SPD:** YES				**# OF RUNS:** 1			
WIRES: 3		**# OF VERTICAL SECTIONS:** 1				**TOTAL AMPACITY:** 110A			
KAIC: 22		**SERVICE RATED:** NO							
NOTES:									

CKT	LOAD	BREAKER P	BREAKER TRIP	PHASE (kVA) A	PHASE (kVA) B	PHASE (kVA) A	PHASE (kVA) B	BREAKER TRIP	BREAKER P	LOAD	CKT
1	LIGHTING	1	20	0.2		0.2		20	1	EXTERIOR RECEPTACLE	2
3	INTERIOR RECEPTACLE	1	20		0.2		0.7	20	1	INTERIOR RECEPTACLES	4
5	PUMP PKG	1	20	1.0		0.2		20	1	EXHAUST FAN	6
7	GENERATOR BLOCK HEATER	1	20		1.0		0.2	20	1	GENERATOR BATTERY CHARGER	8
9	UNIT HEATER	2	35	3.3		0.2		20	1	EYEWASH	10
11	CKT SHALL BE 2#8,#10G,3/4"C				3.3			20	1	SPARE	12
13	SPARE	1	20					20	1	SPARE	14
15	SPARE	1	20					20	1	SPARE	16
17	SPACE									SPACE	18
19	SPACE									SPACE	20
21	SPACE									SPACE	22
23	SPACE									SPACE	24
	TOTAL PHASE LOAD (kVA):			5.1	5.4	**HIGH PHASE (AMPS):** 45.0					
	TOTAL CONNECTED LOAD (kVA):			10.5		**TOTAL LOAD (AMPS):** 43.8					

KEY NOTES

1. INTERIOR LIGHT FIXTURE, SIGNIFY DAYBRITE #LBX-70L-840-UNV-FD. TYP OF 2. PROVIDE ONE OF THESE FUIXTURES WITH INTEGRAL EMERGENCY BATTERY PACK.
2. EXTERIOR WALL MOUNTED LIGHT FIXTURE, SIGNIFY GARDCO #1111L-16L-550-NW-G2-3-VOLT-BRONZE.
3. WALL MOUNTED SPACE HEATER. SEE SCHEDULE.
4. THRU WALL EXHAUST FAN. SEE SCHEDULE. PROVIDE LINE VOLTAGE THERMOSTATE ADJACENT TO FAN.
5. EYEWASH STATION. PROVIDE FLOW SWITCH & HORN STROBE, SEE DIAGRAM.
6. PUMPS AND CONTROLS. PROVIDE PUMPS AND CONTROLS, SEE DIAGRAMS.
7. PROVIDE LINE VOLTAGE DOOR SWITCHES WIRED IN PARALLEL WITH WALL SWITCH SUCH THAT IF THE SWITCH IS ON, THERMOSTAT CALLS FOR COOLING OR EITHER DOOR IS OPENED THE EF WILL RUN.

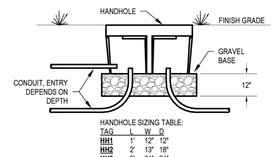


NOTES:
1. ENGRAVED 1/16" THICK PLASTIC TAG.
2. TAG SHALL HAVE ALL EDGES BEVELED AND SMOOTH.
3. SECURE TAG WITH A MINIMUM OF 2 CHROME (STAINLESS STEEL FOR WET OR DAMP LOCATIONS) SCREWS. ADHESIVE BACKING, TAPE, ETC IS NOT ALLOWED.
4. DIMENSIONS SHALL BE AS REQUIRED TO FIT APPROPRIATE TEXT. COLORS AS FOLLOWS:

COLORS AS FOLLOWS:

BRANCH	LETTERS	BACKGROUND
NORMAL	BLACK	WHITE

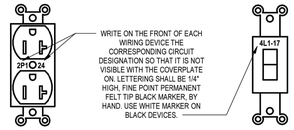
4 TYPICAL EQUIPMENT LABELING DETAIL
NOT TO SCALE



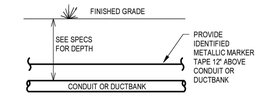
HANDHOLE SIZING TABLE:

TAG	L	W	D
HH1	1'	12"	12"
HH2	2'	13"	18"
HH3	3'	24"	24"
HH4	4'	30"	24"
HH5	5'	36"	36"
HH6	6'	48"	36"

5 HANDHOLE DETAIL
NOT TO SCALE



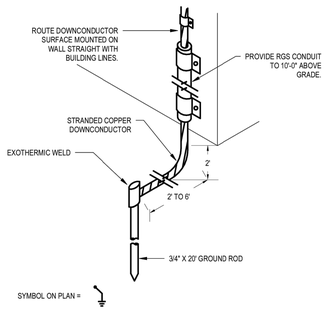
6 WIRING DEVICE LABEL DETAIL
NOT TO SCALE



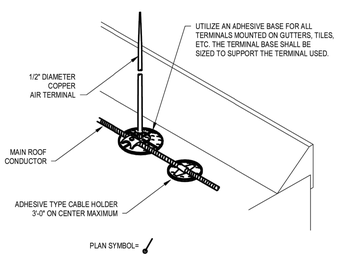
3 BURIED CONDUIT MARKER DETAIL
NOT TO SCALE

GENERAL LIGHTNING PROTECTION NOTE

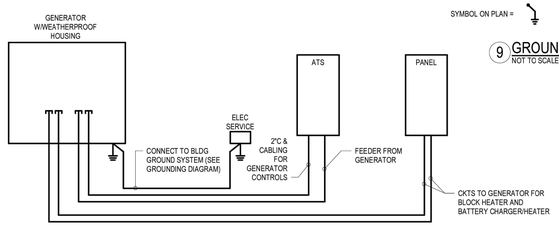
CONTRACTOR SHALL PROVIDE A CLASS 1 LIGHTING PROTECTION SYSTEM IN COMPLIANCE WITH NFPA 780. SYSTEM SHALL BE PROVIDED WITH A MASTER LABEL ATTACHED TO THE BUILDING AND SHALL BE IN COMPLIANCE WITH UNDERWRITERS LABORATORIES, INC. MASTER LABEL SERVICE, ULMIA. SEE SPECIFICATIONS FOR A COMPLETE DESCRIPTION. COORDINATE LAYOUT WITH ARCHITECTURAL PLANS. PROVIDE REQUIRED CONNECTIONS TO ROOF MOUNTED EQUIPMENT SUCH AS EXHAUST FANS, VENT-THRU-ROOF PIPES, ETC NOT SHOWN HERE, SEE MECHANICAL & PLUMBING PLANS.



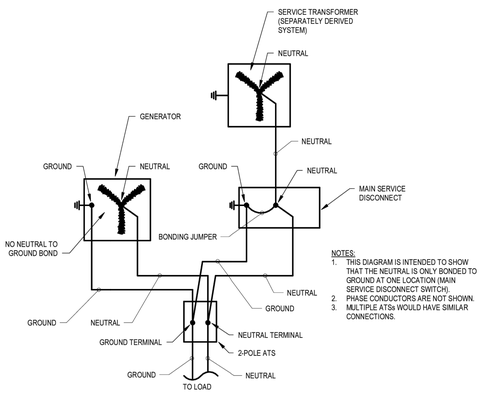
9 GROUNDING ARRANGEMENT
NOT TO SCALE



7 ADHESIVE AIR TERMINAL BASE DETAIL
NOT TO SCALE



8 GENERATOR DIAGRAM
NOT TO SCALE



NOTES:
1. THIS DIAGRAM IS INTENDED TO SHOW THAT THE NEUTRAL IS ONLY BONDED TO GROUND AT ONE LOCATION (MAIN SERVICE DISCONNECT SWITCH).
2. PHASE CONDUCTORS ARE NOT SHOWN.
3. MULTIPLE ATSs WOULD HAVE SIMILAR CONNECTIONS.

10 GENERATION SYSTEM GROUNDING DIAGRAM - 2-POLE ATS
NOT TO SCALE

Akin Brooks Engineering

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Newberry, FL 32669

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REVISIONS	
DATE	DESCRIPTION

NORTH FLORIDA PROFESSIONAL SERVICES, INC.
P.O. BOX 3823
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PH. 386-752-4675
LIC NO. LB8356

2551 BLAIRSTONE PINES DR.
TALLAHASSEE, FL 32301
WWW.NFPS.NET
CA# 29011

ELEC FLOOR PLANS, DIAGRAMS & DETAILS

ELLISVILLE WATER MAIN EXTENSION

JOB NUMBER: L220110CCB
EOR: MARK E. AKIN
P.E. NO.: 54674

SHEET NO. 91

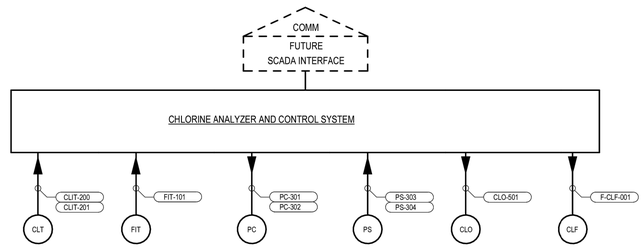
COLUMBIA COUNTY, FLORID

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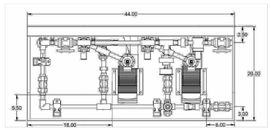
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LEGEND

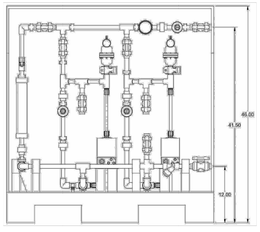
DI	DIGITAL INPUT
DO	DIGITALOUTPUT
AI	ANALOG INPUT
AO	ANALOG OUTPUT
COM-#	BAS COMMUNICATION LINK, # INDICATES AS FOLLOWS: B (BACBET) M (MODBUS)
CL	CHLORINE SAMPLE PORT
FM	FLOW METER
INT	INTRUSION ALARM
H/S	HORN STROBE (OUTDOOR RATED) SIMILAR TO EDWARDS SIGNALING MODEL 868STRR-N5
FIT XXX	FLOW METER
PS XXX	PUMP STATUS
PC XXX	PUMP CONTROL
CLT XXX	FREE CHLORINE TRANSMITTER
F-GEN XXX	GENERAL FAULT GENERATOR
S-ATS XXX	AUTOMATIC TRANSFER SWITCH STATUS: TRANSFER TO EMERGENCY POWER SOURCE
C-HL XXX	CHLORINE STORAGE HIGH LIMIT
C-LL XXX	CHLORINE STORAGE LOW LIMIT
CLF XXX	CHLORINE FAULT
	FILTER BANK
P	FAN
P	PUMP
	CHECK VALVE
	TWO WAY CONTROL VALVE
ATS	AUTOMATIC TRANSFER SWITCH
G	GENERATOR



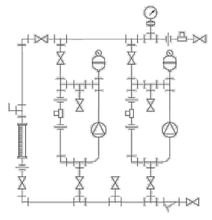
1 CONTROL BLOCK DIAGRAM
NOT TO SCALE



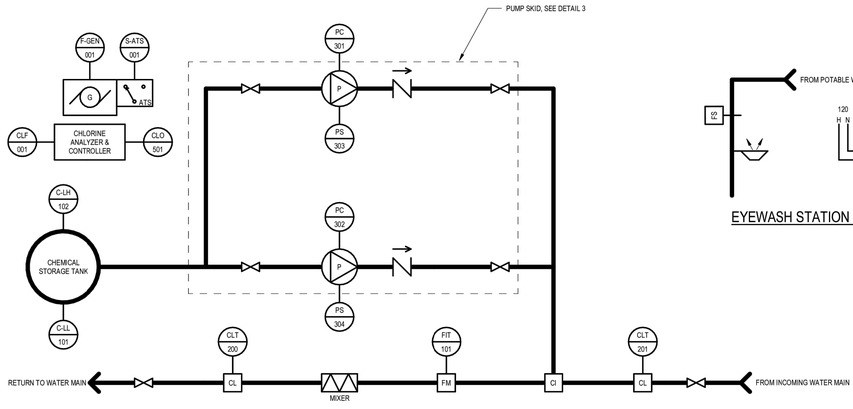
PLAN VIEW



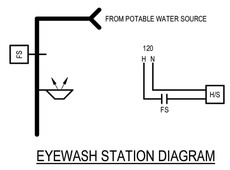
FRONT VIEW



PIPING DIAGRAM



2 CHLORINE ANALYZER AND CONTROL SYSTEM DIAGRAM
NOT TO SCALE



EYEWASH STATION DIAGRAM

GENERAL NOTES:

1. ALL PIPING AND FITTINGS SHALL BE 1/2" SCH. 80 CPVC SOCKET WELD WITH VITON SEALS UNLESS OTHERWISE REQUIRED BY COMPONENTS.
2. ALL VALVES TO BE VENTED.
3. ALL DIMENSIONS ARE IN INCHES AND ARE SHOWN FOR REFERENCE ONLY.

3 PUMP SKID AND PIPING DIAGRAM
NOT TO SCALE

EXHAUST FAN SCHEDULE	
MARK	EF-1
MANUFACTURER	GREENHECK
MODEL	AER-20
TYPE	SIDEWALL DIRECT
DRIVE	STARTER
AIRFLOW (CFM)	250
TSP (IN WG)	0.27
COATING TYPE	INDUSTRIAL GREY EPOXY
MOTOR SECTION	
VOLTS-PHASE	115/1
BHP/HP	1/4
DRIVE TYPE	DIRECT
MOTOR SPEED (RPM)	860
SCHEDULE NOTES	(1)(2)(3)

SCHEDULE NOTES
(1) PROVIDE BACKDRAFT DAMPER
(2) PROVIDE THERMAL OVERLOAD
(3) PROVIDE WALL HOUSING AND INLET GUARD

UNIT HEATER	
MARK	UH-1
MANUFACTURER	BRASCH
MODEL	240 SERIES
TYPE	ELECTRIC WALL MOUNT
DRIVE	STARTER
AIRFLOW (CFM)	650
KW RATING	6.7
COATING COLOR	CAMEL
MOTOR SECTION	
VOLTS-PHASE	240/1
BHP/HP	1/4
DRIVE TYPE	DIRECT
MOTOR SPEED (RPM)	1750
SCHEDULE NOTES	(1)(2)(3)(4)(5)

SCHEDULE NOTES
(1) 2-STAGE CONTROL
(2) BUILT IN THERMOSTAT
(3) 24VAC TRANSFORMER AND DISCONNECTING MAGNETIC CONTACTOR
(4) CABINET - HEAVEL GAUGE STEEL WITH BAKED ON POLYESTER POWDER COAT
(5) DIRECTIONAL LOUVERS

Akin Brooks Engineering, Inc.
14260 W Newberry Rd #115
Newberry, FL 32669
FL License 35307
352.281.7104
akinbrooks.com

REVISIONS	
DATE	DESCRIPTION

NORTH FLORIDA PROFESSIONAL SERVICES, INC.
P.O. BOX 3823
LAKE CITY, FL 32056
PH. 386-752-4675
LIC NO. LB8356
2551 BLAIRSTONE PINES DR.
TALLAHASSEE, FL 32301
WWW.NFPS.NET
CA# 29011

JOB NUMBER: L220110CCB
EOR: DAVID L. BROOKS
P.E. NO.: 56766

INST - LEGENDS & DIAGRAMS

ELLISVILLE WATER MAIN EXTENSION
COLUMBIA COUNTY, FLORIDA

SHEET NO. 92

THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.

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Non-Collusion Affidavit

STATE OF _____

COUNTY OF _____

I state that I _____ of _____,
(Name and Title) (Name of Firm)
am authorized to make this affidavit on behalf of my firm and its owner, directors and officers. I am the person responsible in my firm for the price(s) and amount(s) of this Response, and the preparation of the Response. I state that:

1. The price(s) and amount(s) of this Response have been arrived at independently and without consultation, communication or agreement with any other Provider, potential provider, Proposal, or potential Proposal.

2. Neither the price(s) nor the amount(s) of this Response, and neither the approximate price(s) nor approximate amount(s) of this Response, have been disclosed to any other firm or person who is a Provider, potential Provider, Proposal, or potential Proposal, and they will not be disclosed before Proposal opening.

3. No attempt has been made or will be made to induce any firm or persons to refrain from submitting a Response for this contract, or to submit a price(s) higher that the prices in this Response, or to submit any intentionally high or noncompetitive price(s) or other form of complementary Response.

4. The Response of my firm is made in good faith and not pursuant to any agreement or discussion with, or inducement from, any firm or person to submit a complementary or other noncompetitive Response.

5. _____, its affiliates, subsidiaries, officers, director, and employees
(Name of Firm)
are not currently under investigation, by any governmental agency and have not in the last three years been convicted or found liable for any act prohibited by State or Federal law in any jurisdiction, involving conspiracy or collusion with respect to Proposal, on any public contract, except as follows:

I state that I and the named firm understand and acknowledge that the above representations are material and important, and will be relied on by the Board of County Commissioners of Columbia County, Florida for which this Response is submitted. I understand and my firm understands that any misstatement in this affidavit is, and shall be treated as, fraudulent concealment from the State of Florida of the true facts relating to the submission of responses for this contract.

Dated this _____ day of _____, _____.

Name of Organization: _____

Signed by: _____

Print Name: _____

Being duly sworn deposes and says that the information herein is true and sufficiently complete so as not to be misleading.

The foregoing instrument was executed before me this day _____ of _____ 20____, by _____ as _____ of _____, who personally swore or affirmed that he/she is authorized to execute this document and thereby bind the Corporation, and who is personally known to me OR has produced _____ as identification.

_____

(stamp) NOTARY PUBLIC, State of _____

Public Entity Crimes Statement

SWORN STATEMENT UNDER SECTION 287.133(3) (a), FLORIDA STATUTES: THIS FORM MUST BE SIGNED IN THE PRESENCE OF A NOTARY PUBLIC OR OTHER OFFICER AUTHORIZED TO ADMINISTER OATHS.

1. This sworn statement is submitted with Proposal, ITN, or Contract Number

2. This sworn statement is submitted by _____
[Name of entity submitting sworn statement]
whose business address is _____ and (if applicable) its Federal Employer Identification Number (FEIN) is _____
(If the entity has no FEIN, include the Social Security Number of the individual signing this sworn statement: _____.

3. My name is _____ and my relationship to the above is
[Please print name of individual signing]
_____.

4. I understand that a "public entity crime" as defined in section 287.133(l)(g), Florida Statutes, means a violation of any state or federal law by a person with respect to and directly related to the transaction of business with any public entity in Florida or with an agency or political subdivision of any other state or with the United States, including, but not limited to, any proposal or contract for goods or services to be provided to any public entity or an agency or political subdivision and involving antitrust, fraud, theft, bribery, collusion, racketeering, conspiracy, or material misrepresentation.

5. I understand that "convicted" or "conviction" as defined in section 287.133(l) (b), Florida Statutes, means a finding of guilt or a conviction of a public entity crime, with or without an adjudication of guilt, in any federal or state trial court of record relating to charges brought by indictment or information after July 1, 1989, as a result of a jury verdict, non-jury trial, or entry of a plea of guilty or nolo contenders.

6. I understand that "affiliate" as defined in section 287.133(l) (a), Florida Statutes, means:

   a. A predecessor or successor of a person convicted of a public entity crime; or

   b. An entity under the control of any natural person who is active in the management of the entity and who has been convicted of a public entity crime. The term "affiliate" includes those officers, directors, executives, partners, shareholders, employees, members, and agents who are active in the management of an affiliate. The ownership by one person of shares constituting a controlling interest in another person, or a pooling of equipment or income among persons when not for fair market value under an arm's length agreement, shall be a prima facie case that one person controls another person. A person who knowingly enters into a joint venture with a person who has been convicted of a public entity crime in Florida during the preceding thirty-six (36) months shall be considered an affiliate.

7. I understand that a "person" as defined in section 287.133(l) (e), Florida Statutes, means any natural person or entity organized under the laws of any state or of the United States with the legal power to enter into a binding contract and which bids/proposals or applies to bids/proposals on contracts for the provision of goods or services let by a public entity, or which otherwise transacts or applies to transact business with a public entity. The term "person" includes those officers, directors, executives, partners, shareholders, employees, members, and agents who are active in management of an entity.

8. Based on information and belief, the statement, which I have marked below, is true in relation to the entity submitting this sworn statement. **[Please indicate which statement applies].**

_____ Neither the entity submitting this sworn statement, nor any officers, directors, executives, partners, shareholders, employees, members, or agents who is active in the management of the entity, nor any affiliate of the entity have been convicted of a public entity crime subsequent to July 1, 1989.

_____ The entity submitting this sworn statement, or one or more of the officers, directors, executives, partners, shareholders, employees, members, or agents who are active in the management of the entity, or an affiliate of the entity has been charged with and convicted of a public entity crime subsequent to July 1, 1989, AND **[Please indicate which additional statement applies].**

_____ There has been a proceeding concerning the conviction before a judge or hearing officer of the State of Florida, Division of Administrative Hearings, or a court of law having proper jurisdiction. The final order entered by the hearing officer or judge did not place the person or affiliate on the convicted Contractor list. **[Please attach a copy of the final order.]**

_____ The person or affiliate was placed on the convicted Contractor list. There has been a subsequent proceeding before a court of law having proper jurisdiction or a judge or hearing officer of the State of Florida, Division of Administrative Hearings. The final order entered by the judge or hearing officer determined that is was in the public interest to remove the person or affiliate from the convicted Contractor list. **[Please attach a copy of the final order.]**

_____ The person or affiliate has not been placed on any convicted vendor list. [Please describe any action taken by or pending with the State of Florida, Department of Management Services.]

By the signature(s) below, I/we, the undersigned, as authorized signatory to commit the firm, certify that the information as provided in Attachment "C", Public Entity Crimes, is truthful and

correct at the time of submission.

_____
AFFIANT

_____
Typed Name of AFFIANT

_____
Title

STATE OF _____

County OF _____

The foregoing instrument was executed before me this day _____ of _____ 20____, by _____ as _____ of _____, who personally swore or affirmed that he/she is authorized to execute this document and thereby bind the Corporation, and who is personally known to me OR has produced _____ as identification.

(stamp) NOTARY PUBLIC, State of _____

Drug-Free Workplace Certification

The drug-free certification form below must be signed and returned with the solicitation response.

In order to have a drug-free workplace program, a business shall:

1. Publish a statement notifying employees that the unlawful manufacture, distribution, dispensing, possession, or use of a controlled substance is prohibited in the workplace and specifying the actions that will be taken against employees for violations of such prohibition.

2. Inform employees about the dangers of drug abuse in the workplace, the business' policy of maintaining a drug-free workplace, any available drug counseling, rehabilitation, and employee assistance programs, and the penalties that may be imposed upon employees for drug abuse violations.

3. Give each employee engaged in providing the commodities or contractual services that are under bid/proposal a copy of the statement specified in the first paragraph.

4. In the statement specified in the first paragraph, notify the employees that, as a condition of working on the commodities or contractual services that are under bid/proposal, the employee will abide by the terms of the statement and will notify the employer of any conviction of, or plea of guilty or nolo contendere to, any violation of chapter 893, Florida Statutes, or of any controlled substance law of the United States or any state, for a violation occurring in the workplace no later than five (5) Days after such conviction.

5. Impose a sanction on, or require the satisfactory participation in, a drug abuse assistance or rehabilitation program if such is available in the employee's community, by any employee who is so convicted.

6. Make a good faith effort to continue to maintain a drug-free workplace through implementation of the foregoing provisions.

By the signature(s) below, I/we, the undersigned, as authorized signatory to commit the firm, certify that the information as provided in this Drug-Free Workplace Certification, is truthful and correct at the time of submission.

_____
AFFIANT

_____
Typed Name of AFFIANT

_____
Title

STATE OF _____

County OF _____
The foregoing instrument was executed before me this day _____ of _____ 20____, by _____ as _____ of _____, who personally swore or affirmed that he/she is authorized to execute this document and thereby bind the Corporation, and who is personally known to me OR has produced _____ as identification.

(stamp) NOTARY PUBLIC, State of _____

Conflict of Interest Statement

STATE OF _____

County OF _____

Before me, the undersigned authority, personally appeared _____, who was duly sworn, deposes, and states:

I am the_____ of _____with a local office
(Insert Title) (Insert Company Name)
in_____ and principal office in _____. Said entity is submitting this proposal/offer to

1. The AFFIANT has made diligent inquiry and provided the information in this statement affidavit based upon its full knowledge.

2. The AFFIANT states that only one submittal for this solicitation has been submitted and tendered by the appropriate date and time and that said above stated entity has no financial interest in other entities submitting a proposal for the work contemplated hereby.

3. Neither the AFFIANT nor the above named entity has directly or indirectly entered into any agreement, participated in any collusion or collusive activity, or otherwise taken any action which in any way restricts or restraints the competitive nature of this solicitation, including but not limited to the prior discussion of terms, conditions, pricing, or other offer parameters required by this solicitation.

4. Neither the entity nor its affiliates, nor anyone associated with them, is presently suspended or otherwise prohibited from participation in this solicitation or any contract to follow thereafter by any government entity.

5. Neither the entity nor its affiliates, nor anyone associated with them, have any potential conflict of interest because and due to any other clients, contracts, or property interests in this solicitation or the resulting project.

6. I hereby also certify that no member of the entity's ownership or management or staff has a vested interest in any County Office or Department.

7. I certify that no member of the entity's ownership or management is presently applying, actively seeking, or has been selected for an elected position within Columbia County government.

8. In the event that a conflict of interest is identified in the provision of services, I, the undersigned will immediately notify the County in writing.

_____

AFFIANT

_____

Typed Name of AFFIANT

_____

Title

STATE OF _____

County OF _____

The foregoing instrument was executed before me this day _____ of _____ 20____, by _____ as _____ of _____, who personally swore or affirmed that he/she is authorized to execute this document and thereby bind the Corporation, and who is personally known to me OR has produced _____ as identification.

(stamp)

NOTARY PUBLIC, State of _____

Form **W-9**
(Rev. October 2018)
Department of the Treasury
Internal Revenue Service

Request for Taxpayer Identification Number and Certification

▶ Go to *www.irs.gov/FormW9* for instructions and the latest information.

Give Form to the requester. Do not send to the IRS.

Print or type. See Specific Instructions on page 3.

1 Name (as shown on your income tax return). Name is required on this line; do not leave this line blank.

2 Business name/disregarded entity name, if different from above

3 Check appropriate box for federal tax classification of the person whose name is entered on line 1. Check only one of the following seven boxes.

☐ Individual/sole proprietor or single-member LLC ☐ C Corporation ☐ S Corporation ☐ Partnership ☐ Trust/estate

☐ Limited liability company. Enter the tax classification (C=C corporation, S=S corporation, P=Partnership) ▶ _____

Note: Check the appropriate box in the line above for the tax classification of the single-member owner. Do not check LLC if the LLC is classified as a single-member LLC that is disregarded from the owner unless the owner of the LLC is another LLC that is not disregarded from the owner for U.S. federal tax purposes. Otherwise, a single-member LLC that is disregarded from the owner should check the appropriate box for the tax classification of its owner.

☐ Other (see instructions) ▶

4 Exemptions (codes apply only to certain entities, not individuals; see instructions on page 3):

Exempt payee code (if any) _____

Exemption from FATCA reporting code (if any) _____

(Applies to accounts maintained outside the U.S.)

5 Address (number, street, and apt. or suite no.) See instructions.

Requester's name and address (optional)

6 City, state, and ZIP code

7 List account number(s) here (optional)

Part I Taxpayer Identification Number (TIN)

Enter your TIN in the appropriate box. The TIN provided must match the name given on line 1 to avoid backup withholding. For individuals, this is generally your social security number (SSN). However, for a resident alien, sole proprietor, or disregarded entity, see the instructions for Part I, later. For other entities, it is your employer identification number (EIN). If you do not have a number, see *How to get a TIN*, later.

Note: If the account is in more than one name, see the instructions for line 1. Also see *What Name and Number To Give the Requester* for guidelines on whose number to enter.

Social security number

			–			–				

or

Employer identification number

		–							

Part II Certification

Under penalties of perjury, I certify that:

1. The number shown on this form is my correct taxpayer identification number (or I am waiting for a number to be issued to me); and
2. I am not subject to backup withholding because: (a) I am exempt from backup withholding, or (b) I have not been notified by the Internal Revenue Service (IRS) that I am subject to backup withholding as a result of a failure to report all interest or dividends, or (c) the IRS has notified me that I am no longer subject to backup withholding; and
3. I am a U.S. citizen or other U.S. person (defined below); and
4. The FATCA code(s) entered on this form (if any) indicating that I am exempt from FATCA reporting is correct.

Certification instructions. You must cross out item 2 above if you have been notified by the IRS that you are currently subject to backup withholding because you have failed to report all interest and dividends on your tax return. For real estate transactions, item 2 does not apply. For mortgage interest paid, acquisition or abandonment of secured property, cancellation of debt, contributions to an individual retirement arrangement (IRA), and generally, payments other than interest and dividends, you are not required to sign the certification, but you must provide your correct TIN. See the instructions for Part II, later.

Sign Here Signature of U.S. person ▶ Date ▶

General Instructions

Section references are to the Internal Revenue Code unless otherwise noted.

Future developments. For the latest information about developments related to Form W-9 and its instructions, such as legislation enacted after they were published, go to *www.irs.gov/FormW9*.

Purpose of Form

An individual or entity (Form W-9 requester) who is required to file an information return with the IRS must obtain your correct taxpayer identification number (TIN) which may be your social security number (SSN), individual taxpayer identification number (ITIN), adoption taxpayer identification number (ATIN), or employer identification number (EIN), to report on an information return the amount paid to you, or other amount reportable on an information return. Examples of information returns include, but are not limited to, the following.

- Form 1099-INT (interest earned or paid)
- Form 1099-DIV (dividends, including those from stocks or mutual funds)
- Form 1099-MISC (various types of income, prizes, awards, or gross proceeds)
- Form 1099-B (stock or mutual fund sales and certain other transactions by brokers)
- Form 1099-S (proceeds from real estate transactions)
- Form 1099-K (merchant card and third party network transactions)
- Form 1098 (home mortgage interest), 1098-E (student loan interest), 1098-T (tuition)
- Form 1099-C (canceled debt)
- Form 1099-A (acquisition or abandonment of secured property)

Use Form W-9 only if you are a U.S. person (including a resident alien), to provide your correct TIN.

If you do not return Form W-9 to the requester with a TIN, you might be subject to backup withholding. See What is backup withholding, *later.*

By signing the filled-out form, you:

1. Certify that the TIN you are giving is correct (or you are waiting for a number to be issued),

2. Certify that you are not subject to backup withholding, or

3. Claim exemption from backup withholding if you are a U.S. exempt payee. If applicable, you are also certifying that as a U.S. person, your allocable share of any partnership income from a U.S. trade or business is not subject to the withholding tax on foreign partners' share of effectively connected income, and

4. Certify that FATCA code(s) entered on this form (if any) indicating that you are exempt from the FATCA reporting, is correct. See *What is FATCA reporting,* later, for further information.

Note: If you are a U.S. person and a requester gives you a form other than Form W-9 to request your TIN, you must use the requester's form if it is substantially similar to this Form W-9.

Definition of a U.S. person. For federal tax purposes, you are considered a U.S. person if you are:

- An individual who is a U.S. citizen or U.S. resident alien;
- A partnership, corporation, company, or association created or organized in the United States or under the laws of the United States;
- An estate (other than a foreign estate); or
- A domestic trust (as defined in Regulations section 301.7701-7).

Special rules for partnerships. Partnerships that conduct a trade or business in the United States are generally required to pay a withholding tax under section 1446 on any foreign partners' share of effectively connected taxable income from such business. Further, in certain cases where a Form W-9 has not been received, the rules under section 1446 require a partnership to presume that a partner is a foreign person, and pay the section 1446 withholding tax. Therefore, if you are a U.S. person that is a partner in a partnership conducting a trade or business in the United States, provide Form W-9 to the partnership to establish your U.S. status and avoid section 1446 withholding on your share of partnership income.

In the cases below, the following person must give Form W-9 to the partnership for purposes of establishing its U.S. status and avoiding withholding on its allocable share of net income from the partnership conducting a trade or business in the United States.

- In the case of a disregarded entity with a U.S. owner, the U.S. owner of the disregarded entity and not the entity;
- In the case of a grantor trust with a U.S. grantor or other U.S. owner, generally, the U.S. grantor or other U.S. owner of the grantor trust and not the trust; and
- In the case of a U.S. trust (other than a grantor trust), the U.S. trust (other than a grantor trust) and not the beneficiaries of the trust.

Foreign person. If you are a foreign person or the U.S. branch of a foreign bank that has elected to be treated as a U.S. person, do not use Form W-9. Instead, use the appropriate Form W-8 or Form 8233 (see Pub. 515, Withholding of Tax on Nonresident Aliens and Foreign Entities).

Nonresident alien who becomes a resident alien. Generally, only a nonresident alien individual may use the terms of a tax treaty to reduce or eliminate U.S. tax on certain types of income. However, most tax treaties contain a provision known as a "saving clause." Exceptions specified in the saving clause may permit an exemption from tax to continue for certain types of income even after the payee has otherwise become a U.S. resident alien for tax purposes.

If you are a U.S. resident alien who is relying on an exception contained in the saving clause of a tax treaty to claim an exemption from U.S. tax on certain types of income, you must attach a statement to Form W-9 that specifies the following five items.

1. The treaty country. Generally, this must be the same treaty under which you claimed exemption from tax as a nonresident alien.

2. The treaty article addressing the income.

3. The article number (or location) in the tax treaty that contains the saving clause and its exceptions.

4. The type and amount of income that qualifies for the exemption from tax.

5. Sufficient facts to justify the exemption from tax under the terms of the treaty article.

Example. Article 20 of the U.S.-China income tax treaty allows an exemption from tax for scholarship income received by a Chinese student temporarily present in the United States. Under U.S. law, this student will become a resident alien for tax purposes if his or her stay in the United States exceeds 5 calendar years. However, paragraph 2 of the first Protocol to the U.S.-China treaty (dated April 30, 1984) allows the provisions of Article 20 to continue to apply even after the Chinese student becomes a resident alien of the United States. A Chinese student who qualifies for this exception (under paragraph 2 of the first protocol) and is relying on this exception to claim an exemption from tax on his or her scholarship or fellowship income would attach to Form W-9 a statement that includes the information described above to support that exemption.

If you are a nonresident alien or a foreign entity, give the requester the appropriate completed Form W-8 or Form 8233.

Backup Withholding

What is backup withholding? Persons making certain payments to you must under certain conditions withhold and pay to the IRS 24% of such payments. This is called "backup withholding." Payments that may be subject to backup withholding include interest, tax-exempt interest, dividends, broker and barter exchange transactions, rents, royalties, nonemployee pay, payments made in settlement of payment card and third party network transactions, and certain payments from fishing boat operators. Real estate transactions are not subject to backup withholding.

You will not be subject to backup withholding on payments you receive if you give the requester your correct TIN, make the proper certifications, and report all your taxable interest and dividends on your tax return.

Payments you receive will be subject to backup withholding if:

1. You do not furnish your TIN to the requester,

2. You do not certify your TIN when required (see the instructions for Part II for details),

3. The IRS tells the requester that you furnished an incorrect TIN,

4. The IRS tells you that you are subject to backup withholding because you did not report all your interest and dividends on your tax return (for reportable interest and dividends only), or

5. You do not certify to the requester that you are not subject to backup withholding under 4 above (for reportable interest and dividend accounts opened after 1983 only).

Certain payees and payments are exempt from backup withholding. See *Exempt payee code,* later, and the separate Instructions for the Requester of Form W-9 for more information.

Also see *Special rules for partnerships,* earlier.

What is FATCA Reporting?

The Foreign Account Tax Compliance Act (FATCA) requires a participating foreign financial institution to report all United States account holders that are specified United States persons. Certain payees are exempt from FATCA reporting. See *Exemption from FATCA reporting code,* later, and the Instructions for the Requester of Form W-9 for more information.

Updating Your Information

You must provide updated information to any person to whom you claimed to be an exempt payee if you are no longer an exempt payee and anticipate receiving reportable payments in the future from this person. For example, you may need to provide updated information if you are a C corporation that elects to be an S corporation, or if you no longer are tax exempt. In addition, you must furnish a new Form W-9 if the name or TIN changes for the account; for example, if the grantor of a grantor trust dies.

Penalties

Failure to furnish TIN. If you fail to furnish your correct TIN to a requester, you are subject to a penalty of $50 for each such failure unless your failure is due to reasonable cause and not to willful neglect.

Civil penalty for false information with respect to withholding. If you make a false statement with no reasonable basis that results in no backup withholding, you are subject to a $500 penalty.

Criminal penalty for falsifying information. Willfully falsifying certifications or affirmations may subject you to criminal penalties including fines and/or imprisonment.

Misuse of TINs. If the requester discloses or uses TINs in violation of federal law, the requester may be subject to civil and criminal penalties.

Specific Instructions

Line 1

You must enter one of the following on this line; **do not** leave this line blank. The name should match the name on your tax return.

If this Form W-9 is for a joint account (other than an account maintained by a foreign financial institution (FFI)), list first, and then circle, the name of the person or entity whose number you entered in Part I of Form W-9. If you are providing Form W-9 to an FFI to document a joint account, each holder of the account that is a U.S. person must provide a Form W-9.

a. **Individual.** Generally, enter the name shown on your tax return. If you have changed your last name without informing the Social Security Administration (SSA) of the name change, enter your first name, the last name as shown on your social security card, and your new last name.

Note: ITIN applicant: Enter your individual name as it was entered on your Form W-7 application, line 1a. This should also be the same as the name you entered on the Form 1040/1040A/1040EZ you filed with your application.

b. **Sole proprietor or single-member LLC.** Enter your individual name as shown on your 1040/1040A/1040EZ on line 1. You may enter your business, trade, or "doing business as" (DBA) name on line 2.

c. **Partnership, LLC that is not a single-member LLC, C corporation, or S corporation.** Enter the entity's name as shown on the entity's tax return on line 1 and any business, trade, or DBA name on line 2.

d. **Other entities.** Enter your name as shown on required U.S. federal tax documents on line 1. This name should match the name shown on the charter or other legal document creating the entity. You may enter any business, trade, or DBA name on line 2.

e. **Disregarded entity.** For U.S. federal tax purposes, an entity that is disregarded as an entity separate from its owner is treated as a "disregarded entity." See Regulations section 301.7701-2(c)(2)(iii). Enter the owner's name on line 1. The name of the entity entered on line 1 should never be a disregarded entity. The name on line 1 should be the name shown on the income tax return on which the income should be reported. For example, if a foreign LLC that is treated as a disregarded entity for U.S. federal tax purposes has a single owner that is a U.S. person, the U.S. owner's name is required to be provided on line 1. If the direct owner of the entity is also a disregarded entity, enter the first owner that is not disregarded for federal tax purposes. Enter the disregarded entity's name on line 2, "Business name/disregarded entity name." If the owner of the disregarded entity is a foreign person, the owner must complete an appropriate Form W-8 instead of a Form W-9. This is the case even if the foreign person has a U.S. TIN.

Line 2

If you have a business name, trade name, DBA name, or disregarded entity name, you may enter it on line 2.

Line 3

Check the appropriate box on line 3 for the U.S. federal tax classification of the person whose name is entered on line 1. Check only one box on line 3.

IF the entity/person on line 1 is a(n) . . .	THEN check the box for . . .
• Corporation	Corporation
• Individual • Sole proprietorship, or • Single-member limited liability company (LLC) owned by an individual and disregarded for U.S. federal tax purposes.	Individual/sole proprietor or single-member LLC
• LLC treated as a partnership for U.S. federal tax purposes, • LLC that has filed Form 8832 or 2553 to be taxed as a corporation, or • LLC that is disregarded as an entity separate from its owner but the owner is another LLC that is not disregarded for U.S. federal tax purposes.	Limited liability company and enter the appropriate tax classification. (P= Partnership; C= C corporation; or S= S corporation)
• Partnership	Partnership
• Trust/estate	Trust/estate

Line 4, Exemptions

If you are exempt from backup withholding and/or FATCA reporting, enter in the appropriate space on line 4 any code(s) that may apply to you.

Exempt payee code.

- Generally, individuals (including sole proprietors) are not exempt from backup withholding.
- Except as provided below, corporations are exempt from backup withholding for certain payments, including interest and dividends.
- Corporations are not exempt from backup withholding for payments made in settlement of payment card or third party network transactions.
- Corporations are not exempt from backup withholding with respect to attorneys' fees or gross proceeds paid to attorneys, and corporations that provide medical or health care services are not exempt with respect to payments reportable on Form 1099-MISC.

The following codes identify payees that are exempt from backup withholding. Enter the appropriate code in the space in line 4.

1—An organization exempt from tax under section 501(a), any IRA, or a custodial account under section 403(b)(7) if the account satisfies the requirements of section 401(f)(2)

2—The United States or any of its agencies or instrumentalities

3—A state, the District of Columbia, a U.S. commonwealth or possession, or any of their political subdivisions or instrumentalities

4—A foreign government or any of its political subdivisions, agencies, or instrumentalities

5—A corporation

6—A dealer in securities or commodities required to register in the United States, the District of Columbia, or a U.S. commonwealth or possession

7—A futures commission merchant registered with the Commodity Futures Trading Commission

8—A real estate investment trust

9—An entity registered at all times during the tax year under the Investment Company Act of 1940

10—A common trust fund operated by a bank under section 584(a)

11—A financial institution

12—A middleman known in the investment community as a nominee or custodian

13—A trust exempt from tax under section 664 or described in section 4947

The following chart shows types of payments that may be exempt from backup withholding. The chart applies to the exempt payees listed above, 1 through 13.

IF the payment is for . . .	THEN the payment is exempt for . . .
Interest and dividend payments	All exempt payees except for 7
Broker transactions	Exempt payees 1 through 4 and 6 through 11 and all C corporations. S corporations must not enter an exempt payee code because they are exempt only for sales of noncovered securities acquired prior to 2012.
Barter exchange transactions and patronage dividends	Exempt payees 1 through 4
Payments over $600 required to be reported and direct sales over $5,000[1]	Generally, exempt payees 1 through 5[2]
Payments made in settlement of payment card or third party network transactions	Exempt payees 1 through 4

[1] See Form 1099-MISC, Miscellaneous Income, and its instructions.

[2] However, the following payments made to a corporation and reportable on Form 1099-MISC are not exempt from backup withholding: medical and health care payments, attorneys' fees, gross proceeds paid to an attorney reportable under section 6045(f), and payments for services paid by a federal executive agency.

Exemption from FATCA reporting code. The following codes identify payees that are exempt from reporting under FATCA. These codes apply to persons submitting this form for accounts maintained outside of the United States by certain foreign financial institutions. Therefore, if you are only submitting this form for an account you hold in the United States, you may leave this field blank. Consult with the person requesting this form if you are uncertain if the financial institution is subject to these requirements. A requester may indicate that a code is not required by providing you with a Form W-9 with "Not Applicable" (or any similar indication) written or printed on the line for a FATCA exemption code.

A—An organization exempt from tax under section 501(a) or any individual retirement plan as defined in section 7701(a)(37)

B—The United States or any of its agencies or instrumentalities

C—A state, the District of Columbia, a U.S. commonwealth or possession, or any of their political subdivisions or instrumentalities

D—A corporation the stock of which is regularly traded on one or more established securities markets, as described in Regulations section 1.1472-1(c)(1)(i)

E—A corporation that is a member of the same expanded affiliated group as a corporation described in Regulations section 1.1472-1(c)(1)(i)

F—A dealer in securities, commodities, or derivative financial instruments (including notional principal contracts, futures, forwards, and options) that is registered as such under the laws of the United States or any state

G—A real estate investment trust

H—A regulated investment company as defined in section 851 or an entity registered at all times during the tax year under the Investment Company Act of 1940

I—A common trust fund as defined in section 584(a)

J—A bank as defined in section 581

K—A broker

L—A trust exempt from tax under section 664 or described in section 4947(a)(1)

M—A tax exempt trust under a section 403(b) plan or section 457(g) plan

Note: You may wish to consult with the financial institution requesting this form to determine whether the FATCA code and/or exempt payee code should be completed.

Line 5

Enter your address (number, street, and apartment or suite number). This is where the requester of this Form W-9 will mail your information returns. If this address differs from the one the requester already has on file, write NEW at the top. If a new address is provided, there is still a chance the old address will be used until the payor changes your address in their records.

Line 6

Enter your city, state, and ZIP code.

Part I. Taxpayer Identification Number (TIN)

Enter your TIN in the appropriate box. If you are a resident alien and you do not have and are not eligible to get an SSN, your TIN is your IRS individual taxpayer identification number (ITIN). Enter it in the social security number box. If you do not have an ITIN, see *How to get a TIN* below.

If you are a sole proprietor and you have an EIN, you may enter either your SSN or EIN.

If you are a single-member LLC that is disregarded as an entity separate from its owner, enter the owner's SSN (or EIN, if the owner has one). Do not enter the disregarded entity's EIN. If the LLC is classified as a corporation or partnership, enter the entity's EIN.

Note: See *What Name and Number To Give the Requester,* later, for further clarification of name and TIN combinations.

How to get a TIN. If you do not have a TIN, apply for one immediately. To apply for an SSN, get Form SS-5, Application for a Social Security Card, from your local SSA office or get this form online at *www.SSA.gov*. You may also get this form by calling 1-800-772-1213. Use Form W-7, Application for IRS Individual Taxpayer Identification Number, to apply for an ITIN, or Form SS-4, Application for Employer Identification Number, to apply for an EIN. You can apply for an EIN online by accessing the IRS website at *www.irs.gov/Businesses* and clicking on Employer Identification Number (EIN) under Starting a Business. Go to *www.irs.gov/Forms* to view, download, or print Form W-7 and/or Form SS-4. Or, you can go to *www.irs.gov/OrderForms* to place an order and have Form W-7 and/or SS-4 mailed to you within 10 business days.

If you are asked to complete Form W-9 but do not have a TIN, apply for a TIN and write "Applied For" in the space for the TIN, sign and date the form, and give it to the requester. For interest and dividend payments, and certain payments made with respect to readily tradable instruments, generally you will have 60 days to get a TIN and give it to the requester before you are subject to backup withholding on payments. The 60-day rule does not apply to other types of payments. You will be subject to backup withholding on all such payments until you provide your TIN to the requester.

Note: Entering "Applied For" means that you have already applied for a TIN or that you intend to apply for one soon.

Caution: A disregarded U.S. entity that has a foreign owner must use the appropriate Form W-8.

Part II. Certification

To establish to the withholding agent that you are a U.S. person, or resident alien, sign Form W-9. You may be requested to sign by the withholding agent even if item 1, 4, or 5 below indicates otherwise.

For a joint account, only the person whose TIN is shown in Part I should sign (when required). In the case of a disregarded entity, the person identified on line 1 must sign. Exempt payees, see *Exempt payee code,* earlier.

Signature requirements. Complete the certification as indicated in items 1 through 5 below.

1. Interest, dividend, and barter exchange accounts opened before 1984 and broker accounts considered active during 1983. You must give your correct TIN, but you do not have to sign the certification.

2. Interest, dividend, broker, and barter exchange accounts opened after 1983 and broker accounts considered inactive during 1983. You must sign the certification or backup withholding will apply. If you are subject to backup withholding and you are merely providing your correct TIN to the requester, you must cross out item 2 in the certification before signing the form.

3. Real estate transactions. You must sign the certification. You may cross out item 2 of the certification.

4. Other payments. You must give your correct TIN, but you do not have to sign the certification unless you have been notified that you have previously given an incorrect TIN. "Other payments" include payments made in the course of the requester's trade or business for rents, royalties, goods (other than bills for merchandise), medical and health care services (including payments to corporations), payments to a nonemployee for services, payments made in settlement of payment card and third party network transactions, payments to certain fishing boat crew members and fishermen, and gross proceeds paid to attorneys (including payments to corporations).

5. Mortgage interest paid by you, acquisition or abandonment of secured property, cancellation of debt, qualified tuition program payments (under section 529), ABLE accounts (under section 529A), IRA, Coverdell ESA, Archer MSA or HSA contributions or distributions, and pension distributions. You must give your correct TIN, but you do not have to sign the certification.

What Name and Number To Give the Requester

For this type of account:	Give name and SSN of:
1. Individual	The individual
2. Two or more individuals (joint account) other than an account maintained by an FFI	The actual owner of the account or, if combined funds, the first individual on the account[1]
3. Two or more U.S. persons (joint account maintained by an FFI)	Each holder of the account
4. Custodial account of a minor (Uniform Gift to Minors Act)	The minor[2]
5. a. The usual revocable savings trust (grantor is also trustee)	The grantor-trustee[1]
b. So-called trust account that is not a legal or valid trust under state law	The actual owner[1]
6. Sole proprietorship or disregarded entity owned by an individual	The owner[3]
7. Grantor trust filing under Optional Form 1099 Filing Method 1 (see Regulations section 1.671-4(b)(2)(i)(A))	The grantor*
For this type of account:	**Give name and EIN of:**
8. Disregarded entity not owned by an individual	The owner
9. A valid trust, estate, or pension trust	Legal entity[4]
10. Corporation or LLC electing corporate status on Form 8832 or Form 2553	The corporation
11. Association, club, religious, charitable, educational, or other tax-exempt organization	The organization
12. Partnership or multi-member LLC	The partnership
13. A broker or registered nominee	The broker or nominee
14. Account with the Department of Agriculture in the name of a public entity (such as a state or local government, school district, or prison) that receives agricultural program payments	The public entity
15. Grantor trust filing under the Form 1041 Filing Method or the Optional Form 1099 Filing Method 2 (see Regulations section 1.671-4(b)(2)(i)(B))	The trust

[1] List first and circle the name of the person whose number you furnish. If only one person on a joint account has an SSN, that person's number must be furnished.

[2] Circle the minor's name and furnish the minor's SSN.

[3] You must show your individual name and you may also enter your business or DBA name on the "Business name/disregarded entity" name line. You may use either your SSN or EIN (if you have one), but the IRS encourages you to use your SSN.

[4] List first and circle the name of the trust, estate, or pension trust. (Do not furnish the TIN of the personal representative or trustee unless the legal entity itself is not designated in the account title.) Also see *Special rules for partnerships*, earlier.

*Note: The grantor also must provide a Form W-9 to trustee of trust.

Note: If no name is circled when more than one name is listed, the number will be considered to be that of the first name listed.

Secure Your Tax Records From Identity Theft

Identity theft occurs when someone uses your personal information such as your name, SSN, or other identifying information, without your permission, to commit fraud or other crimes. An identity thief may use your SSN to get a job or may file a tax return using your SSN to receive a refund.

To reduce your risk:

- Protect your SSN,
- Ensure your employer is protecting your SSN, and
- Be careful when choosing a tax preparer.

If your tax records are affected by identity theft and you receive a notice from the IRS, respond right away to the name and phone number printed on the IRS notice or letter.

If your tax records are not currently affected by identity theft but you think you are at risk due to a lost or stolen purse or wallet, questionable credit card activity or credit report, contact the IRS Identity Theft Hotline at 1-800-908-4490 or submit Form 14039.

For more information, see Pub. 5027, Identity Theft Information for Taxpayers.

Victims of identity theft who are experiencing economic harm or a systemic problem, or are seeking help in resolving tax problems that have not been resolved through normal channels, may be eligible for Taxpayer Advocate Service (TAS) assistance. You can reach TAS by calling the TAS toll-free case intake line at 1-877-777-4778 or TTY/TDD 1-800-829-4059.

Protect yourself from suspicious emails or phishing schemes. Phishing is the creation and use of email and websites designed to mimic legitimate business emails and websites. The most common act is sending an email to a user falsely claiming to be an established legitimate enterprise in an attempt to scam the user into surrendering private information that will be used for identity theft.

The IRS does not initiate contacts with taxpayers via emails. Also, the IRS does not request personal detailed information through email or ask taxpayers for the PIN numbers, passwords, or similar secret access information for their credit card, bank, or other financial accounts.

If you receive an unsolicited email claiming to be from the IRS, forward this message to *phishing@irs.gov*. You may also report misuse of the IRS name, logo, or other IRS property to the Treasury Inspector General for Tax Administration (TIGTA) at 1-800-366-4484. You can forward suspicious emails to the Federal Trade Commission at *spam@uce.gov* or report them at *www.ftc.gov/complaint*. You can contact the FTC at *www.ftc.gov/idtheft* or 877-IDTHEFT (877-438-4338). If you have been the victim of identity theft, see *www.IdentityTheft.gov* and Pub. 5027.

Visit *www.irs.gov/IdentityTheft* to learn more about identity theft and how to reduce your risk.

Privacy Act Notice

Section 6109 of the Internal Revenue Code requires you to provide your correct TIN to persons (including federal agencies) who are required to file information returns with the IRS to report interest, dividends, or certain other income paid to you; mortgage interest you paid; the acquisition or abandonment of secured property; the cancellation of debt; or contributions you made to an IRA, Archer MSA, or HSA. The person collecting this form uses the information on the form to file information returns with the IRS, reporting the above information. Routine uses of this information include giving it to the Department of Justice for civil and criminal litigation and to cities, states, the District of Columbia, and U.S. commonwealths and possessions for use in administering their laws. The information also may be disclosed to other countries under a treaty, to federal and state agencies to enforce civil and criminal laws, or to federal law enforcement and intelligence agencies to combat terrorism. You must provide your TIN whether or not you are required to file a tax return. Under section 3406, payers must generally withhold a percentage of taxable interest, dividend, and certain other payments to a payee who does not give a TIN to the payer. Certain penalties may also apply for providing false or fraudulent information.

CONSTRUCTION AGREEMENT

COLUMBIA COUNTY, a political subdivision of the State of Florida, by and through its Board of County Commissioners, situated at 135 NE Hernando Avenue, Suite 203, Lake City, Florida 32056-1529 (the "County"), hereby contracts with _____ (the "Contractor") of _____ (address) a contractor licensed to perform all work in the State of Florida in connection with the County's Project No._____ (the "Project"), as said work is set forth in the Plans and Specifications and other Contract Documents hereafter specified (the "Work"). The designated Engineer for the Project and the Work, as referenced in this Agreement, shall be _____ _____ _____.

The County and the Contractor, for the consideration herein set forth, agree as follows:

Section 1. Contract Documents

The Contract Documents consist of this Agreement, the Exhibits described in Section 4 hereof, the Legal Advertisement, the Instructions to Bidders, the Proposal and any duly executed and issued addenda, Change Orders, Work Directive Changes, Field Orders, Work Authorizations and amendments relating thereto. All of the foregoing Contract Documents are incorporated by reference and made a part of this Agreement (all of said documents including the Agreement sometimes being referred to herein as the "Contract Documents" and sometimes as the "Agreement"). A copy of the Contract Documents shall be maintained by Contractor at the Project site at all times during the performance of the Work.

Section 2. Scope of Work

The Contractor agrees to furnish and pay for all management, supervision, financing, labor, materials, tools, fuel, supplies, utilities, equipment and services of every kind and type necessary to diligently, timely, and fully perform and complete in a good and workmanlike manner the Work required by this Agreement.

Section 3. Contract Amount

In consideration of the faithful performance by the Contractor of the covenants in this Agreement to the full satisfaction and acceptance of the County, the County agrees to pay, or cause to be paid, to Contractor the following amount (herein "Contract Amount"), in accordance with the terms of this Agreement: $_____ (_____ _____).

[INSERT SCHEDULE OF UNIT PRICES AS APPLICABLE]

Section 4. Exhibits Incorporated

The following documents are expressly agreed to be incorporated by reference and made a part of this Agreement:

A. Legal Advertisement
B. Invitation to Bid
C. Bid Proposal with required forms
D. Performance Bond
E. Public Payment Bond
F. Insurance Requirements, including certificates of insurance
G. Form of Release and Affidavit
H. Change Order Form
I. Notice of Award
J. Notice to Proceed Form
K. Application for Payment Form
L. Special Conditions, if any
M. Project Plans
N. _____
O. _____
P. _____

Section 5. Bonds

A. The Contractor shall provide Performance and Payment Bonds, in the form prescribed in the Exhibits to the Agreement, in the amount of 100% of the Contract Amount, the costs of which are to be paid by Contractor. The Performance and Payment Bonds shall be underwritten by a surety authorized to do business in the State of Florida and otherwise acceptable to the County; provided, however, the surety shall be rated as "A-" or better as to general policy holders rating and Class V or higher rating as to financial size category and the amount required shall not exceed 5% of the reported policy holders surplus, all as reported in the most current Best Key Rating Guide, published by A.M. Best Company, Inc. of 75 Fulton Street, New York, New York 10038.

B. If the surety for any bond furnished by Contractor is declared bankrupt, becomes insolvent, its right to do business is terminated in the State of Florida, or it ceases to meet the requirements imposed by the Contract Documents, the Contractor shall, within five (5) calendar days thereafter, substitute another bond and surety, both of which shall be subject to the County's approval.

Section 6. Contract Time and Liquidated Damages

A. Time is of the essence in the performance of the Work under this Agreement. The "Commencement Date" shall be established in the Notice to Proceed to be issued by the County. The Contractor shall commence the Work within five (5) calendar days from the Commencement Date. No Work shall be performed at the Project site prior to the Commencement Date. Any Work performed by the Contractor prior to the Commencement Date shall be at the sole risk of the Contractor. The Work shall be substantially completed within _____ calendar days from the

Commencement Date. The date of substantial completion of the Work (or designated portions thereof) is the date certified by the Engineer when construction is sufficiently complete, in accordance with the Contract Documents, so the County can occupy or utilize the Work (or designated portions thereof) for the use for which it is intended. The Work shall be fully completed and ready for final acceptance by the County within _____ calendar days from the Commencement Date (herein "Contract Time").

B. The County and the Contractor recognize that, since time is of the essence for this Agreement, the County will suffer financial loss if the Work is not substantially completed within the time specified above, as said time may be adjusted as provided for herein. Should the Contractor fail to substantially complete the Work within the time period noted above, the County shall be entitled to assess, as liquidated damages, but not as a penalty, _____[1]for each calendar day thereafter until substantial completion is achieved. The Project shall be deemed to be substantially completed on the date the Engineer issues a Substantial Completion Certificate pursuant to the terms hereof. The Contractor hereby expressly waives and relinquishes any right which it may have to seek to characterize the above noted liquidated damages as a penalty, which the parties agree represents a fair and reasonable estimate of the County's actual damages at the time of contracting if the Contractor fails to substantially complete the Work in a timely manner.

C. When any period of time is referenced by days herein, it shall be computed to exclude the first day and include the last day of such period. If the last day of any such period falls on a Saturday or Sunday or on a day made a legal holiday by the law of the applicable jurisdiction, such day shall be omitted from the computation, and the last day shall become the next succeeding day which is not a Saturday, Sunday or legal holiday.

Section 7. Intent of Contract Documents and Contractor Representations

A. It is the intent of the Contract Documents to describe a functionally complete project (or portion thereof) to be constructed in accordance with the Contract Documents. Any work, materials or equipment that may reasonably be inferred from the Contract Documents as being required to produce the intended result shall be supplied whether or not specifically called for. When words which have a well known technical or trade meaning are used to describe work, materials or equipment, such words shall be interpreted in accordance with that meaning. Reference to standard specifications, manuals or codes of any technical society, organization or association or to the laws or regulations of any governmental authority having jurisdiction over the Project, whether such reference be specific or by implication, shall mean the latest standard specification, manual, code, law or regulation in effect at the time the Work is performed, except as may be otherwise specifically stated herein.

1 The Liquidated Damages have been valued based upon the Florida Department of Transportation's Standard Specifications for Road and Bridge Construction, published **July 2017**.

B. If before or during the performance of the Work, Contractor discovers a conflict, error or discrepancy in the Contract Documents, Contractor immediately shall report same to Engineer in writing and before proceeding with the Work affected thereby shall obtain a written interpretation or clarification from the Engineer. Contractor shall take field measurements and verify field conditions and shall carefully compare such field measurements and conditions and other information known to Contractor with the Contract Documents before commencing any portion of the Work.

C. Drawings are intended to show general arrangements, design and extent of Work and are not intended to serve as shop drawings. Specifications are separated into divisions for convenience of reference only and shall not be interpreted as establishing divisions for the Work, trades, subcontracts, or extent of any part of the Work. In the event of a discrepancy between or among the drawings, specifications or other Contract Document provisions, Contractor shall be required to comply with the provision which is the more restrictive or stringent requirement upon the Contractor, as determined by the Engineer.

D. In order to induce Owner to enter into this Agreement Contractor makes the following representations:

D.1 Contractor has examined and carefully studied the Contract Documents (including those listed in Section 4) and the other related data identified in the Project Documents including "technical data."

D.2 Contractor has visited the site and become familiar with and is satisfied as to the general, local, and site conditions that may affect cost, progress, performance or furnishing of the Work.

D.3 Contractor is familiar with and is satisfied as to all federal, state, and local Laws and Regulations that may affect cost, progress, performance and furnishing of the Work.

D.4 Contractor has carefully studied all reports of explorations and tests of subsurface conditions at or contiguous to site and all drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the site. Contractor acknowledges that Owner and Engineer do not assume responsibility for the accuracy or completeness of information and data shown or indicated in the Contract Documents with respect to Underground Facilities at or contiguous to the site. Contractor has obtained and carefully studied (or assumes responsibility for having done so) all such additional supplementary examinations, investigations, explorations, tests, studies, and data concerning conditions (surface, subsurface, and Underground Facilities) at or contiguous to the site or otherwise which may affect cost, progress, performance, or furnishing of the Work or which relate to any aspect of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor and safety precautions, and

programs incident thereto. Contractor does not consider that any additional examinations, investigations, explorations, tests, studies, or data are necessary for the performance and furnishing of the Work at the Contract Price, within the Contract Times and in accordance with the other terms and conditions of the Contract Documents.

D.5 Contractor is aware of the general nature of work to be performed by Owner and others at the site that relates to the Work as indicated in the Contract Documents.

D.6. Contractor has correlated the information known to Contractor, information and observation obtained from visits to the site, reports, and drawings identified in the Contract Documents and all additional examinations, investigations, explorations, tests, studies, and data with the Contract Documents.

D.7. Contractor has given Engineer written notice of all conflicts, errors, ambiguities or discrepancies that Contractor has discovered in the Contract Documents and the written resolution thereof by Engineer is acceptable to Contractor, and the Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.

Section 8. Investigation and Utilities

A. Contractor shall have the sole responsibility of satisfying itself concerning the nature and location of the Work and the general and local conditions, and particularly, but without limitation, with respect to the following: those affecting transportation, access, disposal, handling and storage of materials; availability and quality of labor; water and electric power; availability and condition of roads; work area; living facilities; climatic conditions and seasons; physical conditions at the work-site and the project area as a whole; topography and ground surface conditions; nature and quantity of the surface materials to be encountered; subsurface conditions; equipment and facilities needed preliminary to and during performance of the Work; and all other costs associated with such performance. The failure of Contractor to acquaint itself with any applicable conditions shall not relieve Contractor from any of its responsibilities to perform under the Contract Documents, nor shall it be considered the basis for any claim for additional time or compensation.

B. Contractor shall locate all existing roadways, railways, drainage facilities and utility services above, upon, or under the Project site, said roadways, railways, drainage facilities and utilities being referred to in this Sub-Section 8.B. as the "Utilities". Contractor shall contact the owners of all Utilities to determine the necessity for relocating or temporarily interrupting any Utilities during the construction of the Project. Contractor shall schedule and coordinate its Work around any such relocation or temporary service interruption. Contractor shall be responsible for properly shoring, supporting and protecting all Utilities at all times during the course of the Work.

Section 9. Schedule

A. The Contractor, within ten (10) calendar days after receipt of a Notice of Award, shall prepare and submit to the County and Engineer, for their review and approval, a progress schedule for the Project (herein "Progress Schedule"). The Progress Schedule shall relate to all Work required by the Contract Documents and shall: show the various activities of work in sufficient detail to demonstrate a reasonable and workable plan to complete the Project within the Contract Time; show the order and interdependence of activities and the sequence for accomplishing the Work and describe all activities in sufficient detail so that the Engineer can readily identify the work and measure the progress on of each activity; show each activity with a beginning work date, a duration, and a monetary value; include activities for procurement fabrication, and delivery of materials, plant, and equipment, and review time for shop drawings and submittals; include milestone activities when milestones are required by the Contract Documents; and in a Project with more than one phase, adequately identify each phase and its completion date, and not allow activities to span more than one phase. The Contractor shall also submit a working plan with the Progress Schedule, consisting of a concise written description of the construction plan.

B. The Engineer will return inadequate schedules to the Contractor for corrections and Contractor shall resubmit a corrected schedule within five (5) calendar days from the date of the Engineer’s return transmittal. The Engineer will use the accepted Project Schedule as the baseline against which to measure the progress. However, by acceptance of the Project Schedule, the Engineer does not endorse or otherwise certify the validity or accuracy of the activity durations or sequencing of activities.

B. The Progress Schedule shall be updated by the Contractor if there is a significant change in the planned order or duration of an activity or upon the request of the Engineer, which shall not be requested more than [INSERT TIMES] a month. All updates to the Progress Schedule shall be subject to the County's and Engineer's review and approval. The Engineer's review and approval of submitted the Progress Schedule and any required or requested updates shall be a condition precedent to the County's obligation to pay the Contractor.

Section 10. Progress Payments

A. Prior to submitting its first Application for Payment, Contractor shall submit to the County and the Engineer, for their review and approval, a schedule of values based upon the Contract Price, listing the major elements of the Work and the dollar value for each element. After its approval by the County and Engineer, this schedule of values shall be used as the basis for the Contractor's monthly Applications for Payment. This schedule shall be updated and submitted each month to the Engineer along with a completed and notarized copy of the Application for Payment form.

B. Prior to submitting its first Application for Payment, Contractor shall submit to the Engineer a complete list of all its proposed subcontractors and materialmen. The first Application for Payment shall be submitted no earlier than thirty (30) days after the Commencement Date.

C. If payment is requested on the basis of materials and equipment not incorporated into the Project, but delivered and suitably stored at the site or at another location agreed to by the County in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice or other documentation warranting that the County has received the materials and equipment free and clear of all liens, charges, security interests and encumbrances, together with evidence that the materials and equipment are covered by appropriate property insurance and other arrangements to protect the County's interest therein, all of which shall be subject to the County's satisfaction.

D. Contractor shall submit its monthly Application for Payment to the Engineer on or before the 25th day of each month for work performed during the previous month. Invoices received after the 25th day of each month shall be considered for payment as part of the next month's application. Within ten (10) calendar days after receipt of each Application for Payment, the Engineer shall either:

D.1 indicate his approval of the requested payment;

D.2 indicate his approval of only a portion of the requested payment, stating in writing his reasons therefore; or

D.3 return the Application for Payment to the Contractor indicating, in writing, the reason for refusing to approve payment.

In the event of a total denial and return of the Application for Payment by the Engineer, the Contractor may make the necessary corrections and resubmit the Application for Payment. The County shall, within thirty (30) calendar days after County approval of an Application for Payment, pay the Contractor the amounts so approved. Provided, however, in no event shall the County be obligated to pay any amount greater than that portion of the Application for Payment approved by the Engineer.

E. The County shall retain five percent (5%) of the gross amount of each monthly payment request or five percent (5%) of the portion thereof approved by the Engineer for payment, whichever is less. Such sums shall be accumulated and released to Contractor with final payment.

F. Monthly payments to Contractor shall in no way imply approval or acceptance of Contractor's work.

G. Each Application for Payment shall be accompanied by a Release and Affidavit, in the form attached to this Agreement, showing that all materials, labor, equipment and other bills associated with that portion of the Work for which payment is being requested have been paid in full. The County shall not be required to make payment until and unless these affidavits are furnished by the Contractor.

H. The County reserves the right to issue joint checks to Contractor and its material suppliers, subcontractors, labor unions, equipment suppliers, etc., if, in the County's sole judgment, it is necessary to do so to ensure payment to the above named parties or if above named parties have filed a notice of nonpayment, lien or intent to lien, stop notice, etc.

Section 11. Payments Withheld

A. The Engineer or the County may decline to approve any Application for Payment, or portions thereof, because of subsequently discovered evidence or subsequent inspections. The Engineer or the County may nullify the whole or any part of any approval for payment previously issued and the County may withhold any payments otherwise due Contractor under this Agreement or any other agreement between the County and Contractor, to such extent as may be necessary in the County's opinion to protect it from loss because of:

A.1 Defective Work not remedied;

A.2 Third party claims filed or reasonable evidence indicating probable filing of such claims;

A.3 Failure of Contractor to make payment properly to subcontractors or for labor, materials or equipment;

A.4 Reasonable doubt that the Work can be completed for the unpaid balance of the Contract Amount;

A.5 Reasonable indication that the Work will not be completed within the Contract Time;

A.6 Unsatisfactory prosecution of the Work by the Contractor;

A.7 Failure to provide accurate and current "As-Builts"; or

A.8 Any other material breach of the Contract Documents.

B. If these conditions in Subsection 11.A are not remedied or removed, the County may, after three (3) days written notice, rectify the same at Contractor's expense. The County also may offset against any sums due Contractor the amount of any liquidated or unliquidated obligations of Contractor to the County, whether relating to or arising out of this Agreement or any other agreement between Contractor and the County.

Section 12. Final Payment

A. The County shall make final payment to Contractor within thirty (30) calendar days after the Work is finally inspected and accepted by both the County and the Engineer in accordance with Section 25.B. herein, provided that Contractor first, and as an explicit condition precedent to the accrual of Contractor's right to final payment, shall have furnished the County with a properly executed and notarized copy of the Release and Affidavit, as well as, a duly executed copy of the Surety's consent to final payment and such other documentation that may be required by the Contract Documents and the County.

B. Contractor's acceptance of final payment shall constitute a full waiver of any and all claims by Contractor against the County arising out of this Agreement or otherwise relating to the Project, except those previously made in writing and identified by parties as unsettled at the time of the final Application for Payment. Neither the acceptance of the Work nor payment by the County shall be deemed to be a waiver of the County's right to enforce any obligations of Contractor hereunder or to the recovery of damages for defective Work not discovered by the Engineer or the County at the time of final inspection.

Section 13. Submittals and Substitutions

A. Contractor shall carefully examine the Contract Documents for all requirements for approval of materials to be submitted such as a schedule of values, safety manual, shop drawings, data, test results, schedules and samples. Contractor shall submit all such materials at its own expense and in such form as required by the Contract Documents in sufficient time to prevent any delay in the delivery of such materials and the installation thereof.

B. Whenever materials or equipment are specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular supplier, the naming of the item is intended to establish the type, function and quality required. Unless the name is followed by words indicating that no substitution is permitted, materials or equipment of other suppliers may be accepted by the County if sufficient information is submitted by Contractor to allow the County to determine that the material or equipment proposed is equivalent or better than to that named. Requests for review of substitute items of material and equipment will not be accepted by the County from anyone other than Contractor and all such requests must be submitted by Contractor to Engineer within thirty (30) calendar days after Notice of Award is received by Contractor.

C. If Contractor wishes to furnish or use a substitute item of material or equipment, Contractor shall make application to the Engineer for acceptance thereof, certifying that the proposed substitute shall perform adequately the functions and achieve the results called for by the general design, be similar and of equal substance to that specified and be suited to the same use as that specified. The application shall state that the evaluation and acceptance of the proposed substitute will not prejudice Contractor's achievement of substantial completion on time, whether or not acceptance of the substitute for use in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with the County for the Project) to adapt the design to the proposed substitute and whether or not incorporation or use of the substitute in

connection with the Work is subject to payment of any license fee or royalty. All variations of the proposed substitute from that specified will be identified in the application and available maintenance, repair and replacement service shall be indicated. The application also shall contain an itemized estimate of all costs that will result, directly or indirectly, from acceptance of such substitute, including costs for redesign and claims of other contractors affected by the resulting change, all of which shall be considered by the Engineer in evaluating the proposed substitute. The Engineer may require Contractor to furnish at Contractor's expense additional data about the proposed substitute.

D. If a specific means, method, technique, sequence or procedure of construction is indicated in or required by the Contract Documents, Contractor may furnish or utilize a substitute means, method, sequence, technique or procedure of construction acceptable to the Engineer, if Contractor submits sufficient information to allow the Engineer to determine that the substitute proposed is equivalent to that indicated or required by the Contract Documents. The procedures for submission to and review by the Engineer shall be the same as those provided herein for substitute materials and equipment.

E. The Engineer shall be allowed a reasonable time within which to evaluate each proposed substitute. The Engineer shall be the sole judge of acceptability, and no substitute will be ordered, installed or utilized without the Engineer's prior written acceptance which shall be evidenced by either a Change Order or an approved Shop Drawing. The County may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute.

Section 14. Daily Reports, As-Builts and Meetings

A. Unless waived in writing by the County, Contractor shall complete, maintain, and submit to Engineer on a _____ basis a daily log of the Contractor's work in a format approved by the Engineer. The daily log shall document all activities of Contractor at the Project site including, but not limited to, the following:

A.1. Weather conditions showing the high and low temperatures during work hours, the amount of precipitation received on the Project site, and any other weather conditions which adversely affect the Work;

A.2. Any Conditions which adversely affect the Work;

A.3. The hours of operation by Contractor's and subcontractor's personnel;

A.4. The number of Contractor's and subcontractor's personnel present and working at the Project site, by subcontract and trade;

A5. All equipment present at the Project site, description of equipment use and designation of time equipment was used (specifically indicating any down time);

A.6. Description of Work being performed at the Project site;

A.7. Any unusual or special occurrences at the Project site;

A.8. Materials received at the Project site;

A.9. A list of all visitors to the Project site; and

A.10. Any problems that might impact either the cost or quality of the Work or the time of performance.

The daily log shall not constitute nor take the place of any notice required to be given by Contractor to the County or Engineer pursuant to the Contract Documents.

B. Contractor shall maintain in a safe place at the Project site one record copy of the Contract Documents, including, but not limited to, all drawings, specifications, addenda, amendments, Change Orders, Work Directive Changes and Field Orders, as well as all written interpretations and clarifications issued by the Engineer, in good order and annotated to show all changes made during construction. The annotated drawings shall be continuously updated by the Contractor throughout the prosecution of the Work to accurately reflect all field changes that are made to adapt the Work to field conditions, changes resulting from Change Orders, Work Directive Changes and Field Orders, and all concealed and buried installations of piping, conduit and utility services. All buried and concealed items, both inside and outside the Project site, shall be accurately located on the annotated drawings as to depth and in relationship to not less than two (2) permanent features (e.g. interior or exterior wall faces). The annotated drawings shall be clean and all changes, corrections and dimensions shall be given in a neat and legible manner in a contrasting color. The "As-Built" record documents, together with all approved samples and a counterpart of all approved shop drawings shall be available to Engineer for reference. Current and accurate "As-Built" record documents shall be submitted with each Application for Payment. Failure to provide current and accurate "As-Built" record drawings shall be reason for rejecting the Application for Payment. Upon completion of the Work and as a condition precedent to Contractor's entitlement to final payment, these "As-Built" record documents, samples and shop drawings shall be delivered to Engineer by Contractor for the County.

C. Contractor shall keep all records and supporting documentation which concern or relate to the Work hereunder for a minimum of five (5) years from the date of termination of this Agreement or the date the Project is completed, whichever is later. The County, or any duly authorized agents or representatives of the County, shall have the right to audit, inspect and copy all such records and documentation as often as they deem necessary during the period of this Agreement

and during the five (5) year period noted above; provided, however, such activity shall be conducted only during normal business hours.

D. In addition to other requirements provided herein, Contractor shall:

D.1. Keep and maintain public records that ordinarily and necessarily would be required by the County in order to perform the Work.

D.2. Provide the public with access to public records on the same terms and conditions that the County would provide the records and at a cost that does not exceed the cost provided in this chapter or as otherwise provided by law.

D.3. Ensure that public records that are exempt or confidential and exempt from public records disclosure requirements are not disclosed except as authorized by law.

D.4. Meet all requirements for retaining public records and transfer, at no cost, to the County all public records in possession of the Contractor upon termination of the Contract and destroy any duplicate public records that are exempt or confidential and exempt from public records disclosure requirements. All records stored electronically must be provided to the County in a format that is compatible with the information technology systems of the County.

D.5. If the Contractor does not comply with a public records request, the County may terminate this Contract in accordance with Section 23 hereof.

Section 15. Independent Contractor

Contractor is an independent contractor and shall, at its sole cost and expenses and without increase in the contract price, comply with all laws, rules, ordinances, and regulations of all governing bodies having jurisdiction over the Work. Contractor shall be responsible for securing timely inspections and approvals of its work from all such authorities and as required by the Contract Documents. Contractor shall obtain and pay for all necessary permits and licenses, including business licenses; pay all fees, manufacturer's taxes, sales taxes, use taxes, processing taxes, and all federal and state taxes, insurance and contributions for social security and unemployment or disability insurance, which are measured by wages, salaries, or other remunerations paid to Contractor's employees, whether levied under existing or subsequently enacted laws, rules, or regulations. Contractor shall maintain proof that it has complied with all aspects of the foregoing provision and shall make such proof available for review by the County at County's request.

Section 16. Contractor Performance, Extensions, and No Damages for Delay of Work

A. Contractor shall diligently pursue the completion of the Work and coordinate the Work being done on the Project by its subcontractors and materialmen, as well as coordinating its Work with all work of others at the Project Site, so that its Work or the work of others shall not be delayed or impaired by any act or omission by Contractor. Contractor shall be solely responsible for

all construction means, methods, techniques, sequences, and procedures, as well as coordination of all portions of the Work under the Contract Documents.

B. Should Contractor be obstructed or delayed in the prosecution of or completion of the Work as a result of unforeseeable causes beyond the control of Contractor, and not due to its fault or neglect, including but not restricted to acts of God or of the public enemy, acts of government, fires, floods, epidemics, quarantine regulation, strikes or lockouts, Contractor shall notify the County in writing within forty-eight (48) hours after the commencement of such delay, stating the cause or causes thereof, or be deemed to have waived any right which Contractor may have had to request a time extension.

C. No interruption, interference, inefficiency, suspension or delay in the commencement or progress of the Work from any cause whatever, including those for which the County may be responsible, in whole or in part, shall relieve Contractor of his duty to perform or give rise to any right to damages or additional compensation from the County. Contractor expressly acknowledges and agrees that it shall receive no damages for delay. Contractor's sole remedy, if any, against the County will be the right to seek an extension to the Contract Time; provided, however, the granting of any such time extension shall not be a condition precedent to the aforementioned "No Damage For Delay" provision. This paragraph shall expressly apply to claims for early completion, as well as to claims based on late completion.

Section 17. Changes in the Work

A. The County shall have the right at any time during the progress of the Work to increase or decrease the Work. Promptly after being notified of a change, Contractor shall submit an itemized estimate of any cost or time increases or savings it foresees as a result of the change. Except in an emergency endangering life or property, or as expressly set forth herein, no addition or changes to the Work shall be made except upon written order of the County, and the County shall not be liable to the Contractor for any increased compensation without such written order. No officer, employee or agent of the County is authorized to direct any extra or changed work orally.

B. A Change Order, in the form attached to this Agreement, shall be issued and executed promptly after an agreement is reached between Contractor and the County concerning the requested changes. Contractor shall promptly perform changes authorized by duly executed Change Orders. The Contract Amount and Contract Time shall be adjusted in the Change Order in the manner as the County and Contractor shall mutually agree.

C. If the County and Contractor are unable to agree on a Change Order for the requested change, Contractor shall, nevertheless, promptly perform the change as directed by the County in a written Work Directive Change. In that event, the Contract Amount and Contract Time shall be adjusted as directed by the County. If Contractor disagrees with the County's adjustment determination, Contractor must make a claim pursuant to Section 18 of this Agreement or else be deemed to have waived any claim on this matter it might otherwise have had.

D. In the event a requested change results in an increase to the Contract Amount, the amount of the increase shall be limited to the Contractor's reasonable direct labor and material costs and reasonable actual equipment costs as a result of the change (including allowance for labor burden costs) plus a maximum ten percent (10%) markup for all overhead and profit. In the event such change Work is performed by a Subcontractor, a maximum ten percent (10%) markup for all overhead and profit for all Subcontractors' and sub-subcontractors' direct labor and material costs and actual equipment costs shall be permitted, with a maximum five percent (5%) markup thereon by the Contractor for all of its overhead and profit, for a total maximum markup of fifteen percent (15%). All compensation due Contractor and any Subcontractor or sub-subcontractor for field and home office overhead is included in the markups noted above.

E. The County shall have the right to conduct an audit of Contractor's books and records to verify the accuracy of the Contractor's claim with respect to Contractor's costs associated with any Change Order.

F. The Engineer shall have authority to order minor changes in the Work not involving an adjustment to the Contract Amount or an extension to the Contract Time exceeding his/her authority and not inconsistent with the intent of the Contract Documents. Minor changes approved by the Engineer, whether changes to Work and or Contract Time, cumulatively may not exceed ten percent (10%) of the Work and or Original Contract Time. Such changes may be effected by Field Order or by other written order. Such changes shall be binding on the Contractor.

Section 18. Claims and Disputes

A. A Claim is a demand or assertion by one of the parties seeking an adjustment or interpretation of the terms of the Contract Documents, payment of money, extension of time or other relief with respect to the terms of the Contract Documents. The term "Claim" also includes other disputes and matters in question between the County and Contractor arising out of or relating to the Contract Documents. The responsibility to substantiate a Claim shall rest with the party making the Claim.

B. Claims by the Contractor shall be made in writing to the Engineer within forty-eight (48) hours after the first day of the event giving rise to such Claim or else the Contractor shall be deemed to have waived the Claim. Written supporting data shall be submitted to the Engineer within fifteen (15) calendar days after the occurrence of the event, unless the County grants additional time in writing, or else the Contractor shall be deemed to have waived the Claim. All claims shall be priced in accordance with the provisions of Subsection 17.D. Engineer will render a formal decision on the claim in writing within fifteen (15) calendar days after receipt of the Contractor’s Claim. Engineer’s written decision will be final and binding upon Contractor and unless Contractor submits a written notice to the County and Engineer requesting non-binding voluntary mediation within fifteen (15) calendar days of the date of such decisions, then Contractor forever waives and relinquishes any rights to bring any future legal actions or court claims with respect to such Claim.

Non-binding Mediation shall be completed within sixty (60) days from the date of Contractor's timely submission of a written notice requesting non-binding voluntary mediation.

C. The Contractor shall proceed diligently with its performance as directed by the County, regardless of any pending Claim, action, suit or administrative proceeding, unless otherwise agreed to by the County in writing. The County shall continue to make payments in accordance with the Contract Documents during the pendency of any Claim.

Section 19. Indemnification and Insurance

A. To the fullest extent permitted by law, Contractor and its surety covenant and agree to indemnify and hold County harmless of and from any and all claims, losses, demands, causes of action and the like, including but not limited to, attorneys' fees and court costs which may be asserted against County by anyone other than Contractor, resulting from, arising out of, or occurring in connection with the failure of Contractor or supplier of Contractor to perform all work required within the scope of this agreement in strict accordance with the contract documents.

B. To the full extent permitted by law, Contractor hereby agrees to defend and indemnify, protect and hold harmless County, its agents, employees, servants and sureties (individually the "Indemnified Party" and collectively the "Indemnified Parties") of and from any loss or damage and to reimburse the Indemnified Parties for any and all expenses, including legal fees, expert witness fees and other litigation costs to which the Indemnified Parties may be put because of:

B.1. the liability for claims and liens for labor performed or materials used or furnished through or under Contractor for the project for which Contractor is liable due to any failure of Contractor to adhere to the terms of this agreement or any of the contract documents;

B.2. liability to County resulting from Contractor's failure to comply with applicable licensing requirements;

B.3. any personal injury, loss, damage or death to any person or persons (including employees, officers or agents of County, Contractor and lower tier subcontractors) and any property damage arising out of, result from, or in connection with the performance or non performance of work required in this contract or by reason of any act, omission, fault or negligence whether active or passive of Contractor whether on the project or proceeding to or from the site, including, without limitation, any personal injury, loss, damage, death or property damage caused (or alleged to be caused) by any negligent or grossly negligent act, error or omission of any person or entity, including any Indemnified Party whether such Indemnified Party's or the person's or

entity's negligence be joint or concurrent however, Contractor shall not be required to indemnify an Indemnified Party for that party's sole negligence; or

B.4. liability imposed upon County directly or indirectly by Contractor's failure or the failure of any of its employees to comply with any law, ordinance, rule, regulation or requirement, including, but not limited to, any Occupational Safety and Health Administration violations and any penalties, including enhancements, resulting in whole or in part by subcontractor's acts or omissions as well as the Immigration Reform and Control Act of 1986 and all rules and regulations adopted pursuant thereto.

C. To the fullest extent permitted by law, in addition to the express duty to indemnify County when there is any causal connection between Contractor's work and any injury, loss, damage, death or property damage, Contractor expressly undertakes a duty to defend County as a separate duty, independent of and broader than the duty to indemnify. The duty to defend agreed to by Contractor hereby expressly include all costs of litigation, attorney's fees, settlement costs and reasonable expenses in connection with the litigation, whether or not the claims made for loss, injury, damage or property damage are valid or groundless and regardless of whether the defense of County is maintained by the County or assumed by Contractor as long as the claims made could be causally connected to Contractor as reasonable determined by County (claims).

D. The County and Contractor agree the first $100.00 of the Contract Amount paid by the County to Contractor shall be given as separate consideration for this indemnification and duty to defend, and any other indemnification of the County by Contractor provided for within the Contract Documents, the sufficiency of such separate consideration being acknowledged by Contractor by Contractor's execution of the Agreement. The Contractor's obligation under this provision shall not be limited in any way by the agreed upon contract price as shown in this contract or the Contractor's limit of, or lack of, sufficient insurance protection.

E. Contractor shall obtain and carry, at all times during its performance under the Contract Documents, insurance of the types and in the amounts set forth in the Insurance Requirements attached to this Agreement. All insurance policies shall be from responsible companies duly authorized to do business in the State of Florida and/or responsible risk retention group insurance companies which are registered with the State of Florida. Within fifteen (15) calendar days after Notice of Award is received by Contractor, Contractor shall provide the County with properly executed Certificates of Insurance to evidence Contractor's compliance with the insurance requirements of the Contract Documents. Said Certificates of Insurance shall be on forms approved by the County. The Certificates of Insurance shall be personally, manually signed by the authorized representatives of the insurance company/companies shown on the Certificates of Insurance, with proof that they are authorized representatives thereof. In addition, certified, true and exact copies of all insurance polices required hereunder shall be provided to the County, on a timely basis, when requested by the County.

F. The Certificates of Insurance and required insurance policies shall contain provisions that thirty (30) days prior written notice by registered or certified mail shall be given the County of any cancellation, intent not to renew, or reduction in the policies or coverages, except in the application of the aggregate limits provisions. In the event of a reduction in the aggregate limit of any policy, Contractor shall immediately take steps to have the aggregate limit reinstated to the full extent permitted under such policy.

G. All insurance coverages of the Contractor shall be primary to any insurance or self insurance program carried by the County applicable to this Project. The acceptance by the County of any Certificate of Insurance does not constitute approval or agreement by the County that the insurance requirements have been satisfied or that the insurance policy shown on the Certificate of Insurance is in compliance with the requirements of the Contract Documents. No work shall commence at the Project site unless and until the required Certificates of Insurance are received by the County.

H. Contractor shall require each of its subcontractors to procure and maintain, until the completion of the subcontractor's work, insurance of the types and to the limits specified in the Insurance Requirements attached to this Agreement, unless such insurance requirements for the subcontractor is expressly waived in writing by the County. All liability insurance policies, other than professional liability, worker's compensation, employer's liability and business auto liability policies, obtained by Contractor to meet the requirements of the Contract Documents shall name the County and Engineer as additional insureds and shall contain severability of interest provisions. If any insurance provided pursuant to the Contract Documents expires prior to the completion of the Work, renewal Certificates of Insurance and, if requested by the County, certified, true copies of the renewal policies, shall be furnished by Contractor within thirty (30) days prior to the date of expiration.

I. Should at any time the Contractor not maintain the insurance coverages required herein, the County may terminate the Agreement or at its sole discretion shall be authorized to purchase such coverages and charge the Contractor for such coverages purchased. The County shall be under no obligation to purchase such insurance, nor shall it be responsible for the coverages purchased or the insurance company or companies used. The decision of the County to purchase such insurance coverages shall in no way be construed to be a waiver of any of its rights under the Contract Documents.

J. Contractor shall submit to Engineer a copy of all accident reports arising out of any injuries to its employees or those of any firm or individual to whom it may have subcontracted a portion of the Work, or any personal injuries or property damages arising or alleged to have arisen on account of any work by Contractor under the Contract Documents.

Section 20. Compliance with Laws

Contractor agrees to comply, at its own expense, with all federal, state and local laws, codes, statutes, ordinances, rules, regulations and requirements applicable to the Project, including but not

limited to those dealing with taxation, worker's compensation, equal employment and safety. If Contractor observes that the Contract Documents are at variance therewith, it shall promptly notify the County and Engineer in writing.

Section 21. Cleanup and Protections

A. Contractor agrees to keep the Project site clean at all times of debris, rubbish and waste materials arising out of the Work. At the completion of the Work, Contractor shall remove all debris, rubbish and waste materials from and about the Project site, as well as all tools, appliances, construction equipment and machinery and surplus materials, and shall leave the Project site clean and ready for occupancy by the County.

B. Any existing surface or subsurface improvements, including, but not limited to, pavements, curbs, sidewalks, pipes, utilities, footings, structures, trees and shrubbery, not indicated in the Contract Documents to be removed or altered, shall be protected by Contractor from damage during the prosecution of the Work. Any such improvements so damaged shall be restored by Contractor to the condition equal to that existing at the time of Contractor's commencement of the Work.

Section 22. Assignment

Contractor shall not assign this Agreement or any part thereof, without the prior consent in writing of the County. If Contractor does, with approval, assign this Agreement or any part thereof, it shall require that its assignee be bound to it and to assume toward Contractor all of the obligations and responsibilities that Contractor has assumed toward the County.

Section 23. Permits, Licenses and Taxes

A. Pursuant to Section 218.80, F.S., the County will pay for all County permits and fees, including license fees, permit fees, impact fees or inspection fees applicable to the work. Contractor is not responsible for paying for permits issued by the County wherein the work is to be performed, but is responsible for acquiring all permits. The County may require the Contractor to deliver internal budget transfer documents to applicable County agencies when the Contractor is acquiring permits.

B. All permits, fees and licenses necessary for the prosecution of the Work which are not issued by the County shall be acquired and paid for by the Contractor.

C. Contractor shall pay any and all sales, use, or other taxes, assessments and other similar charges when due, as required by any local, state of federal law, as it pertains to the services provided herein. Contractor further agrees that it shall protect, reimburse, and indemnify the County from and assume all liability for its tax obligations under the terms of this Agreement.

Section 24. Termination for Default

A. Contractor shall be considered in material default of the Agreement and such default shall be considered cause for the County to terminate the Agreement, in whole or in part, as further set forth in this Section, if Contractor: (1) fails to begin the Work under the Contract Documents within the time specified herein; or (2) fails to properly and timely perform the Work as directed by the County or the Engineer or as provided for in the approved Progress Schedule; or (3) performs the Work unsuitably or neglects or refuses to remove materials or to correct or replace such Work as may be rejected as unacceptable or unsuitable; or (4) discontinues the prosecution of the Work; or (5) fails to resume Work which has been suspended within a reasonable time after being notified to do so; or (6) becomes insolvent or is declared bankrupt, or commits any act of bankruptcy; or (7) allows any final judgment to stand against it unsatisfied for more than ten (10) days; or (8) makes an assignment for the benefit of creditors; or (9) fails to obey any applicable codes, laws, ordinances, rules or regulations with respect to the Work; or (10) materially breaches any other provision of the Contract Documents.

B. The County shall notify Contractor in writing of Contractor's default(s). If the County determines that Contractor has not remedied and cured the default(s) within seven (7) calendar days following receipt by Contractor of said written notice, then the County, at its option, without releasing or waiving its rights and remedies against the Contractor's sureties and without prejudice to any other right or remedy it may be entitled to hereunder or by law, may terminate Contractor's right to proceed under the Agreement, in whole or in part, and take possession of all or any portion of the Work and any materials, tools, equipment, and appliances of Contractor, take assignments of any of Contractor's subcontracts and purchase orders, and complete all or any portion of Contractor's Work by whatever means, method or agency which the County, in its sole discretion, may choose.

C. If the County deems any of the foregoing remedies necessary, Contractor agrees that it shall not be entitled to receive any further payments hereunder until after the Project is completed. All monies expended and all of the costs, losses, damages and extra expenses, including all management, administrative and other overhead and other direct and indirect expenses (including Engineer and attorneys' fees) or damages incurred by the County incident to such completion, shall be deducted from the Contract Amount, and if such expenditures exceed the unpaid balance of the Contract Amount, Contractor agrees to pay promptly to the County on demand the full amount of such excess, including costs of collection, attorney's fees (including appeals) and interest thereon at the maximum legal rate of interest until paid. If the unpaid balance of the Contract Amount exceeds all such costs, expenditures and damages incurred by the County to complete the Work, such excess shall be paid to the Contractor. The amount to be paid to the Contractor or the County, as the case may be, shall be approved by the Engineer, upon application, and this obligation for payment shall survive termination of the Agreement.

D. The liability of Contractor hereunder shall extend to and include the full amount of any and all sums paid, expenses and losses incurred, damages sustained, and obligations assumed by the County in good faith under the belief that such payments or assumptions were necessary or required, in completing the Work and providing labor, materials, equipment, supplies, and other

items therefore or re-letting the Work, and in settlement, discharge or compromise of any claims, demands, suits, and judgments pertaining to or arising out of the Work hereunder.

E. If, after notice of termination of Contractor's right to proceed pursuant to this Section, it is determined for any reason that Contractor was not in default, or that its default was excusable, or that the County is not entitled to the remedies against Contractor provided herein, then Contractor's remedies against the County shall be the same as and limited to those afforded Contractor under Section 24 below.

Section 24. Termination for Convenience and Right of Suspension

A. The County shall have the right to terminate this Agreement without cause upon seven (7) calendar days written notice to Contractor. In the event of such termination for convenience, Contractor's recovery against the County shall be limited to that portion of the Contract Amount earned through the date of termination, together with any retainage withheld and reasonable termination expenses incurred, but Contractor shall not be entitled to any other or further recovery against the County, including, but not limited to, damages or any anticipated profit on portions of the Work not performed.

B. The County shall have the right to suspend all or any portions of the Work upon giving Contractor not less than two (2) calendar days' prior written notice of such suspension. If all or any portion of the Work is so suspended, Contractor's sole and exclusive remedy shall be to seek an extension of time to its schedule in accordance with the procedures set forth in the Contract Documents. In no event shall the Contractor be entitled to any additional compensation or damages. Provided, however, if the ordered suspension exceeds six (6) months, the Contractor shall have the right to terminate the Agreement with respect to that portion of the Work which is subject to the ordered suspension.

Section 25. Completion

A. When the entire Work (or any portion thereof designated in writing by the County) is ready for its intended use, Contractor shall notify the Engineer in writing that the entire Work (or such designated portion) is substantially complete and request that Engineer issue a Certificate of Substantial Completion (or Certificate of Partial Substantial Completion). Within a reasonable time thereafter, the Contractor and Engineer shall make an inspection of the Work (or designated portion thereof) to determine the status of completion. If the Engineer does not consider the Work (or designated portion) substantially complete, Engineer shall notify Contractor in writing giving the reasons therefor. If the Engineer considers the Work (or designated portion) substantially complete, Engineer shall prepare and deliver to Contractor a Certificate of Substantial Completion (or Certificate of Partial Substantial Completion) which shall fix the date of Substantial Completion for the entire Work (or designated portion thereof) and include a tentative punchlist of items to be completed or corrected by Contractor before final payment. The County shall have the right to exclude Contractor from the Work and Project site (or designated portion thereof) after the date of

Substantial Completion, but the County shall allow Contractor reasonable access to complete or correct items on the tentative punchlist.

B. Upon receipt of written certification by Contractor that the Work is completed in accordance with the Contract Documents and is ready for final inspection and acceptance and upon receipt of a final Application for Payment, Engineer will make such inspection and, if he finds the Work acceptable and fully performed under the Contract Documents, he shall promptly issue a final Certificate for Payment, recommending that, on the basis of his observations and inspections, and the Contractor's certification that the Work has been completed in accordance with the terms and conditions of the Contract Documents, that the entire balance found to be due Contractor is due and payable. Neither the final payment nor the retainage shall become due and payable until Contractor submits: (1) the Release and Affidavit in the form attached, (2) consent of surety to final payment, and (3) if required by the County, other data establishing payment or satisfaction of all obligations, such as receipts, releases and waivers of liens, arising out of the Contract Documents, to the extent and in such form as may be designated by the County. The County reserves the right to inspect the Work and make an independent determination as to the Work's acceptability, even though the Engineer may have issued his recommendations. Unless and until the County is completely satisfied, neither the final payment nor the retainage shall become due and payable.

Section 26. Warranty

Contractor shall obtain and assign to the County all express warranties given to Contractor or any subcontractors by any materialmen supplying materials, equipment or fixtures to be incorporated into the Project. Contractor warrants to the County that any materials and equipment furnished under the Contract Documents shall be new unless otherwise specified, and that all Work shall be of good quality, free from all defects and in conformance with the Contract Documents. Contractor further warrants to the County that all materials and equipment furnished under the Contract Documents shall be applied, installed, connected, erected, used, cleaned and conditioned in accordance with the instructions of the applicable manufacturers, fabricators, suppliers or processors except as otherwise provided for in the Contract Documents. If, within one (1) year after final completion, any Work is found to be defective or not in conformance with the Contract Documents, Contractor shall correct it promptly after receipt of written notice from the County. Contractor shall also be responsible for and pay for replacement or repair of adjacent materials or Work which may be damaged as a result of such replacement or repair. These warranties are in addition to those implied warranties to which the County is entitled as a matter of law.

Section 27. Tests and Inspections.

A. The County, Engineer, their respective representatives, agents and employees, and governmental agencies with jurisdiction over the Project shall have access at all times to the Work, whether the Work is being performed on or off of the Project site, for their observation, inspection and testing. Contractor shall provide proper, safe conditions for such access. Contractor shall provide Engineer with timely notice of readiness of the Work for all required inspections, tests or approvals.

B. If the Contract Documents or any codes, laws, ordinances, rules or regulations of any public authority having jurisdiction over the Project requires any portion of the Work to be specifically inspected, tested or approved, Contractor shall assume full responsibility therefore, pay all costs in connection therewith and furnish Engineer the required certificates of inspection, testing or approval. All inspections, tests or approvals shall be performed in a manner and by organizations acceptable to the Engineer and the County.

C. If any Work that is to be inspected, tested or approved is covered without written concurrence from the Engineer, such work must, if requested by Engineer, be uncovered for observation. Such uncovering shall be at Contractor's expense unless Contractor has given Engineer timely notice of Contractor's intention to cover the same and Engineer has not acted with reasonable promptness to respond to such notice. If any Work is covered contrary to written directions from Engineer, such Work must, if requested by Engineer, be uncovered for Engineer's observation and be replaced at Contractor's sole expense.

D. The County shall charge to Contractor and may deduct from any payments due Contractor all engineering and inspection expenses incurred by the County in connection with any overtime work. Such overtime work consisting of any work during the construction period beyond the regular eight (8) hour day and for any work performed on Saturday, Sunday or holidays.

E. Neither observations nor other actions by the Engineer nor inspections, tests or approvals by others shall relieve Contractor from Contractor's obligations to perform the Work in accordance with the Contract Documents.

Section 28. Defective Work

A. Work not conforming to the requirements of the Contract Documents shall be deemed defective Work. If required by the County or Engineer, Contractor shall, as directed, either correct all defective Work, whether or not fabricated, installed or completed, or if the defective Work has been rejected by the County or Engineer, remove it from the site and replace it with conforming Work. Contractor shall bear all direct, indirect and consequential costs of such correction or removal (including, but not limited to fees and charges of engineers, architects, attorneys and other professionals) made necessary thereby, and shall hold the County harmless for same.

B. If any portion of the Work is defective, or Contractor fails to supply sufficient skilled workers with suitable materials or equipment, or fails to finish or perform the Work in such a way that the completed Work will conform to the Contract Documents, the County or Engineer may order Contractor to stop the Work, or any portion thereof, until the cause for such stop in the work has been eliminated; however, this right of the County or Engineer to stop the Work shall not give rise to any duty on the part of the County or Engineer to exercise this right for the benefit of Contractor or any other party.

C. If Contractor fails, within a reasonable time after the written notice from the County or Engineer, to correct defective Work or to remove and replace rejected defective Work as required by Engineer or the County, or if Contractor fails to perform the Work in accordance with the Contract Documents, or if Contractor fails to comply with any of the provisions of the Contract Documents, the County may, after seven (7) days written notice to Contractor, correct and remedy any such deficiency.

Section 29. Supervision and Superintendents

Contractor shall plan, organize, supervise, schedule, monitor, direct and control the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. Contractor shall be responsible to see that the finished Work complies accurately with the Contract Documents. Contractor shall keep on the Work at all times during its progress a competent resident superintendent, who shall not be replaced without prior written notice to the County and Engineer except under extraordinary circumstances. The superintendent shall be Contractor's representative at the Project site and shall have authority to act on behalf of Contractor. All communications given to the superintendent shall be as binding as if given to the Contractor.

Section 30. Protection of Work

Contractor shall fully protect the Work from loss or damage and shall bear the cost of any such loss or damage until final payment has been made. If Contractor or any one for whom Contractor is legally liable is responsible for any loss or damage to the Work, or other work or materials of the County or the County's separate contractors, Contractor shall be charged with the same, and any monies necessary to replace such loss or damage shall be deducted from any amounts due Contractor.

Section 31. Emergencies

In the event of an emergency affecting the safety or protection of persons or the Work or property at the Project site or adjacent thereto, Contractor, without special instruction or authorization from the County or Engineer is obligated to act to prevent threatened damage, injury or loss. Contractor shall give Engineer written notice within forty-eight (48) hours after the occurrence of the emergency, if Contractor believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby. If the Engineer determines that a change in the Contract Documents is required because of the action taken in response to an emergency, a Change Order shall be issued to document the consequences of the changes or variations. If Contractor fails to provide the forty-eight (48) hour written notice noted above, the Contractor shall be deemed to have waived any right it otherwise may have had to seek an adjustment to the Contract Amount or an extension to the Contract Time.

Section 32. Use of Premises

Contractor shall confine all construction equipment, the storage of materials and equipment and the operations of workers to the Project site and land and areas identified in and permitted by the Contract Documents and other lands and areas permitted by law, rights of way, permits and easements, and shall not unreasonably encumber the Project site with construction equipment or other material or equipment. Contractor shall assume full responsibility for any damage to any such land or area, or to the owner or occupant thereof, or any land or areas contiguous thereto, resulting from the performance of the Work.

Section 33. Safety

A. Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury or loss to:

A.1. All employees on the Work and other persons and/or organizations who may be affected thereby;

A.2. All the Work and materials and equipment to be incorporated therein, whether in storage on or off the Project site; and

A.3. Other property on Project site or adjacent thereto, including trees, shrubs, walks, pavements, roadways, structures, utilities and any underground structures or improvements not designated for removal, relocation or replacement in the Contract Documents.

B. Contractor shall comply with all applicable codes, laws, ordinances, rules and regulations of any public body having jurisdiction for the safety of persons or property or to protect them from damage, injury or loss. Contractor shall erect and maintain all necessary safeguards for such safety and protection. Contractor shall notify owners of adjacent property and of underground structures and improvements and utility owners when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation or replacement of their property. Contractor's duties and responsibilities for the safety and protection of the Work shall continue until such time as the Work is completed and final acceptance of same by the County has occurred.

C. Contractor shall designate a responsible representative at the Project site whose duty shall be the prevention of accidents. This person shall be Contractor's superintendent unless otherwise designated in writing by Contractor to the County.

Section 34. Project Meetings

Prior to the commencement of Work, the Contractor shall attend a preconstruction conference with the Engineer and others as appropriate to discuss the Progress Schedule, procedures for handling shop drawings and other submittals, and for processing Applications for Payment, and to establish a working understanding among the parties as to the Work. During the prosecution of the Work, the Contractor shall attend any and all meetings convened by the Engineer or the County with respect to the Project, when directed to do so by the County or Engineer. Contractor shall have its subcontractors and suppliers attend all such meetings (including the preconstruction conference) as may be directed by the County or Engineer.

Section 35. Notices

A. All notices required or made pursuant to this Agreement by the Contractor to the County or Engineer shall be in writing and delivered by hand or by United States Postal Service Department, first class mail, postage pre-paid, return receipt requested, or by Federal Express, addressed to the following:

County

David Kraus, Columbia County Administrator
135 NE Hernando Avenue, Suite 203
Lake City, Florida 32056-1529

and

Engineer

_____
_____
_____
_____

With courtesy copies also provided to:

Joel F. Foreman, County Attorney
Columbia County, Florida
207 S. Marion Avenue
Lake City, Florida 32025

Kevin Kirby, Public Works Director
Columbia County, Florida
Post Office Box 969
Lake City, Florida 32056-0969

Chad Williams, County Engineer
Columbia County Engineering Department
Post Office Box 1529
Lake City, Florida 32056

B. All notices required or made pursuant to this Agreement by the County to Contractor shall be made in writing and shall be delivered by hand or by United States Postal Service Department, first class mail, postage pre-paid, return receipt requested, or by Federal Express, addressed to the following:

Corporate Name of Contractor: Address _____

(including city, state and zip): _____

_____

Name of person with their title to whose

Attention the notice should be sent: _____

Telephone and Fax numbers: _____

Email Address: _____

C. Either party may change its above noted address by giving written notice to the other party in accordance with the requirements of this Section.

Section 36. Modification

No modification or change to the Agreement shall be valid or binding upon the parties unless in writing and executed by the party or parties intended to be bound by it.

Section 37. Successors and Assigns

Subject to other provisions hereof, the Agreement shall be binding upon and shall inure to the benefit of the successors and assigns of the parties to the Agreement.

Section 38. Governing Law

The Agreement shall be interpreted under and its performance governed by the laws of the State of Florida.

Section 39. Venue

The state courts in and for Columbia County, Florida shall be the proper and sole venue for any legal action on any and all claims, disputes or other matters in controversy arising out of or relating to this Agreement, whether stated as contractual, tort, equitable, statutory or any other claims or causes of action.

Section 40. No Waiver

The failure of the County to enforce at any time or for any period of time any one or more of the provisions of the Agreement shall not be construed to be and shall not be a waiver of any such provision or provisions or of its right thereafter to enforce each and every such provision.

Section 41. Remedies Cumulative

No right or remedy in this Agreement is intended to be exclusive of any other right or remedy, but every such right or remedy shall be cumulative and shall be in addition to and not a limitation of any duties, obligations, rights and remedies otherwise imposed or available by law.

Section 42. Entire Agreement

Each of the parties hereto agrees and represents that the Agreement comprises the full and entire agreement between the parties affecting the Work contemplated, and no other agreement or understanding of any nature concerning the same has been entered into or will be recognized, and that all negotiations, acts, work performed, or payments made prior to the execution hereof shall be deemed merged in, integrated and superseded by the Agreement.

Section 43. Severability

Should any provision of the Agreement be determined by a court to be unenforceable, such a determination shall not affect the validity or enforceability of any other section or part thereof.

Section 44. Third Party Beneficiaries

It is specifically agreed between the parties executing this Agreement that it is not intended by any of the provisions of any part of the Agreement to create in the public or any member thereof, a third party beneficiary under this Agreement, or to authorize anyone not a party to this Agreement to maintain a suit for personal injuries or property damage pursuant to the terms or provisions of this Agreement.

Section 45. Public Records

IF THE CONTRACTOR HAS QUESTIONS REGARDING THE APPLICATION OF CHAPTER 119, FLORIDA STATUTES, TO THE CONTRACTOR'S DUTY TO PROVIDE PUBLIC RECORDS RELATING TO THIS CONTRACT, CONTACT THE CUSTODIAN OF PUBLIC RECORDS AT (INSERT TELEPHONE NUMBER, E-MAIL ADDRESS, AND MAILING ADDRESS).

Contractor must comply with the public records laws, Florida Statute chapter 119, specifically Contractor must:

A. Keep and maintain public records required by the County to perform the service.
B. Upon request from the County's custodian of public records, provide the County with a copy of the requested records or allow the records to be inspected or copied within a reasonable

time at a cost that does not exceed the cost provided in chapter 119 Florida Statutes or as otherwise provided by law.

C. Ensure that public records that are exempt or confidential and exempt from public records disclosure requirements are not disclosed except as authorized by law for the duration of the contract term and following completion of the contract if the contractor does not transfer the records to the County.

D. Upon completion of the contract, transfer, at no cost, to the County all public records in possession of the contractor or keep and maintain public records required by the County to perform the service. If the contractor transfers all public records to the public agency upon completion of the contract, the contractor shall destroy any duplicate public records that are exempt or confidential and exempt from public records disclosure requirements. If the contractor keeps and maintains public records upon completion of the contract, the contractor shall meet all applicable requirements for retaining the public records. All records stored electronically must be provided to the public agency, upon the request from the public agency's custodian of public records, in a format that is compatible with the information technology systems of the public agency.

IN WITNESS WHEREOF, the parties have executed this Agreement on the date(s) indicated below.

CONTRACTOR: _____
(Company Name)

ATTEST:

By:_____ (Signature) _____ (Printed)
Its: _____ (Title)
Date: _____

Witness:

Its:_____
President/Corporate Secretary/Witness Date:_____
[Corporate Seal]

_____
2nd Witness (if not incorporated)

OWNER: Board of County Commissioners of Columbia County, Florida

(SEAL) By:_____
Chairman

Clerk: _____ Date:_____

_____
Approved as to Form and Content:

_____
County Attorney

EXHIBIT A
LEGAL ADVERTISEMENT

EXHIBIT B
INVITATION TO BID

EXHIBIT C
BID PROPOSAL WITH REQUIRED FORMS

EXHIBIT D
PERFORMANCE BOND

BOND NO._____

KNOW ALL MEN BY THESE PRESENTS: That _____ _____, as Principal, whose principal business address is _____ and phone number is _____, and _____, as Surety, whose principal address is_____ _____ and phone number is: _____ are held and firmly bound to Columbia County, Florida (the "COUNTY"), as Obligee in the sum of:_____ _____ ($_____) for the payment whereof we bond ourselves, our heirs, executors, personal representatives, successors and assigns, jointly and severally.

WHEREAS, Principal has entered into a contract dated as of the _____ day of _____, 20____, with Obligee for _____ _____ _____ _____ COLUMBIA COUNTY Project No.:_____ in accordance with drawings and specifications, which contract is incorporated by reference and made a part hereof, and is referred to as the Contract.

THE CONDITION OF THIS BOND is that if Principal:

1. Performs the Contract at the times and in the manner prescribed in the Contract; and

2. Pays Obligee any and all losses, damages, costs and attorneys' fees, including appellate proceedings, that Obligee sustains because of any default by Principal under the Contract, including, but not limited to, all delay damages, whether liquidated or actual, incurred by Obligee; and

3. Performs the guarantee of all work and materials furnished under the Contract for the time specified in the Contract, then this bond is void; otherwise it remains in full force.

Any changes in or under the Contract and compliance or noncompliance with any formalities connected with the Contract or the changes do not affect Surety's obligation under this Bond.

The Surety, for value received, hereby stipulates and agrees that no changes, extensions of time, alterations or additions to the terms of the Contract or other work to be performed hereunder, or the specifications referred to therein shall in anywise affect its obligations under this bond, and it does hereby waive notice of any such changes, extensions of time, alterations or additions to the terms of the Contract or to work or to the specifications.

This bond is intended to comply with provisions of Section 255.05, Florida Statutes, and all terms and conditions of said statute are incorporated herein by reference thereto, specifically including but not limited to the notice and time limitation provisions of said section. In the event of any conflict, ambiguity or discrepancy between Section 255.05, Florida Statutes, and this Bond, Florida Statutes shall control. No right of action shall accrue on this Bond to or, for the use of any person or entity other than the COUNTY and those persons or corporations provided for by said statute, their heirs, executors, administrators, successors or assigns.

It is further agreed and understood that if the COUNTY is required to initiate legal proceedings to recover on this Bond, the COUNTY may also recover its costs relating there to, including a reasonable amount for its attorney's fees and legal assistant's fees before trial, at trial, on appeal and in bankruptcy.

IN WITNESS WHEREOF, the above parties have executed this instrument this _____ day of _____, 20____, the name of each party being affixed and these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

Signed, sealed and delivered
in the presence of:

PRINCIPAL: _____
(Company Name of Contractor)

By:_____(Officers Signature)
_____ (Officers Name Printed)

Witnesses as to Principal Name:_____ (Signature)
Its:_____ (Title)

STATE OF _____

COUNTY OF _____

The foregoing instrument was acknowledged before me this _____day of _____, 20 _____, by _____(officer's name), as _____ (title) of _____ (company name), a(n)_____ (state) corporation, on behalf of the corporation. He/she is personally known to me OR has produced _____ as identification and did (did not) take an oath.

My Commission Expires: _____

Signature of Notary :_____
(Legibly Printed) _____

(AFFIX OFFICIAL SEAL) Notary Public, State of_____

Commission No. _____

ATTEST: SURETY:

_____
(Printed Company Name)
_____

_____

(Business Address)

_____ _____
(Surety Authorized Signature) (Printed Name)

Witness as to Surety _____(Signature)
_____(Printed Name)

OR

_____ _____
As Attorney in Fact (Signature) (Printed Name)

(Attach Power of Attorney)

Witnessed by: _____ _____
(Signature) (Printed Name)

_____ _____
(Business Address) (Telephone Number)

STATE OF _____

COUNTY OF _____

The foregoing instrument was acknowledged before me this _____day of _____, 20____, by_____ (officer's name), as_____ (title) of _____ Surety, on behalf of Surety. He/She is personally known to me OR has produced _____ as identification and who did (did not) take an oath.

My Commission Expires: _____

Signature of Notary :_____
(Legibly Printed) _____

(AFFIX OFFICIAL SEAL) Notary Public, State of_____

Commission No. _____

EXHIBIT E
PUBLIC PAYMENT BOND

BOND No. _____

KNOW ALL MEN BY THESE PRESENTS: That_____
_____, as Principal, whose principal business address is:
_____
and phone number and fax numbers are: _____
and _____, as Surety, whose principal address is:
_____
_____
and phone number and fax numbers are: _____ are held and firmly bound to COLUMBIA COUNTY, FLORIDA (the "COUNTY") as Obligee in the sum of_____
_____ ($_____)
for the payment whereof we bind ourselves, our heirs, executors, personal representatives, successors and assigns, jointly and severally.

WHEREAS, Principal has entered into a contract dated as of the ____ day of _____, 20___, with Obligee for _____
in accordance with drawings and specifications, which contract is incorporated by reference and made a part hereof, and this referred to as the Contract.

THE CONDITION OF THIS BOND is that if Principal promptly makes payment to all claimants as defined in Section 255.05(1), Florida Statutes, supplying Principal with labor, materials or supplies, used directly or indirectly by Principal in the prosecution of the work provided for in the Contract, then is bond is void; otherwise it remains in full force.

Any changes in or under the Contract and compliance or noncompliance with any formalities connected with the Contract or the changes do not affect Surety's obligation under this Bond.

The provisions of this bond are subject to the time limitations of Section 255.05(2). In no event will the Surety be liable in the aggregate to claimants for more than the penal sum of this Payment Bond, regardless of the number of suits that may be filed by claimants.

IN WITNESS WHEREOF, the above parties have executed this instrument this _____ day of _____, 20___, the name of each party being affixed and these presents duly signed by its under-signed representative, pursuant to authority of its governing body.
Signed, sealed and delivered in the presence of:

PRINCIPAL: _____
(Company Name of Contractor)

By:_____ (Officer's Signature)
_____ (Officer's Name Printed)

Witnesses as to Principal Name:_____ (Signature)
Its:_____ (Title)

STATE OF _____

COUNTY OF _____

The foregoing instrument was acknowledged before me this ___day of _____, 20_____,

by_____ (officer's name), as

_____ (title) of _____, a

_____corporation, on behalf of the corporation. He/she is personally known to me OR has

produced_____ as identification and did (did not) take an oath.

My Commission Expires: _____
Signature of Notary: _____
(Legibly Printed) _____
(AFFIX OFFICIAL SEAL) Notary Public, State of _____
Commission No.:_____

ATTEST: SURETY:

_____
(Printed Company Name)
_____
_____
(Business Address)

_____ _____
(Surety Authorized Signature) (Printed Name)

Witness as to Surety: _____ (Signature)

_____(Printed Name)

OR

_____ _____

As Attorney in Fact (Signature) (Printed Name)

(Attach Power of Attorney)

Witnessed by: _____ _____

(Signature) (Printed Name)

_____

_____

(Business Address)

_____

(Telephone Number)

STATE OF _____
COUNTY OF _____

The foregoing instrument was acknowledged before me this ____day of _____, 20 __, by_____ (officer's name), as_____ (title) of_____ Surety, on behalf of Surety. He/She is personally known to me OR has produced _____ as identification and who did (did not) take an oath.

My Commission Expires: _____

Signature of Notary: _____

(Legibly Printed) _____

(AFFIX OFFICIAL SEAL)

Notary Public, State of _____

Commission No:_____

EXHIBIT F
INSURANCE REQUIREMENTS
CERTIFICATES OF INSURANCE

(1) The Contractor shall obtain and maintain such insurance as will protect it from: (1) claims under worker's compensation laws, disability benefit laws, or other similar employee benefit laws; (2) claims for damages because of bodily injury, occupational sickness or disease or death of his employees including claims insured by usual personal injury liability coverage; (3) claims for damages because of bodily injury, sickness or disease, or death of any person other than his employees including claims insured by usual personal injury liability coverage; and (4) from claims for injury to or destruction of tangible property including loss of use resulting there from -- any or all of which claims may arise out of, or result from, the services, work and operations carried out pursuant to and under the requirements of the Contract Documents, whether such services, work and operations be by the Contractor, its employees, or by subcontractor(s), or anyone employed by or under the supervision of any of them, or for whose acts any of them may be legally liable.

(2) This insurance shall be obtained and written for not less than the limits of liability specified hereinafter, or as required by law, whichever is greater.

(3) The Contractor shall require, and shall be responsible for assuring throughout the time the Agreement is in effect, that any and all of its subcontractors obtain and maintain until the completion of that subcontractor's work, such of the insurance coverages described herein as are required by law to be provided on behalf of their employees and others.

(4) The Contractor shall obtain, have and maintain during the entire period of the Agreement insurance policies, which contain the following information and provisions:

(A) The name and type of policy and coverages provided;
(B) The amount or limit applicable to each coverage provided;
(C) The date of expiration of coverage;
(D) The designation of the COUNTY as an additional insured and a certificate holder. (This requirement may be excepted for Worke''s Compensation and professional liability Insurance.);
(E) The following clause must appear on the Certificate of Insurance:

Should any material change occur in any of the above described policies or should any of said policies be canceled before the expiration date thereof, the issuing company will mail at least thirty (30) days written notice to the COUNTY.

(5) If the initial, or any subsequently issued Certificate of Insurance expires prior to the completion of the Work or termination of the Agreement, the Contractor shall furnish to the COUNTY, in triplicate, renewal or replacement Certificate(s) of Insurance not later than thirty (30) calendar days prior to the date of their expiration. Failure of the Contractor to provide the COUNTY

with such renewal certificate(s) shall be considered justification for the COUNTY to terminate the Agreement.

(6) Contractor shall include the COUNTY, the COUNTY's agents, officers and employees in the Contractor's General Liability and Automobile Liability policies as additional insureds.

(7) If the COUNTY has any objection to the coverage afforded by other provisions of the insurance required to be purchased and maintained by Contractor in accordance with the requirements of the Contract Documents on the basis of its not complying with the Contract Documents, the COUNTY shall notify Contractor in writing thereof within thirty (30) days of the delivery of such certificates to the COUNTY. Contractor shall provide to the COUNTY such additional information with respect to its insurance as may be requested.

(8) The Contractor shall obtain and maintain the following insurance coverages as provided hereinbefore, and in the type, amounts and in conformance with the following minimum requirements:

WORKER'S COMPENSATION **[REVISE AS NEEDED TO MEET COUNTY'S REQUIREMENTS]**

State: Statutory
Applicable Federal:
(e.g. Longshoremen's) Statutory
Employer's Liability: $1,000,000.00

COMPREHENSIVE GENERAL LIABILITY

Bodily Injury: $1,000,000.00 Each Occurrence
Property Damage: $1,000,000.00 Each Occurrence

Comprehensive General Liability Insurance shall include:

Contractual Liability, Explosion, Collapse and Underground Coverages and Products and Completed Operations Coverages.

COMPREHENSIVE AUTOMOBILE LIABILITY

Bodily Injury: $1,000,000.00 Each Occurrence
Property Damage: $1,000,000.00 Each Occurrence

Comprehensive Automobile Liability shall include coverage for any owned auto, non-owned autos and hired autos.

EXHIBIT G
RELEASE AND AFFIDAVIT

COUNTY OF_____

STATE OF FLORIDA

Before me, the undersigned authority, personally appeared _____ _____, who after being duly sworn, deposes and says:

(1) In accordance with the Contract Documents and in consideration of $_____ paid, _____ ("Contractor") releases and waives for itself and its subcontractors, materialmen, successors and assigns, all claims demands, damages, costs and expenses, whether in contract or in tort, against Columbia County, Florida (the "COUNTY"), its Board of County Commissioners, employees and agents relating in any way to the performance of the Agreement between Contractor and the COUNTY, dated _____, ____, for the period from _____ to _____.

(2) Contractor certifies for itself and its subcontractors, materialmen, successors and assigns, that all charges for labor, materials, supplies, lands, licenses and other expenses for which the COUNTY might be sued or for which a lien or a demand against any payment bond might be filed, have been fully satisfied and paid.

(3) Contractor agrees to indemnify, defend and save harmless the COUNTY, its Board of County Commissioners, employees and agents from all demands or suits, actions, claims of liens or other charges filed or asserted against the COUNTY arising out of the performance by Contractor of the Work covered by this Release and Affidavit.

(4) This Release and Affidavit is given in connection with Contractor's [monthly/final] Application for Payment No._____.

CONTRACTOR:

_____

By: _____ (signature of the executive officer)

Its:_____ (title of the executive officer)

Date:_____

Witnesses

_____ _____

[Corporate Seal]

STATE OF _____

COUNTY OF _____

The foregoing instrument was acknowledged before me this _____ day of _____, _____, by _____, as _____ of _____, a _____ corporation, on behalf of the corporation. He/she is personally known to me or has produced _____ _____ as identification and did (did not) take an oath.

My Commission Expires: _____
(Signature of Notary)

Name:_____
(Legibly Printed)

(AFFIX OFFICIAL SEAL) Notary Public, State of_____

Commission No.:_____

EXHIBIT H
CHANGE ORDER FORM

CHANGE ORDER NO. _____ COLUMBIA COUNTY PROJECT NO. _____

TO: _____
_____
_____

DATE: _____

PROJECT NAME: _____

Columbia County Project No._____

Under our AGREEMENT dated_____.

****

You hereby are authorized and directed to make the following change(s) in accordance with terms and conditions of the Agreement:

_____
_____

FOR THE ADDITIVE or DEDUCTIVE Sum of:
_____($_____).

Original Agreement Amount $_____

Sum of Previous Changes $_____

This Change Order ADD/DEDUCT $_____

Present Agreement Amount $_____

The time for completion shall be (increased/decreased) by _____ calendar days due to this Change Order. Accordingly, the Contract Time is now _____ (_____) calendar days and the final completion date is _____. Your acceptance of this Change Order shall constitute a modification to our Agreement and will be performed subject to all the same terms and conditions as contained in our Agreement indicated above, as fully as if the same were repeated in this acceptance. The adjustment, if any, to the Agreement shall constitute a full and final settlement of any and all claims arising out of or related to the change set forth herein, including claims for impact and delay costs.

Accepted:_____ , 20____ .

COLUMBIA COUNTY, FLORIDA CONTRACTOR

By:_____ By:_____
Chair President

ENGINEER: By:_____

EXHIBIT I
NOTICE OF AWARD

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INSERT THE NOTICE OF AWARD BEHIND THIS COVER PAGE

EXHIBIT J

NOTICE TO PROCEED

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INSERT THE NOTICE TO PROCEEED BEHIND THIS COVER PAGE

EXHIBIT K

APPLICATION FOR PAYMENT

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INSERT THE APPLICATION FOR PAYMENT BEHIND THIS COVER PAGE