

**HARNETT COUNTY, NORTH CAROLINA
DUNN-ERWIN LANDFILL
CORRECTIVE ACTION PROJECTS**

**Project 1 – Sanitary Sewer Pump Station, Force Main,
& Groundwater Extraction System**

**Project 2 – Convenience Center and
Transfer Station Improvements**

PROJECT MANUAL

BOARD OF COMMISSIONERS

**TIMOTHY B. MCNEILL, CHAIRMAN
BEATRICE HILL, VICE CHAIRMAN
DAN ANDREWS
JIM BURGIN
GARY HOUSE**

COUNTY MANAGER

SCOTT SAUER

Permit No.	Date	Document ID No.
43-02	September 25, 2012	17303

Received via a mail
Date: September 25, 2012
Solid Waste Section
Raleigh Central Office
(The Project 1 is the a groundwater remedial project associated with CAP at the Closed
MSWLF which is overlain by a CDLF)

**ISSUED BY
C.T. CLAYTON, SR., P.E., INC.
PROJECT 032002B**

September, 2012



46 West Washington Street - Coats, North Carolina 27521
Phone: 910-897-7070 - Fax: 910-897-6767 – www.ctclayton.com
Offices located in Coats and New Bern, North Carolina
License No. C-2570

**FINAL
NOT RELEASED
FOR CONSTRUCTION
RELEASED FOR BID**



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APPENDIX A

NCDOT RIGHT-OF-WAY ENCROACHMENT AGREEMENT

Advertisement for Bids

Owner: County of Harnett
Scott Sauer, County Manager

Address: P.O. Box 759
102 East Front Street
Lillington, NC 27546

Separate sealed bids for the construction of the Dunn Erwin Landfill Corrective Action Project will be received by the County of Harnett at the Training Room, Room 101 of the Public Utilities Business Center, 700 McKinney Parkway, Lillington, North Carolina until 2:00 p.m. (local prevailing time) on October 9, 2012 and then in said room publicly opened and read aloud.

The work for the Dunn Erwin Landfill Corrective Action Project consists of two projects. Project #1 consists of the Sanitary Sewer Pump Station / Force Main, which includes a duplex pump station with associated controls and electrical work and 9,300-feet of 6-inch force main, and a well-point groundwater extraction system and 3 sump pump stations with associated controls and electrical work. Project #2 consists of the Convenience Center Improvements and Transfer Station Rehabilitation, which includes rehabilitation of the existing transfer station concrete floor, walls, and metal siding, expansion of the transfer station metal building and construction of an additional raised concrete dumping pad with concrete retaining wall at the existing convenience center.

The two projects are to be bid separately as parts of a single contract awarded as either multiple or single prime depending on low bids.

Each Bid must be submitted in a sealed envelope, addressed to Scott Sauer, County Manger, County of Harnett, P.O. Box 759, 102 East Front Street, Lillington, NC 27546. Each sealed envelope containing a BID must be plainly marked on the outside as BID for construction of Dunn Erwin Landfill Corrective Action Project, and the envelope should bear on the outside the name of the Bidder, his address and his license number. If forwarded by mail, the sealed envelope containing the BID must be enclosed in another envelope addressed to the Owner.

The Contract Documents may be examined after September 16, 2012 at the following locations: C.T. Clayton, Sr., P.E., Inc., 46 W. Washington Street, Coats, NC; Harnett County General Services, 103 E Ivey Street, Lillington, NC; Associated General Contractors online plan room; and Hispanic Contractors Association of the Carolinas.

Copies of the Contract Documents may be obtained at the office of C.T. Clayton, Sr., P.E., Inc., upon a non-refundable payment of \$250 for each set. The Engineer will require a 24-hour notice prior to pick up of the Contract Documents. Sets will be mailed, if requested, upon receipt of payment.

THIS BID REQUIRES ATTENDANCE BY THE BIDDER TO THE PRE-BID CONFERENCE.

The Pre-Bid Conference will be held at 2:00 p.m. on October 2, 2012 at the Dunn Erwin Landfill Maintenance Shop Building, 449 Daniel's Rd., Dunn, North Carolina.

Date: September 12, 2012
Scott Sauer, County Manager

INFORMATION FOR BIDDERS

Separate sealed bids for the construction of the Dunn Erwin Landfill Corrective Action Project will be received by the County of Harnett at the Training Room, Room 101 of the Public Utilities Business Center, 700 McKinney Parkway, Lillington, North Carolina until 2:00 p.m. (local prevailing time) on October 9, 2012 and then in said room publicly opened and read aloud.

Each Bid must be submitted in a sealed envelope, addressed to Scott Sauer, County Manger, County of Harnett, P.O. Box 759, 102 East Front Street, Lillington, NC 27546. Each sealed envelope containing a BID must be plainly marked on the outside as BID for construction of Dunn Erwin Landfill Corrective Action Project – Project 1, Project 2, or Project 1&2, and the envelope should bear on the outside the name of the Bidder, his address and his license number. If forwarded by mail, the sealed envelope containing the BID must be enclosed in another envelope addressed to the Owner at P.O. Box 759, 102 East Front Street, Lillington, NC 27546

North Carolina law requires any contractor bidding on work in the State which costs \$30,000 or more to show evidence that he is licensed under the “Act to Regulate the Practice of General Contracting”.

Bidders who have been found guilty of discrimination within the last two years are debarred from bidding.

All BIDS must be made on the required BID form. All blank spaces for BID prices must be filled in, in ink or typewritten, and the BID form must be fully completed and executed when submitted. Only one copy of the BID form is required.

Each BIDDERS shall acknowledge receipt of all addenda in the spaces provided in the Bid Form. The BID form and BID bond may be submitted loose. It is not necessary to submit these documents in the specification book. Each BIDDERS will be responsible to assure himself that all ADDENDA have been received. The Owner reserves the right to reject all bids.

THIS BID REQUIRES ATTENDANCE BY THE BIDDER TO THE PRE-BID CONFERENCE. The Pre-Bid Conference will be held at 2:00 p.m. on October 2, 2012 at the Dunn Erwin Landfill Maintenance Shop Building, 449 Daniel's Rd., Dunn, North Carolina.

To demonstrate qualification to perform the Work, each Bidder shall submit with the proposal satisfactory proof of his qualification to satisfactorily complete the work within them allocated. Bidder shall submit, among with other items, information and evidence with respect to the following:

1. That the Bidder is licensed in the State of North Carolina to perform the type and scope of work included in the plans and specifications, has proper Limitations, and proper Classification.
2. That the bidder has done work of similar nature and value.
3. That the Bidder will have the available staff, adequate equipment and facilities to complete the work within the time allocated.
4. At least three (3) references from Owners of projects completed by the Bidder within the past 3 years are to be listed on Qualifications of Bidders form included in the Bid Documents.
5. If the Bidder is a corporation, the names of all corporate officers.

MINORITY BUSINESS PARTICIPATION REQUIREMENTS:

Bidder shall identify on the bid, the minority businesses that will be utilized on the project with corresponding total dollar value of the bid and affidavit listing good faith efforts or an affidavit indicating work under contract will be self-performed, as required by G.S. 143-128.2 (c) and G.S. 143-128.2(f). Failure to comply with these requirements is grounds for rejection of the bid.

For the single-prime alternative, the names and license numbers of major subcontractors shall be listed on the proposal form. The Contractor whose bid is accepted shall not substitute any person as subcontractor in the place of the subcontractor listed in the original bid, except:

- a. if the listed subcontractors bid is later determined by the contractor to be non-responsible or non-responsive, or the listed subcontractor refuses to enter into a contract for the complete performance of the bid work; or
- b. with the approval of the awarding authority for good cause shown by the contractor.

Good-faith efforts as set forth in G.S. 143-13(b) shall be used in the selection of a substitute subcontractor. Prior to substituting a subcontractor, the contractor shall identify the substitute contractor and inform the public-entity of its good-faith efforts pursuant to G.S. 143-131(b).

Within 72 hours after notification of being low bidder, the lowers responsible, responsive bidder shall provide either:

- a. An affidavit that includes a description of the portion of work to be executed by minority business, expressed as a percentage of the total contract price, which is equal to or more than the applicable goal. This affidavit shall give rise to a presumption that the bidder has made the required good-faith effort; or
- b. Documentation of its good-faith effort to meet the goal. The documentation must include evidence of all good-faith efforts that were implemented, including any advertisements, solicitations, and evidence of other specific actions demonstrating recruitment and selection of minority business for participation in the contract.

Within thirty (30) days after award of the contract, a list of all identified subcontractors that the contractor will use on the project shall be submitted.

Bidders must earn at least 50 points from the good faith efforts listed below for their bid to be considered responsive. See Affidavit A for point value of each good faith effort.

1. Contacting minority businesses that reasonably could have been expected to submit a quote and that were known to the contractor or available on State or local government maintained lists at least ten (10) days before the bid or proposal date and notifying them of the nature and scope of the work to be performed;
2. Making the construction plans, specification, and requirements available for review by prospective minority businesses, or providing these documents to them at least ten (10) days before the bid or proposals are due;

3. Breaking down or combining elements of work into economically feasible units to facilitate minority participation;
4. Working with minority trade, community, or contractor organizations identified by the Office of Historically Underutilized Businesses and included in the bid documents that provide assistance in recruitment of minority businesses.
5. Attending any pre-bid meetings scheduled by the public owner;
6. Providing assistance in getting required bonding or insurance, or providing alternatives to bonding or insurance for subcontractors;
7. Negotiating in good faith with interested minority businesses and not rejecting them as unqualified without sound reasons based on their capabilities. Any rejection of a minority business, based on lack of qualification, should have the reasons documented in writing;
8. Providing assistance to an otherwise qualified minority business in need of equipment, loan capital, lines of credit, or joint pay agreements to secure loans, supplies, or letters of credit, including waiving credit that is ordinarily required. Assisting minority businesses in obtaining the same unit pricing with the bidder's suppliers in order to help minority businesses in establishing credit;
9. Negotiating joint venture and partnership arrangements with minority businesses in order to increase opportunities for minority business participation in a public construction or repair project when possible;
10. Providing quick pay agreements and policies to enable minority contractors and suppliers to meet cash-flow demands.

Minority business participation must be documented in two ways. State law requires documentation outlined in affidavits A through D. This requirement establishes a 10% goal for minority participation. Use of these affidavits alone does not satisfy the federal documentation requirements. The Federal Government requires documentation of the participation of minority and women owned businesses as described in the NOTICE OF REQUIREMENTS FOR AFFIRMATIVE ACTION.

The Owner reserves the right to reject any or all Bids, including without limitation, nonconforming, non-responsive, unbalanced, or conditional Bids. Owner further reserves the right to reject the Bid of any Bidder whom it finds, after reasonable inquiry and evaluation, to be non-responsible. Owner also reserves the right to waive all informalities not involving price time, or changes in the Work and to negotiate contract terms with the Successful Bidder.

Owner reserves the right to reject any or all bids of any Bidder based on the Bidder's past performance of work for the Owner and any others.

Any BID may be withdrawn prior to the above scheduled time for the opening of BIDS or authorized postponement thereof. Any BID received after the time and date specified shall not be considered. No BIDDER may withdraw a BID within ninety (90) days after the actual date of the opening thereof. Should there be reasons why the contract cannot be awarded within the specified period, the time may be extended by mutual agreement between the OWNER and BIDDER.

It is the responsibility of each Bidder before submitting a Bid, to (1) examine the Contract Documents thoroughly, (b) visit the site to become familiar with local conditions that may affect cost, progress and/or performance of furnishing the Work, (c) Consider Federal, State, and Local Laws and Regulations that may affect cost, progress, performance or furnishing of the Work, (d) study and carefully correlate Bidder's observations with the Contract Documents, and (e) notify Engineer of all conflicts, errors or discrepancies in the Contract Documents.

Information and data reflected in the Contract Documents with respect to Underground facilities at or contiguous to the site is based upon information and data furnished to Engineer by owners of such Underground Facilities and other, and neither Owner nor Engineer assumes responsibility for the accuracy or completeness thereof unless it is expressly provided otherwise in the Supplementary Conditions.

Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders on subsurface conditions, Underground facilities, and other physical conditions and possible changes in the Contract Documents due to differing conditions appear in the General Conditions.

Before submitting a Bid, each Bidder may, at Bidder's own expense and responsibility, make or obtain any examinations, investigations, explorations, test and studies and obtain any additional information and data which pertain to the physical conditions (surface, subsurface, and Underground facilities) at or contiguous to the site or otherwise which may affect cost, progress, performance, or furnishing the Work in accordance with the time, price, and other terms and conditions of the Contract Documents.

The lands upon which the Work is to be performed, rights-of-way and easements for access thereto and other lands designated for use by Contractor in performing the Work are identified in the Contract Documents. All additional lands and access thereto required for temporary construction facilities or storage of materials and equipment are to be provide by Contractor.

Bidder shall coordinate site visit with the Owner, fill all holes, clean up and restore the site to its former conditions upon completion of any such explorations.

Subsurface information is available for the groundwater extraction area such as well installation logs. This information can be provided upon request.

BIDDERS must satisfy themselves of the accuracy of the estimated quantities in the BID schedule by examination of the site and review of the drawings and specifications including ADDENDA. After BIDS have been submitted, the BIDDER shall not assert that there was a misunderstanding concerning the quantities of WORK or of the nature of the work to be done.

BIDDERS may bid on the work in Project 1 only, Project 2 only, or Projects 1&2. The owner reserves the right to award this contract to the lowest, responsive, responsible bidder(s) based on either the Base Bid price for Project 1; the Base Bid price for Project 2; or the combined Base Bid price for Projects 1&2.

The CONTRACT DOCUMENTS contain the provisions required for the construction of the PROJECT. Information obtained from an officer, agent, or employee of the OWNER or any other person shall not affect the risks or obligations assumed by the CONTRACTOR or relieve him from fulfilling any of the conditions of the contract.

Each BID must be accompanied by a BID Bond payable to the OWNER for five percent (5%) of the total amount of the BIDS. As soon as the BID prices have been compared, the OWNER will return the BONDS of all except the three lowest responsible BIDDERS. When the Agreement is executed, the Bonds of the two remaining unsuccessful BIDDERS will be returned. The BID BOND of the successful BIDDER will be retained until the payment BOND and performance BOND have been executed and approved, after which it will be returned. A certified check may be used in lieu of a BID BOND.

A Performance Bond and a Payment Bond, each in the amount of 100 percent of the contract price, with a corporate surety approved by the OWNER, will be required for the faithful performance of the contract. Performance and Payment Bonds shall be valid for a period of at least one year from the date of acceptance of the completed work on each contract division.

Attorneys-in-fact who sign Bid Bonds or Payment Bonds and Performance Bonds must file with each Bond a certified and effective dated copy of their power of attorney.

The party to whom the contract is awarded will be required to execute the Agreement and obtain the Performance Bond and Payment Bonds ten (10) calendar days from the date when NOTICE OF AWARD is delivered to the BIDDER. The NOTICE OF AWARD shall be accompanied by the necessary Agreement and Bond forms. In case of failure of the BIDDER to execute the Agreement, the OWNER may at his option consider the BIDDER in default in which case the BID BOND accompanying the proposal shall become the property of the OWNER.

The OWNER within sixty (60) days of receipt of acceptable Performance Bond, Payment Bond, and Agreement signed by the party to whom the Agreement was awarded shall sign the Agreement and return to such party an executed duplicate of the Agreement. Should the OWNER not execute the Agreement with such period, the BIDDER may by written notice withdraw his signed Agreement. Such notice of withdrawal shall be effective upon receipt of the notice by the OWNER.

The NOTICE TO PROCEED shall be issued within sixty (60) days of the execution of the Agreement by the OWNER. Should there be reasons why the NOTICE TO PROCEED cannot be issued within such period; the time may be extended by mutual agreement between the OWNER and CONTRACTOR. If the NOTICE TO PROCEED has not been issued within the sixty (60) day period or within the period mutually agreed upon, the CONTRACTOR may terminate the Agreement without further liability on the part of either party.

The OWNER may make such investigations as he deems necessary to determine the ability of the BIDDER to perform the work, and the BIDDER shall furnish to the OWNER all such information and data for this purpose as the Owner may request. The OWNER reserves the right to reject any BID if the evidence submitted by, or investigation of, such BIDDER fails to satisfy the OWNER that such BIDDER is property qualified to carry out the obligations of the Agreement and to complete the work contemplated therein.

Failure to file a required affidavit or documentation demonstrating that the contractor made the required good-faith effort is grounds for rejection of the bid.

Award of the Contract, if awarded, will be to the lowest responsive and responsible BIDDER whose qualifications indicate the award will be:

- 1) in the best interest of the Owner.
- 2) and whose proposal complies with all the prescribed requirements.

The OWNER will award the contract conditioned upon funds being made available for such construction for each division. However, the OWNER reserves the right to reject all bids.

All applicable laws, ordinances, and the rules and regulations of all authorities having jurisdiction over construction of the project shall apply to the contract throughout.

Each BIDDER is responsible for inspecting the site and for reading and being thoroughly familiar with the CONTRACT DOCUMENTS. The failure or omission of any BIDDER to do any of the foregoing shall in no way relieve any BIDDER from any obligation in respect to his BID.

The low BIDDER shall supply the names and addresses of major materials SUPPLIERS and SUBCONTRACTORS as information purposes.

Time of Completion and Liquidated Damages: The BIDDER must agree to commence work within the time stipulated in the Agreement. Bidders must also agree to pay as liquidated damages the amount set forth in the Agreement for each consecutive calendar day that the work is incomplete after the scheduled date of completion.

Interpretations of Plans and Specifications: No interpretation of the meaning of the plans, specifications, or other documents will be made to any bidder orally prior to the receipt of bids.

Each BIDDER, after having carefully examined the bidding documents, and not later than seven (7) calendar days prior to date for receipt of BIDS, shall make written request to the Engineer for interpretation or correction of any ambiguity, inconsistency, or error therein which he discovered. The failure on the part of the successful BIDDER to do so shall constitute a waiver of any right to later seek additional compensation for, seek a time extension for, or contest a later interpretation by the Engineer resolving such ambiguity, inconsistency, or error.

Any request for such interpretation shall be in writing addressed to ENGINEER. To be given consideration, such request must be received at least seven (7) days prior to the scheduled date for opening bids. Any such interpretation or supplemental instructions will be issued in the form of addenda to the specifications, which will be mailed to all persons receiving a set of contract documents, not later than five days prior to the date for opening of bids. Failure of any bidder to receive such addenda shall not relieve him of any obligation under his bid as submitted. All addenda so issued shall become part of the contract documents.

Right to Increase or Decrease the Amount of Work: The work comprises approximately the quantities shown in the Bid Form which will be used as a basis for comparison of bids and not for final estimate. The Owner does not, by expression or by implication, agree that the actual work shall correspond with the estimated quantities. BIDDER shall make positive efforts to use small and minority owned businesses and comply with GS 143-128. The BIDDER that is awarded the project shall submit documentation to indicate compliance.

Subcontractors Supplier and Others: If the Supplementary Conditions require the identity of certain Subcontractors, Suppliers, individuals, or entities to be submitted to Owner in advance of a specified date prior to the Effective Date of the Agreement, the apparent Successful Bidder, and any other Bidder so requested, shall within five days after Bid opening, submit to Owner a list of all such Subcontractors, Suppliers, individuals, or entities proposed for those portions of the Work for which such identification is required. Such list shall be accompanied by an experience statement with pertinent information regarding similar projects and other evidence of qualification for each such Subcontractor, Supplier, individual, or entity if requested by Owner. If Owner or Engineer, after due investigation, has

reasonable objection to any proposed Subcontractor, Supplier, individual, or entity, Owner may, before Notice of Award if given, request apparent Successful Bidder to submit a substitute, without an increase in the Bid.

If apparent Successful Bidder declines to make any such substitution, Owner may determine such Bidder to be nonresponsive and reject the Bid. Declining to make requested substitutions will not constitute grounds for forfeiture of the Bid security of any Bidder. Any Subcontractor, Supplier, individual, or entity so listed and against which Owner and Engineer makes no written objection prior to the giving of the Notice of Award will be deemed acceptable to Owner and Engineer subject to revocation of such acceptance after the Effective Date of the Agreement as provided in paragraph 6.06 of the General Conditions.

Sales and Use taxes: OWNER is exempt from North Carolina state sales and use taxes on material and equipment to be incorporated in the work.

Bidders must comply with the President's Executive Order No. 111246 as amended, which prohibits discrimination in employment regarding race, creed, color, sex, or national origin.

Bidders must comply with Title VI of the Civil rights Act of 1964, the David-Bacon Act, the Anti-Kickback Act, the Contract Work Hours Standard Act, and 40 CFR 22.1016.

The Bidder shall make positive efforts to use small and minority owned businesses.

The Contractor and Subcontractors shall comply with 41 CFR 60-4, in regard to affirmative action, to insure equal opportunity to females and minorities and will apply the timetables and goals, set forth in 41 CFR 60-4, if applicable.

The Contractor shall meet all labor standards.

**BIDDER'S REPORT OF
SUBCONTRACTOR SELECTION AND EFFORTS
TO OBTAIN WOMEN AND MINORITY SUBCONTRACTORS**

One form must be completed for each subcontractor trade.

Project Name:

Project Reference Number:

General Contractor:

Subcontractor Trade:

If no subcontractors used indicate why:

Selected Subcontractor: _____ Subcontract Amount \$ _____

Address and Telephone No.:

Is the selected contractor(s) women or minority owned: Yes () No ()

If No, list M/WBE firms you contacted:

Name, Address and Telephone No.

How did you learn or
Become familiar with Firm

1. _____

2. _____

3. _____

4. _____

If women and minority-owned firm(s) contacted and not selected explain reason(s):

If women and minority-owned firm(s) not contacted explain reason(s):

Completed By:

Name: _____ Position: _____

Signature: _____ Date: _____

Multiple forms to be attached to bid proposal forms and must be completed and signed in order for bid to be complete.

SUBCONTRACTORS AND MATERIAL SUPPLIERS LIST

Bidder shall provide the following information concerning minorities and women-owned subcontractors. All information shall be complete for acceptable award.

A. List of Subcontractors to be used

<u>Subcontractor</u>	(M/F*)	<u>Work</u>	<u>Dollar Amt.</u>	<u>% of Total</u>
_____	()	_____	_____	_____
_____	()	_____	_____	_____
_____	()	_____	_____	_____
_____	()	_____	_____	_____
_____	()	_____	_____	_____
_____	()	_____	_____	_____

B. Material Suppliers List

<u>Supplier</u>		<u>Material</u>		
_____	()	_____	_____	_____
_____	()	_____	_____	_____
_____	()	_____	_____	_____
_____	()	_____	_____	_____
_____	()	_____	_____	_____
_____	()	_____	_____	_____

*(M) Denotes Minority
 (F) Denotes Female
 (M/F) Denotes Minority & Female

The total value of minority business contracting will be (\$)_____.

State of North Carolina AFFIDAVIT A – Listing of Good Faith Efforts

County of _____

(Name of Bidder)

Affidavit of _____

I have made a good faith effort to comply under the following areas checked:

Bidders must earn at least 50 points from the good faith efforts listed for their bid to be considered responsive. (1 NC Administrative Code 30 I.0101)

- 1 – (10 pts)** Contacted minority businesses that reasonably could have been expected to submit a quote and that were known to the contractor, or available on State or local government maintained lists, at least 10 days before the bid date and notified them of the nature and scope of the work to be performed.
- 2 --(10 pts)** Made the construction plans, specifications and requirements available for review by prospective minority businesses, or providing these documents to them at least 10 days before the bids are due.
- 3 – (15 pts)** Broken down or combined elements of work into economically feasible units to facilitate minority participation.
- 4 – (10 pts)** Worked with minority trade, community, or contractor organizations identified by the Office of Historically Underutilized Businesses and included in the bid documents that provide assistance in recruitment of minority businesses.
- 5 – (10 pts)** Attended prebid meetings scheduled by the public owner.
- 6 – (20 pts)** Provided assistance in getting required bonding or insurance or provided alternatives to bonding or insurance for subcontractors.
- 7 – (15 pts)** Negotiated in good faith with interested minority businesses and did not reject them as unqualified without sound reasons based on their capabilities. Any rejection of a minority business based on lack of qualification should have the reasons documented in writing.
- 8 – (25 pts)** Provided assistance to an otherwise qualified minority business in need of equipment, loan capital, lines of credit, or joint pay agreements to secure loans, supplies, or letters of credit, including waiving credit that is ordinarily required. Assisted minority businesses in obtaining the same unit pricing with the bidder's suppliers in order to help minority businesses in establishing credit.
- 9 – (20 pts)** Negotiated joint venture and partnership arrangements with minority businesses in order to increase opportunities for minority business participation on a public construction or repair project when possible.
- 10 - (20 pts)** Provided quick pay agreements and policies to enable minority contractors and suppliers to meet cash-flow demands.

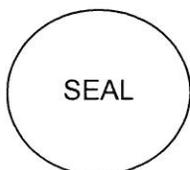
The undersigned, if apparent low bidder, will enter into a formal agreement with the firms listed in the Identification of Minority Business Participation schedule conditional upon scope of contract to be executed with the Owner. Substitution of contractors must be in accordance with GS143-128.2(d) Failure to abide by this statutory provision will constitute a breach of the contract.

The undersigned hereby certifies that he or she has read the terms of the minority business commitment and is authorized to bind the bidder to the commitment herein set forth.

Date: _____ Name of Authorized Officer: _____

Signature: _____

Title: _____



State of _____, County of _____

Subscribed and sworn to before me this _____ day of _____ 20____

Notary Public _____

My commission expires _____

State of North Carolina --AFFIDAVIT B-- Intent to Perform Contract with Own Workforce.

County of _____

Affidavit of _____
(Name of Bidder)

I hereby certify that it is our intent to perform 100% of the work required for the _____
_____ contract.
(Name of Project)

In making this certification, the Bidder states that the Bidder does not customarily subcontract elements of this type project, and normally performs and has the capability to perform and will perform all elements of the work on this project with his/her own current work forces; and

The Bidder agrees to provide any additional information or documentation requested by the owner in support of the above statement.

The undersigned hereby certifies that he or she has read this certification and is authorized to bind the Bidder to the commitments herein contained.

Date: _____ Name of Authorized Officer: _____

Signature: _____

Title: _____



State of _____, County of _____

Subscribed and sworn to before me this _____ day of _____ 20__

Notary Public _____

My commission expires _____

Do not submit with bid Do not submit with bid Do not submit with bid Do not submit with bid

State of North Carolina - AFFIDAVIT C - Portion of the Work to be Performed by Minority Firms

County of _____

(Note this form is to be submitted only by the apparent lowest responsible, responsive bidder.)

If the portion of the work to be executed by minority businesses as defined in GS143-128.2(g) is equal to or greater than 10% of the bidders total contract price, then the bidder must complete this affidavit. This affidavit shall be provided by the apparent lowest responsible, responsive bidder within **72 hours** after notification of being low bidder.

Affidavit of _____ I do hereby certify that on the _____
(Name of Bidder)

Project ID# _____ (Project Name) Amount of Bid \$ _____

I will expend a minimum of _____% of the total dollar amount of the contract with minority business enterprises. Minority businesses will be employed as construction subcontractors, vendors, suppliers or providers of professional services. Such work will be subcontracted to the following firms listed below. Attach additional sheets if required

Name and Phone Number	*Minority Category	Work description	Dollar Value

*Minority categories: Black, African American (B), Hispanic (H), Asian American (A) American Indian (I), Female (F) Socially and Economically Disadvantaged (D)

Pursuant to GS143-128.2(d), the undersigned will enter into a formal agreement with Minority Firms for work listed in this schedule conditional upon execution of a contract with the Owner. Failure to fulfill this commitment may constitute a breach of the contract.

The undersigned hereby certifies that he or she has read the terms of this commitment and is authorized to bind the bidder to the commitment herein set forth.

Date: _____ Name of Authorized Officer: _____

Signature: _____

Title: _____



State of _____, County of _____

Subscribed and sworn to before me this _____ day of _____ 20____

Notary Public _____

My commission expires _____

State of North Carolina AFFIDAVIT D – Good Faith Efforts

County of _____

(Note this form is to be submitted only by the apparent lowest responsible, responsive bidder.)

If the goal of 10% participation by minority business **is not** achieved, the Bidder shall provide the following documentation to the Owner of his good faith efforts:

Affidavit of _____ I do hereby certify that on the
(Name of Bidder)

_____ (Project Name)
Project ID# _____ Amount of Bid \$ _____

I will expend a minimum of _____% of the total dollar amount of the contract with minority business enterprises. Minority businesses will be employed as construction subcontractors, vendors, suppliers or providers of professional services. Such work will be subcontracted to the following firms listed below. (Attach additional sheets if required)

Name and Phone Number	*Minority Category	Work description	Dollar Value

*Minority categories: Black, African American (B), Hispanic (H), Asian American (A) American Indian (I), Female (F) Socially and Economically Disadvantaged (D)

Examples of documentation that may be required to demonstrate the Bidder's good faith efforts to meet the goals set forth in these provisions include, but are not necessarily limited to, the following:

- A. Copies of solicitations for quotes to at least three (3) minority business firms from the source list provided by the State for each subcontract to be let under this contract (if 3 or more firms are shown on the source list). Each solicitation shall contain a specific description of the work to be subcontracted, location where bid documents can be reviewed, representative of the Prime Bidder to contact, and location, date and time when quotes must be received.
- B. Copies of quotes or responses received from each firm responding to the solicitation.
- C. A telephone log of follow-up calls to each firm sent a solicitation.
- D. For subcontracts where a minority business firm is not considered the lowest responsible sub-bidder, copies of quotes received from all firms submitting quotes for that particular subcontract.
- E. Documentation of any contacts or correspondence to minority business, community, or contractor organizations in an attempt to meet the goal.
- F. Copy of pre-bid roster.
- G. Letter documenting efforts to provide assistance in obtaining required bonding or insurance for minority business.
- H. Letter detailing reasons for rejection of minority business due to lack of qualification.
- I. Letter documenting proposed assistance offered to minority business in need of equipment, loan capital, lines of credit, or joint pay agreements to secure loans, supplies, or letter of credit, including waiving credit that is ordinarily required.

Failure to provide the documentation as listed in these provisions may result in rejection of the bid and award to the next lowest responsible and responsive bidder.

Pursuant to GS143-128.2(d), the undersigned will enter into a formal agreement with Minority Firms for work listed in this schedule conditional upon execution of a contract with the Owner. Failure to fulfill this commitment may constitute a breach of the contract.

Do not submit with the bid Do not submit with the bid

The undersigned hereby certifies that he or she has read the terms of this commitment and is authorized to bind the bidder to the commitment herein set forth.

Date: _____ Name of Authorized Officer: _____

Signature: _____

Title: _____



State of _____, County of _____

Subscribed and sworn to before me this _____ day of _____ 20____

Notary Public _____

My commission expires _____

**BID FORM
FOR
COUNTY OF HARNETT
DUNN ERWIN LANDFILL CORRECTIVE ACTION PROJECT**

FROM:

Bidder: _____ Submitted: _____

Address: _____

Contractor's License No.: _____

TO: COUNTY OF HARNETT

The undersigned, as Bidder, hereby declares that the only person, or persons, interested in this Bid as principal(s) is, or are, named herein; that no other persons have any interest in the Bid or in the Contract to be entered into; that this Bid is made without connection with any person, company, or parties making a bid; and that it is in all respects fair and in good faith without collusion or fraud.

The Bidder further declares that he has examined the Site of the work and informed himself fully in regard to all conditions pertaining to the place where the work is to be done, that he has examined the Plans and Specifications for the work and the contractual documents relative thereto; and that he has satisfied himself as to the work to be performed.

Bidder acknowledges receipt of the following addenda:

No. _____

Date: _____

Bidder acknowledges that it was required to make written request to the Engineer for interpretation or correction of any ambiguity, inconsistency, or error in the Bidding Documents which he discovered. The Bidder acknowledges that this submission of a Bid constitutes a free and knowing waiver on the part of the Bidder, if later he becomes the successful Bidder and/or Contractor, to seek additional compensation, to seek an extension of time, or to contest a later interpretation by the Engineer, for any ambiguity, inconsistency, or error that the Bidder discovered prior to submission of the Bid.

The Bidder further proposes and agrees, if this Bid is accepted, to contract with the Owner, County of Harnett, in the attached form to contract, to furnish all material, equipment, tools, apparatus, means of transportation, and labor necessary thereto, and to complete the construction of the proposed facilities in full and complete accordance with the Plans, Specifications and Contract Documents, to the full and entire satisfaction of the Engineer and the Owner at the prices listed hereafter.

ITEMS OF WORK: The work comprises approximately the quantities shown herein which will be used as a basis for comparison of bids and not for final estimate. The Owner does not, expressly or by implication, agree that the actual amount of work shall correspond with the estimated quantities.

Payment for work required by the Contract Documents shall be based on the pay items described herein. The work associated with each pay item is intended to include all of the work and materials required for complete installation. The descriptions herein may not be complete; however, the project shall be constructed in accordance with the Contract Documents, and for the cost associated with the lump sum and unit process included in the Bid Form.

In the event the Contractor discovers and item or work not listed in the Bid Form, he shall include his cost for this work in a related item listed.

In case of error in extension, the "Unit Price" shall govern rather than the "Total."

The unit prices and lump sum amounts listed below include all labor, materials, installation cost, overhead, profit, insurance, taxes, etc., to cover the finished work, in place.

ADDITIVE OR DEDUCTIVE ALTERNATES: The basis for award shall be the Base Bid for plus any combination of the Additive or Deductive Alternates.

**BID FORM
HARNETT COUNTY
DUNN ERWIN LANDFILL CORRECTIVE ACTION PROJECT**

PROJECT 1
SANITARY SEWER PUMP STATION, FORCE MAIN, &
GROUNDWATER EXTRACTION SYSTEM

PROJECT 1, DIVISION 1.1, PUMP STATION & FORCE MAIN					
Number	Description	Quantity	Unit	Unit Cost	Total Cost
1.1.1	General requirements, Mobilization	lump sum		\$	\$
1.1.2	Clearing	0.1	acre	\$	\$
1.1.3	Silt fence, Check dams, Fill, Fabric, Compacted ABC stone & other necessary E&S control items	lump sum		\$	\$
1.1.4	Chain-link fence 6' high	185	lf	\$	\$
1.1.5	Gate 12' wide	1	each	\$	\$
1.1.6	Gate 3' wide	1	each	\$	\$
1.1.7	Precast wet well, 6' dia., 10' deep with Aluminum Hatch 30" x 48"	1	each	\$	\$
1.1.8	Precast vault, 4'x4.5'x4' with Aluminum hatch, 42"x 42"	2	each	\$	\$
1.1.9	Concrete pad, 4" thick	60	sf	\$	\$
1.1.10	Gravel paving within Pump Station yard	lump sum		\$	\$
1.1.11	Precast manhole, 4' dia., 5' deep	1	each	\$	\$
1.1.12	(2) Submersible pumps, 4" discharge, 230 volt w/ phase conversion, all associated controls, wiring, installation, rails, and required appertunances	lump sum		\$	\$

PROJECT 1, DIVISION 1.1, PUMP STATION & FORCE MAIN					
Number	Description	Quantity	Unit	Unit Cost	Total Cost
1.1.13	4" check valve	2	each	\$	\$
1.1.14	4" gate valve	3	each	\$	\$
1.1.15	Jib crane w/ power hoist & concrete foundation	lump sum		\$	\$
1.1.16	Yard piping, hydrant, & associated concrete	lump sum		\$	\$
1.1.17	SCADA package	Allowance			\$18,000
1.1.18	Rain Hood, Circuit breaker panel, Disconnect Switch, Service Pole w/ Light, Generator connection & Manual Transfer Switch, Yard wiring, Lights Junction Box, & any other misc. electrical items necessary for completeion of work.	lump sum		\$	\$
1.1.19	Ultrasonic flow meter	1	each	\$	\$
1.1.20	Odor control pump & tank	Allowance			\$3,000
1.1.21	6" PVC SDR-21 force main including fittings & tracer wire	9310	lf	\$	\$
1.1.22	6" D.I.P. Cl. 350 force main	40	lf	\$	\$
1.1.23	8" HDPE DR-9 by horiz. directional drilling	156	lf	\$	\$
1.1.24	12" steel encasement pipe	80	lf	\$	\$
1.1.25	Combination air valve in manhole	1	each	\$	\$
1.1.26	Coating & connection to existing manhole	lump sum		\$	\$
1.1.27	Asphalt pavement repair	35	sy	\$	\$
1.1.28	Gravel drive repair	30	sy	\$	\$
1.1.29	Seeding & mulching	2.2	acres	\$	\$
SUBTOTAL DIVISION 1.1					

PROJECT 1, DIVISION 1.2, GROUNDWATER EXTRACTION SYSTEM					
Number	Description	Quantity	Unit	Unit Cost	Total Cost
1.2.1	General requirements, Mobilization	lump sum		\$	\$
1.2.2	Leachate Pump Station #1, 1 1/2" discharge & associated controls & appertunances	lump sum		\$	\$
1.2.3	Leachate Pump Station #2, 2" discharge & associated controls & appertunances	lump sum		\$	\$
1.2.4	Leachate Pump Station #3, 1 1/2" discharge & associated controls & appertunances	lump sum		\$	\$
1.2.5	3" x 6" dual containment HDPE leachate line	2411	lf	\$	\$
1.2.6	30' PVC well points w/ valve	50	each	\$	\$
1.2.7	4" PVC or HDPE well point header pipe	1690	lf	\$	\$
1.2.8	4" x 8" dual containment HDPE groundwater pipe	1310	lf	\$	\$
1.2.9	6" PVC sleeve under drive by open cut	26	lf	\$	\$
1.2.10	Asphalt pavement repair	30	sy	\$	\$
1.2.11	Well point pump station w/ power conversion & associated controls & appertunances	lump sum		\$	\$
1.2.12	Circuit breaker panel, service pole w/ light, Well point pump station wiring	lump sum		\$	\$
1.2.13	Extension of power to Leachate P.S. #1, 3 #8, 1 #10, & required conduit	700	lf	\$	\$
1.2.14	Extension of power to Leachate P.S. #2, 3 #8, 1 #10 & required conduit	710	lf	\$	\$
1.2.15	Extension of power to Leachate P.S. #3, 3 #8, 1 #10 & required conduit	1320	lf	\$	\$
1.2.16	Coordination of installation of power to well point pump station by Progress	Allowance			\$1,000
1.2.17	Seeding & mulching	1	ac	\$	\$
SUBTOTAL DIVISION 1.2					\$

Project 1 - Total Base Bid (Division 1.1 + 1.2) \$ _____

Use Words _____

PROJECT 2
CONVENIENCE CENTER AND TRANSFER STATION IMPROVEMENTS

PROJECT 2, DIVISION 2.1, CONVENIENCE CENTER IMPROVEMENTS BASE BID					
Number	Description	Quantity	Unit	Unit Cost	Total Cost
2.1.1	General requirements, Mobilization	lump sum		\$	\$
2.1.2	Silt fence, Inlet protection, & other necessary E&S Controls	lump sum		\$	\$
2.1.3	Demolition of concrete wing wall	lump sum		\$	\$
2.1.4	Demolition of concrete curb	68	lf	\$	\$
2.1.5	Topsoil stripping and Replacement	140	cy	\$	\$
2.1.6	Fill	300	cy	\$	\$
2.1.7	Concrete retaining wall 8' high	50	lf	\$	\$
2.1.8	Concrete curb & gutter	174	lf	\$	\$
2.1.9	Concrete pavement 6" thick	556	sy	\$	\$
2.1.10	Concrete pavement lower level	155	sy	\$	\$
2.1.11	Steel pipe bollards	17	each	\$	\$
2.1.12	Precast concrete bin wall blocks	32	each	\$	\$
2.1.13	8" x 8" x 22' steel angle	lump sum		\$	\$
2.1.14	Relocation of yard hydrant	lump sum		\$	\$
2.1.15	Seeding & matting	260	sy	\$	\$
SUBTOTAL DIVISION 2.1 BASE BID					\$

PROJECT 2, DIVISION 2.1A, CONVENIENCE CENTER IMPROVEMENTS ALTERNATE					
Number	Description	Quantity	Unit	Unit Cost	Total Cost
2.1.16	Demolition of concrete wing wall	lump sum		\$	\$
2.1.17	Demolition of concrete curb	115	lf	\$	\$
2.1.18	Topsoil stripping & Replacement	30	cy	\$	\$
2.1.19	Fill	55	cy	\$	\$
2.1.20	Concrete retaining wall 8' high	54	lf	\$	\$
2.1.21	Concrete curb & gutter	230	lf	\$	\$
2.1.22	Concrete pavement 6" thick	24	sy	\$	\$
2.1.23	Concrete pavement lower level	184	sy	\$	\$
2.1.24	Ashpalt pavement	64	sy	\$	\$
2.1.25	Steel pipe bollards	2	each	\$	\$
2.1.26	Seeding & matting	78	sy	\$	\$
	SUBTOTAL DIVISION 2.1A (ALTERNATE)				\$

PROJECT 2, DIVISION 2.2, TRANSFER STATION EXPANSION & RENOVATION					
Number	Description	Quantity	Unit	Unit Cost	Total Cost
2.2.1	General requirements, Mobilization	lump sum		\$	\$
2.2.2	Clearing	lump sum		\$	\$
2.2.3	Silt fence	300	lf	\$	\$
2.2.4	Concrete curb	100	lf	\$	\$
2.2.5	Concrete diversion swale berm	93	lf	\$	\$
2.2.6	Abandonment of trench drain	lump sum		\$	\$
2.2.7	Concrete topping	790	sy	\$	\$
2.2.8	Concrete wall 1' thick, 13' high	61	lf	\$	\$
2.2.9	Concrete shelf repair	lump sum		\$	\$
2.2.10	Concrete wing wall repair	lump sum		\$	\$
2.2.11	Concrete sidewalk	24	sy	\$	\$
2.2.12	Concrete tipping floor runoff sumps	2	each	\$	\$
2.2.13	Steel pipe bollards	2	each	\$	\$
2.2.14	Steel trash bin alterations	lump sum		\$	\$
2.2.15	Metal building expansion	lump sum		\$	\$
2.2.16	3,000 concrete pump tanks, traffic rated	2	each	\$	\$
2.2.17	8" PVC drain pipe with fittings	86	lf	\$	\$
2.2.18	6" PVC drain pipe with fittings	558	lf	\$	\$
2.2.19	4" PVC drain pipe with fittings	26	lf	\$	\$
2.2.20	PVC cleanouts	9	each	\$	\$
2.2.21	8" gate valve	2	each	\$	\$
2.2.22	4" plug valves	3	each	\$	\$
2.2.23	2" PVC water line, hydrant bend & installation of hose reel	lump sum		\$	\$
2.2.24	Replace light fixtures	3	each	\$	\$
2.2.25	Provide light fixtures	2	each	\$	\$
2.2.26	Wiring	lump sum		\$	\$
SUBTOTAL DIVISION 2.2					

Total Base Bid – Project 2 (Division 2.1 + 2.2) \$ _____

Use Words _____

Total Base Bid – Project 2 +Division 2.1A Alternate \$ _____

Use Words _____

Total Base Bid for completing all work in Project 1 and Project 2 as described in the specifications and as shown on the Drawings (if submitting bid on both Projects)

\$ _____

Use Words _____

Total Base Bid for completing all work in Project 1 and Project 2 including Division 2.1A Alternate as described in the specifications and as shown on the Drawings (if submitting bid on both Projects)

\$ _____

Use Words _____

The basis for award shall be either the Base Bid Price for Project 1, the Base Bid for Project 2, or the combination of the Total Base Bid for Project 1 and 2.

SUBCONTRACTOR LIST:

Plumbing Subcontractor: _____

Plumbing Subcontractor License Number: _____

Electrical Subcontractor: _____

Electrical Subcontractor License Number: _____

The above unit prices shall include all labor, materials, bailing, shoring, removal, overhead, profit, insurance, etc., to cover the finished work of the several kinds called for.

Bidder understands that the Owner reserves the right to reject all bids and to waive any technicalities and formalities in the bidding.

The Bidder agrees that this bid shall be good and may not be withdrawn for a period of sixty (60) calendar days after the scheduled closing time for receiving bids.

Upon receipt of notice of award, bidder will execute the formal contract attached within twenty (20) days and deliver a Surety Bond or Bonds.

ATTACHED HERETO is a certified check on the _____
_____ Bank of _____
and/or bid bond with the _____ Company for
the sum of _____ Dollars (\$_____),
made payable to _____ as a bid guarantee.

The attached bid security is to become the property of the Owner in the event the contract and bond are not executed within the time above set forth, as liquidated damages for the delay and additional expense to the Owner caused thereby.

The Bidder further proposes and agrees hereby to commence the work with adequate forces and equipment within fifteen (15) days after being notified by the Owner to proceed, and to complete the work within two hundred forty (240) calendar days after the date when Contract Times commence to run, and completed and ready for final payment within two hundred sixty (260) calendar days after the date with Contract Times commence to run unless the period for completion is extended otherwise by the Contract Documents.

The Bidder further agrees to pay the sum of \$500.00 per day as liquidated damages to the Owner for each calendar day that expires after the time specified for substantial completion until the work is substantially complete. After substantial completion, if the Bidder shall neglect, refuse, or fail to complete the remaining Work within the Contract Time or any proper extension thereof granted by the Owner, Bidder shall pay Owner \$500.00 for each calendar day that expires after the time specified for completeness and readiness for final payment until the Work is completed and ready for final payment.

Firm: _____

By: _____

Title: _____

(Seal - if bid is by a corporation)

MINORITY BUSINESS PARTICIPATION REQUIREMENTS:

Provide on the Bid: Under GS143-128.3 (c) the undersigned bidder shall identify on its bid the minority business that it will use on the project and the total dollar value of the bid that will be performed by the minority business and list the good faith efforts (Affidavit A) made to solicit participation.

Note: A contractor that performs all of the work with its own workforce may submit an Affidavit B to that effect in lieu of the Affidavit A required above.

After the bid opening: The Owner will consider all bids and alternated and determine the lowest responsible, responsive bidder. Upon notification of being the apparent low bidder, the bidder shall then submit within 72 hours of the notification of being the apparent low bidder, the following:

An Affidavit C that includes a description of the portion of work to be executed by minority businesses, expressed as a percentage of the total contract price, which is equal to or more than the 10% goal established. This affidavit shall give rise to the presumption that the bidder has made the required good faith effort;

OR

Affidavit D of its good faith effort to meet the goal. The document must include evidence of all good faith efforts that were implemented, including any advertisements, solicitations and other specific actions demonstrating recruitment and selection of minority businesses for participation in the contract.

NOTE: Bidders must submit with their bid the BIDDER'S REPORT OF SUBCONTRACTOR SELECTION AND EFFORTS TO OBTAIN WOMEN AND MINORITY SUBCONTRACTORS (page DBE-3), the SUBCONTRACTOR'S AND MINORITY SUPPLIERS LIST (page DBE-4), and AFFIDAVIT A or AFFIDAVIT B as applicable. Failure to submit a required affidavit or documentation with the bid or after being notified apparent low bidder may be grounds for rejection of the bid.

Firm: _____

By: _____

Title: _____

(Seal - if bid is by a corporation)

COMMUNICATION OF COUNTY OF HARNETT, NORTH CAROLINA TOWARD USE OF MINORITY AND WOMEN-OWNED BUSINESS CONTRACTORS

In accordance with G.S. 143-128.2, (effective January 1, 2002), these guidelines establish goals for minority participation in single-prime bidding, separate-prime bidding, construction manager-at-risk, and alternative contracting methods on construction projects in the amount of \$300,000 or more. The legislation provides that the Public Entity shall have a verifiable ten percent goal for participation by minority businesses in the total value of work for each project for which a contract or contracts are awarded. These requirements are published to accomplish that end.

SECTION A: INTENT

It is the intent of these guidelines that the Public Entity, as awarding authority for construction projects, and the contractors and subcontractors performing the construction contracts awarded, shall cooperate and, in good faith, do all things legal, proper, and reasonable to achieve the statutory goal of 10% for participation by minority businesses in each construction project as mandated by GS 143-128.2. Nothing in these guidelines shall be construed to require contractors, or awarding authorities, to award contracts or subcontracts to make purchases of materials or equipment from minority-business contractors, or minority-business subcontractors, who do not submit the lowest responsible, responsive bid(s).

SECTION B: DEFINITIONS

1. Minority - A person who is a citizen or lawful permanent resident of the United States, and who is:
 - a. Black; that is, a person having origins in any of the black racial groups in Africa;
 - b. Hispanic; that is, a person of Spanish or Portuguese culture with origins in Mexico, South or Central America, or the Caribbean Islands, regardless of race;
 - c. Asian American; that is, a person having origins in any of the original peoples of the Far East, Southeast Asia, Asia, the Indian subcontinent, and the Pacific Islands;
 - d. American Indian; that is, a person having origins in any of the original peoples of North America; or
 - e. Female.
2. Minority Business - Means a business:
 - a. In which at least fifty one percent is owned by one or more minority persons; or in the case of a corporation, in which at least fifty one percent

of the stock is owned by one or more minority persons, or socially and economically disadvantaged individuals; and

- b. Of which the management and daily business operations are controlled by one or more of the minority persons, or socially and economically disadvantaged individuals who own it.
3. Socially and Economically Disadvantaged Individual - Means the same as defined in 15 U.S.C. 637. "Socially Disadvantaged Individuals are those who have been subjected to racial or ethnic prejudice, or cultural bias because of their identity as a member of a group without regard to their individual qualities. Economically Disadvantaged Individuals are socially disadvantaged individuals whose ability to compete in the free enterprise system has been impaired due to diminished capital and credit opportunities, as compared to others in the same business area who are not socially disadvantaged."
4. Public Entity - Means local governmental units.
5. Owner - The local government unit named in the contract.
6. Designer - Any person, firm, partnership, or corporation, which has contracted with the Public Entity to perform architectural or engineering work.
7. Bidder - Any person, firm, partnership, corporation, association, or joint venture seeking to be awarded a public contract or subcontract.
8. Contract - A mutually binding legal relationship, or any modification thereof, obligating the seller to furnish equipment, materials or services, including construction, and obligating the buyer to pay for them.
9. Contractor - Any person, firm, partnership, corporation, association, or joint venture which has contracted with the Public Entity to perform construction work or repair.
10. Subcontractor - A firm under contract with the prime contractor or construction manager-at-risk for supplying materials, labor, and/or installation. The subcontractor may or may not provide materials in his subcontract.

SECTION C: RESPONSIBILITIES

1. Office for Historically Underutilized Businesses, Department of Administration (hereinafter referred to as HUB Office.)

The HUB Office has established a program which allows interested persons or businesses, qualifying as a minority business under G. S. 143-128.2, to obtain certification in the State of North Carolina procurement system. The information provided by the minority businesses will be used by the HUB Office to:

- a. Identify those areas of work for which there are minority businesses, as requested;
- b. Make available to interested parties, a list of prospective minority-business contractors and subcontractors;
- c. Assist in the determination of technical assistance needed by minority-business contractors.

In addition to being responsible for the certification/verification of minority businesses that want to participate in the State construction program, the HUB Office will:

- (1) Maintain a current list of minority businesses. The list shall include areas of work in which each minority business is interested;
- (2) Inform minority businesses on how to identify and obtain contracting and subcontracting opportunities through the public entity;
- (3) Inform minority businesses of the contracting and subcontracting process for public construction building projects;
- (4) Work with the North Carolina trade and professional organizations to improve the ability of minority businesses to compete in the State construction projects;
- (5) The HUB Office also oversees the minority business program by:
 - a. Monitoring compliance with the program requirements;
 - b. Assisting in the implementation of training and technical assistance programs;
 - c. Identifying and implementing outreach efforts to increase the utilization of minority businesses;
- d. Reporting the results of minority business utilization to the Secretary of the Department of Administration, the Governor, and the General Assembly.

2. Owner

Before awarding a contract, the owner shall do the following:

- a. Develop and implement a minority business participation outreach plan to identify minority businesses that can perform public building projects, and to implement outreach efforts to encourage minority business participation in these projects to include education, recruitment, and interaction between minority businesses and non-minority businesses;

- b. Attend the scheduled Pre-bid Conference;
- c. At least 10 days prior to the scheduled day of bid opening, notify minority businesses that have requested notices from the Public Entity for public construction or repair work, and minority businesses that otherwise indicate to the Office for Historically Underutilized Businesses an interest in the type of work being bid, or the potential contracting opportunities listed in the proposal. The notification shall include the following:
 - 1. A description of the work for which the bid is being solicited;
 - 2. The date, time, and location where bids are to be submitted;
 - 3. The name of the individual within the owner's organization who will be available to answer questions about the project;
 - 4. Where bid documents may be reviewed;
 - 5. Any special requirements that may exist;
- d. Utilize other media, as appropriate, likely to inform potential minority businesses of the bid being sought;
- e. Maintain documentation of any contracts, correspondence, or conversation with minority business firms made in an attempt to meet the goals;
- f. Review, jointly with the designer, all requirements of G.S. 143-128.2(c) and G.S. 143-128.2(f) - (i.e. bidders' proposals for identification of the minority businesses that will be utilized with corresponding total dollar value of the bid and an affidavit listing good faith efforts, or an affidavit of self-performance of work, if the contractor will perform work under contract by its own workforce) prior to recommendation of award;
- g. Evaluate documentation to determine that good faith effort has been achieved for minority business utilization prior to recommendation of award.

3. Designer

Under the single-prime bidding, separate-prime bidding, construction manager-at-risk, or alternative contracting method, the designer will:

- a. Attend the scheduled Pre-bid Conference to explain minority business requirements to prospective bidders;
- b. Assist the owner to identify and notify prospective minority business prime and subcontractors of potential contracting opportunities;

- c. Maintain documentation of any contacts, correspondence, or conversation with minority business firms made in an attempt to meet the goals;
- d. Review jointly with the owner, all requirements of G.S. 143-128.2(c) and G.S. 143-128.2(f) – (i.e. bidders’ proposals for identification of the minority businesses that will be utilized with corresponding total dollar value of the bid, and affidavit listing good faith efforts, or affidavit of self-performance of work, if the contractor will perform work under contract by its own workforce) - prior to recommendation of award.

4. Prime Contractor(s), Construction Manager-at-risk, and its First-Tier Subcontractors

- a. Attend the scheduled Pre-bid Conference;
- b. Identify or determine those work areas of a subcontract where minority businesses may have an interest in performing subcontract work;
- c. At least ten (10) days prior to the scheduled day of bid opening, notify minority businesses of potential subcontracting opportunities listed in the proposal. The notification will include the following:
 - 1. a description of the work for which the sub-bid is being solicited;
 - 2. The date, time, and location where sub-bids are to be submitted;
 - 3. The name of the individual within the company who will be available to answer questions about the project;
 - 4. Where bid documents may be reviewed;
 - 5. Any special requirements that may exist, such as insurance, licenses, bonds, and financial arrangements.

If there are more than three minority businesses in the general locality of the project who offer similar contracting or subcontracting services in the specific trade, the contractor(s) shall notify three (3), but may contact more, if the contractor(s) so desires;

- d. During the bidding process, comply with the contractor’(s) requirements listed in the proposal for minority participation;
- e. Identify on the bid, the minority businesses that will be utilized on the project with corresponding total dollar value of the bid, and an affidavit listing good faith efforts as required by G.S. 143-128.2(c) and G.S. 143-128.2(f);

- e. Make documentation showing evidence of implementation of Prime Contractor(s), Construction Manager-at-risk, and First-Tier Subcontractor responsibilities available for review by County of Harnett upon request;
- f. Upon being named the apparent low bidder, the bidder shall provide one of the following:
 - 1. An affidavit (Affidavit C) that includes a description of the portion of work to be executed by minority businesses, expressed as a percentage of the total contract price which is equal to, or more than the applicable goal.
 - 2. If the percentage is not equal to the applicable goal, then documentation of all good faith efforts is taken to meet the goal. Failure to comply with these requirements is grounds for rejection of the bid and award to the next lowest responsible and responsive bidder;
- g. The contractor(s) shall identify the name(s) of minority business subcontractor(s) and corresponding dollar amount of work on the Schedule of Values. The Schedule of Values shall be provided as required in Article 31 of the General Conditions of the contract to facilitate payments to the subcontractors;
- h. During the construction of a project, at any time, if it becomes necessary to replace a minority business subcontractor, immediately advise the owner, in writing, of the circumstances involved. The prime contractor shall make a good faith effort to replace a minority business subcontractor with another;
- i. If during the construction of a project additional subcontracting opportunities become available, make a good faith effort to solicit sub-bids for minority businesses;
- j. It is the intent that these requirements apply to all contractors performing as prime contractor, first-tier subcontractor, or construction manager-at-risk;
- k. In accordance with GS143-135.5(b) contractors who have been found guilty of discrimination within the last two years are not allowed to bid.

6. Minority Business Responsibilities

Minority businesses contracted by owners or bidders must respond promptly, whether or not they wish to submit a bid.

SECTION D: DISPUTE PROCEDURES

It is the policy of this State that, disputes involving a person's rights, duties, or privileges, should be settled through informal procedures. To that end, minority business disputes, arising under these guidelines, should be resolved as governed under G.S. 143-128(g).

MINORITY BUSINESS CONTRACT PROVISIONS (CONSTRUCTION)

MINORITY BUSINESS SUBCONTRACT GOALS:

The goals for participation by minority firms as subcontractors on this project have been set at 10%.

The bidder must identify on its bid the minority businesses that will be utilized on the project with corresponding total dollar value of the bid and affidavit (Affidavit A) listing good faith efforts, or affidavit (Affidavit B) self-performance of work, if the bidder will perform work under contract by its own workforce, as required by G.S. 143-128.2(c) and G.S. 143-0128.2(f).

The lowest responsible, responsive bidder must provide Affidavit C; which includes a description of the portion of work to be executed by minority businesses expressed as a percentage of the total contract price which is equal to, or more than the applicable goal.

OR

Provide Affidavit D; which includes a description of the portion of work to be executed by minority businesses expressed as a percentage of the total contract price, **with documentation of good faith effort, if the percentage is not equal to the applicable goal.**

OR

Provide Affidavit B; which includes sufficient information for the State to determine that the bidder does not customarily subcontract work on this type of project.

The above information must be provided as required. Failure to submit these documents is grounds for rejection of the bid.

MINIMUM COMPLIANCE REQUIREMENTS:

All written statements, affidavits, or intentions made by the Bidder shall become a part of the agreement between the Contractor and the Public Entity for performance of this contract. Failure to comply with any of these statements, affidavits, or intentions, or with the minority business guidelines shall constitute a breach of the contract. A finding by the Public Entity that any information submitted, either prior to the award of the contract or during the performance of the contract, is inaccurate, false, or incomplete, shall also constitute a breach of the contract. Any such breach may result in termination of the contract in accordance with the termination provisions contained in the contract. It shall be solely at the option of the State whether to terminate the contract for breach or not.

In determining whether a contractor has made good faith efforts, the State will evaluate all efforts made by the Contractor and will determine compliance in regard to quantity, intensity, and the results of these efforts. Good faith efforts include:

1. Contacting minority businesses that reasonably could have been expected to

- submit a quote, that were known to the contractor, or available to the State or local government maintained lists at least 10 days before the bid or proposal date, and notifying them of the nature and scope of the work to be performed;
2. Making the construction plans, specifications and requirements available for review by prospective minority businesses, or providing these documents to them at least 10 days before the bid or proposals are due;
 3. Breaking down or combining elements or work into economically feasible units to facilitate minority participation;
 4. Working with minority trade, community, or contractor organizations identified by the Office for Historically Underutilized Businesses and included in the bid documents that provide assistance in recruitment of minority businesses;
 5. Attending any Pre-bid meetings scheduled by the public owner;
 6. Providing assistance in getting the required bonding or insurance, or providing alternative bonding or insurance for subcontractors;
 7. Negotiating, in good faith, with interested minority businesses and not rejecting them as unqualified without sound reasons based on their capabilities. Any rejection of a minority business, based on lack of qualification, should have the reasons documented in writing;
 8. Providing assistance to an otherwise qualified minority business in need of equipment, loan capital, lines of credit, or joint pay agreements to secure loans, supplies, or letters of credit, including waiving credit that is ordinarily required. Assisting minority businesses in obtaining the same unit pricing with the bidder's suppliers in order to help minority businesses in establishing credit;
 9. Negotiating joint venture and partnership arrangements with minority businesses in order to increase opportunities for minority business participation on a public construction or repair project, when possible;
 10. Providing quick pay agreements and policies to enable minority contractors and suppliers meet cash-flow demands.

BID BOND

KNOW ALL MEN BY THESE PRESENTS, that we, the undersigned, _____
_____ as Principal, and _____
_____ as Surety, are hereby held and firmly bound
unto _____ as OWNER in the penal sum of _____

for payment of which, well and truly to be made, we hereby jointly and severally bind ourselves, successors and assigns.

Signed, this _____ day of _____, 20_____.

The Condition of the above obligation is such that whereas the Principal has submitted to
_____ a certain BID, attached
hereto and hereby made a part hereof to enter into a contract in writing, for the

NOW, THEREFORE,

- (a) If said BID shall be rejected, or
- (b) If said BID shall be accepted and the Principal shall execute and deliver a contract in the Form of Contract attached hereto (properly completed in accordance with said BID) and shall furnish a BOND for his faithful performance of said contract, and for the payment of all persons performing labor or furnishing materials in connection therewith, and shall in all other respects perform the agreement created by the acceptance of said BID, then, this obligation shall be void, otherwise the same shall remain in force and effect; it being expressly understood and agreed that the liability of the Surety for any and all claims hereunder shall, in no event, exceed the penal amount of this obligation as herein stated.

The Surety, for value received, hereby stipulates and agrees that the obligations of said Surety and its BOND shall be in no way impaired or affected by any extension of the time within which the OWNER may accept such BID; and said Surety does hereby waive notice of any such extension.

IN WITNESS WHEREOF, the Principal and the Surety have hereunto set their hands and seals, and such of them as are corporations have caused their corporate seals to be hereto affixed and these presents to be signed by their proper officers, the day and year first set forth above.

Principal (L.S.)

Surety

By: _____

IMPORTANT -- Surety companies executing BONDS must appear on the Treasury Department's most current list (circular 570 as amended) and be authorized to transact business in the state where the project is located.

AGREEMENT

THIS AGREEMENT, made the _____ day of _____, 20__, by and between County of Harnett, hereinafter called the "OWNER" and _____ doing business as (an individual), or (a partnership) or (a corporation) hereinafter call "CONTRACTOR".

WITNESSETH:

That for and in consideration of the payments and agreements hereinafter mentioned:

1. The CONTRACTOR will commence and complete the construction of the Dunn Erwin Corrective Action Project _____.
2. The CONTRACTOR will furnish all of the materials, supplies, tools, equipment, labor, and other services necessary for the construction and completion of the PROJECT described herein.
3. The CONTRACTOR will commence the work required by the CONTRACT DOCUMENTS within fifteen (15) calendar days after the date of the NOTICE TO PROCEED and will complete the same within 240 calendar days after the date when Contract Times commence to run, and completed and ready for final payment within 260 calendar days after the date with Contract Times commence to run unless the period for completion is extended otherwise by the CONTRACT DOCUMENTS.

The CONTRACTOR further agrees to pay the sum of \$500.00 per day as liquidated damages to the OWNER for each calendar day that expires after the time specified for substantial completion until the work is substantially complete. After substantial completion, if the CONTRACTOR shall neglect, refuse, or fail to complete the remaining Work within the Contract Time or any proper extension thereof granted by the OWNER, CONTRACTOR shall pay OWNER \$500.00 for each calendar day that expires after the item specified for completeness and readiness for final payment until the Work is completed and ready for final payment.

4. The CONTRACTOR agrees to perform all of the WORK described in the CONTRACT DOCUMENTS and comply with the terms therein for the sum of \$ _____, or as shown in the BID schedule.

5. The term "CONTRACT DOCUMENTS" means and includes the following:
- A. Advertisement for Bids
 - B. Information for Bidders
 - C. Bid Form
 - D. Bidder's Report of Subcontractor Selection and Efforts to
 - E. Obtain Women and Minority Subcontractors
 - F. Affidavit A – Listing of the Good Faith Effort
 - G. Affidavit B – Intent to Perform Contract with Own Workforce
 - H. Affidavit C – Portion of the Work to be Performed by Minority Firms
 - I. Affidavit D – Good Faith Efforts
 - J. Communication of County of Harnett, North Carolina Toward Use of Minority and Women-Owned Business Contractors
 - K. Bid Bond
 - L. Agreement
 - M. Payment Bond
 - N. Performance Bond
 - O. Notice of Award
 - P. Notice to Proceed
 - Q. Change Order
 - R. Application for Payment
 - S. General Conditions
 - T. Supplementary General Conditions
 - A. Drawings prepared by _____ numbered _____ through _____ dated _____.
 - B. Specifications prepared by _____ dated _____.
 - C. ADDENDA: _____

6. The OWNER will pay to the CONTRACTOR in the manner and at such times as set forth in the General Conditions such amounts as required by the CONTRACT DOCUMENTS.

7. This Agreement shall be binding upon all parties hereto and their respective heirs, executors, administrators, successors, and assigns.

IN WITNESS WHEREOF, the parties hereto have executed, or caused to be executed by their duly authorized officials, this Agreement in (4) copies each of which shall be deemed an original on date first above written.

OWNER:

County of Harnett

By: _____

Name: Scott T. Sauer

Title: County Manager

(SEAL)

ATTEST:

Name: _____

Title: _____

CONTRACTOR:

By: _____

Name: _____

Address: _____

(SEAL)

ATTEST:

Name: _____

NOTICE OF AWARD

TO: _____

Project Description: Dunn Erwin Landfill Corrective Action Project

The OWNER has considered the BID submitted by you for the above described WORK in response to its Advertisement for Bids dated _____

You are hereby notified that your BID has been accepted for items in the amount of \$_____.

You are required by the Information for Bidders to execute the Agreement and furnish the required CONTRACTOR'S Performance Bond, Payment Bond and certificates of insurance within ten (10) calendar days from the date of this Notice to you.

If you fail to execute said Agreement and to furnish said Bonds within ten (10) days from the date of this Notice, said OWNER will be entitled to consider all your rights arising out of the OWNER'S acceptance of your BID as abandoned and as a forfeiture of your Bid Bond. The OWNER will be entitled to such other rights as may be granted by law.

You are required to return an acknowledged copy of this NOTICE OF AWARD to the OWNER.

Dated this ____ day of _____, 2012

County of Harnett
Owner

By: _____

Name: Scott T. Sauer

Title: County Manager

Receipt of the above NOTICE OF AWARD is hereby acknowledged by this the ____ day of _____, 2012.

By: _____

Title: _____

Contractor: _____

NOTICE TO PROCEED

TO: _____

DATE: _____
PROJECT: Dunn Erwin Corrective Action

You are hereby notified to commence WORK in accordance with our Agreement dated _____, 20__, on or before _____, 20__, and you are to complete the work within _____ consecutive calendar days thereafter. The work will be completed and ready for final payment within _____ consecutive days after the date which Contract Time will commence to run. The date of substantial completion of all WORK is _____. The date of readiness for final payment is _____.

County of Harnett
Owner

By: _____

Name: Scott T. Sauer

Title: County Manager

ACCEPTANCE OF NOTICE:

Receipt of the above NOTICE TO PROCEED is hereby acknowledged by

this the _____ day of _____, 201__

By: _____

Title: _____

PAYMENT BOND

Any singular reference to Contractor, Surety, Owner, or other party shall be considered plural where applicable.

CONTRACTOR (*Name and Address*):

SURETY (*Name, and Address of Principal Place of Business*):

OWNER (*Name and Address*):

CONTRACT

Effective Date of Agreement:

Amount:

Description (*Name and Location*):

BOND

Bond Number:

Date (*Not earlier than Effective Date of Agreement*):

Amount:

Modifications to this Bond Form:

Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth below, do each cause this Payment Bond to be duly executed by an authorized officer, agent, or representative.

CONTRACTOR AS PRINCIPAL

SURETY

Contractor's Name and Corporate Seal (Seal)

Surety's Name and Corporate Seal (Seal)

By: _____
Signature

By: _____
Signature (Attach Power of Attorney)

Print Name

Print Name

Title

Title

Attest: _____
Signature

Attest: _____
Signature

Title

Title

Note: Provide execution by additional parties, such as joint venturers, if necessary.

1. Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to Owner to pay for labor, materials, and equipment furnished by Claimants for use in the performance of the Contract, which is incorporated herein by reference.
2. With respect to Owner, this obligation shall be null and void if Contractor:
 - 2.1 Promptly makes payment, directly or indirectly, for all sums due Claimants, and
 - 2.2 Defends, indemnifies, and holds harmless Owner from all claims, demands, liens, or suits alleging non-payment by Contractor by any person or entity who furnished labor, materials, or equipment for use in the performance of the Contract, provided Owner has promptly notified Contractor and Surety (at the addresses described in Paragraph 12) of any claims, demands, liens, or suits and tendered defense of such claims, demands, liens, or suits to Contractor and Surety, and provided there is no Owner Default.
3. With respect to Claimants, this obligation shall be null and void if Contractor promptly makes payment, directly or indirectly, for all sums due.
4. Surety shall have no obligation to Claimants under this Bond until:
 - 4.1 Claimants who are employed by or have a direct contract with Contractor have given notice to Surety (at the address described in Paragraph 12) and sent a copy, or notice thereof, to Owner, stating that a claim is being made under this Bond and, with substantial accuracy, the amount of the claim.
 - 4.2 Claimants who do not have a direct contract with Contractor:
 1. Have furnished written notice to Contractor and sent a copy, or notice thereof, to Owner, within 90 days after having last performed labor or last furnished materials or equipment included in the claim stating, with substantial accuracy, the amount of the claim and the name of the party to whom the materials or equipment were furnished or supplied, or for whom the labor was done or performed; and
 2. Have either received a rejection in whole or in part from Contractor, or not received within 30 days of furnishing the above notice any communication from Contractor by which Contractor had indicated the claim will be paid directly or indirectly; and
 3. Not having been paid within the above 30 days, have sent a written notice to Surety (at the address described in Paragraph 12) and sent a copy, or notice thereof, to Owner, stating that a claim is being made under this Bond and enclosing a copy of the previous written notice furnished to Contractor.
5. If a notice by a Claimant required by Paragraph 4 is provided by Owner to Contractor or to Surety, that is sufficient compliance.
6. Reserved.
7. Surety's total obligation shall not exceed the amount of this Bond, and the amount of this Bond shall be credited for any payments made in good faith by Surety.
8. Amounts owed by Owner to Contractor under the Contract shall be used for the performance of the Contract and to satisfy claims, if any, under any performance bond. By Contractor furnishing and Owner accepting this Bond, they agree that all funds earned by Contractor in the performance of the Contract are dedicated to satisfy obligations of Contractor and Surety under this Bond, subject to Owner's priority to use the funds for the completion of the Work.
9. Surety shall not be liable to Owner, Claimants, or others for obligations of Contractor that are unrelated to the Contract. Owner shall not be liable for payment of any costs or expenses of any Claimant under this Bond, and shall have under this Bond no obligations to make payments to, give notices on behalf of, or otherwise have obligations to Claimants under this Bond.

10. Surety hereby waives notice of any change, including changes of time, to the Contract or to related subcontracts, purchase orders, and other obligations.

11. No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the location in which the Work or part of the Work is located or after the expiration of one year from the date (1) on which the Claimant gave the notice required by Paragraph 4.1 or Paragraph 4.2.3, or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Contract, whichever of (1) or (2) first occurs. If the provisions of this paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

12. Notice to Surety, Owner, or Contractor shall be mailed or delivered to the addresses shown on the signature page. Actual receipt of notice by Surety, Owner, or Contractor, however accomplished, shall be sufficient compliance as of the date received at the address shown on the signature page.

13. When this Bond has been furnished to comply with a statutory requirement in the location where the Contract was to be performed, any provision in this Bond conflicting with said statutory requirement shall be deemed deleted herefrom and provisions conforming to such statutory requirement shall be deemed incorporated herein. The intent is that this Bond shall be construed as a statutory Bond and not as a common law bond.

14. Upon request of any person or entity appearing to be a potential beneficiary of this Bond, Contractor shall promptly furnish a copy of this Bond or shall permit a copy to be made.

15. Definitions

15.1 Claimant: An individual or entity having a direct contract with Contractor, or with a first-tier subcontractor of Contractor, to furnish labor, materials, or equipment for use in the performance of the Contract. The intent of this Bond shall be to include without limitation in the terms "labor, materials or equipment" that part of water, gas, power, light, heat, oil, gasoline, telephone service, or rental equipment used in the Contract, architectural and engineering services required for performance of the Work of Contractor and Contractor's subcontractors, and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor, materials, or equipment were furnished.

15.2 Contract: The agreement between Owner and Contractor identified on the signature page, including all Contract Documents and changes thereto.

15.3 Owner Default: Failure of Owner, which has neither been remedied nor waived, to pay Contractor as required by the Contract, or to perform and complete or otherwise comply with the other terms thereof.

FOR INFORMATION ONLY – *(Name, Address, and Telephone)*

Surety Agency or Broker:

Owner's Representative *(Engineer or other)*:

PERFORMANCE BOND

Any singular reference to Contractor, Surety, Owner, or other party shall be considered plural where applicable.

CONTRACTOR (*Name and Address*): SURETY (*Name, and Address of Principal Place of Business*):

OWNER (*Name and Address*):

CONTRACT

Effective Date of Agreement:

Amount:

Description (*Name and Location*):

BOND

Bond Number:

Date (*Not earlier than Effective Date of Agreement*):

Amount:

Modifications to this Bond Form:

Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth below, do each cause this Performance Bond to be duly executed by an authorized officer, agent, or representative.

CONTRACTOR AS PRINCIPAL

SURETY

Contractor's Name and Corporate Seal (Seal)

Surety's Name and Corporate Seal (Seal)

By: _____
Signature

By: _____
Signature (Attach Power of Attorney)

Print Name

Print Name

Title

Title

Attest: _____
Signature

Attest: _____
Signature

Title

Title

Note: Provide execution by additional parties, such as joint venturers, if necessary.

Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to Owner for the performance of the Contract, which is incorporated herein by reference.

1. If Contractor performs the Contract, Surety and Contractor have no obligation under this Bond, except to participate in conferences as provided in Paragraph 2.1.
2. If there is no Owner Default, Surety's obligation under this Bond shall arise after:
 - 2.1 Owner has notified Contractor and Surety, at the addresses described in Paragraph 9 below, that Owner is considering declaring a Contractor Default and has requested and attempted to arrange a conference with Contractor and Surety to be held not later than 15 days after receipt of such notice to discuss methods of performing the Contract. If Owner, Contractor, and Surety agree, Contractor shall be allowed a reasonable time to perform the Contract, but such an agreement shall not waive Owner's right, if any, subsequently to declare a Contractor Default; and
 - 2.2 Owner has declared a Contractor Default and formally terminated Contractor's right to complete the Contract. Such Contractor Default shall not be declared earlier than 20 days after Contractor and Surety have received notice as provided in Paragraph 2.1; and
 - 2.3 Owner has agreed to pay the Balance of the Contract Price to:
 1. Surety in accordance with the terms of the Contract; or
 2. Another contractor selected pursuant to Paragraph 3.3 to perform the Contract.
3. When Owner has satisfied the conditions of Paragraph 2, Surety shall promptly, and at Surety's expense, take one of the following actions:
 - 3.1 Arrange for Contractor, with consent of Owner, to perform and complete the Contract; or
 - 3.2 Undertake to perform and complete the Contract itself, through its agents or through independent contractors; or
 - 3.3 Obtain bids or negotiated proposals from qualified contractors acceptable to Owner for a contract for performance and completion of the Contract, arrange for a contract to be prepared for execution by Owner and contractor selected with Owner's concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Contract, and pay to Owner the amount of damages as described in Paragraph 5 in excess of the Balance of the Contract Price incurred by Owner resulting from Contractor Default; or
 - 3.4 Waive its right to perform and complete, arrange for completion, or obtain a new contractor, and with reasonable promptness under the circumstances:
 1. After investigation, determine the amount for which it may be liable to Owner and, as soon as practicable after the amount is determined, tender payment therefor to Owner; or
 2. Deny liability in whole or in part and notify Owner citing reasons therefor.
4. If Surety does not proceed as provided in Paragraph 3 with reasonable promptness, Surety shall be deemed to be in default on this Bond 15 days after receipt of an additional written notice from Owner to Surety demanding that Surety perform its obligations under this Bond, and Owner shall be entitled to enforce any remedy available to Owner. If Surety proceeds as provided in Paragraph 3.4, and Owner refuses the payment tendered or Surety has denied liability, in whole or in part, without further notice Owner shall be entitled to enforce any remedy available to Owner.
5. After Owner has terminated Contractor's right to complete the Contract, and if Surety elects to act under Paragraph 3.1, 3.2, or 3.3 above, then the responsibilities of Surety to Owner shall not be greater than those of Contractor under the Contract, and the responsibilities of Owner to Surety shall not be greater than those of Owner under the Contract. To the limit of the amount of this Bond, but subject to commitment by Owner of the Balance of the Contract Price to mitigation of costs and damages on the Contract, Surety is obligated without duplication for:

- 5.1 The responsibilities of Contractor for correction of defective Work and completion of the Contract;
- 5.2 Additional legal, design professional, and delay costs resulting from Contractor's Default, and resulting from the actions of or failure to act of Surety under Paragraph 3; and
- 5.3 Liquidated damages, or if no liquidated damages are specified in the Contract, actual damages caused by delayed performance or non-performance of Contractor.

6. Surety shall not be liable to Owner or others for obligations of Contractor that are unrelated to the Contract, and the Balance of the Contract Price shall not be reduced or set off on account of any such unrelated obligations. No right of action shall accrue on this Bond to any person or entity other than Owner or its heirs, executors, administrators, or successors.

7. Surety hereby waives notice of any change, including changes of time, to Contract or to related subcontracts, purchase orders, and other obligations.

8. Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction in the location in which the Work or part of the Work is located, and shall be instituted within two years after Contractor Default or within two years after Contractor ceased working or within two years after Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

9. Notice to Surety, Owner, or Contractor shall be mailed or delivered to the address shown on the signature page.

10. When this Bond has been furnished to comply with a statutory requirement in the location where the Contract was to be performed, any provision in this Bond conflicting with said statutory requirement shall be deemed deleted herefrom and provisions conforming to such statutory requirement shall be deemed incorporated herein. The intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

11. Definitions.

- 11.1 Balance of the Contract Price: The total amount payable by Owner to Contractor under the Contract after all proper adjustments have been made, including allowance to Contractor of any amounts received or to be received by Owner in settlement of insurance or other Claims for damages to which Contractor is entitled, reduced by all valid and proper payments made to or on behalf of Contractor under the Contract.
- 11.2 Contract: The agreement between Owner and Contractor identified on the signature page, including all Contract Documents and changes thereto.
- 11.3 Contractor Default: Failure of Contractor, which has neither been remedied nor waived, to perform or otherwise to comply with the terms of the Contract.
- 11.4 Owner Default: Failure of Owner, which has neither been remedied nor waived, to pay Contractor as required by the Contract or to perform and complete or otherwise comply with the other terms thereof.

FOR INFORMATION ONLY – *(Name, Address and Telephone)*

Surety Agency or Broker:

Owner's Representative *(Engineer or other party)*:

APPLICATION FOR PAYMENT NO. _____

To: _____ (OWNER)

From: _____ (CONTRACTOR)

Contract: _____

Project: _____

OWNER's Contract No. _____ ENGINEER's Project No. _____

For Work accomplished through the date of: _____

- 1. Original Contract Price: \$ _____
- 2. Net change by Change Orders and Written Amendments (+ or -): \$ _____
- 3. Current Contract Price (1 plus 2): \$ _____
- 4. Total completed and stored to date: \$ _____
- 5. Retainage (per Agreement):
 - _____ % of completed Work: \$ _____
 - _____ % of stored material: \$ _____
 - Total Retainage: \$ _____
- 6. Total completed and stored to date less retainage (4 minus 5): \$ _____
- 7. Less previous Application for Payments: \$ _____
- 8. **DUE THIS APPLICATION (6 MINUS 7):** \$ _____

Accompanying Documentation:

CONTRACTOR'S Certification:

The undersigned CONTRACTOR certifies that (1) all previous progress payments received from OWNER on account of Work done under the Contract referred to above have been applied on account to discharge CONTRACTOR's legitimate obligations incurred in connection with Work covered by prior Applications for Payment numbered 1 through _____ inclusive; (2) title of all Work, materials and equipment incorporated in said Work or otherwise listed in or covered by this Application for Payment will pass to OWNER at time of payment free and clear of all Liens, security interests and encumbrances (except such as are covered by a Bond acceptable to OWNER indemnifying OWNER against any such Lien, security interest or encumbrance); and (3) all Work covered by this Application for Payment is in accordance with the Contract Documents and not defective.

Dated _____ CONTRACTOR

By: _____
State of _____
County of _____
Subscribed and sworn to before me this _____
day of _____, _____

Notary Public
My Commission expires: _____

Payment of the above AMOUNT DUE THIS APPLICATION is recommended.

Dated _____ ENGINEER

By: _____

APPLICATION FOR PAYMENT

INSTRUCTIONS

A. GENERAL INFORMATION

The sample form of Schedule of Values is intended as a guide only. Many projects require a more extensive form with space for numerous items, descriptions of Change Orders, identification of variable quantity adjustments, summary of materials and equipment stored at the site and other information. It is expected that a separate form will be developed by Engineer and Contractor at the time Contractor's Schedule of Values is finalized. Note also that the format for retainage must be changed if the Contract permits (or the law provides), and Contractor elects to deposit securities in lieu of retainage. Refer to Article 14 of the General Conditions for provisions concerning payments to Contractor.

B. COMPLETING THE FORM

The Schedule of Values, submitted and approved as provided in paragraphs 2.05.B.3 and 2.07 of the General Conditions, should be reproduced as appropriate in the space indicated on the Application for Payment form. Note that the cost of materials and equipment is often listed separately from the cost of installation. Also, note that each Unit Price is deemed to include Contractor's overhead and profit.

All Change Orders affecting the Contract Price should be identified and included in the Schedule of Values as required for progress payments.

The form is suitable for use in the Final Application for Payment as well as for Progress Payments; however, the required accompanying documentation is usually more extensive for final payment. All accompanying documentation should be identified in the space provided on the form.

C. LEGAL REVIEW

All accompanying documentation of a legal nature, such as Lien waivers, should be reviewed by an attorney, and Engineer should so advise Owner.

ITEM	UNIT PRICE	ESTIMATED QUANTITY	SCHEDULE OF VALUES AMOUNT	QUANTITY COMPLETED	AMOUNT	%	MATERIAL STORED	AMOUNT COMPLETED AND STORED
1.	\$		\$		\$		\$	\$
2.								
3.								
4.								
5.								
6.								
7.								
8.								
9.								
10.								
11.								
12.								
13.								
14.								
15.								
16.								
17.								
18.								
19.								
20.								
21.								
22.								
23.								
24.								
25.								
26.								
27.								
28.								
29.								
30.								
TOTAL			\$		\$		\$	\$

Note: Total Schedule of Values Amount should equal the current Contract Price.

Certificate of Substantial Completion

Project:

Owner:

Owner's Contract No.:

Contract:

Engineer's Project No.:

This [tentative] [definitive] Certificate of Substantial Completion applies to:

- All Work under the Contract Documents: The following specified portions of the Work:

Date of Substantial Completion

The Work to which this Certificate applies has been inspected by authorized representatives of Owner, Contractor, and Engineer, and found to be substantially complete. The Date of Substantial Completion of the Project or portion thereof designated above is hereby declared and is also the date of commencement of applicable warranties required by the Contract Documents, except as stated below.

A [tentative] [definitive] list of items to be completed or corrected is attached hereto. This list may not be all-inclusive, and the failure to include any items on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

The responsibilities between Owner and Contractor for security, operation, safety, maintenance, heat, utilities, insurance and warranties shall be as provided in the Contract Documents except as amended as follows:

- Amended Responsibilities Not Amended

Owner's Amended Responsibilities:

Contractor's Amended Responsibilities:

CHANGE ORDER

Change Order No.: _____ **Date:** _____ **Agreement Date:** _____

NAME OF PROJECT: Dunn Erwin Landfill Corrective Action Project

OWNER: County of Harnett

CONTRACTOR: _____

The following changes are hereby made to the CONTRACT DOCUMENTS:

Justification:

CHANGE to CONTRACT PRICE: \$ _____

Original CONTRACT PRICE: \$ _____

Current CONTRACT PRICE adjusted by previous CHANGE ORDER: \$ _____

The CONTRACT PRICE due to this CHANGE ORDER will be (increased) (decreased) by \$ _____.

The new CONTRACT PRICE including this CHANGE ORDER: \$ _____.

CHANGE to CONTRACT TIME: _____

Original CONTRACT TIME: _____

Current CONTRACT TIME Changed by previous Change Orders: _____

The CONTRACT TIME will be (increased) (decreased) by _____ calendar days.

The NEW CONTRACT TIME including this Change Order: _____ calendar days

The date for completion of all work will be: _____

Requested by: _____ Contractor

Recommended by: _____ Engineer

Accepted by: _____ Owner

This document has important legal consequences; consultation with an attorney is encouraged with respect to its use or modification. This document should be adapted to the particular circumstances of the contemplated Project and the controlling Laws and Regulations.

STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

Prepared by

ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

and

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Endorsed by



CONSTRUCTION SPECIFICATIONS INSTITUTE

These General Conditions have been prepared for use with the Suggested Forms of Agreement Between Owner and Contractor (EJCDC C-520 or C-525, 2007 Editions). Their provisions are interrelated and a change in one may necessitate a change in the other. Comments concerning their usage are contained in the Narrative Guide to the EJCDC Construction Documents (EJCDC C-001, 2007 Edition). For guidance in the preparation of Supplementary Conditions, see Guide to the Preparation of Supplementary Conditions (EJCDC C-800, 2007 Edition).

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STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

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ARTICLE 1 – DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

- A. Wherever used in the Bidding Requirements or Contract Documents and printed with initial capital letters, the terms listed below will have the meanings indicated which are applicable to both the singular and plural thereof. In addition to terms specifically defined, terms with initial capital letters in the Contract Documents include references to identified articles and paragraphs, and the titles of other documents or forms.
1. *Addenda*—Written or graphic instruments issued prior to the opening of Bids which clarify, correct, or change the Bidding Requirements or the proposed Contract Documents.
 2. *Agreement*—The written instrument which is evidence of the agreement between Owner and Contractor covering the Work.
 3. *Application for Payment*—The form acceptable to Engineer which is to be used by Contractor during the course of the Work in requesting progress or final payments and which is to be accompanied by such supporting documentation as is required by the Contract Documents.
 4. *Asbestos*—Any material that contains more than one percent asbestos and is friable or is releasing asbestos fibers into the air above current action levels established by the United States Occupational Safety and Health Administration.
 5. *Bid*—The offer or proposal of a Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.
 6. *Bidder*—The individual or entity who submits a Bid directly to Owner.
 7. *Bidding Documents*—The Bidding Requirements and the proposed Contract Documents (including all Addenda).
 8. *Bidding Requirements*—The advertisement or invitation to bid, Instructions to Bidders, Bid security of acceptable form, if any, and the Bid Form with any supplements.
 9. *Change Order*—A document recommended by Engineer which is signed by Contractor and Owner and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times, issued on or after the Effective Date of the Agreement.
 10. *Claim*—A demand or assertion by Owner or Contractor seeking an adjustment of Contract Price or Contract Times, or both, or other relief with respect to the terms of the Contract. A demand for money or services by a third party is not a Claim.
 11. *Contract*—The entire and integrated written agreement between the Owner and Contractor concerning the Work. The Contract supersedes prior negotiations, representations, or agreements, whether written or oral.

12. *Contract Documents*—Those items so designated in the Agreement. Only printed or hard copies of the items listed in the Agreement are Contract Documents. Approved Shop Drawings, other Contractor submittals, and the reports and drawings of subsurface and physical conditions are not Contract Documents.
13. *Contract Price*—The moneys payable by Owner to Contractor for completion of the Work in accordance with the Contract Documents as stated in the Agreement (subject to the provisions of Paragraph 11.03 in the case of Unit Price Work).
14. *Contract Times*—The number of days or the dates stated in the Agreement to: (i) achieve Milestones, if any; (ii) achieve Substantial Completion; and (iii) complete the Work so that it is ready for final payment as evidenced by Engineer's written recommendation of final payment.
15. *Contractor*—The individual or entity with whom Owner has entered into the Agreement.
16. *Cost of the Work*—See Paragraph 11.01 for definition.
17. *Drawings*—That part of the Contract Documents prepared or approved by Engineer which graphically shows the scope, extent, and character of the Work to be performed by Contractor. Shop Drawings and other Contractor submittals are not Drawings as so defined.
18. *Effective Date of the Agreement*—The date indicated in the Agreement on which it becomes effective, but if no such date is indicated, it means the date on which the Agreement is signed and delivered by the last of the two parties to sign and deliver.
19. *Engineer*—The individual or entity named as such in the Agreement.
20. *Field Order*—A written order issued by Engineer which requires minor changes in the Work but which does not involve a change in the Contract Price or the Contract Times.
21. *General Requirements*—Sections of Division 1 of the Specifications.
22. *Hazardous Environmental Condition*—The presence at the Site of Asbestos, PCBs, Petroleum, Hazardous Waste, or Radioactive Material in such quantities or circumstances that may present a substantial danger to persons or property exposed thereto.
23. *Hazardous Waste*—The term Hazardous Waste shall have the meaning provided in Section 1004 of the Solid Waste Disposal Act (42 USC Section 6903) as amended from time to time.
24. *Laws and Regulations; Laws or Regulations*—Any and all applicable laws, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.
25. *Liens*—Charges, security interests, or encumbrances upon Project funds, real property, or personal property.
26. *Milestone*—A principal event specified in the Contract Documents relating to an intermediate completion date or time prior to Substantial Completion of all the Work.

27. *Notice of Award*—The written notice by Owner to the Successful Bidder stating that upon timely compliance by the Successful Bidder with the conditions precedent listed therein, Owner will sign and deliver the Agreement.
28. *Notice to Proceed*—A written notice given by Owner to Contractor fixing the date on which the Contract Times will commence to run and on which Contractor shall start to perform the Work under the Contract Documents.
29. *Owner*—The individual or entity with whom Contractor has entered into the Agreement and for whom the Work is to be performed.
30. *PCBs*—Polychlorinated biphenyls.
31. *Petroleum*—Petroleum, including crude oil or any fraction thereof which is liquid at standard conditions of temperature and pressure (60 degrees Fahrenheit and 14.7 pounds per square inch absolute), such as oil, petroleum, fuel oil, oil sludge, oil refuse, gasoline, kerosene, and oil mixed with other non-Hazardous Waste and crude oils.
32. *Progress Schedule*—A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising the Contractor's plan to accomplish the Work within the Contract Times.
33. *Project*—The total construction of which the Work to be performed under the Contract Documents may be the whole, or a part.
34. *Project Manual*—The bound documentary information prepared for bidding and constructing the Work. A listing of the contents of the Project Manual, which may be bound in one or more volumes, is contained in the table(s) of contents.
35. *Radioactive Material*—Source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954 (42 USC Section 2011 et seq.) as amended from time to time.
36. *Resident Project Representative*—The authorized representative of Engineer who may be assigned to the Site or any part thereof.
37. *Samples*—Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and which establish the standards by which such portion of the Work will be judged.
38. *Schedule of Submittals*—A schedule, prepared and maintained by Contractor, of required submittals and the time requirements to support scheduled performance of related construction activities.
39. *Schedule of Values*—A schedule, prepared and maintained by Contractor, allocating portions of the Contract Price to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

40. *Shop Drawings*—All drawings, diagrams, illustrations, schedules, and other data or information which are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work.
41. *Site*—Lands or areas indicated in the Contract Documents as being furnished by Owner upon which the Work is to be performed, including rights-of-way and easements for access thereto, and such other lands furnished by Owner which are designated for the use of Contractor.
42. *Specifications*—That part of the Contract Documents consisting of written requirements for materials, equipment, systems, standards and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable thereto.
43. *Subcontractor*—An individual or entity having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work at the Site.
44. *Substantial Completion*—The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of Engineer, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms “substantially complete” and “substantially completed” as applied to all or part of the Work refer to Substantial Completion thereof.
45. *Successful Bidder*—The Bidder submitting a responsive Bid to whom Owner makes an award.
46. *Supplementary Conditions*—That part of the Contract Documents which amends or supplements these General Conditions.
47. *Supplier*—A manufacturer, fabricator, supplier, distributor, materialman, or vendor having a direct contract with Contractor or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by Contractor or Subcontractor.
48. *Underground Facilities*—All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.
49. *Unit Price Work*—Work to be paid for on the basis of unit prices.
50. *Work*—The entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction, and furnishing, installing, and incorporating all materials and equipment into such construction, all as required by the Contract Documents.
51. *Work Change Directive*—A written statement to Contractor issued on or after the Effective Date of the Agreement and signed by Owner and recommended by Engineer ordering an

addition, deletion, or revision in the Work, or responding to differing or unforeseen subsurface or physical conditions under which the Work is to be performed or to emergencies. A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the change ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order following negotiations by the parties as to its effect, if any, on the Contract Price or Contract Times.

1.02 Terminology

A. The words and terms discussed in Paragraph 1.02.B through F are not defined but, when used in the Bidding Requirements or Contract Documents, have the indicated meaning.

B. *Intent of Certain Terms or Adjectives:*

1. The Contract Documents include the terms "as allowed," "as approved," "as ordered," "as directed" or terms of like effect or import to authorize an exercise of professional judgment by Engineer. In addition, the adjectives "reasonable," "suitable," "acceptable," "proper," "satisfactory," or adjectives of like effect or import are used to describe an action or determination of Engineer as to the Work. It is intended that such exercise of professional judgment, action, or determination will be solely to evaluate, in general, the Work for compliance with the information in the Contract Documents and with the design concept of the Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective is not intended to and shall not be effective to assign to Engineer any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility contrary to the provisions of Paragraph 9.09 or any other provision of the Contract Documents.

C. *Day:*

1. The word "day" means a calendar day of 24 hours measured from midnight to the next midnight.

D. *Defective:*

1. The word "defective," when modifying the word "Work," refers to Work that is unsatisfactory, faulty, or deficient in that it:
 - a. does not conform to the Contract Documents; or
 - b. does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents; or
 - c. has been damaged prior to Engineer's recommendation of final payment (unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion in accordance with Paragraph 14.04 or 14.05).

E. *Furnish, Install, Perform, Provide:*

1. The word "furnish," when used in connection with services, materials, or equipment, shall mean to supply and deliver said services, materials, or equipment to the Site (or some other specified location) ready for use or installation and in usable or operable condition.
2. The word "install," when used in connection with services, materials, or equipment, shall mean to put into use or place in final position said services, materials, or equipment complete and ready for intended use.
3. The words "perform" or "provide," when used in connection with services, materials, or equipment, shall mean to furnish and install said services, materials, or equipment complete and ready for intended use.
4. When "furnish," "install," "perform," or "provide" is not used in connection with services, materials, or equipment in a context clearly requiring an obligation of Contractor, "provide" is implied.

- F. Unless stated otherwise in the Contract Documents, words or phrases that have a well-known technical or construction industry or trade meaning are used in the Contract Documents in accordance with such recognized meaning.

ARTICLE 2 – PRELIMINARY MATTERS

2.01 *Delivery of Bonds and Evidence of Insurance*

- A. When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner such bonds as Contractor may be required to furnish.
- B. *Evidence of Insurance:* Before any Work at the Site is started, Contractor and Owner shall each deliver to the other, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance which either of them or any additional insured may reasonably request) which Contractor and Owner respectively are required to purchase and maintain in accordance with Article 5.

2.02 *Copies of Documents*

- A. Owner shall furnish to Contractor up to ten printed or hard copies of the Drawings and Project Manual. Additional copies will be furnished upon request at the cost of reproduction.

2.03 *Commencement of Contract Times; Notice to Proceed*

- A. The Contract Times will commence to run on the thirtieth day after the Effective Date of the Agreement or, if a Notice to Proceed is given, on the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within 30 days after the Effective Date of the Agreement. In no event will the Contract Times commence to run later than the sixtieth day after the day of Bid opening or the thirtieth day after the Effective Date of the Agreement, whichever date is earlier.

2.04 *Starting the Work*

- A. Contractor shall start to perform the Work on the date when the Contract Times commence to run. No Work shall be done at the Site prior to the date on which the Contract Times commence to run.

2.05 *Before Starting Construction*

- A. *Preliminary Schedules:* Within 10 days after the Effective Date of the Agreement (unless otherwise specified in the General Requirements), Contractor shall submit to Engineer for timely review:
 - 1. a preliminary Progress Schedule indicating the times (numbers of days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract Documents;
 - 2. a preliminary Schedule of Submittals; and
 - 3. a preliminary Schedule of Values for all of the Work which includes quantities and prices of items which when added together equal the Contract Price and subdivides the Work into component parts in sufficient detail to serve as the basis for progress payments during performance of the Work. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.

2.06 *Preconstruction Conference; Designation of Authorized Representatives*

- A. Before any Work at the Site is started, a conference attended by Owner, Contractor, Engineer, and others as appropriate will be held to establish a working understanding among the parties as to the Work and to discuss the schedules referred to in Paragraph 2.05.A, procedures for handling Shop Drawings and other submittals, processing Applications for Payment, and maintaining required records.
- B. At this conference Owner and Contractor each shall designate, in writing, a specific individual to act as its authorized representative with respect to the services and responsibilities under the Contract. Such individuals shall have the authority to transmit instructions, receive information, render decisions relative to the Contract, and otherwise act on behalf of each respective party.

2.07 *Initial Acceptance of Schedules*

- A. At least 10 days before submission of the first Application for Payment a conference attended by Contractor, Engineer, and others as appropriate will be held to review for acceptability to Engineer as provided below the schedules submitted in accordance with Paragraph 2.05.A. Contractor shall have an additional 10 days to make corrections and adjustments and to complete and resubmit the schedules. No progress payment shall be made to Contractor until acceptable schedules are submitted to Engineer.
 - 1. The Progress Schedule will be acceptable to Engineer if it provides an orderly progression of the Work to completion within the Contract Times. Such acceptance will not impose on

Engineer responsibility for the Progress Schedule, for sequencing, scheduling, or progress of the Work, nor interfere with or relieve Contractor from Contractor's full responsibility therefor.

2. Contractor's Schedule of Submittals will be acceptable to Engineer if it provides a workable arrangement for reviewing and processing the required submittals.
3. Contractor's Schedule of Values will be acceptable to Engineer as to form and substance if it provides a reasonable allocation of the Contract Price to component parts of the Work.

ARTICLE 3 – CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE

3.01 Intent

- A. The Contract Documents are complementary; what is required by one is as binding as if required by all.
- B. It is the intent of the Contract Documents to describe a functionally complete project (or part thereof) to be constructed in accordance with the Contract Documents. Any labor, documentation, services, materials, or equipment that reasonably may be inferred from the Contract Documents or from prevailing custom or trade usage as being required to produce the indicated result will be provided whether or not specifically called for, at no additional cost to Owner.
- C. Clarifications and interpretations of the Contract Documents shall be issued by Engineer as provided in Article 9.

3.02 Reference Standards

- A. Standards, Specifications, Codes, Laws, and Regulations
 1. Reference to standards, specifications, manuals, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, shall mean the standard, specification, manual, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Agreement if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.
 2. No provision of any such standard, specification, manual, or code, or any instruction of a Supplier, shall be effective to change the duties or responsibilities of Owner, Contractor, or Engineer, or any of their subcontractors, consultants, agents, or employees, from those set forth in the Contract Documents. No such provision or instruction shall be effective to assign to Owner, Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of the Contract Documents.

3.03 *Reporting and Resolving Discrepancies*

A. *Reporting Discrepancies:*

1. *Contractor's Review of Contract Documents Before Starting Work:* Before undertaking each part of the Work, Contractor shall carefully study and compare the Contract Documents and check and verify pertinent figures therein and all applicable field measurements. Contractor shall promptly report in writing to Engineer any conflict, error, ambiguity, or discrepancy which Contractor discovers, or has actual knowledge of, and shall obtain a written interpretation or clarification from Engineer before proceeding with any Work affected thereby.
2. *Contractor's Review of Contract Documents During Performance of Work:* If, during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents, or between the Contract Documents and (a) any applicable Law or Regulation, (b) any standard, specification, manual, or code, or (c) any instruction of any Supplier, then Contractor shall promptly report it to Engineer in writing. Contractor shall not proceed with the Work affected thereby (except in an emergency as required by Paragraph 6.16.A) until an amendment or supplement to the Contract Documents has been issued by one of the methods indicated in Paragraph 3.04.
3. Contractor shall not be liable to Owner or Engineer for failure to report any conflict, error, ambiguity, or discrepancy in the Contract Documents unless Contractor had actual knowledge thereof.

B. *Resolving Discrepancies:*

1. Except as may be otherwise specifically stated in the Contract Documents, the provisions of the Contract Documents shall take precedence in resolving any conflict, error, ambiguity, or discrepancy between the provisions of the Contract Documents and:
 - a. the provisions of any standard, specification, manual, or code, or the instruction of any Supplier (whether or not specifically incorporated by reference in the Contract Documents); or
 - b. the provisions of any Laws or Regulations applicable to the performance of the Work (unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation).

3.04 *Amending and Supplementing Contract Documents*

- A. The Contract Documents may be amended to provide for additions, deletions, and revisions in the Work or to modify the terms and conditions thereof by either a Change Order or a Work Change Directive.
- B. The requirements of the Contract Documents may be supplemented, and minor variations and deviations in the Work may be authorized, by one or more of the following ways:

1. A Field Order;
2. Engineer's approval of a Shop Drawing or Sample (subject to the provisions of Paragraph 6.17.D.3); or
3. Engineer's written interpretation or clarification.

3.05 *Reuse of Documents*

- A. Contractor and any Subcontractor or Supplier shall not:
1. have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer or its consultants, including electronic media editions; or
 2. reuse any such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of Owner and Engineer and specific written verification or adaptation by Engineer.
- B. The prohibitions of this Paragraph 3.05 will survive final payment, or termination of the Contract. Nothing herein shall preclude Contractor from retaining copies of the Contract Documents for record purposes.

3.06 *Electronic Data*

- A. Unless otherwise stated in the Supplementary Conditions, the data furnished by Owner or Engineer to Contractor, or by Contractor to Owner or Engineer, that may be relied upon are limited to the printed copies (also known as hard copies). Files in electronic media format of text, data, graphics, or other types are furnished only for the convenience of the receiving party. Any conclusion or information obtained or derived from such electronic files will be at the user's sole risk. If there is a discrepancy between the electronic files and the hard copies, the hard copies govern.
- B. Because data stored in electronic media format can deteriorate or be modified inadvertently or otherwise without authorization of the data's creator, the party receiving electronic files agrees that it will perform acceptance tests or procedures within 60 days, after which the receiving party shall be deemed to have accepted the data thus transferred. Any errors detected within the 60-day acceptance period will be corrected by the transferring party.
- C. When transferring documents in electronic media format, the transferring party makes no representations as to long term compatibility, usability, or readability of documents resulting from the use of software application packages, operating systems, or computer hardware differing from those used by the data's creator.

**ARTICLE 4 – AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS;
HAZARDOUS ENVIRONMENTAL CONDITIONS; REFERENCE POINTS**

4.01 *Availability of Lands*

- A. Owner shall furnish the Site. Owner shall notify Contractor of any encumbrances or restrictions not of general application but specifically related to use of the Site with which Contractor must comply in performing the Work. Owner will obtain in a timely manner and pay for easements for permanent structures or permanent changes in existing facilities. If Contractor and Owner are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, as a result of any delay in Owner's furnishing the Site or a part thereof, Contractor may make a Claim therefor as provided in Paragraph 10.05.
- B. Upon reasonable written request, Owner shall furnish Contractor with a current statement of record legal title and legal description of the lands upon which the Work is to be performed and Owner's interest therein as necessary for giving notice of or filing a mechanic's or construction lien against such lands in accordance with applicable Laws and Regulations.
- C. Contractor shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

4.02 *Subsurface and Physical Conditions*

A. *Reports and Drawings:* The Supplementary Conditions identify:

- 1. those reports known to Owner of explorations and tests of subsurface conditions at or contiguous to the Site; and
- 2. those drawings known to Owner of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities).

B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors with respect to:

- 1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto; or
- 2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or
- 3. any Contractor interpretation of or conclusion drawn from any "technical data" or any such other data, interpretations, opinions, or information.

4.03 *Differing Subsurface or Physical Conditions*

A. *Notice:* If Contractor believes that any subsurface or physical condition that is uncovered or revealed either:

1. is of such a nature as to establish that any "technical data" on which Contractor is entitled to rely as provided in Paragraph 4.02 is materially inaccurate; or
2. is of such a nature as to require a change in the Contract Documents; or
3. differs materially from that shown or indicated in the Contract Documents; or
4. is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents;

then Contractor shall, promptly after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.16.A), notify Owner and Engineer in writing about such condition. Contractor shall not further disturb such condition or perform any Work in connection therewith (except as aforesaid) until receipt of written order to do so.

B. *Engineer's Review:* After receipt of written notice as required by Paragraph 4.03.A, Engineer will promptly review the pertinent condition, determine the necessity of Owner's obtaining additional exploration or tests with respect thereto, and advise Owner in writing (with a copy to Contractor) of Engineer's findings and conclusions.

C. *Possible Price and Times Adjustments:*

1. The Contract Price or the Contract Times, or both, will be equitably adjusted to the extent that the existence of such differing subsurface or physical condition causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:
 - a. such condition must meet any one or more of the categories described in Paragraph 4.03.A; and
 - b. with respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraphs 9.07 and 11.03.
2. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times if:
 - a. Contractor knew of the existence of such conditions at the time Contractor made a final commitment to Owner with respect to Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract; or
 - b. the existence of such condition could reasonably have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and

contiguous areas required by the Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor's making such final commitment; or

- c. Contractor failed to give the written notice as required by Paragraph 4.03.A.
3. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, a Claim may be made therefor as provided in Paragraph 10.05. However, neither Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors shall be liable to Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Contractor on or in connection with any other project or anticipated project.

4.04 *Underground Facilities*

A. *Shown or Indicated:* The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or contiguous to the Site is based on information and data furnished to Owner or Engineer by the owners of such Underground Facilities, including Owner, or by others. Unless it is otherwise expressly provided in the Supplementary Conditions:

1. Owner and Engineer shall not be responsible for the accuracy or completeness of any such information or data provided by others; and
2. the cost of all of the following will be included in the Contract Price, and Contractor shall have full responsibility for:
 - a. reviewing and checking all such information and data;
 - b. locating all Underground Facilities shown or indicated in the Contract Documents;
 - c. coordination of the Work with the owners of such Underground Facilities, including Owner, during construction; and
 - d. the safety and protection of all such Underground Facilities and repairing any damage thereto resulting from the Work.

B. *Not Shown or Indicated:*

1. If an Underground Facility is uncovered or revealed at or contiguous to the Site which was not shown or indicated, or not shown or indicated with reasonable accuracy in the Contract Documents, Contractor shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.16.A), identify the owner of such Underground Facility and give written notice to that owner and to Owner and Engineer. Engineer will promptly review the Underground Facility and determine the extent, if any, to which a change is required in the Contract Documents to reflect and document the

consequences of the existence or location of the Underground Facility. During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.

2. If Engineer concludes that a change in the Contract Documents is required, a Work Change Directive or a Change Order will be issued to reflect and document such consequences. An equitable adjustment shall be made in the Contract Price or Contract Times, or both, to the extent that they are attributable to the existence or location of any Underground Facility that was not shown or indicated or not shown or indicated with reasonable accuracy in the Contract Documents and that Contractor did not know of and could not reasonably have been expected to be aware of or to have anticipated. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment in Contract Price or Contract Times, Owner or Contractor may make a Claim therefor as provided in Paragraph 10.05.

4.05 *Reference Points*

- A. Owner shall provide engineering surveys to establish reference points for construction which in Engineer's judgment are necessary to enable Contractor to proceed with the Work. Contractor shall be responsible for laying out the Work, shall protect and preserve the established reference points and property monuments, and shall make no changes or relocations without the prior written approval of Owner. Contractor shall report to Engineer whenever any reference point or property monument is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points or property monuments by professionally qualified personnel.

4.06 *Hazardous Environmental Condition at Site*

- A. *Reports and Drawings:* The Supplementary Conditions identify those reports and drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at the Site.
- B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors with respect to:
 1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences and procedures of construction to be employed by Contractor and safety precautions and programs incident thereto; or
 2. other data, interpretations, opinions and information contained in such reports or shown or indicated in such drawings; or
 3. any Contractor interpretation of or conclusion drawn from any "technical data" or any such other data, interpretations, opinions or information.

- C. Contractor shall not be responsible for any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work. Contractor shall be responsible for a Hazardous Environmental Condition created with any materials brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible.
- D. If Contractor encounters a Hazardous Environmental Condition or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, Contractor shall immediately: (i) secure or otherwise isolate such condition; (ii) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by Paragraph 6.16.A); and (iii) notify Owner and Engineer (and promptly thereafter confirm such notice in writing). Owner shall promptly consult with Engineer concerning the necessity for Owner to retain a qualified expert to evaluate such condition or take corrective action, if any. Promptly after consulting with Engineer, Owner shall take such actions as are necessary to permit Owner to timely obtain required permits and provide Contractor the written notice required by Paragraph 4.06.E.
- E. Contractor shall not be required to resume Work in connection with such condition or in any affected area until after Owner has obtained any required permits related thereto and delivered written notice to Contractor: (i) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work; or (ii) specifying any special conditions under which such Work may be resumed safely. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, or both, as a result of such Work stoppage or such special conditions under which Work is agreed to be resumed by Contractor, either party may make a Claim therefor as provided in Paragraph 10.05.
- F. If after receipt of such written notice Contractor does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special conditions, then Owner may order the portion of the Work that is in the area affected by such condition to be deleted from the Work. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of an adjustment in Contract Price or Contract Times as a result of deleting such portion of the Work, then either party may make a Claim therefor as provided in Paragraph 10.05. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with Article 7.
- G. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition: (i) was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be included within the scope of the Work, and (ii) was not created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 4.06.G shall obligate Owner to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

- H. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 4.06.H shall obligate Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- I. The provisions of Paragraphs 4.02, 4.03, and 4.04 do not apply to a Hazardous Environmental Condition uncovered or revealed at the Site.

ARTICLE 5 – BONDS AND INSURANCE

5.01 *Performance, Payment, and Other Bonds*

- A. Contractor shall furnish performance and payment bonds, each in an amount at least equal to the Contract Price as security for the faithful performance and payment of all of Contractor's obligations under the Contract Documents. These bonds shall remain in effect until one year after the date when final payment becomes due or until completion of the correction period specified in Paragraph 13.07, whichever is later, except as provided otherwise by Laws or Regulations or by the Contract Documents. Contractor shall also furnish such other bonds as are required by the Contract Documents.
- B. All bonds shall be in the form prescribed by the Contract Documents except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in the list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (amended) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury. All bonds signed by an agent or attorney-in-fact must be accompanied by a certified copy of that individual's authority to bind the surety. The evidence of authority shall show that it is effective on the date the agent or attorney-in-fact signed each bond.
- C. If the surety on any bond furnished by Contractor is declared bankrupt or becomes insolvent or its right to do business is terminated in any state where any part of the Project is located or it ceases to meet the requirements of Paragraph 5.01.B, Contractor shall promptly notify Owner and Engineer and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which shall comply with the requirements of Paragraphs 5.01.B and 5.02.

5.02 *Licensed Sureties and Insurers*

- A. All bonds and insurance required by the Contract Documents to be purchased and maintained by Owner or Contractor shall be obtained from surety or insurance companies that are duly licensed or authorized in the jurisdiction in which the Project is located to issue bonds or insurance policies for the limits and coverages so required. Such surety and insurance companies shall also

meet such additional requirements and qualifications as may be provided in the Supplementary Conditions.

5.03 *Certificates of Insurance*

- A. Contractor shall deliver to Owner, with copies to each additional insured and loss payee identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by Owner or any other additional insured) which Contractor is required to purchase and maintain.
- B. Owner shall deliver to Contractor, with copies to each additional insured and loss payee identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by Contractor or any other additional insured) which Owner is required to purchase and maintain.
- C. Failure of Owner to demand such certificates or other evidence of Contractor's full compliance with these insurance requirements or failure of Owner to identify a deficiency in compliance from the evidence provided shall not be construed as a waiver of Contractor's obligation to maintain such insurance.
- D. Owner does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor.
- E. The insurance and insurance limits required herein shall not be deemed as a limitation on Contractor's liability under the indemnities granted to Owner in the Contract Documents.

5.04 *Contractor's Insurance*

- A. Contractor shall purchase and maintain such insurance as is appropriate for the Work being performed and as will provide protection from claims set forth below which may arise out of or result from Contractor's performance of the Work and Contractor's other obligations under the Contract Documents, whether it is to be performed by Contractor, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform any of the Work, or by anyone for whose acts any of them may be liable:
 - 1. claims under workers' compensation, disability benefits, and other similar employee benefit acts;
 - 2. claims for damages because of bodily injury, occupational sickness or disease, or death of Contractor's employees;
 - 3. claims for damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees;
 - 4. claims for damages insured by reasonably available personal injury liability coverage which are sustained:

- a. by any person as a result of an offense directly or indirectly related to the employment of such person by Contractor, or
 - b. by any other person for any other reason;
5. claims for damages, other than to the Work itself, because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom; and
 6. claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance or use of any motor vehicle.
- B. The policies of insurance required by this Paragraph 5.04 shall:
1. with respect to insurance required by Paragraphs 5.04.A.3 through 5.04.A.6 inclusive, be written on an occurrence basis, include as additional insureds (subject to any customary exclusion regarding professional liability) Owner and Engineer, and any other individuals or entities identified in the Supplementary Conditions, all of whom shall be listed as additional insureds, and include coverage for the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of all such additional insureds, and the insurance afforded to these additional insureds shall provide primary coverage for all claims covered thereby;
 2. include at least the specific coverages and be written for not less than the limits of liability provided in the Supplementary Conditions or required by Laws or Regulations, whichever is greater;
 3. include contractual liability insurance covering Contractor's indemnity obligations under Paragraphs 6.11 and 6.20;
 4. contain a provision or endorsement that the coverage afforded will not be canceled, materially changed or renewal refused until at least 30 days prior written notice has been given to Owner and Contractor and to each other additional insured identified in the Supplementary Conditions to whom a certificate of insurance has been issued (and the certificates of insurance furnished by the Contractor pursuant to Paragraph 5.03 will so provide);
 5. remain in effect at least until final payment and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work in accordance with Paragraph 13.07; and
 6. include completed operations coverage:
 - a. Such insurance shall remain in effect for two years after final payment.
 - b. Contractor shall furnish Owner and each other additional insured identified in the Supplementary Conditions, to whom a certificate of insurance has been issued, evidence satisfactory to Owner and any such additional insured of continuation of such insurance at final payment and one year thereafter.

5.05 *Owner's Liability Insurance*

- A. In addition to the insurance required to be provided by Contractor under Paragraph 5.04, Owner, at Owner's option, may purchase and maintain at Owner's expense Owner's own liability insurance as will protect Owner against claims which may arise from operations under the Contract Documents.

5.06 *Property Insurance*

- A. Unless otherwise provided in the Supplementary Conditions, Owner shall purchase and maintain property insurance upon the Work at the Site in the amount of the full replacement cost thereof (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). This insurance shall:
1. include the interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as a loss payee;
 2. be written on a Builder's Risk "all-risk" policy form that shall at least include insurance for physical loss or damage to the Work, temporary buildings, falsework, and materials and equipment in transit, and shall insure against at least the following perils or causes of loss: fire, lightning, extended coverage, theft, vandalism and malicious mischief, earthquake, collapse, debris removal, demolition occasioned by enforcement of Laws and Regulations, water damage (other than that caused by flood), and such other perils or causes of loss as may be specifically required by the Supplementary Conditions.
 3. include expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects);
 4. cover materials and equipment stored at the Site or at another location that was agreed to in writing by Owner prior to being incorporated in the Work, provided that such materials and equipment have been included in an Application for Payment recommended by Engineer;
 5. allow for partial utilization of the Work by Owner;
 6. include testing and startup; and
 7. be maintained in effect until final payment is made unless otherwise agreed to in writing by Owner, Contractor, and Engineer with 30 days written notice to each other loss payee to whom a certificate of insurance has been issued.
- B. Owner shall purchase and maintain such equipment breakdown insurance or additional property insurance as may be required by the Supplementary Conditions or Laws and Regulations which will include the interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors,

members, partners, employees, agents, consultants and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as a loss payee.

- C. All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance with this Paragraph 5.06 will contain a provision or endorsement that the coverage afforded will not be canceled or materially changed or renewal refused until at least 30 days prior written notice has been given to Owner and Contractor and to each other loss payee to whom a certificate of insurance has been issued and will contain waiver provisions in accordance with Paragraph 5.07.
- D. Owner shall not be responsible for purchasing and maintaining any property insurance specified in this Paragraph 5.06 to protect the interests of Contractor, Subcontractors, or others in the Work to the extent of any deductible amounts that are identified in the Supplementary Conditions. The risk of loss within such identified deductible amount will be borne by Contractor, Subcontractors, or others suffering any such loss, and if any of them wishes property insurance coverage within the limits of such amounts, each may purchase and maintain it at the purchaser's own expense.
- E. If Contractor requests in writing that other special insurance be included in the property insurance policies provided under this Paragraph 5.06, Owner shall, if possible, include such insurance, and the cost thereof will be charged to Contractor by appropriate Change Order. Prior to commencement of the Work at the Site, Owner shall in writing advise Contractor whether or not such other insurance has been procured by Owner.

5.07 *Waiver of Rights*

- A. Owner and Contractor intend that all policies purchased in accordance with Paragraph 5.06 will protect Owner, Contractor, Subcontractors, and Engineer, and all other individuals or entities identified in the Supplementary Conditions as loss payees (and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them) in such policies and will provide primary coverage for all losses and damages caused by the perils or causes of loss covered thereby. All such policies shall contain provisions to the effect that in the event of payment of any loss or damage the insurers will have no rights of recovery against any of the insureds or loss payees thereunder. Owner and Contractor waive all rights against each other and their respective officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them for all losses and damages caused by, arising out of or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Subcontractors and Engineer, and all other individuals or entities identified in the Supplementary Conditions as loss payees (and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them) under such policies for losses and damages so caused. None of the above waivers shall extend to the rights that any party making such waiver may have to the proceeds of insurance held by Owner as trustee or otherwise payable under any policy so issued.
- B. Owner waives all rights against Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them for:

1. loss due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to Owner's property or the Work caused by, arising out of, or resulting from fire or other perils whether or not insured by Owner; and
 2. loss or damage to the completed Project or part thereof caused by, arising out of, or resulting from fire or other insured peril or cause of loss covered by any property insurance maintained on the completed Project or part thereof by Owner during partial utilization pursuant to Paragraph 14.05, after Substantial Completion pursuant to Paragraph 14.04, or after final payment pursuant to Paragraph 14.07.
- C. Any insurance policy maintained by Owner covering any loss, damage or consequential loss referred to in Paragraph 5.07.B shall contain provisions to the effect that in the event of payment of any such loss, damage, or consequential loss, the insurers will have no rights of recovery against Contractor, Subcontractors, or Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them.

5.08 *Receipt and Application of Insurance Proceeds*

- A. Any insured loss under the policies of insurance required by Paragraph 5.06 will be adjusted with Owner and made payable to Owner as fiduciary for the loss payees, as their interests may appear, subject to the requirements of any applicable mortgage clause and of Paragraph 5.08.B. Owner shall deposit in a separate account any money so received and shall distribute it in accordance with such agreement as the parties in interest may reach. If no other special agreement is reached, the damaged Work shall be repaired or replaced, the moneys so received applied on account thereof, and the Work and the cost thereof covered by an appropriate Change Order.
- B. Owner as fiduciary shall have power to adjust and settle any loss with the insurers unless one of the parties in interest shall object in writing within 15 days after the occurrence of loss to Owner's exercise of this power. If such objection be made, Owner as fiduciary shall make settlement with the insurers in accordance with such agreement as the parties in interest may reach. If no such agreement among the parties in interest is reached, Owner as fiduciary shall adjust and settle the loss with the insurers and, if required in writing by any party in interest, Owner as fiduciary shall give bond for the proper performance of such duties.

5.09 *Acceptance of Bonds and Insurance; Option to Replace*

- A. If either Owner or Contractor has any objection to the coverage afforded by or other provisions of the bonds or insurance required to be purchased and maintained by the other party in accordance with Article 5 on the basis of non-conformance with the Contract Documents, the objecting party shall so notify the other party in writing within 10 days after receipt of the certificates (or other evidence requested) required by Paragraph 2.01.B. Owner and Contractor shall each provide to the other such additional information in respect of insurance provided as the other may reasonably request. If either party does not purchase or maintain all of the bonds and insurance required of such party by the Contract Documents, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage. Without prejudice to any other right or remedy, the other party may elect to obtain equivalent bonds or insurance to protect such other party's

interests at the expense of the party who was required to provide such coverage, and a Change Order shall be issued to adjust the Contract Price accordingly.

5.10 *Partial Utilization, Acknowledgment of Property Insurer*

- A. If Owner finds it necessary to occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work as provided in Paragraph 14.05, no such use or occupancy shall commence before the insurers providing the property insurance pursuant to Paragraph 5.06 have acknowledged notice thereof and in writing effected any changes in coverage necessitated thereby. The insurers providing the property insurance shall consent by endorsement on the policy or policies, but the property insurance shall not be canceled or permitted to lapse on account of any such partial use or occupancy.

ARTICLE 6 – CONTRACTOR’S RESPONSIBILITIES

6.01 *Supervision and Superintendence*

- A. Contractor shall supervise, inspect, and direct 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 solely responsible for the means, methods, techniques, sequences, and procedures of construction. Contractor shall not be responsible for the negligence of Owner or Engineer in the design or specification of a specific means, method, technique, sequence, or procedure of construction which is shown or indicated in and expressly required by the Contract Documents.
- B. At all times during the progress of the Work, Contractor shall assign a competent resident superintendent who shall not be replaced without written notice to Owner and Engineer except under extraordinary circumstances.

6.02 *Labor; Working Hours*

- A. Contractor shall provide competent, suitably qualified personnel to survey and lay out the Work and perform construction as required by the Contract Documents. Contractor shall at all times maintain good discipline and order at the Site.
- B. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site shall be performed during regular working hours. Contractor will not permit the performance of Work on a Saturday, Sunday, or any legal holiday without Owner’s written consent (which will not be unreasonably withheld) given after prior written notice to Engineer.

6.03 *Services, Materials, and Equipment*

- A. Unless otherwise specified in the Contract Documents, Contractor shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the performance, testing, start-up, and completion of the Work.

- B. All materials and equipment incorporated into the Work shall be as specified or, if not specified, shall be of good quality and new, except as otherwise provided in the Contract Documents. All special warranties and guarantees required by the Specifications shall expressly run to the benefit of Owner. If required by Engineer, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment.
- C. All materials and equipment shall be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise may be provided in the Contract Documents.

6.04 *Progress Schedule*

- A. Contractor shall adhere to the Progress Schedule established in accordance with Paragraph 2.07 as it may be adjusted from time to time as provided below.
 - 1. Contractor shall submit to Engineer for acceptance (to the extent indicated in Paragraph 2.07) proposed adjustments in the Progress Schedule that will not result in changing the Contract Times. Such adjustments will comply with any provisions of the General Requirements applicable thereto.
 - 2. Proposed adjustments in the Progress Schedule that will change the Contract Times shall be submitted in accordance with the requirements of Article 12. Adjustments in Contract Times may only be made by a Change Order.

6.05 *Substitutes and "Or-Equals"*

- A. Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the specification or description is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or "or-equal" item or no substitution is permitted, other items of material or equipment or material or equipment of other Suppliers may be submitted to Engineer for review under the circumstances described below.
 - 1. "*Or-Equal*" Items: If in Engineer's sole discretion an item of material or equipment proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, it may be considered by Engineer as an "or-equal" item, in which case review and approval of the proposed item may, in Engineer's sole discretion, be accomplished without compliance with some or all of the requirements for approval of proposed substitute items. For the purposes of this Paragraph 6.05.A.1, a proposed item of material or equipment will be considered functionally equal to an item so named if:
 - a. in the exercise of reasonable judgment Engineer determines that:
 - 1) it is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;

- 2) it will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole; and
- 3) it has a proven record of performance and availability of responsive service.

b. Contractor certifies that, if approved and incorporated into the Work:

- 1) there will be no increase in cost to the Owner or increase in Contract Times; and
- 2) it will conform substantially to the detailed requirements of the item named in the Contract Documents.

2. *Substitute Items:*

- a. If in Engineer's sole discretion an item of material or equipment proposed by Contractor does not qualify as an "or-equal" item under Paragraph 6.05.A.1, it will be considered a proposed substitute item.
- b. Contractor shall submit sufficient information as provided below to allow Engineer to determine if the item of material or equipment proposed is essentially equivalent to that named and an acceptable substitute therefor. Requests for review of proposed substitute items of material or equipment will not be accepted by Engineer from anyone other than Contractor.
- c. The requirements for review by Engineer will be as set forth in Paragraph 6.05.A.2.d, as supplemented by the General Requirements, and as Engineer may decide is appropriate under the circumstances.
- d. Contractor shall make written application to Engineer for review of a proposed substitute item of material or equipment that Contractor seeks to furnish or use. The application:
 - 1) shall certify that the proposed substitute item will:
 - a) perform adequately the functions and achieve the results called for by the general design,
 - b) be similar in substance to that specified, and
 - c) be suited to the same use as that specified;
 - 2) will state:
 - a) the extent, if any, to which the use of the proposed substitute item will prejudice Contractor's achievement of Substantial Completion on time,
 - b) whether use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with Owner for other work on the Project) to adapt the design to the proposed substitute item, and

- c) whether incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty;
 - 3) will identify:
 - a) all variations of the proposed substitute item from that specified, and
 - b) available engineering, sales, maintenance, repair, and replacement services; and
 - 4) shall contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including costs of redesign and claims of other contractors affected by any resulting change.
- B. *Substitute Construction Methods or Procedures:* If a specific means, method, technique, sequence, or procedure of construction is expressly required by the Contract Documents, Contractor may furnish or utilize a substitute means, method, technique, sequence, or procedure of construction approved by Engineer. Contractor shall submit sufficient information to allow Engineer, in Engineer's sole discretion, to determine that the substitute proposed is equivalent to that expressly called for by the Contract Documents. The requirements for review by Engineer will be similar to those provided in Paragraph 6.05.A.2.
- C. *Engineer's Evaluation:* Engineer will be allowed a reasonable time within which to evaluate each proposal or submittal made pursuant to Paragraphs 6.05.A and 6.05.B. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No "or equal" or substitute will be ordered, installed or utilized until Engineer's review is complete, which will be evidenced by a Change Order in the case of a substitute and an approved Shop Drawing for an "or equal." Engineer will advise Contractor in writing of any negative determination.
- D. *Special Guarantee:* Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute.
- E. *Engineer's Cost Reimbursement:* Engineer will record Engineer's costs in evaluating a substitute proposed or submitted by Contractor pursuant to Paragraphs 6.05.A.2 and 6.05.B. Whether or not Engineer approves a substitute so proposed or submitted by Contractor, Contractor shall reimburse Owner for the reasonable charges of Engineer for evaluating each such proposed substitute. Contractor shall also reimburse Owner for the reasonable charges of Engineer for making changes in the Contract Documents (or in the provisions of any other direct contract with Owner) resulting from the acceptance of each proposed substitute.
- F. *Contractor's Expense:* Contractor shall provide all data in support of any proposed substitute or "or-equal" at Contractor's expense.

6.06 Concerning Subcontractors, Suppliers, and Others

- A. Contractor shall not employ any Subcontractor, Supplier, or other individual or entity (including those acceptable to Owner as indicated in Paragraph 6.06.B), whether initially or as a replacement, against whom Owner may have reasonable objection. Contractor shall not be

required to employ any Subcontractor, Supplier, or other individual or entity to furnish or perform any of the Work against whom Contractor has reasonable objection.

- B. If the Supplementary Conditions require the identity of certain Subcontractors, Suppliers, or other individuals or entities to be submitted to Owner in advance for acceptance by Owner by a specified date prior to the Effective Date of the Agreement, and if Contractor has submitted a list thereof in accordance with the Supplementary Conditions, Owner's acceptance (either in writing or by failing to make written objection thereto by the date indicated for acceptance or objection in the Bidding Documents or the Contract Documents) of any such Subcontractor, Supplier, or other individual or entity so identified may be revoked on the basis of reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity, and the Contract Price will be adjusted by the difference in the cost occasioned by such replacement, and an appropriate Change Order will be issued. No acceptance by Owner of any such Subcontractor, Supplier, or other individual or entity, whether initially or as a replacement, shall constitute a waiver of any right of Owner or Engineer to reject defective Work.
- C. Contractor shall be fully responsible to Owner and Engineer for all acts and omissions of the Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work just as Contractor is responsible for Contractor's own acts and omissions. Nothing in the Contract Documents:
1. shall create for the benefit of any such Subcontractor, Supplier, or other individual or entity any contractual relationship between Owner or Engineer and any such Subcontractor, Supplier or other individual or entity; nor
 2. shall create any obligation on the part of Owner or Engineer to pay or to see to the payment of any moneys due any such Subcontractor, Supplier, or other individual or entity except as may otherwise be required by Laws and Regulations.
- D. Contractor shall be solely responsible for scheduling and coordinating the Work of Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work under a direct or indirect contract with Contractor.
- E. Contractor shall require all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work to communicate with Engineer through Contractor.
- F. The divisions and sections of the Specifications and the identifications of any Drawings shall not control Contractor in dividing the Work among Subcontractors or Suppliers or delineating the Work to be performed by any specific trade.
- G. All Work performed for Contractor by a Subcontractor or Supplier will be pursuant to an appropriate agreement between Contractor and the Subcontractor or Supplier which specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of Owner and Engineer. Whenever any such agreement is with a Subcontractor or Supplier who is listed as a loss payee on the property insurance provided in Paragraph 5.06, the agreement between the Contractor and the Subcontractor or Supplier will contain provisions whereby the Subcontractor or Supplier waives all rights against Owner,

Contractor, Engineer, and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or loss payees (and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them) for all losses and damages caused by, arising out of, relating to, or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work. If the insurers on any such policies require separate waiver forms to be signed by any Subcontractor or Supplier, Contractor will obtain the same.

6.07 *Patent Fees and Royalties*

- A. Contractor shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work of any invention, design, process, product, or device which is the subject of patent rights or copyrights held by others. If a particular invention, design, process, product, or device is specified in the Contract Documents for use in the performance of the Work and if, to the actual knowledge of Owner or Engineer, its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights shall be disclosed by Owner in the Contract Documents.
- B. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, and its officers, directors, members, partners, employees, agents, consultants, and subcontractors from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals, and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device specified in the Contract Documents, but not identified as being subject to payment of any license fee or royalty to others required by patent rights or copyrights.
- C. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device not specified in the Contract Documents.

6.08 *Permits*

- A. Unless otherwise provided in the Supplementary Conditions, Contractor shall obtain and pay for all construction permits and licenses. Owner shall assist Contractor, when necessary, in obtaining such permits and licenses. Contractor shall pay all governmental charges and inspection fees necessary for the prosecution of the Work which are applicable at the time of opening of Bids, or, if there are no Bids, on the Effective Date of the Agreement. Owner shall pay all charges of utility owners for connections for providing permanent service to the Work.

6.09 *Laws and Regulations*

- A. Contractor shall give all notices required by and shall comply with all Laws and Regulations applicable to the performance of the Work. Except where otherwise expressly required by applicable Laws and Regulations, neither Owner nor Engineer shall be responsible for monitoring Contractor's compliance with any Laws or Regulations.
- B. If Contractor performs any Work knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such Work. However, it shall not be Contractor's responsibility to make certain that the Specifications and Drawings are in accordance with Laws and Regulations, but this shall not relieve Contractor of Contractor's obligations under Paragraph 3.03.
- C. Changes in Laws or Regulations not known at the time of opening of Bids (or, on the Effective Date of the Agreement if there were no Bids) having an effect on the cost or time of performance of the Work shall be the subject of an adjustment in Contract Price or Contract Times. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in Paragraph 10.05.

6.10 *Taxes*

- A. Contractor shall pay all sales, consumer, use, and other similar taxes required to be paid by Contractor in accordance with the Laws and Regulations of the place of the Project which are applicable during the performance of the Work.

6.11 *Use of Site and Other Areas*

A. *Limitation on Use of Site and Other Areas:*

1. Contractor shall confine construction equipment, the storage of materials and equipment, and the operations of workers to the Site and other areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and other areas with construction equipment or other materials or equipment. Contractor shall assume full responsibility for any damage to any such land or area, or to the owner or occupant thereof, or of any adjacent land or areas resulting from the performance of the Work.
2. Should any claim be made by any such owner or occupant because of the performance of the Work, Contractor shall promptly settle with such other party by negotiation or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law.
3. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any claim or action, legal or equitable, brought

by any such owner or occupant against Owner, Engineer, or any other party indemnified hereunder to the extent caused by or based upon Contractor's performance of the Work.

- B. *Removal of Debris During Performance of the Work:* During the progress of the Work Contractor shall keep the Site and other areas free from accumulations of waste materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris shall conform to applicable Laws and Regulations.
- C. *Cleaning:* Prior to Substantial Completion of the Work Contractor shall clean the Site and the Work and make it ready for utilization by Owner. At the completion of the Work Contractor shall remove from the Site all tools, appliances, construction equipment and machinery, and surplus materials and shall restore to original condition all property not designated for alteration by the Contract Documents.
- D. *Loading Structures:* Contractor shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall Contractor subject any part of the Work or adjacent property to stresses or pressures that will endanger it.

6.12 *Record Documents*

- A. Contractor shall maintain in a safe place at the Site one record copy of all Drawings, Specifications, Addenda, Change Orders, Work Change Directives, Field Orders, and written interpretations and clarifications in good order and annotated to show changes made during construction. These record documents together with all approved Samples and a counterpart of all approved Shop Drawings will be available to Engineer for reference. Upon completion of the Work, these record documents, Samples, and Shop Drawings will be delivered to Engineer for Owner.

6.13 *Safety and Protection*

- A. Contractor shall be solely responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. Such responsibility does not relieve Subcontractors of their responsibility for the safety of persons or property in the performance of their work, nor for compliance with applicable safety Laws and Regulations. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury or loss to:
 - 1. all persons on the Site or who may be affected by the Work;
 - 2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and
 - 3. other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.
- B. Contractor shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and

shall erect and maintain all necessary safeguards for such safety and protection. Contractor shall notify owners of adjacent property and of Underground Facilities and other utility owners when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property.

- C. Contractor shall comply with the applicable requirements of Owner's safety programs, if any. The Supplementary Conditions identify any Owner's safety programs that are applicable to the Work.
- D. Contractor shall inform Owner and Engineer of the specific requirements of Contractor's safety program with which Owner's and Engineer's employees and representatives must comply while at the Site.
- E. All damage, injury, or loss to any property referred to in Paragraph 6.13.A.2 or 6.13.A.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of Owner or Engineer or anyone employed by any of them, or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them).
- F. Contractor's duties and responsibilities for safety and for protection of the Work shall continue until such time as all the Work is completed and Engineer has issued a notice to Owner and Contractor in accordance with Paragraph 14.07.B that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).

6.14 *Safety Representative*

- A. Contractor shall designate a qualified and experienced safety representative at the Site whose duties and responsibilities shall be the prevention of accidents and the maintaining and supervising of safety precautions and programs.

6.15 *Hazard Communication Programs*

- A. Contractor shall be responsible for coordinating any exchange of material safety data sheets or other hazard communication information required to be made available to or exchanged between or among employers at the Site in accordance with Laws or Regulations.

6.16 *Emergencies*

- A. In emergencies affecting the safety or protection of persons or the Work or property at the Site or adjacent thereto, Contractor is obligated to act to prevent threatened damage, injury, or loss. Contractor shall give Engineer prompt written notice if Contractor believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby or are required as a result thereof. If Engineer determines that a change in the Contract Documents is

required because of the action taken by Contractor in response to such an emergency, a Work Change Directive or Change Order will be issued.

6.17 *Shop Drawings and Samples*

- A. Contractor shall submit Shop Drawings and Samples to Engineer for review and approval in accordance with the accepted Schedule of Submittals (as required by Paragraph 2.07). Each submittal will be identified as Engineer may require.
1. *Shop Drawings:*
 - a. Submit number of copies specified in the General Requirements.
 - b. Data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show Engineer the services, materials, and equipment Contractor proposes to provide and to enable Engineer to review the information for the limited purposes required by Paragraph 6.17.D.
 2. *Samples:*
 - a. Submit number of Samples specified in the Specifications.
 - b. Clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which intended and other data as Engineer may require to enable Engineer to review the submittal for the limited purposes required by Paragraph 6.17.D.
- B. Where a Shop Drawing or Sample is required by the Contract Documents or the Schedule of Submittals, any related Work performed prior to Engineer's review and approval of the pertinent submittal will be at the sole expense and responsibility of Contractor.
- C. *Submittal Procedures:*
1. Before submitting each Shop Drawing or Sample, Contractor shall have:
 - a. reviewed and coordinated each Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents;
 - b. determined and verified all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;
 - c. determined and verified the suitability of all materials offered with respect to the indicated application, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work; and
 - d. determined and verified all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto.

2. Each submittal shall bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review and approval of that submittal.
3. With each submittal, Contractor shall give Engineer specific written notice of any variations that the Shop Drawing or Sample may have from the requirements of the Contract Documents. This notice shall be both a written communication separate from the Shop Drawings or Sample submittal; and, in addition, by a specific notation made on each Shop Drawing or Sample submitted to Engineer for review and approval of each such variation.

D. Engineer's Review:

1. Engineer will provide timely review of Shop Drawings and Samples in accordance with the Schedule of Submittals acceptable to Engineer. Engineer's review and approval will be only to determine if the items covered by the submittals will, after installation or incorporation in the Work, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.
2. Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction (except where a particular means, method, technique, sequence, or procedure of construction is specifically and expressly called for by the Contract Documents) or to safety precautions or programs incident thereto. The review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.
3. Engineer's review and approval shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 6.17.C.3 and Engineer has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. Engineer's review and approval shall not relieve Contractor from responsibility for complying with the requirements of Paragraph 6.17.C.1.

E. Resubmittal Procedures:

1. Contractor shall make corrections required by Engineer and shall return the required number of corrected copies of Shop Drawings and submit, as required, new Samples for review and approval. Contractor shall direct specific attention in writing to revisions other than the corrections called for by Engineer on previous submittals.

6.18 *Continuing the Work*

- A. Contractor shall carry on the Work and adhere to the Progress Schedule during all disputes or disagreements with Owner. No Work shall be delayed or postponed pending resolution of any disputes or disagreements, except as permitted by Paragraph 15.04 or as Owner and Contractor may otherwise agree in writing.

6.19 *Contractor's General Warranty and Guarantee*

- A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective. Engineer and its officers, directors, members, partners, employees, agents, consultants, and subcontractors shall be entitled to rely on representation of Contractor's warranty and guarantee.
- B. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:
 - 1. abuse, modification, or improper maintenance or operation by persons other than Contractor, Subcontractors, Suppliers, or any other individual or entity for whom Contractor is responsible; or
 - 2. normal wear and tear under normal usage.
- C. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents or a release of Contractor's obligation to perform the Work in accordance with the Contract Documents:
 - 1. observations by Engineer;
 - 2. recommendation by Engineer or payment by Owner of any progress or final payment;
 - 3. the issuance of a certificate of Substantial Completion by Engineer or any payment related thereto by Owner;
 - 4. use or occupancy of the Work or any part thereof by Owner;
 - 5. any review and approval of a Shop Drawing or Sample submittal or the issuance of a notice of acceptability by Engineer;
 - 6. any inspection, test, or approval by others; or
 - 7. any correction of defective Work by Owner.

6.20 *Indemnification*

- A. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the performance of the Work, provided that any such claim, cost, loss, or damage is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom but only to the extent caused by any negligent act or omission of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work or anyone for whose acts any of them may be liable .

- B. In any and all claims against Owner or Engineer or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors by any employee (or the survivor or personal representative of such employee) of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 6.20.A shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for Contractor or any such Subcontractor, Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.
- C. The indemnification obligations of Contractor under Paragraph 6.20.A shall not extend to the liability of Engineer and Engineer's officers, directors, members, partners, employees, agents, consultants and subcontractors arising out of:
 - 1. the preparation or approval of, or the failure to prepare or approve maps, Drawings, opinions, reports, surveys, Change Orders, designs, or Specifications; or
 - 2. giving directions or instructions, or failing to give them, if that is the primary cause of the injury or damage.

6.21 *Delegation of Professional Design Services*

- A. Contractor will not be required to provide professional design services unless such services are specifically required by the Contract Documents for a portion of the Work or unless such services are required to carry out Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. Contractor shall not be required to provide professional services in violation of applicable law.
- B. If professional design services or certifications by a design professional related to systems, materials or equipment are specifically required of Contractor by the Contract Documents, Owner and Engineer will specify all performance and design criteria that such services must satisfy. Contractor shall cause such services or certifications to be provided by a properly licensed professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to Engineer.
- C. Owner and Engineer shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications or approvals performed by such design professionals, provided Owner and Engineer have specified to Contractor all performance and design criteria that such services must satisfy.
- D. Pursuant to this Paragraph 6.21, Engineer's review and approval of design calculations and design drawings will be only for the limited purpose of checking for conformance with performance and design criteria given and the design concept expressed in the Contract Documents. Engineer's review and approval of Shop Drawings and other submittals (except design calculations and design drawings) will be only for the purpose stated in Paragraph 6.17.D.1.

- E. Contractor shall not be responsible for the adequacy of the performance or design criteria required by the Contract Documents.

ARTICLE 7 – OTHER WORK AT THE SITE

7.01 *Related Work at Site*

- A. Owner may perform other work related to the Project at the Site with Owner's employees, or through other direct contracts therefor, or have other work performed by utility owners. If such other work is not noted in the Contract Documents, then:
1. written notice thereof will be given to Contractor prior to starting any such other work; and
 2. if Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times that should be allowed as a result of such other work, a Claim may be made therefor as provided in Paragraph 10.05.
- B. Contractor shall afford each other contractor who is a party to such a direct contract, each utility owner, and Owner, if Owner is performing other work with Owner's employees, proper and safe access to the Site, provide a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work, and properly coordinate the Work with theirs. Contractor shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly integrate with such other work. Contractor shall not endanger any work of others by cutting, excavating, or otherwise altering such work; provided, however, that Contractor may cut or alter others' work with the written consent of Engineer and the others whose work will be affected. The duties and responsibilities of Contractor under this Paragraph are for the benefit of such utility owners and other contractors to the extent that there are comparable provisions for the benefit of Contractor in said direct contracts between Owner and such utility owners and other contractors.
- C. If the proper execution or results of any part of Contractor's Work depends upon work performed by others under this Article 7, Contractor shall inspect such other work and promptly report to Engineer in writing any delays, defects, or deficiencies in such other work that render it unavailable or unsuitable for the proper execution and results of Contractor's Work. Contractor's failure to so report will constitute an acceptance of such other work as fit and proper for integration with Contractor's Work except for latent defects and deficiencies in such other work.

7.02 *Coordination*

- A. If Owner intends to contract with others for the performance of other work on the Project at the Site, the following will be set forth in Supplementary Conditions:
1. the individual or entity who will have authority and responsibility for coordination of the activities among the various contractors will be identified;
 2. the specific matters to be covered by such authority and responsibility will be itemized; and
 3. the extent of such authority and responsibilities will be provided.

- B. Unless otherwise provided in the Supplementary Conditions, Owner shall have sole authority and responsibility for such coordination.

7.03 *Legal Relationships*

- A. Paragraphs 7.01.A and 7.02 are not applicable for utilities not under the control of Owner.
- B. Each other direct contract of Owner under Paragraph 7.01.A shall provide that the other contractor is liable to Owner and Contractor for the reasonable direct delay and disruption costs incurred by Contractor as a result of the other contractor's wrongful actions or inactions.
- C. Contractor shall be liable to Owner and any other contractor under direct contract to Owner for the reasonable direct delay and disruption costs incurred by such other contractor as a result of Contractor's wrongful action or inactions.

ARTICLE 8 – OWNER'S RESPONSIBILITIES

8.01 *Communications to Contractor*

- A. Except as otherwise provided in these General Conditions, Owner shall issue all communications to Contractor through Engineer.

8.02 *Replacement of Engineer*

- A. In case of termination of the employment of Engineer, Owner shall appoint an engineer to whom Contractor makes no reasonable objection, whose status under the Contract Documents shall be that of the former Engineer.

8.03 *Furnish Data*

- A. Owner shall promptly furnish the data required of Owner under the Contract Documents.

8.04 *Pay When Due*

- A. Owner shall make payments to Contractor when they are due as provided in Paragraphs 14.02.C and 14.07.C.

8.05 *Lands and Easements; Reports and Tests*

- A. Owner's duties with respect to providing lands and easements and providing engineering surveys to establish reference points are set forth in Paragraphs 4.01 and 4.05. Paragraph 4.02 refers to Owner's identifying and making available to Contractor copies of reports of explorations and tests of subsurface conditions and drawings of physical conditions relating to existing surface or subsurface structures at the Site.

8.06 *Insurance*

- A. Owner's responsibilities, if any, with respect to purchasing and maintaining liability and property insurance are set forth in Article 5.

8.07 *Change Orders*

A. Owner is obligated to execute Change Orders as indicated in Paragraph 10.03.

8.08 *Inspections, Tests, and Approvals*

A. Owner's responsibility with respect to certain inspections, tests, and approvals is set forth in Paragraph 13.03.B.

8.09 *Limitations on Owner's Responsibilities*

A. The Owner shall not supervise, direct, or have control or authority over, nor be responsible for, Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Owner will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

8.10 *Undisclosed Hazardous Environmental Condition*

A. Owner's responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in Paragraph 4.06.

8.11 *Evidence of Financial Arrangements*

A. Upon request of Contractor, Owner shall furnish Contractor reasonable evidence that financial arrangements have been made to satisfy Owner's obligations under the Contract Documents.

8.12 *Compliance with Safety Program*

A. While at the Site, Owner's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Owner has been informed pursuant to Paragraph 6.13.D.

ARTICLE 9 – ENGINEER'S STATUS DURING CONSTRUCTION

9.01 *Owner's Representative*

A. Engineer will be Owner's representative during the construction period. The duties and responsibilities and the limitations of authority of Engineer as Owner's representative during construction are set forth in the Contract Documents.

9.02 *Visits to Site*

A. Engineer will make visits to the Site at intervals appropriate to the various stages of construction as Engineer deems necessary in order to observe as an experienced and qualified design professional the progress that has been made and the quality of the various aspects of Contractor's executed Work. Based on information obtained during such visits and observations, Engineer, for the benefit of Owner, will determine, in general, if the Work is proceeding in accordance with the Contract Documents. Engineer will not be required to make exhaustive or

continuous inspections on the Site to check the quality or quantity of the Work. Engineer's efforts will be directed toward providing for Owner a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of such visits and observations, Engineer will keep Owner informed of the progress of the Work and will endeavor to guard Owner against defective Work.

- B. Engineer's visits and observations are subject to all the limitations on Engineer's authority and responsibility set forth in Paragraph 9.09. Particularly, but without limitation, during or as a result of Engineer's visits or observations of Contractor's Work, Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work.

9.03 *Project Representative*

- A. If Owner and Engineer agree, Engineer will furnish a Resident Project Representative to assist Engineer in providing more extensive observation of the Work. The authority and responsibilities of any such Resident Project Representative and assistants will be as provided in the Supplementary Conditions, and limitations on the responsibilities thereof will be as provided in Paragraph 9.09. If Owner designates another representative or agent to represent Owner at the Site who is not Engineer's consultant, agent or employee, the responsibilities and authority and limitations thereon of such other individual or entity will be as provided in the Supplementary Conditions.

9.04 *Authorized Variations in Work*

- A. Engineer may authorize minor variations in the Work from the requirements of the Contract Documents which do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. These may be accomplished by a Field Order and will be binding on Owner and also on Contractor, who shall perform the Work involved promptly. If Owner or Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, or both, and the parties are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in Paragraph 10.05.

9.05 *Rejecting Defective Work*

- A. Engineer will have authority to reject Work which Engineer believes to be defective, or that Engineer believes will not produce a completed Project that conforms to the Contract Documents or that will prejudice the integrity of the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Engineer will also have authority to require special inspection or testing of the Work as provided in Paragraph 13.04, whether or not the Work is fabricated, installed, or completed.

9.06 *Shop Drawings, Change Orders and Payments*

- A. In connection with Engineer's authority, and limitations thereof, as to Shop Drawings and Samples, see Paragraph 6.17.
- B. In connection with Engineer's authority, and limitations thereof, as to design calculations and design drawings submitted in response to a delegation of professional design services, if any, see Paragraph 6.21.
- C. In connection with Engineer's authority as to Change Orders, see Articles 10, 11, and 12.
- D. In connection with Engineer's authority as to Applications for Payment, see Article 14.

9.07 *Determinations for Unit Price Work*

- A. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor. Engineer will review with Contractor the Engineer's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). Engineer's written decision thereon will be final and binding (except as modified by Engineer to reflect changed factual conditions or more accurate data) upon Owner and Contractor, subject to the provisions of Paragraph 10.05.

9.08 *Decisions on Requirements of Contract Documents and Acceptability of Work*

- A. Engineer will be the initial interpreter of the requirements of the Contract Documents and judge of the acceptability of the Work thereunder. All matters in question and other matters between Owner and Contractor arising prior to the date final payment is due relating to the acceptability of the Work, and the interpretation of the requirements of the Contract Documents pertaining to the performance of the Work, will be referred initially to Engineer in writing within 30 days of the event giving rise to the question.
- B. Engineer will, with reasonable promptness, render a written decision on the issue referred. If Owner or Contractor believes that any such decision entitles them to an adjustment in the Contract Price or Contract Times or both, a Claim may be made under Paragraph 10.05. The date of Engineer's decision shall be the date of the event giving rise to the issues referenced for the purposes of Paragraph 10.05.B.
- C. Engineer's written decision on the issue referred will be final and binding on Owner and Contractor, subject to the provisions of Paragraph 10.05.
- D. When functioning as interpreter and judge under this Paragraph 9.08, Engineer will not show partiality to Owner or Contractor and will not be liable in connection with any interpretation or decision rendered in good faith in such capacity.

9.09 *Limitations on Engineer's Authority and Responsibilities*

- A. Neither Engineer's authority or responsibility under this Article 9 or under any other provision of the Contract Documents nor any decision made by Engineer in good faith either to exercise or not

exercise such authority or responsibility or the undertaking, exercise, or performance of any authority or responsibility by Engineer shall create, impose, or give rise to any duty in contract, tort, or otherwise owed by Engineer to Contractor, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.

- B. Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Engineer will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.
- C. Engineer will not be responsible for the acts or omissions of Contractor or of any Subcontractor, any Supplier, or of any other individual or entity performing any of the Work.
- D. Engineer's review of the final Application for Payment and accompanying documentation and all maintenance and operating instructions, schedules, guarantees, bonds, certificates of inspection, tests and approvals, and other documentation required to be delivered by Paragraph 14.07.A will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests, and approvals that the results certified indicate compliance with, the Contract Documents.
- E. The limitations upon authority and responsibility set forth in this Paragraph 9.09 shall also apply to the Resident Project Representative, if any, and assistants, if any.

9.10 *Compliance with Safety Program*

- A. While at the Site, Engineer's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Engineer has been informed pursuant to Paragraph 6.13.D.

ARTICLE 10 -- CHANGES IN THE WORK; CLAIMS

10.01 *Authorized Changes in the Work*

- A. Without invalidating the Contract and without notice to any surety, Owner may, at any time or from time to time, order additions, deletions, or revisions in the Work by a Change Order, or a Work Change Directive. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved which will be performed under the applicable conditions of the Contract Documents (except as otherwise specifically provided).
- B. If Owner and Contractor are unable to agree on entitlement to, or on the amount or extent, if any, of an adjustment in the Contract Price or Contract Times, or both, that should be allowed as a result of a Work Change Directive, a Claim may be made therefor as provided in Paragraph 10.05.

10.02 *Unauthorized Changes in the Work*

- A. Contractor shall not be entitled to an increase in the Contract Price or an extension of the Contract Times with respect to any work performed that is not required by the Contract Documents as amended, modified, or supplemented as provided in Paragraph 3.04, except in the case of an emergency as provided in Paragraph 6.16 or in the case of uncovering Work as provided in Paragraph 13.04.D.

10.03 *Execution of Change Orders*

- A. Owner and Contractor shall execute appropriate Change Orders recommended by Engineer covering:
 - 1. changes in the Work which are: (i) ordered by Owner pursuant to Paragraph 10.01.A, (ii) required because of acceptance of defective Work under Paragraph 13.08.A or Owner's correction of defective Work under Paragraph 13.09, or (iii) agreed to by the parties;
 - 2. changes in the Contract Price or Contract Times which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive; and
 - 3. changes in the Contract Price or Contract Times which embody the substance of any written decision rendered by Engineer pursuant to Paragraph 10.05; provided that, in lieu of executing any such Change Order, an appeal may be taken from any such decision in accordance with the provisions of the Contract Documents and applicable Laws and Regulations, but during any such appeal, Contractor shall carry on the Work and adhere to the Progress Schedule as provided in Paragraph 6.18.A.

10.04 *Notification to Surety*

- A. If the provisions of any bond require notice to be given to a surety of any change affecting the general scope of the Work or the provisions of the Contract Documents (including, but not limited to, Contract Price or Contract Times), the giving of any such notice will be Contractor's responsibility. The amount of each applicable bond will be adjusted to reflect the effect of any such change.

10.05 *Claims*

- A. *Engineer's Decision Required:* All Claims, except those waived pursuant to Paragraph 14.09, shall be referred to the Engineer for decision. A decision by Engineer shall be required as a condition precedent to any exercise by Owner or Contractor of any rights or remedies either may otherwise have under the Contract Documents or by Laws and Regulations in respect of such Claims.
- B. *Notice:* Written notice stating the general nature of each Claim shall be delivered by the claimant to Engineer and the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto. The responsibility to substantiate a Claim shall rest with the party making the Claim. Notice of the amount or extent of the Claim, with supporting data

shall be delivered to the Engineer and the other party to the Contract within 60 days after the start of such event (unless Engineer allows additional time for claimant to submit additional or more accurate data in support of such Claim). A Claim for an adjustment in Contract Price shall be prepared in accordance with the provisions of Paragraph 12.01.B. A Claim for an adjustment in Contract Times shall be prepared in accordance with the provisions of Paragraph 12.02.B. Each Claim shall be accompanied by claimant's written statement that the adjustment claimed is the entire adjustment to which the claimant believes it is entitled as a result of said event. The opposing party shall submit any response to Engineer and the claimant within 30 days after receipt of the claimant's last submittal (unless Engineer allows additional time).

- C. *Engineer's Action:* Engineer will review each Claim and, within 30 days after receipt of the last submittal of the claimant or the last submittal of the opposing party, if any, take one of the following actions in writing:
1. deny the Claim in whole or in part;
 2. approve the Claim; or
 3. notify the parties that the Engineer is unable to resolve the Claim if, in the Engineer's sole discretion, it would be inappropriate for the Engineer to do so. For purposes of further resolution of the Claim, such notice shall be deemed a denial.
- D. In the event that Engineer does not take action on a Claim within said 30 days, the Claim shall be deemed denied.
- E. Engineer's written action under Paragraph 10.05.C or denial pursuant to Paragraphs 10.05.C.3 or 10.05.D will be final and binding upon Owner and Contractor, unless Owner or Contractor invoke the dispute resolution procedure set forth in Article 16 within 30 days of such action or denial.
- F. No Claim for an adjustment in Contract Price or Contract Times will be valid if not submitted in accordance with this Paragraph 10.05.

ARTICLE 11 – COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK

11.01 *Cost of the Work*

- A. *Costs Included:* The term Cost of the Work means the sum of all costs, except those excluded in Paragraph 11.01.B, necessarily incurred and paid by Contractor in the proper performance of the Work. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, the costs to be reimbursed to Contractor will be only those additional or incremental costs required because of the change in the Work or because of the event giving rise to the Claim. Except as otherwise may be agreed to in writing by Owner, such costs shall be in amounts no higher than those prevailing in the locality of the Project, shall not include any of the costs itemized in Paragraph 11.01.B, and shall include only the following items:

1. Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Owner and Contractor. Such employees shall include, without limitation, superintendents, foremen, and other personnel employed full time on the Work. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits, which shall include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, bonuses, sick leave, vacation and holiday pay applicable thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, shall be included in the above to the extent authorized by Owner.
2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts shall accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts shall accrue to Owner. All trade discounts, rebates and refunds and returns from sale of surplus materials and equipment shall accrue to Owner, and Contractor shall make provisions so that they may be obtained.
3. Payments made by Contractor to Subcontractors for Work performed by Subcontractors. If required by Owner, Contractor shall obtain competitive bids from subcontractors acceptable to Owner and Contractor and shall deliver such bids to Owner, who will then determine, with the advice of Engineer, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee shall be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 11.01.
4. Costs of special consultants (including but not limited to engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed for services specifically related to the Work.
5. Supplemental costs including the following:
 - a. The proportion of necessary transportation, travel, and subsistence expenses of Contractor's employees incurred in discharge of duties connected with the Work.
 - b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, and hand tools not owned by the workers, which are consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of Contractor.
 - c. Rentals of all construction equipment and machinery, and the parts thereof whether rented from Contractor or others in accordance with rental agreements approved by Owner with the advice of Engineer, and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs shall be in accordance with the terms of

said rental agreements. The rental of any such equipment, machinery, or parts shall cease when the use thereof is no longer necessary for the Work.

- d. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, as imposed by Laws and Regulations.
- e. Deposits lost for causes other than negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.
- f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of property insurance established in accordance with Paragraph 5.06.D), provided such losses and damages have resulted from causes other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses shall include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses shall be included in the Cost of the Work for the purpose of determining Contractor's fee.
- g. The cost of utilities, fuel, and sanitary facilities at the Site.
- h. Minor expenses such as telegrams, long distance telephone calls, telephone service at the Site, express and courier services, and similar petty cash items in connection with the Work.
- i. The costs of premiums for all bonds and insurance Contractor is required by the Contract Documents to purchase and maintain.

B. *Costs Excluded:* The term Cost of the Work shall not include any of the following items:

1. Payroll costs and other compensation of Contractor's officers, executives, principals (of partnerships and sole proprietorships), general managers, safety managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expeditors, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 11.01.A.1 or specifically covered by Paragraph 11.01.A.4, all of which are to be considered administrative costs covered by the Contractor's fee.
2. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.
3. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.
4. Costs due to the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not

limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.

5. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraphs 11.01.A.
- C. *Contractor's Fee:* When all the Work is performed on the basis of cost-plus, Contractor's fee shall be determined as set forth in the Agreement. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, Contractor's fee shall be determined as set forth in Paragraph 12.01.C.
- D. *Documentation:* Whenever the Cost of the Work for any purpose is to be determined pursuant to Paragraphs 11.01.A and 11.01.B, Contractor will establish and maintain records thereof in accordance with generally accepted accounting practices and submit in a form acceptable to Engineer an itemized cost breakdown together with supporting data.

11.02 Allowances

- A. It is understood that Contractor has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be performed for such sums and by such persons or entities as may be acceptable to Owner and Engineer.
- B. *Cash Allowances:*
 1. Contractor agrees that:
 - a. the cash allowances include the cost to Contractor (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes; and
 - b. Contractor's costs for unloading and handling on the Site, labor, installation, overhead, profit, and other expenses contemplated for the cash allowances have been included in the Contract Price and not in the allowances, and no demand for additional payment on account of any of the foregoing will be valid.
- C. *Contingency Allowance:*
 1. Contractor agrees that a contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.
- D. Prior to final payment, an appropriate Change Order will be issued as recommended by Engineer to reflect actual amounts due Contractor on account of Work covered by allowances, and the Contract Price shall be correspondingly adjusted.

11.03 Unit Price Work

- A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to

the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement.

- B. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Determinations of the actual quantities and classifications of Unit Price Work performed by Contractor will be made by Engineer subject to the provisions of Paragraph 9.07.
- C. Each unit price will be deemed to include an amount considered by Contractor to be adequate to cover Contractor's overhead and profit for each separately identified item.
- D. Owner or Contractor may make a Claim for an adjustment in the Contract Price in accordance with Paragraph 10.05 if:
 - 1. the quantity of any item of Unit Price Work performed by Contractor differs materially and significantly from the estimated quantity of such item indicated in the Agreement; and
 - 2. there is no corresponding adjustment with respect to any other item of Work; and
 - 3. Contractor believes that Contractor is entitled to an increase in Contract Price as a result of having incurred additional expense or Owner believes that Owner is entitled to a decrease in Contract Price and the parties are unable to agree as to the amount of any such increase or decrease.

ARTICLE 12 – CHANGE OF CONTRACT PRICE; CHANGE OF CONTRACT TIMES

12.01 *Change of Contract Price*

- A. The Contract Price may only be changed by a Change Order. Any Claim for an adjustment in the Contract Price shall be based on written notice submitted by the party making the Claim to the Engineer and the other party to the Contract in accordance with the provisions of Paragraph 10.05.
- B. The value of any Work covered by a Change Order or of any Claim for an adjustment in the Contract Price will be determined as follows:
 - 1. where the Work involved is covered by unit prices contained in the Contract Documents, by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 11.03); or
 - 2. where the Work involved is not covered by unit prices contained in the Contract Documents, by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 12.01.C.2); or
 - 3. where the Work involved is not covered by unit prices contained in the Contract Documents and agreement to a lump sum is not reached under Paragraph 12.01.B.2, on the basis of the Cost of the Work (determined as provided in Paragraph 11.01) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 12.01.C).

C. *Contractor's Fee*: The Contractor's fee for overhead and profit shall be determined as follows:

1. a mutually acceptable fixed fee; or
2. if a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:
 - a. for costs incurred under Paragraphs 11.01.A.1 and 11.01.A.2, the Contractor's fee shall be 15 percent;
 - b. for costs incurred under Paragraph 11.01.A.3, the Contractor's fee shall be five percent;
 - c. where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of Paragraphs 12.01.C.2.a and 12.01.C.2.b is that the Subcontractor who actually performs the Work, at whatever tier, will be paid a fee of 15 percent of the costs incurred by such Subcontractor under Paragraphs 11.01.A.1 and 11.01.A.2 and that any higher tier Subcontractor and Contractor will each be paid a fee of five percent of the amount paid to the next lower tier Subcontractor;
 - d. no fee shall be payable on the basis of costs itemized under Paragraphs 11.01.A.4, 11.01.A.5, and 11.01.B;
 - e. the amount of credit to be allowed by Contractor to Owner for any change which results in a net decrease in cost will be the amount of the actual net decrease in cost plus a deduction in Contractor's fee by an amount equal to five percent of such net decrease; and
 - f. when both additions and credits are involved in any one change, the adjustment in Contractor's fee shall be computed on the basis of the net change in accordance with Paragraphs 12.01.C.2.a through 12.01.C.2.e, inclusive.

12.02 *Change of Contract Times*

- A. The Contract Times may only be changed by a Change Order. Any Claim for an adjustment in the Contract Times shall be based on written notice submitted by the party making the Claim to the Engineer and the other party to the Contract in accordance with the provisions of Paragraph 10.05.
- B. Any adjustment of the Contract Times covered by a Change Order or any Claim for an adjustment in the Contract Times will be determined in accordance with the provisions of this Article 12.

12.03 *Delays*

- A. Where Contractor is prevented from completing any part of the Work within the Contract Times due to delay beyond the control of Contractor, the Contract Times will be extended in an amount equal to the time lost due to such delay if a Claim is made therefor as provided in Paragraph 12.02.A. Delays beyond the control of Contractor shall include, but not be limited to, acts or

neglect by Owner, acts or neglect of utility owners or other contractors performing other work as contemplated by Article 7, fires, floods, epidemics, abnormal weather conditions, or acts of God.

- B. If Owner, Engineer, or other contractors or utility owners performing other work for Owner as contemplated by Article 7, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in the Contract Price or the Contract Times, or both. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.
- C. If Contractor is delayed in the performance or progress of the Work by fire, flood, epidemic, abnormal weather conditions, acts of God, acts or failures to act of utility owners not under the control of Owner, or other causes not the fault of and beyond control of Owner and Contractor, then Contractor shall be entitled to an equitable adjustment in Contract Times, if such adjustment is essential to Contractor's ability to complete the Work within the Contract Times. Such an adjustment shall be Contractor's sole and exclusive remedy for the delays described in this Paragraph 12.03.C.
- D. Owner, Engineer, and their officers, directors, members, partners, employees, agents, consultants, or subcontractors shall not be liable to Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Contractor on or in connection with any other project or anticipated project.
- E. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delays within the control of Contractor. Delays attributable to and within the control of a Subcontractor or Supplier shall be deemed to be delays within the control of Contractor.

ARTICLE 13 – TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK

13.01 Notice of Defects

- A. Prompt notice of all defective Work of which Owner or Engineer has actual knowledge will be given to Contractor. Defective Work may be rejected, corrected, or accepted as provided in this Article 13.

13.02 Access to Work

- A. Owner, Engineer, their consultants and other representatives and personnel of Owner, independent testing laboratories, and governmental agencies with jurisdictional interests will have access to the Site and the Work at reasonable times for their observation, inspection, and testing. Contractor shall provide them proper and safe conditions for such access and advise them of Contractor's safety procedures and programs so that they may comply therewith as applicable.

13.03 *Tests and Inspections*

- A. Contractor shall give Engineer timely notice of readiness of the Work for all required inspections, tests, or approvals and shall cooperate with inspection and testing personnel to facilitate required inspections or tests.
- B. Owner shall employ and pay for the services of an independent testing laboratory to perform all inspections, tests, or approvals required by the Contract Documents except:
 - 1. for inspections, tests, or approvals covered by Paragraphs 13.03.C and 13.03.D below;
 - 2. that costs incurred in connection with tests or inspections conducted pursuant to Paragraph 13.04.B shall be paid as provided in Paragraph 13.04.C; and
 - 3. as otherwise specifically provided in the Contract Documents.
- C. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested, or approved by an employee or other representative of such public body, Contractor shall assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith, and furnish Engineer the required certificates of inspection or approval.
- D. Contractor shall be responsible for arranging and obtaining and shall pay all costs in connection with any inspections, tests, or approvals required for Owner's and Engineer's acceptance of materials or equipment to be incorporated in the Work; or acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work. Such inspections, tests, or approvals shall be performed by organizations acceptable to Owner and Engineer.
- E. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by Contractor without written concurrence of Engineer, Contractor shall, if requested by Engineer, uncover such Work for observation.
- F. Uncovering Work as provided in Paragraph 13.03.E 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 in response to such notice.

13.04 *Uncovering Work*

- A. If any Work is covered contrary to the written request of Engineer, it must, if requested by Engineer, be uncovered for Engineer's observation and replaced at Contractor's expense.
- B. If Engineer considers it necessary or advisable that covered Work be observed by Engineer or inspected or tested by others, Contractor, at Engineer's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as Engineer may require, that portion of the Work in question, furnishing all necessary labor, material, and equipment.

- C. If it is found that the uncovered Work is defective, Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount thereof, Owner may make a Claim therefor as provided in Paragraph 10.05.
- D. If the uncovered Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, or both, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, Contractor may make a Claim therefor as provided in Paragraph 10.05.

13.05 *Owner May Stop the Work*

- A. If the Work is defective, or Contractor fails to supply sufficient skilled workers or suitable materials or equipment, or fails to perform the Work in such a way that the completed Work will conform to the Contract Documents, Owner may order Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of Owner to stop the Work shall not give rise to any duty on the part of Owner to exercise this right for the benefit of Contractor, any Subcontractor, any Supplier, any other individual or entity, or any surety for, or employee or agent of any of them.

13.06 *Correction or Removal of Defective Work*

- A. Promptly after receipt of written notice, Contractor shall correct all defective Work, whether or not fabricated, installed, or completed, or, if the Work has been rejected by Engineer, remove it from the Project and replace it with Work that is not defective. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or removal (including but not limited to all costs of repair or replacement of work of others).
- B. When correcting defective Work under the terms of this Paragraph 13.06 or Paragraph 13.07, Contractor shall take no action that would void or otherwise impair Owner's special warranty and guarantee, if any, on said Work.

13.07 *Correction Period*

- A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed by the terms of any applicable special guarantee required by the Contract Documents) or by any specific provision of the Contract Documents, any Work is found to be defective, or if the repair of any damages to the land or areas made available for Contractor's use by Owner or permitted by Laws and Regulations as contemplated in Paragraph 6.11.A is found to be defective, Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:

1. repair such defective land or areas; or
 2. correct such defective Work; or
 3. if the defective Work has been rejected by Owner, remove it from the Project and replace it with Work that is not defective, and
 4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others or other land or areas resulting therefrom.
- B. If Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. All claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others) will be paid by Contractor.
- C. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications.
- D. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this Paragraph 13.07, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.
- E. Contractor's obligations under this Paragraph 13.07 are in addition to any other obligation or warranty. The provisions of this Paragraph 13.07 shall not be construed as a substitute for, or a waiver of, the provisions of any applicable statute of limitation or repose.

13.08 *Acceptance of Defective Work*

- A. If, instead of requiring correction or removal and replacement of defective Work, Owner (and, prior to Engineer's recommendation of final payment, Engineer) prefers to accept it, Owner may do so. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) attributable to Owner's evaluation of and determination to accept such defective Work (such costs to be approved by Engineer as to reasonableness) and for the diminished value of the Work to the extent not otherwise paid by Contractor pursuant to this sentence. If any such acceptance occurs prior to Engineer's recommendation of final payment, a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work, and Owner shall be entitled to an appropriate decrease in the Contract Price, reflecting the diminished value of Work so accepted. If the parties are unable to agree as to the amount thereof, Owner may make a Claim therefor as provided in Paragraph 10.05. If the acceptance occurs after such recommendation, an appropriate amount will be paid by Contractor to Owner.

13.09 *Owner May Correct Defective Work*

- A. If Contractor fails within a reasonable time after written notice from Engineer to correct defective Work, or to remove and replace rejected Work as required by Engineer in accordance with Paragraph 13.06.A, or if Contractor fails to perform the Work in accordance with the Contract Documents, or if Contractor fails to comply with any other provision of the Contract Documents, Owner may, after seven days written notice to Contractor, correct, or remedy any such deficiency.
- B. In exercising the rights and remedies under this Paragraph 13.09, Owner shall proceed expeditiously. In connection with such corrective or remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services related thereto, take possession of Contractor's tools, appliances, construction equipment and machinery at the Site, and incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's representatives, agents and employees, Owner's other contractors, and Engineer and Engineer's consultants access to the Site to enable Owner to exercise the rights and remedies under this Paragraph.
- C. All claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 13.09 will be charged against Contractor, and a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work; and Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount of the adjustment, Owner may make a Claim therefor as provided in Paragraph 10.05. Such claims, costs, losses and damages will include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of Contractor's defective Work.
- D. Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise by Owner of Owner's rights and remedies under this Paragraph 13.09.

ARTICLE 14 – PAYMENTS TO CONTRACTOR AND COMPLETION

14.01 *Schedule of Values*

- A. The Schedule of Values established as provided in Paragraph 2.07.A will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to Engineer. Progress payments on account of Unit Price Work will be based on the number of units completed.

14.02 *Progress Payments*

A. *Applications for Payments:*

1. At least 20 days before the date established in the Agreement for each progress payment (but not more often than once a month), Contractor shall submit to Engineer for review an

Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice, or other documentation warranting that Owner has received the materials and equipment free and clear of all Liens and evidence that the materials and equipment are covered by appropriate property insurance or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.

2. Beginning with the second Application for Payment, each Application shall include an affidavit of Contractor stating that all previous progress payments received on account of the Work have been applied on account to discharge Contractor's legitimate obligations associated with prior Applications for Payment.
3. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.

B. Review of Applications:

1. Engineer will, within 10 days after receipt of each Application for Payment, either indicate in writing a recommendation of payment and present the Application to Owner or return the Application to Contractor indicating in writing Engineer's reasons for refusing to recommend payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application.
2. Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to Owner, based on Engineer's observations of the executed Work as an experienced and qualified design professional, and on Engineer's review of the Application for Payment and the accompanying data and schedules, that to the best of Engineer's knowledge, information and belief:
 - a. the Work has progressed to the point indicated;
 - b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, the results of any subsequent tests called for in the Contract Documents, a final determination of quantities and classifications for Unit Price Work under Paragraph 9.07, and any other qualifications stated in the recommendation); and
 - c. the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Engineer's responsibility to observe the Work.
3. By recommending any such payment Engineer will not thereby be deemed to have represented that:
 - a. inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or

- involved detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in the Contract Documents; or
- b. there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.
4. Neither Engineer's review of Contractor's Work for the purposes of recommending payments nor Engineer's recommendation of any payment, including final payment, will impose responsibility on Engineer:
 - a. to supervise, direct, or control the Work, or
 - b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or
 - c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work, or
 - d. to make any examination to ascertain how or for what purposes Contractor has used the moneys paid on account of the Contract Price, or
 - e. to determine that title to any of the Work, materials, or equipment has passed to Owner free and clear of any Liens.
 5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 14.02.B.2. Engineer may also refuse to recommend any such payment or, because of subsequently discovered evidence or the results of subsequent inspections or tests, revise or revoke any such payment recommendation previously made, to such extent as may be necessary in Engineer's opinion to protect Owner from loss because:
 - a. the Work is defective, or completed Work has been damaged, requiring correction or replacement;
 - b. the Contract Price has been reduced by Change Orders;
 - c. Owner has been required to correct defective Work or complete Work in accordance with Paragraph 13.09; or
 - d. Engineer has actual knowledge of the occurrence of any of the events enumerated in Paragraph 15.02.A.

C. Payment Becomes Due:

1. Ten days after presentation of the Application for Payment to Owner with Engineer's recommendation, the amount recommended will (subject to the provisions of Paragraph 14.02.D) become due, and when due will be paid by Owner to Contractor.

D. Reduction in Payment:

1. Owner may refuse to make payment of the full amount recommended by Engineer because:
 - a. claims have been made against Owner on account of Contractor's performance or furnishing of the Work;
 - b. Liens have been filed in connection with the Work, except where Contractor has delivered a specific bond satisfactory to Owner to secure the satisfaction and discharge of such Liens;
 - c. there are other items entitling Owner to a set-off against the amount recommended; or
 - d. Owner has actual knowledge of the occurrence of any of the events enumerated in Paragraphs 14.02.B.5.a through 14.02.B.5.c or Paragraph 15.02.A.
2. If Owner refuses to make payment of the full amount recommended by Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action and promptly pay Contractor any amount remaining after deduction of the amount so withheld. Owner shall promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, when Contractor remedies the reasons for such action.
3. Upon a subsequent determination that Owner's refusal of payment was not justified, the amount wrongfully withheld shall be treated as an amount due as determined by Paragraph 14.02.C.1 and subject to interest as provided in the Agreement.

14.03 Contractor's Warranty of Title

- A. Contractor warrants and guarantees that title to all Work, materials, and equipment covered by any Application for Payment, whether incorporated in the Project or not, will pass to Owner no later than the time of payment free and clear of all Liens.

14.04 Substantial Completion

- A. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner and Engineer in writing that the entire Work is substantially complete (except for items specifically listed by Contractor as incomplete) and request that Engineer issue a certificate of Substantial Completion.
- B. Promptly after Contractor's notification, Owner, Contractor, and Engineer shall make an inspection of the Work to determine the status of completion. If Engineer does not consider the Work substantially complete, Engineer will notify Contractor in writing giving the reasons therefor.
- C. If Engineer considers the Work substantially complete, Engineer will deliver to Owner a tentative certificate of Substantial Completion which shall fix the date of Substantial Completion. There shall be attached to the certificate a tentative list of items to be completed or corrected before

final payment. Owner shall have seven days after receipt of the tentative certificate during which to make written objection to Engineer as to any provisions of the certificate or attached list. If, after considering such objections, Engineer concludes that the Work is not substantially complete, Engineer will, within 14 days after submission of the tentative certificate to Owner, notify Contractor in writing, stating the reasons therefor. If, after consideration of Owner's objections, Engineer considers the Work substantially complete, Engineer will, within said 14 days, execute and deliver to Owner and Contractor a definitive certificate of Substantial Completion (with a revised tentative list of items to be completed or corrected) reflecting such changes from the tentative certificate as Engineer believes justified after consideration of any objections from Owner.

- D. At the time of delivery of the tentative certificate of Substantial Completion, Engineer will deliver to Owner and Contractor a written recommendation as to division of responsibilities pending final payment between Owner and Contractor with respect to security, operation, safety, and protection of the Work, maintenance, heat, utilities, insurance, and warranties and guarantees. Unless Owner and Contractor agree otherwise in writing and so inform Engineer in writing prior to Engineer's issuing the definitive certificate of Substantial Completion, Engineer's aforesaid recommendation will be binding on Owner and Contractor until final payment.
- E. Owner shall have the right to exclude Contractor from the Site after the date of Substantial Completion subject to allowing Contractor reasonable access to remove its property and complete or correct items on the tentative list.

14.05 *Partial Utilization*

- A. Prior to Substantial Completion of all the Work, Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which Owner, Engineer, and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by Owner for its intended purpose without significant interference with Contractor's performance of the remainder of the Work, subject to the following conditions:
 - 1. Owner at any time may request Contractor in writing to permit Owner to use or occupy any such part of the Work which Owner believes to be ready for its intended use and substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor, Owner, and Engineer will follow the procedures of Paragraph 14.04.A through D for that part of the Work.
 - 2. Contractor at any time may notify Owner and Engineer in writing that Contractor considers any such part of the Work ready for its intended use and substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.
 - 3. Within a reasonable time after either such request, Owner, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion. If Engineer does not consider that part of the Work to be substantially complete, Engineer will notify Owner and Contractor in writing giving the reasons therefor. If Engineer considers that part of the Work to be substantially complete, the provisions of Paragraph 14.04 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.

4. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Paragraph 5.10 regarding property insurance.

14.06 *Final Inspection*

- A. Upon written notice from Contractor that the entire Work or an agreed portion thereof is complete, Engineer will promptly make a final inspection with Owner and Contractor and will notify Contractor in writing of all particulars in which this inspection reveals that the Work is incomplete or defective. Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

14.07 *Final Payment*

A. *Application for Payment:*

1. After Contractor has, in the opinion of Engineer, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance, certificates of inspection, marked-up record documents (as provided in Paragraph 6.12), and other documents, Contractor may make application for final payment following the procedure for progress payments.
2. The final Application for Payment shall be accompanied (except as previously delivered) by:
 - a. all documentation called for in the Contract Documents, including but not limited to the evidence of insurance required by Paragraph 5.04.B.6;
 - b. consent of the surety, if any, to final payment;
 - c. a list of all Claims against Owner that Contractor believes are unsettled; and
 - d. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of or Liens filed in connection with the Work.
3. In lieu of the releases or waivers of Liens specified in Paragraph 14.07.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (i) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (ii) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner might in any way be responsible, or which might in any way result in liens or other burdens on Owner's property, have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a bond or other collateral satisfactory to Owner to indemnify Owner against any Lien.

B. *Engineer's Review of Application and Acceptance:*

1. If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying

documentation as required by the Contract Documents, Engineer is satisfied that the Work has been completed and Contractor's other obligations under the Contract Documents have been fulfilled, Engineer will, within ten days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of payment and present the Application for Payment to Owner for payment. At the same time Engineer will also give written notice to Owner and Contractor that the Work is acceptable subject to the provisions of Paragraph 14.09. Otherwise, Engineer will return the Application for Payment to Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor shall make the necessary corrections and resubmit the Application for Payment.

C. Payment Becomes Due:

1. Thirty days after the presentation to Owner of the Application for Payment and accompanying documentation, the amount recommended by Engineer, less any sum Owner is entitled to set off against Engineer's recommendation, including but not limited to liquidated damages, will become due and will be paid by Owner to Contractor.

14.08 Final Completion Delayed

- A. If, through no fault of Contractor, final completion of the Work is significantly delayed, and if Engineer so confirms, Owner shall, upon receipt of Contractor's final Application for Payment (for Work fully completed and accepted) and recommendation of Engineer, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance to be held by Owner for Work not fully completed or corrected is less than the retainage stipulated in the Agreement, and if bonds have been furnished as required in Paragraph 5.01, the written consent of the surety to the payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by Contractor to Engineer with the Application for such payment. Such payment shall be made under the terms and conditions governing final payment, except that it shall not constitute a waiver of Claims.

14.09 Waiver of Claims

- A. The making and acceptance of final payment will constitute:
 1. a waiver of all Claims by Owner against Contractor, except Claims arising from unsettled Liens, from defective Work appearing after final inspection pursuant to Paragraph 14.06, from failure to comply with the Contract Documents or the terms of any special guarantees specified therein, or from Contractor's continuing obligations under the Contract Documents; and
 2. a waiver of all Claims by Contractor against Owner other than those previously made in accordance with the requirements herein and expressly acknowledged by Owner in writing as still unsettled.

ARTICLE 15 – SUSPENSION OF WORK AND TERMINATION

15.01 *Owner May Suspend Work*

- A. At any time and without cause, Owner may suspend the Work or any portion thereof for a period of not more than 90 consecutive days by notice in writing to Contractor and Engineer which will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be granted an adjustment in the Contract Price or an extension of the Contract Times, or both, directly attributable to any such suspension if Contractor makes a Claim therefor as provided in Paragraph 10.05.

15.02 *Owner May Terminate for Cause*

- A. The occurrence of any one or more of the following events will justify termination for cause:
1. Contractor's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the Progress Schedule established under Paragraph 2.07 as adjusted from time to time pursuant to Paragraph 6.04);
 2. Contractor's disregard of Laws or Regulations of any public body having jurisdiction;
 3. Contractor's repeated disregard of the authority of Engineer; or
 4. Contractor's violation in any substantial way of any provisions of the Contract Documents.
- B. If one or more of the events identified in Paragraph 15.02.A occur, Owner may, after giving Contractor (and surety) seven days written notice of its intent to terminate the services of Contractor:
1. exclude Contractor from the Site, and take possession of the Work and of all Contractor's tools, appliances, construction equipment, and machinery at the Site, and use the same to the full extent they could be used by Contractor (without liability to Contractor for trespass or conversion);
 2. incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere; and
 3. complete the Work as Owner may deem expedient.
- C. If Owner proceeds as provided in Paragraph 15.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Owner arising out of or relating to completing the Work, such excess will be paid to Contractor. If such claims, costs, losses, and damages exceed such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by Owner will be reviewed by Engineer as to their reasonableness and, when

so approved by Engineer, incorporated in a Change Order. When exercising any rights or remedies under this Paragraph, Owner shall not be required to obtain the lowest price for the Work performed.

- D. Notwithstanding Paragraphs 15.02.B and 15.02.C, Contractor's services will not be terminated if Contractor begins within seven days of receipt of notice of intent to terminate to correct its failure to perform and proceeds diligently to cure such failure within no more than 30 days of receipt of said notice.
- E. Where Contractor's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor then existing or which may thereafter accrue. Any retention or payment of moneys due Contractor by Owner will not release Contractor from liability.
- F. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 5.01.A, the termination procedures of that bond shall supersede the provisions of Paragraphs 15.02.B and 15.02.C.

15.03 *Owner May Terminate For Convenience*

- A. Upon seven days written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, Contractor shall be paid for (without duplication of any items):
 - 1. completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;
 - 2. expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses;
 - 3. all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred in settlement of terminated contracts with Subcontractors, Suppliers, and others; and
 - 4. reasonable expenses directly attributable to termination.
- B. Contractor shall not be paid on account of loss of anticipated profits or revenue or other economic loss arising out of or resulting from such termination.

15.04 *Contractor May Stop Work or Terminate*

- A. If, through no act or fault of Contractor, (i) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (ii) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (iii) Owner fails for 30 days

to pay Contractor any sum finally determined to be due, then Contractor may, upon seven days written notice to Owner and Engineer, and provided Owner or Engineer do not remedy such suspension or failure within that time, terminate the Contract and recover from Owner payment on the same terms as provided in Paragraph 15.03.

- B. In lieu of terminating the Contract and without prejudice to any other right or remedy, if Engineer has failed to act on an Application for Payment within 30 days after it is submitted, or Owner has failed for 30 days to pay Contractor any sum finally determined to be due, Contractor may, seven days after written notice to Owner and Engineer, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The provisions of this Paragraph 15.04 are not intended to preclude Contractor from making a Claim under Paragraph 10.05 for an adjustment in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to Contractor's stopping the Work as permitted by this Paragraph.

ARTICLE 16 – DISPUTE RESOLUTION

16.01 *Methods and Procedures*

- A. Either Owner or Contractor may request mediation of any Claim submitted to Engineer for a decision under Paragraph 10.05 before such decision becomes final and binding. The mediation will be governed by the Construction Industry Mediation Rules of the American Arbitration Association in effect as of the Effective Date of the Agreement. The request for mediation shall be submitted in writing to the American Arbitration Association and the other party to the Contract. Timely submission of the request shall stay the effect of Paragraph 10.05.E.
- B. Owner and Contractor shall participate in the mediation process in good faith. The process shall be concluded within 60 days of filing of the request. The date of termination of the mediation shall be determined by application of the mediation rules referenced above.
- C. If the Claim is not resolved by mediation, Engineer's action under Paragraph 10.05.C or a denial pursuant to Paragraphs 10.05.C.3 or 10.05.D shall become final and binding 30 days after termination of the mediation unless, within that time period, Owner or Contractor:
1. elects in writing to invoke any dispute resolution process provided for in the Supplementary Conditions; or
 2. agrees with the other party to submit the Claim to another dispute resolution process; or
 3. gives written notice to the other party of the intent to submit the Claim to a court of competent jurisdiction.

ARTICLE 17 – MISCELLANEOUS

17.01 *Giving Notice*

- A. Whenever any provision of the Contract Documents requires the giving of written notice, it will be deemed to have been validly given if:

1. delivered in person to the individual or to a member of the firm or to an officer of the corporation for whom it is intended; or
2. delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the giver of the notice.

17.02 *Computation of Times*

- A. When any period of time is referred to in the Contract Documents by days, it will be computed to exclude the first 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 will be omitted from the computation.

17.03 *Cumulative Remedies*

- A. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee, or by other provisions of the Contract Documents. The provisions of this Paragraph will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right, and remedy to which they apply.

17.04 *Survival of Obligations*

- A. All representations, indemnifications, warranties, and guarantees made in, required by, or given in accordance with the Contract Documents, as well as all continuing obligations indicated in the Contract Documents, will survive final payment, completion, and acceptance of the Work or termination or completion of the Contract or termination of the services of Contractor.

17.05 *Controlling Law*

- A. This Contract is to be governed by the law of the state in which the Project is located.

17.06 *Headings*

- A. Article and paragraph headings are inserted for convenience only and do not constitute parts of these General Conditions.

SUPPLEMENTARY CONDITIONS

These Supplementary Conditions amend or supplement the Standard General Conditions of the Construction Contract EJCDC C-700 (2002 Edition) and other provisions of the Contract Documents as indicated below. All provisions which are not so amended or supplemented remain in full force and effect.

ARTICLE SC-2 – PRELIMINARY MATTERS

SC-2.02 A. Amend the first sentence of Paragraph 2.02A. of the General Conditions to read as follows:

“Owner shall furnish to the Contractor five (5) sets of the Contract Documents,” and so amended Paragraph 2.02 A. remains in effect.

SC-2.03A. Delete paragraph 2.03A. in its entirety and insert the following in its place:

“The Contract Times will commence to run on the day indicated on the Notice to Proceed. A Notice to Proceed may be given at any time within 60 days after the Effective Date of the Agreement.”

ARTICLE SC-4 – AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; REFERENCE POINTS

SC-4.01.D, E., and F. Add the Following Paragraphs immediately after paragraph 4.01 C:

“D. The Contractor and Owner hereby acknowledge that the Owner has acquired permanent and temporary easements on private property for the construction of the Project, and that such easements, together with public street rights-of-way (and previously acquired easements) comprise the sole areas where the Contractor is allowed to work on the Project, or to use for mobilization, access, staging, storage, and other purposes associated with the Project.

E. **Any occupancy of or intrusions onto private property outside such easements or rights-of-way owned or controlled by the Owner will constitute a trespass upon private property, and will likely involve serious legal consequences for the Owner.** Accordingly, the Contractor will be solely responsible for such actions and hereby agrees to hold harmless and indemnify the Owner from all actions, claims, liabilities, including the payment of attorneys’ fees arising from such actions.

F. The only exception to the above stated limitations on the Contractor’s work area will be in those instances where the Contractor has independently negotiated and secured agreements for temporary work and/or access privileges from property owners. Such agreements must be in writing, and a copy of any such agreement shall be provided to the Owner in advance of any use or occupancy of private property pursuant to the agreement. The terms of these agreements should clearly express to the property owner that the Contractor is seeking such use, occupancy, or access independently from the Owner and its Contract with

the Owner, and the Contractor will be solely responsible for activities carried out on such areas.”

- SC – 4.02 A.1 Amend paragraph 3.02A.1., to include the addition of the following:
“Limited subsurface information is available upon request for this project.”
- SC – 4.02.A.2 Amend paragraph 4.02.A.2., to include the addition of the following:
“No drawings of physical conditions have been utilized by the Engineer in preparing the Contract Documents.”
- SC-4.04.B.1. Amend paragraph 4.04.B.1, to include the addition of the following:
“Extreme care shall be exercised when excavating with heavy equipment near existing utility lines, drainage structures, building structures, cables, railroad, and streets. The Owner will not assume nor accept any responsibility for charges assessed by private or public utility companies or from the NC Department of Transportation for damages sustained to their property by virtue of action on the part of the Contractor, nor for such charges as may be imposed by the utility or Department of Transportation for personnel to furnish field location of the facility. All such costs are to be borne by the Contractor within the unit prices and/or lump sum prices stated in the Bid.”
- SC-4.06A. Amend paragraph 4.06A, to include the addition of the following:
“No drawings or reports relative to a hazardous environmental condition identified at the site have been utilized by the Engineer in preparing the Contract Documents.”

ARTICLE SC-5 – BONDS AND INSURANCE

- SC-5.01.A Amend paragraph 5.01 A, to include the addition of the following:
“The performance bond and the payment bond shall be executed by a surety company legally authorized to do business in the State of North Carolina and shall become effective upon the awarding of the construction contract. A bid bond is required and shall be in an amount of five percent (5%) of the bid amount as required by GS 143-129.”
- SC-5.03A. Add the following language at the end of paragraph 5.03A. of the General Conditions:
“The Contractor shall provide the Owner certified copy of all insurance policies and all endorsements thereto. The Contractor shall not be required to name additional insured other than those in General Conditions.”
- SC-5.04.A Add the following:

“Wherever in this Article the terms “The Insured” and the Owner occurs with respect to coverage in a policy, it shall mean the Owner and its agent and agencies, all locations where work is being performed under the Contract, the Engineer, and any other parties specifically designated herein, who shall be named as insured in each policy issued. The insurance policies required herein shall not contain any third party Beneficiary Exclusion.

The Contractor shall not commence work under the Contract until he has obtained all insurance required under this Article and such insurance has been approved by the Owner, nor shall the Contractor allow any subcontractor to commence work on his subcontract until all similar insurance required of the subcontractor has been so obtained and approved.

The insurance carrier shall notify each of The Insured of the filing of any claims within 30 days of the filing of such claim.

The Contractor agrees to protect, defend, indemnify and hold the Owner and its officers, employees and agents free and harmless from and against any and all losses, penalties, damages, settlements, costs, charges, professional fees or other expenses or liabilities of every kind and character arising out of or relating to any and all claims, liens, demands, obligations, actions, proceedings or causes of action of every kind and character in connection with or arising directly or indirectly out of this agreement and/or the performance hereof due to the Contractor’s negligence. The Contractor further agrees to investigate, handle, respond to, provide defense for and respond to provide defense for and defend any such claims, etc. at his soles expense and agrees to bear all costs and expenses related thereto, even if (claims, etc.) is groundless, false, or fraudulent.

If insurance is not with a surety company, the insurance shall be through an insurance company licensed to conduct business in the State where the project is located and has a Best Rating of no less than A.”

SC-5.04.B.7

The insurance required under the above paragraphs shall provide adequate protection for the Contractor and his subcontractors, respectively, as well as the Owner and Engineer, against damage claims which may arise from operations under this contract, whether such operations be by the insured or by anyone directly or indirectly employed by him and, also, against any special hazards which may be encountered in the performance of this contract.

The Contractor shall maintain flood insurance on building structures, equipment, and other insurance items of new construction which could be damaged during a period of flooding during the period of the contraction contract (until the new facilities are accepted by the Owner.)”

SC-5.04.B.8

Add the following to Article 5.04 as a new paragraph 5.04.B8:

“Prior to beginning construction, the Contractor shall furnish to the Owner and Engineer Certificates of Insurance by companies acceptable to the Owner and Engineer covering the above specified items and including an endorsement incorporating the Save Harmless Agreement assumed by the Contractor. The

Contractor shall be solely responsible for securing certificates of insurance coverage as therefore specified from all subcontractors engaged in the work.”

SC-5.04.C

Add the following new paragraph immediately after paragraph 5.04 B:

C. ‘The limits of liability for the insurance required by paragraph 5.04 of the General Conditions shall provide coverage for not less than the following amounts or greater where required by Laws and Regulations:

1. Workers’ Compensation, etc. under paragraphs 5.04.A.1 and A.2 of the General Conditions:

- | | | |
|-----|--|-----------|
| (1) | State | Statutory |
| (2) | Applicable Federal
(e.g., Longshoreman’s) | Statutory |

2. Comprehensive General Liability (under paragraphs 5.04.A3 through 5.04.A5 of the General Conditions):

(a) Bodily Injury (including completed operations and products liability):

\$2,000,000 for each person
\$2,000,000 for each occurrence

Property Damage:

\$2,000,000 for each occurrence
\$2,000,000 - aggregate

(b) Property Damage Liability Insurance will provide Explosion, Collapse and Underground coverages where applicable. Equal to Contract Amount.

(c) Personal Injury, with employment exclusion deleted.

\$2,000,000 - annual aggregate

3. Comprehensive Automobile Liability:

(a) Bodily Injury:

\$2,000,000 for each person
\$2,000,000 for each occurrence

(b) Property Damage:

Combined single limit of \$200,000

4. Umbrella Coverage for This Contract – (under Paragraph 5.04.B.2 of the General Conditions):

(a) General Aggregate \$2,000,000

5. The Contractual Liability coverage required by paragraph 5.04.B.4 of the General Conditions shall be provided by the Contractor as part of the Contractor's General Liability coverage."

SC-5.06.A Delete paragraph 5.06A in its entirety and insert the following in its place:

The Contractor shall procure and maintain, if applicable, Fire and Extended Coverage insurance upon the project to the full insurable value thereof for the benefit of the Owner, the Contractor and Subcontractors as their interest may appear. This provision shall in no way release the Contractor or Contractor's surety from obligations under the Contract Documents to fully complete the Project.

The Contractor shall secure, if applicable, "all Risk" type Builder's Risk Insurance for Work to be performed. Unless specifically authorized by the Owner, the amount of such insurance shall not be less than the Contract Price totaled in the Bid. The policy shall cover not less than the losses due to fire, explosion, hail, lightning, vandalism, malicious mischief, wind collapse, riot, aircraft, and smoke during the Contract Time, and until the Work is accepted by the Owner. The policy shall name as the insured the Contractor and the Owner.

SC-5.11.A Add the following immediately after paragraph 5.10A:

"In the event that claims in excess of the insured amounts provided herein are filed by reason of any operations under the Contract, the amount of excess of such claims or any portion thereof, may be withheld from payment due or to become due to the Contractor until such times as the Contractor shall furnish such additional security covering such claims as may be determined by the Owner."

ARTICLE SC-6 – CONTRACTOR'S RESPONSIBILITIES

SC-6.01.A Amend paragraph 6.01 A by adding the following:

"At no time during the course of construction shall any of the Contractor's personnel behave in any ungentlemanly or abusive manner on the job site or in any meetings or conference involving the Owner or Engineer. Ungentlemanly, abusive, uncooperative behavior shall be grounds for dismissal of the Contractor's personnel from the project.

No alcoholic beverages or narcotics of any description will be allowed on the job site at any time. Furthermore, anyone under the influence of alcohol or narcotics shall be removed from the job site immediately. A second offense involving Contractor's personnel under the influence of alcohol or narcotics on the job site shall constitute grounds for automatic, permanent dismissal from any further work on the project."

SC-6.01.B

Amend paragraph 6.01 B by adding the following:

“The Owner and Engineer shall have authority of approval of the project superintendent and all subcontractors employed on the project. Within five (5) days from receipt of the Notice of Award, the name and written summary of qualifications of the project superintendent and the name and address, and scope of work proposed for all subcontractors shall be submitted for approval by the Owner and the Engineer. The decision for approval or disapproval shall be final and binding.”

SC-6.05.C

Amend the paragraph by making two subparagraphs under title “C. Engineer’s Evaluation.” The paragraph is retitled 6.05.C.2. After Effective Date of Agreement. A new paragraph is added before this paragraph to read as follows:

“SC-6.06.C.1 During Bidding. The Contract, if awarded, will be on the basis of materials and equipment specified or described in the Bidding Documents, or “or-equal” materials and equipment as defined in paragraph 6.05 of the General Conditions, or those substitute or materials and equipment approved by the Engineer and identified by Addendum. The materials and equipment described in the Bidding Documents establish a standard of required type, function, and quality to be met by any proposed substitute “or-equal” item. Request for Engineer’s clarification of materials and equipment considered “or-equal” prior to the Effective Date of the Agreement must be received by the Engineer at least 5 days prior to the date for the receipt of Bids. No item of material or equipment will be considered by Engineer as a substitute unless written request for approval has been submitted by Bidder and has been received by Engineer at least 15 days prior to the date for receipt of Bids. Each request shall conform to the requirements of paragraph 6.05 of the General Conditions. The burden of proof of the merit of the proposed item is upon the Bidder. Engineer’s decision of approval or disapproval of a proposed item will be final. If Engineer approves any proposed substitute item, such approval will be set forth in an Addendum issued to all prospective Bidders. Bidders shall not rely upon approval made in any other manner.”

SC-6.06

Amend by adding the following:

WITHIN FIVE (5) DAYS of the bid opening and before the Notice of Award, the apparent Successful Bidder is required to identify all Subcontractors to be employed in the project. The apparent Successful Bidder shall also identify the Amount of Work that each Subcontractor is employed to perform.

SC-6.06.G

Amend by adding the following:

“Prime Contractors shall not sublet the contract, nor any portion thereof, without the written consent of the Owner.

If such consent is given, the Contractor will be permitted to sublet a portion thereof, but shall perform with his own organization work amount to not less than 50% of the total contract amount and 50% of the total labor. Upon request by the

Owner, the Contractor shall furnish sufficient documentation, satisfactory to the Owner, to demonstrate compliance herewith.

A subcontractor shall not sublet, sell, transfer, assign, or otherwise dispose of his contract with the Contractor, nor any portion thereof, or of his right, title, or interest therein.

The Contractor shall not assign the whole or any of this contract or any moneys due or to become due hereunder without written consent of the Owner. In case the Contractor assigns all or any part of any moneys due or to become due under this contract, the instrument of assignment shall contain a clause substantially to the effect that it is agreed that the right of the assignee in and to any moneys due or to become due to the Contractor shall be subject to prior liens of all persons, firms, and corporations for services rendered or materials supplied for the performance of the work called for in this contract.

SC-6.08A. Add the following:

“Prior to actual construction the Contractor shall obtain copies of all permits obtained by the Owner. Contractor shall be responsible for abiding all permit requirements including any bonding required by NCDOT.”

SC-6.10.A Amend by adding the following:

“Contractors are required to pay North Carolina Sales and/or Use Taxes and County Sales Taxes where applicable on all equipment and materials incorporated into the project. The Owner is qualified to receive rebate of the amount of such Sales Taxes as are paid on Materials and/or Equipment incorporated into the project.

Pursuant to North Carolina General Statutes, Section 105-164, 14, the Owner is eligible for Sales and Use Tax refunds on all materials which become a permanent part of the construction. The Contractor agrees to provide the Owner documentation which meets the requirements of Sales and Use Tax Regulation 42 regarding requests for refund of sales and use taxes. Those requirements are outlined below:

(g) All refund claims must be substantiated by proper documentary proof and only those taxes actually paid by the claimant during the fiscal year covered by the refund claim may be included in the claim.

Any local sales or use taxes included in the claim must be separately stated in the claim for refund. In cases where more than one county's sales and use tax has been paid, a breakdown must be attached to the claim for refund showing the amount of each county's local tax separately.

To substantiate a refund claim for sales and use taxes paid on purchases of building materials, supplies, fixtures, and equipment by its contractor, the claimant must secure from such contractor certified statements setting forth the cost of the property purchased from each vendor and the amount of state and

local sales and/or use taxes paid thereon. Such statement must also include the cost of any tangible personal property withdrawn from the contractor's warehouse stock and the amount of state and local sales or use tax paid therein by the Contractor. Similar certified statements by his subcontractors must be obtained by the general Contractor and furnished to the claimant (Owner). Any local sales or use taxes included in the Contractor's statement must be shown separately from the State sales or use taxes. The Contractor's statements must not contain sales or use taxes paid on purchases of tangible personal property purchased by such contractors for use in performing the contract which does not annex to, affix to or in some manner become a part of the building or structure being erected, altered or repaired for the governmental entities as defined by NCGS 105-164(c). Examples of property on which sales and use tax has been paid by the Contractor and which should not be included in the Contractor's statement are scaffolding, forms of concrete, fuel for the operation of machinery and equipment, tools, equipment repair, parts and equipment rentals, blueprints, etc."

"The Contractor shall submit notarized sales tax certificates which meet the requirements detailed above with each monthly payment request. Payment will not be made until the sales tax certificate(s) has been submitted to the Owner."

SC-6.11.A.3

Amend Paragraph 6.11.A.3:

"Specifically, Contractor shall be responsible for conforming to the requirements of the approved sedimentation control plan as it relates to land disturbing activities undertaken by the Contractor and as directed by the Engineer. Contractor shall be responsible to Owner for any fines imposed on Owner as a result of Contractor's failure to comply with the requirements of this paragraph. Contractor shall be responsible for all bonding required by permits. Contractor shall be responsible for conforming to the requirements of all permits and approvals obtained for the work where costs associated with such conformance could reasonably have been anticipated when bid."

SC-6.11.B

Amend by adding the following:

The Contractor shall be responsible for disposal of all other waste/spoil materials. Means of disposal shall be subject to the Engineer's approval.

SC-6.12A.

Add the following to paragraph 6.12.A:

"The Contractor shall neatly make notes and sketch all changes and variances (including Addenda and Work Change Directives) that occur during construction and that are different than what is shown on the original Drawings and Specifications. The Contractor shall measure ties (at least two ties to each item) to all valves, master meters, air release/vacuum valves and neatly show the measurements on the record copy of the Drawings. The Contractor shall measure (approximately every 100 feet) the distance from the edge of pavement to the centerline of pipeline installed, and show the measurement neatly in the record copy of the Drawings. The Contractor shall measure the distance between each road intersection and fire hydrant and/or in-line valve, from fire hydrant to fire

hydrant, and from in-line valve to in-line valves, and neatly show the measurement on the record copy of the Drawings. The Contractor shall provide as-built invert elevations for sanitary sewer and storm structures.”

SC-6.13.A3

Amend by adding the following:

“The Contractor shall be responsible for removing and disposing of any obstructions or obstacles at the site of the work along the right-of-way to the satisfaction of the Engineer. Minor obstructions shall be removed and properly disposed of or protected and re-erected to as good a condition as found, at the same or adjacent locations, as directed by the Engineer.

1. Fences at the site or along the right-of-way, which interfere with the construction operations, shall be maintained by the Contractor until completion of the work unless written permission is obtained from the Owner thereof to leave the fence dismantled until construction is completed. He shall remove, rebuild, and extend fences as necessary to keep stock away from the construction area or from straying away.
2. Upon completion of work, all fences are to be restored to their original location and condition, unless shown differently on the Plans. The Contractor shall purchase new material, if necessary, to replace all materials damaged, lost, or destroyed.”

SC-6.13.A.4

Add the following to Article 6.13 as a new paragraph 6.13.A4:

“6.13.A4 During progress of the work, the convenience and protection of the public must be provided for, and interferences held to a minimum.

1. The Contractor shall, at all times, conduct the work in such a manner as to insure the least practicable obstruction to public travel. The convenience of the general public and of the residents along and adjacent to the area of the work shall be provided for in a satisfactory manner, consistent with the operation and local conditions. Roads and streets must be kept open at all times, or suitable detours provided. When necessary to close streets, “Street Closed” signs shall be placed immediately adjacent to the work, at such locations as traffic demands, and the Contractor shall notify the Owner, law enforcement agencies, fire departments, and parties operating emergency vehicles before the street is closed and again as soon as it is opened. Access to fire hydrants and other fire extinguishing equipment shall be provided and maintained at all times.
2. When necessary, the Contractor shall provide watchmen and lights to burn between twilight and sunrise, and shall erect and maintain barriers and all other necessary protection about the work at his own expense. He shall also take other precautions as may be necessary to protect life, limb, and property. The Owner reserves the right to remedy and neglect on the part of the Contractor as regards to the protection of the work after 24 hours notice in writing; and in cases of emergency, the Owner shall have the right to remedy and neglect without previous notice and in either case deduct the cost of such remedy from money due the Contractor.”

SC-6.13.A5

Add the following to Article 6.13 as a new paragraph 6.13.A5:

“6.13.A5 The Contractor shall comply with the Department of Labor Safety and Health Regulations for construction promulgated under the Occupational Safety and Health Act of 1970 (PL-91-596) and under Section 107 of the Contract Work Hours and Safety Standards Act (PL-91-054).

All chemicals used during project construction and furnished for project operation, whether herbicide, pesticide, disinfectant, polymer, reactant or of other classification, must show approval of either EPA or USDA. Use of all such chemicals and disposal or residues shall be in strict conformance with instructions.

The Contractor shall contact the local Plant Protection and Quarantine Office of the US Department of Agriculture to determine if any part of this project or any area of his operations in connection therewith is within any quarantine. If so, the Contractor shall thoroughly clean and wash all equipment that moves out of the quarantine area at any time during or after construction of the project and he shall comply with all restrictions and regulations of the US Department of Agriculture and the NC Department of Agriculture.”

SC-6.14A

Add the following paragraphs:

“Conduct of Contractor’s Personnel:

At no time during the course of construction shall any of the Contractor’s personnel behave in any ungentlemanly or abusive manner on the job site or in any meetings or conferences involving the Owner or Engineer. Ungentlemanly, abusive, or uncooperative behavior shall be grounds for dismissal of the Contractor’s personnel from the project.

No alcoholic beverages or narcotics of any description will be allowed on the job site at any time. Furthermore, anyone under the influence of alcohol or narcotics shall be removed from the job site immediately. second offense involving Contractor’s personnel under the influence of alcohol or narcotics on the job site shall constitute grounds for automatic, permanent dismissal from any further work on the project.

SC-6.17.C.3

Add the following paragraph:

“Each submittal of shop drawings shall be accompanied with a transmittal cover, with date and clearly marked as to type and extent of shop drawing submitted for review. A separate sheet shall note any and all exceptions to the specifications. If catalogue cuts are submitted as shop drawings, then each item proposed shall be clearly delineated including any options proposed or not proposed. Shop drawing where applicable shall be from the vendor, manufacturer, material, or equipment supplier or subcontractor written in on bid proposal or where applicable a credit shall be offered. Shop drawings not meeting the

above and General Conditions, Section 6.17.C.1., will be returned without review.”

SC-6.19A Add the following:

“The Contractor shall guarantee all material, equipment, and workmanship for a period of at least one year after final acceptance by the Owner. Repairs occurring under the warranty period will restart the full one year warranty.”

ARTICLE SC-7 – OTHER WORK AT THE SITE

SC-7.02 Delete Article 7.02 in its entirety and insert the following:

“7.02.A If OWNER contracts with others for the performance of other work on the project at the site, the following will be set forth:

7.02.A1 The Prime General Contractor shall be responsible for overall project coordination and scheduling of work items with the Prime Electrical, HVAC and Plumbing Contractors. He shall deliver a revised construction schedule to the Engineer, Owner, and other prime Contractors in sufficient detail to estimate the completion date of major units. Upon request by the Engineer, all Contractors shall make themselves available for project schedules, coordination of work and resolution of conflicts, provided however that such meetings would not be required more often than monthly on the average.”

SC-7.03.D. Add the following to Article 7 as a new paragraph 7.03.D:

“7.03.D Should Contractor cause damage to the work or property of any separate Contractor at the site, or should any claim arising out of the Contractor’s performance of the work at the site be made by any separate Contractor against Contractor, Owner, Engineer, the Construction Coordinator or any other person, Contractor shall promptly attempt to settle with such other Contractor by agreement, or to otherwise resolve the dispute. Contractor shall, to the fullest extent permitted by Laws and Regulations, indemnify and hold Owner, Engineer, and the Construction Coordinator harmless from and against all claims, damages, losses and expenses (including, but not limited to, fees of engineers architects, attorneys and other professionals and court and arbitration costs) arising directly, indirectly or consequentially out of any action, legal or equitable, brought by any separate Contractor against Owner, Engineer, or the Construction Coordinator to the extent based on a claim arising out of Contractor’s performance of the Work.

Should a separate Contractor cause damage to the Work or property of the Contractor or should the performance of Work by any separate Contractor at the site give rise to any other claim, Contractor shall not institute any action, legal or equitable, against Owner, Engineer, or the Construction Coordinator or permit any action against any of them to be maintained and continued in its name or for the benefit on any action which seeks to impose liability on or to recover damages from Owner, Engineer or the Construction Coordinator on account of

any such damage or claim. If Contractor is delayed at any time in performing or furnishing Work by any act or neglect of a separate Contractor and Owner and Contractor are unable to agree as to the extent of any adjustment on Contract Time attributable thereto, Contractor may make a claim for an extension of time in accordance with Article 12. An extension of the Contract Time shall be Contractor's exclusive remedy with respect to Owner, Engineer, and Construction Coordinator for any delay, disruption, interference or hindrance caused by a separate Contractor. This paragraph does not prevent recovery from Owner, Engineer, or Construction Coordinator for activities that are their respective responsibilities."

ARTICLE SC-8 – OWNER'S RESPONSIBILITIES

SC-8.12.A Add the following to Article 8 as a new paragraph 8.12.A:

"The Owner shall obtain and pay application fees for the following permits: NCDOT Right-of-Way Encroachment, North Carolina Department of Environment and Natural Resources Erosion and Sedimentation Control; Department of Environment and Natural Resources, Division of Water Quality approval of plans and specifications for stream crossings, and NCDENR Public Water Supply Approval of plans and specification for potable water systems.

SC-8.13.A Add the following to Article 8 as a new paragraph 8.13.A:

"8.13.A No official of the Owner, who is authorized in such capacity and on behalf of the Owner to negotiate, make, accept, or approve or to take part in negotiating, making, accepting, or approving any architectural, engineering, inspection, construction, or material supply contract or any subcontract in connection with construction of the project, shall become directly or indirectly interested personally in this contract or in any part thereof. No officer, employee, architect, attorney, engineer, or inspector of or for the Owner, who is authorized in such capacity and on behalf of the Owner to exercise any legislative, executive, supervisory, or other similar functions in connection with the construction of the project, shall become directly or indirectly interested personally in this contract or in any part thereof, any material supply contract, subcontract, insurance contract, or any other contract pertaining to the project."

ARTICLE SC-9 – ENGINEER'S STATUS DURING CONSTRUCTION

SC – 9.03.A. Add the following paragraph:

"The Owner or Engineer shall furnish a Resident Project Representative to assist the Engineer in providing more extensive observation of the work. Resident Project Representative duties to be determined prior to and discussed a pre-construction conference.

ARTICLE SC-11 – COST OF THE WORK; CASH ALLOWANCES; UNIT PRICE WORK

SC-11.01.A

Amend by adding the following:

“The work to be done by the Contractor, specified and enumerated under this contract, shall include any minor details of the work not specifically mentioned in the specifications or shown on the plans, but obviously necessary for the proper completion of the work, which shall be considered incidental and as being a part of and included with the work for which prices are given in the Bid Form. The Contractor will not be entitled to any additional compensation therefore.”

ARTICLE SC-12 – CHANGES OF CONTRACT PRICE;CHANGE OF CONTRACT TIMES

SC-12.02.A

Amend by adding the following:

“It is hereby understood and mutually agreed by and between the Contractor and the Owner, that the date of beginning, rate of progress, and the time for completion of the work to be done hereunder are ESSENTIAL CONDITIONS of this contract; and it is further mutually understood and agreed that the work embraced in this contract shall be commenced on a date to be specified in the Notice to Proceed with the work.

The Contractor agrees that said work shall be prosecuted regularly, diligently, and uninterruptedly at such rate of progress as will insure full completion thereof within the time specified. It is expressly understood and agreed, by and between the Contractor and the Owner, that the time for the completion of the work described herein is a reasonable time for the completion of the same, taking into consideration the average climatic range and usual industrial conditions prevailing in this locality. It is further agreed that in the event construction is not completed, or equipment not delivered, within the time specified for completion that the Owner may retain from compensation due the Contractor the stipulated amounts per day for each day thereafter, Sundays and holidays included, that the contract remains uncompleted.

Contract Time extensions for adverse weather delays shall be granted according to the number of days when precipitation exceeds the historical average number of rain events of 0.1 inches rainfall or greater, as established by the US Army Corps of Engineers. The evaluation of weather will be based on the total number of such days over the entire Contract Time.

In addition, time extensions for “impact” days may also be granted if the Contractor can demonstrate that his work plans or production were materially impacted by precipitation which occurred on a previous day. To be considered, the Contractor shall submit detailed documentation relative to each individual “impact” day.

ARTICLE SC-13–TESTS AND INSPECTIONS;CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK

SC-13.02.A Amend by adding the following:

“The Contractor will provide proper facilities for such access and inspection. Access facilities shall include ladders, walks, foot bridges, dewatering, illumination, etc.”

ARTICLE SC-14 – PAYMENTS TO CONTRACTOR AND COMPLETION

SC-14.02.A3 Delete the last sentence of the paragraph in its entirety and add the following:

“The amount of retainage with respect to progress payments will be withheld in accordance with NC General Statute 143-134.1.”

The Engineer may allow partial payment of 95% of the estimated value of materials and equipment not incorporated into the Work, pursuant to the following conditions:

1. Major equipment items (as defined by the Engineer) stored off site shall be stored in a bonded warehouse and maintained with insurance in the name of the Owner for the full value of the equipment.
2. Equipment or materials stored on the site shall be properly stored, protected, and maintained.
3. For any partial payment, the Contractor shall submit, with his monthly progress payment a certified receipt bill from each material or equipment manufacturer.
4. Partial payments on materials or equipment will not be made when the total of such payments would exceed the Contract retainage amount.”

SC-14.02.B2 Amend by adding the following:

“Final inspection and acceptance of the work is to take place at the completion of the entire work under the Agreement, and any inspection or acceptance of materials and workmanship at the mills, shops, or elsewhere to facilitate the progress of the work, or payment of monthly payment applications of work done, shall not preclude rejection of such materials or workmanship thereafter if same be found unsuitable or not in complete accord with the plans, specifications, and contract documents.”

SC-14.02.B5.d Amend this paragraph by adding to the end the word “or” and inserting thereafter the following:

“Contractor has failed to make payment to subcontractors or suppliers or for labor,
or

Contractor has failed to make acceptable submittals in accordance with accepted schedules, or

Liability for liquidated damages has been incurred by Contractor.”

ARTICLE SC-15 – SUSPENSION OF WORK AND TERMINATION

SC-15.01.B Add the following to Article 15.01 as a new paragraph 15.01.B:

“15.01.B No work shall be done under these specifications except by permission of the Engineer and Owner when the weather is unfit for good and careful work to be performed. Should the severity of the weather continue, the Contractor, upon the direction of the Owner, shall suspend all work until instructed to resume operations by the Owner, and the Contract Time shall be extended to cover the duration of the order. Work damaged during periods of suspension due to inclement weather shall be repaired and/or replaced by the Contractor at his own expense.”

ARTICLE SC-16 – DISPUTE RESOLUTION

SC-16.01.A Amend Article 16.01.A by adding the following:

The dispute resolution process shall be available to all parties under the construction contract.

Parties shall participate in mediation concerning a dispute as a precondition to initiating litigation concerning the dispute.

All parties shall agree not to pursue litigation for an amount of \$15,000 or less.

The costs of the dispute resolution process shall be divided between parties in the dispute. A minimum of one third of the resolution cost shall be borne by the public entity, if the public entity is a party to it.

This contract shall not provide in any way for arbitration. This applies to any reference throughout the contract document in the context of dispute resolution.

All parties agree that only the North Carolina Courts shall have jurisdiction over the contract and any controversies arising out of this contract and this agreement shall be governed by and construed in accordance with the law of the State of North Carolina.

ARTICLE SC-17 – MISCELLANEOUS

SC-17.01.A.3 Add a new paragraph immediately after Paragraph 17.01.A.2 of the General Conditions which is to read as follows:

“No oral statement from any person shall in any way modify the terms of this Contract.”

SC-17.07 Add the following to Article 17 as a new paragraph 17.07:

“17.07 Liquidated Damages:

Work on the project shall be commenced with adequate forces within the time stipulated in the Bid and Agreement and fully completed within the stated Contract Time of consecutive calendar days, which shall include Sundays and holidays. No work shall be performed on Saturdays, Sundays, and legal holidays without the prior approval of the Engineer. When the Contractor desires to work on one of the above days, he shall request in writing approval at least one week in advance of the day or days on which he desires to work. Legal holidays shall be the following days: New Year's Day, Easter Monday, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, and Christmas Day and one other day at Christmas. When a holiday falls on a Saturday, the holiday shall be observed on the preceding Friday, and when a holiday falls on a Sunday, the holiday shall be observed on the following Monday.

Liquidated damages sustained by the Owner as a result of the work not being completed within the Contract Time, shall be as stated in the Agreement for each Contract or Division of Work.

Liquidated damages for this contract shall be assessed for each and every calendar day that the work remains incomplete beyond the Contract Time.

It is further agreed that time is of the essence of each and every portion of this contract and of the specifications wherein a definite and certain length of time is fixed for the performance of any act whatsoever; and where under the contract is allowed an additional time for the completion of any work, the new time limit fixed by such extension shall be of the essence of this contract. Provided, that the Contractor shall not be charged with liquidated damages or any excess cost when the delay in completion of the work is due:

1. To any preference, priority, or allocation or order duly issued by the Government;
2. To unforeseeable cause beyond the control and without the fault or negligence of the Contractor, including, but not restricted to, acts of God or of the public enemy, acts of the Owner, acts of another Contractor in the performance of a contract with the Owner, fires, floods, epidemics, quarantine, restrictions, strikes, freight embargoes, and unusually severe weather; and
3. To any delays of subcontractors occasioned by any of the causes specified in subsections (1) and (2) of this article.

SC-17.08 Add the following to Article 17 as a new paragraph 17.08:

“17.08 Where conflicts exist between these General Conditions, Supplemental Conditions, and the Division I Sections of the Specifications, the most stringent requirements shall govern.”

END OF SUPPLEMENTARY CONDITIONS

SECTION 01 33 00 – SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. This Section includes, but is not limited to, requirements for the following:
1. Submittal procedures
 2. Construction progress schedule
 3. Schedule of values
 4. Project record documents
 5. Certificates of compliance
 6. Catalog data
 7. Shop drawings
 8. Manufacturer's installation procedures
 9. Samples
 10. Warranties
 11. Spare parts and maintenance materials

1.2 SUBMITTAL PROCEDURES

- A. Transmit each submittal with cover letter to the Engineer:
C.T.Clayton Engineering 46 W. Washington St., Coats, NC 27521
- B. Sequentially number transmittal forms. Re-submittals are to have original number with an alphabetic suffix.
- C. Cover letter for each submittal package shall list the following:
12. Contractor's Name:
 13. Owner's Name: Harnett County
 14. Project Name: Dunn Erwin Landfill Improvements
 15. C.T.Clayton Engineering Job Number: 03002B
- D. Individual submittals shall each be listed by the following information:
1. Submittal reference number
 1. Specification section number
 2. Drawing and detail number when appropriate
 3. Equipment
 4. Type submittal
 5. Supplier
 6. Manufacturer
- E. Apply Contractor's stamp to each submittal signed or initialed and dated, certifying that Contractor has reviewed submittal for conformance with

requirements of Contract Documents, and has coordinated submittal with related work.

- A. Schedule submittals to expedite Project, and deliver to coordinate submission of related items. Allow a minimum of fifteen (15) working days for Engineer's review.
- B. Identify variations from Contract Documents and Product limitations as they relate to the satisfactory performance of the Project.
- C. Provide space for Contractor and Engineer review stamps.
- D. Revise and resubmit submittals as required – identify changes made since previous submittal.
- E. Distribute copies of reviewed submittals to concerned parties. Instruct parties to promptly report inability to comply with provisions.
- F. Work requiring submittal review by Engineer shall not be started until review has been obtained.
- G. Engineer's review of submittals shall not relieve Contractor of responsibility for complete compliance with Contract Documents.

1.3 ADMINISTRATIVE SUBMITTALS

- A. Construction Progress Schedule
 - 1. Submit five (5) copies of the initial progress schedule 15 days after date of Owner-Contractor Agreement. One copy shall be returned to the Contractor.
 - 2. Progress schedule shall be, as a minimum, a horizontal bar chart with a separate line for each major section of Work. Identify the first workday of each week.
 - 3. Show complete sequence of construction by activity, identifying Work of separate stages and other logically grouped activities. Indicate the early and late start, early and late finish, float dates, and duration.
 - 4. Indicate the expected monthly par requests.
 - 5. Submit revised schedule with each Application for Payment as required for updating, identifying changes since previous

version. Indicate estimated percentage of completion for each item of Work at each submission.

6. Indicate submittal dates required for critical shop drawings, product data, samples, and product delivery dates including those furnished by Owner and items listed under Allowances.
7. Indicate specific work sequences and requirements.

B. Schedule of Values

1. Submit three (3) copies of the schedule of values at least three (3) weeks prior to the first partial payment request. Schedule shall divide the lump sum contract items into major work tasks. Use the table of contents as a guide for itemizing the schedule. Schedule will be used only as a basis for review of the Contractor's request for payment.
2. Engineer may request additional delineation of work tasks and supporting data of the values, as he deems appropriate. Revise schedule and resubmit.
3. Revise schedule to list approved Change Orders, with each request for payment.

C. Project Record Documents

1. Maintain on site, one set of the following record documents; record actual revisions to the Work:
 - a. Contract Drawings
 - b. Contract Documents and Specifications
 - c. Addenda
 - d. Change Orders and other Modifications to the Contract
 - e. Reviewed Submittals
2. Store Record Documents separate from documents used for construction.
3. Record information concurrent with construction progress.
4. Specifications: Legibly mark and record at each Product section description of actual Products installed, including the following:
 - a. Manufacturer's name, product model and number
 - b. Product substitutions or alternates utilized

- c. Changes made by Addenda and Modifications
- 5. Record Documents and Shop Drawings: Legibly mark each item to record actual construction including:
 - a. Measure and reference horizontal and vertical locations of underground utilities and appurtenances to permanent surface improvements.
 - b. Field changes from construction Drawings.
 - c. Details not on original Contract Drawings.
- 6. Submit documents to engineer with final Application for Payment.

1.4 TECHNICAL SUBMITTALS

- A. General: Submit the following, in the number indicated, as required by the individual sections of the technical specifications.
- B. Certificates of Compliance
 - 1. Submit Manufacturer's Certificates of Compliance, in quantities specified for Shop Drawings.
 - 2. Certificates shall certify that the Products delivered to the project are in conformance with the Specifications.
 - 3. Certificates may be recent or previous test results on Product, but must be acceptable to Engineer.
 - 4. Certification shall not relieve the Contractor of responsibility for complying with requirements of the Specifications.
- C. Catalog Data
 - 1. Submit copies of manufacturers' standard catalog cuts of Products to be used in the Work.
 - 2. When shop drawings are not required, the catalog data shall include the following as a minimum:
 - a. Parts schedule that identifies the materials to be used in each of the various parts.
 - b. Sufficient detail to serve as a guide for assembly and disassembly of the product and to serve as guide for ordering parts.
 - 3. Mark each copy to identify applicable products, models options, and other data. Supplement manufacturers' standard data to

provide information unique to this Work in the Shop Drawing submittal.

4. Submit the number of copies as follows:
 - a. Products specified by a national standard: Submit three (3) copies. This data is for the general information of the Engineer and for use by the Owner for operation and maintenance and will not be returned to the Contractor.
 - b. Other Products: Submit the number of copies specified for the Shop Drawing.

D. Shop Drawing

1. Submit the number of copies that Contractor requires, plus three (3) copies that will be retained by Engineer.
2. Shop drawings shall consist of drawings, diagrams, illustrations, schedules, performance charts, brochures and other data, prepared specifically for a portion of the Work. Shop Drawings shall indicate the type, size, quantity, arrangement, location, mode of operation, component materials, utility connections, wiring and control diagrams, anchorages, supports, factory applied coatings, and other information necessary to ensure satisfactory fabrication, installation and operation of the completed Work. Shop Drawings shall establish the actual detail of manufactured or fabricated items, indicate proper relation to adjoining work, amplify design details of mechanical and electrical equipment in proper relation to physical spaces in the structure, and incorporate minor changes to design and construction to suit actual requirements.

E. Manufacturer's Installation Procedures

1. Submit manufacturers' installation procedures to Engineer for review in the quantities specified for Shop Drawings.

F. Samples

1. Submit samples as required by the individual specification sections. Samples shall be physical examples to illustrate the materials and workmanship. Submit in sufficient size and quantity to clearly illustrate the functional characteristics of the Product, with integrally related parts and attachment devices, and the full range of color to be provided.

G. Warranties

1. Provide copies of Product warranties as required by the individual sections of the specifications.
2. Provide duplicate notarized copies.
3. Execute and assemble documents from Subcontractors, suppliers, and manufacturers.
4. Provide Table of Contents and assemble in three D side ring binder with durable plastic cover.
5. Submit prior to final Application for Payment.
6. For items of Work delayed beyond date of Substantial Completion, provide updated submittal within 10 days after acceptance, listing date of acceptance as start of warranty period.

H. Spare Parts and Maintenance Materials

1. Provide recommended manufacturer's list of spare parts, maintenance, and extra material as specified in individual sections.

END OF SECTION 01 33 00

SECTION 01 45 00 – QUALITY CONTROL

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

- A. General quality assurance and control
- B. References
- C. Manufacturer's instructions, certificates, field services, and reports
- D. Testing laboratory services.

1.02 RELATED REQUIREMENTS

- A. Section 01 33 00 Submittal Procedures

1.03 GENERAL QUALITY CONTROL

- A. Maintain quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.
- B. Comply with industry standards except when more restrictive tolerances or specified requirements indicate more rigid standards or more precise workmanship.
- C. Perform work by persons qualified to produce workmanship of specified quality.
- D. Secure products in place with positive anchorage devices and sized to withstand stresses, vibration, physical distortion, and disfigurement.

1.04 REFERENCES

- A. Conform to the referenced standards and Standard Specifications.
- B. Specific provisions of codes, regulations and standards may be referenced in individual Specifications to assist the Contractor and identify options selected by the Engineer. Such references do not relieve the Contractor from compliance with other applicable provisions of codes, regulations, and standards not specifically referenced.
- C. Should specified reference standards conflict with Contract Documents, request clarification from Engineer before proceeding.

1.05 MANUFACTURER'S INSTRUCTIONS AND CERTIFICATES

- A. Comply with manufacturer's instructions in full detail, including each step in sequence. Should instructions conflict with Contract Documents, request clarification from Engineer before proceeding.

- B. When required by individual Specifications Section, submit manufacturer's certificate that products meet or exceed specified requirements.

1.06 MANUFACTURER'S FIELD SERVICES AND REPORTS

- A. When specified in respective Specification Sections, require supplier, manufacturer, or installer, to provide qualified personnel to observe field conditions, conditions of surfaces and installation; quality of workmanship; start-up of equipment; test, adjust, and balance of equipment as applicable; and to make appropriate recommendations.
- B. Manufacturer's representative shall submit a written report to Engineer listing observations, site decisions, and instructions that are supplemental or contrary to manufacturer's written instructions. The manufacturer's representative shall certify that the materials and/or equipment has been properly installed and is functioning correctly.

1.07 TESTING

Provide all testing specified in individual Specification Sections. All testing services shall be arranged for and paid by the Contractor unless otherwise indicated in the Contract Documents.

1.08 INSPECTION AND TESTING LABORATORY SERVICES FOR CONCRETE AND SOILS

- A. Where reference is made in the Specifications to tests, inspections, independent designs, etc., such services shall be furnished by a fully qualified independent testing laboratory or firm of inspection engineers. All costs for providing such services shall be paid for by the Contractor.
- B. All arrangements for the testing work shall be made by the Contractor. Whenever inclement weather does not provide suitable testing conditions, the Contractor shall be responsible for cancellation notice to the testing agency. Any costs incurred because of failure to provide adequate cancellation notice shall be borne by the Contractor. Owner shall be notified of arrangements made for testing work.
- C. If a test fails to meet specification requirements, then the area represented by that test shall be reworked and retested at the Contractor's expense. Any additional testing required to verify previously failing tests shall be at the Contractor's expense. All corrective measures shall be documented in the Quality Control reports.
- D. D. Test reports shall be supplied to the Engineer within 3 days of the completion of such testing.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

SECTION 01 60 00 – PRODUCT REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Products.
- B. Transportation and handling.
- C. Storage and protection.
- D. Product options.
- E. Substitutions

1.2 PRODUCTS

- A. Products: Means new material, machinery, components, equipment, fixtures, and systems forming the Work. It does not include machinery and equipment used for preparation, fabrication, conveying, and erection of the Work. Products may also include existing materials or components specified in the Contract Document for reuse.

1.3 TRANSPORTATION AND HANDLING

- A. Transport and handle Products in accordance with manufacturer's instructions.
- B. Ship fabricated assemblies in largest sections permitted by carrier regulations and properly marked for ease of field erection.
- C. Promptly inspect shipments to assure that Products comply with specified requirements, quantities are correct, and Products are undamaged.
- D. Provide equipment and personnel to handle Products by methods to prevent soiling, disfigurement, or damage.

1.4 STORAGE AND PROTECTION

- A. Keep on site storage of material to a minimum.

- B. Store and protect Products in accordance with manufacturer's instructions in unopened original packages, with seals and labels intact and legible. Store sensitive Products in weather-tight, climate-controlled enclosures.
- C. For exterior storage of fabricated Products, place on sloped supports, above ground.
- D. Provide off site storage and protection when site does not permit on site storage.
- E. Cover Products subject to deterioration with impervious sheet covering. Provide ventilation to avoid condensation.
- F. Store loose granular Products on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.
- G. Arrange storage of Products to permit access for inspection. Periodically inspect to assure Products are maintained under specified conditions.

1.5 DAMAGED PRODUCTS

- A. Remove damaged Products from Project site.

1.6 PRODUCT OPTIONS

- A. Products Specified by Reference Standards: Product meeting standard and specific requirements of these specifications.
- B. The Contract, if awarded, will be on the basis of materials and equipment specified or described in the Bidding Documents, or or-equal materials and equipment as defined in the General Conditions, or those substitute or materials and equipment approved by the Engineer and identified by Addendum. The materials and equipment described in the Bidding Documents establish a standard of required type, function and quality to be met by any proposed substitute or or-equal item. Request for Engineer's clarification of materials and equipment considered or-equal prior to the Effective Date of the Agreement must be received by the Engineer at least 15 days prior to the date for receipt of Bids. No item of material or equipment will be considered by Engineer as a substitute unless written request for approval has been submitted by Bidder and has been received by Engineer at least 15 days prior to the date for receipt of Bids. Each request shall conform to the requirements of the General Conditions. The burden of proof of the merit of the proposed item is upon the Bidder. Engineer's decision of approval or disapproval of a proposed item will be final. If Engineer approves any proposed substitute item, such

approval will be set forth in an Addendum issued to all prospective Bidders. Bidders shall not rely upon approvals made in any other manner.

1.7 SUBSTITUTIONS

- A. Engineer will consider requests for Substitutions only within 30 days after date of Owner-Contractor Agreement.
- B. Substitutions after receipt of bids will not be allowed for any reason other than a product becoming unavailable.
- C. Document each request with complete data substantiating compliance of proposed Substitution with Contract Documents.
- D. Request constitutes a representation that Contractor:
 - 1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
 - 2. Shall provide same warranty for Substitution as for specified product.
 - 3. Shall coordinate installation and make changes to other Work which may be required for the Work to be complete with no additional costs to Owner.
 - 4. Waives claims for additional costs or time extension that may subsequently become apparent.
 - 5. Shall reimburse Owner for review or redesign services associated with reapproval by authorities.
- E. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.
- F. Substitution Submittal Procedure:
 - 1. Submit three copies of request for Substitution for consideration. Limit each request to one proposed Substitution.
 - 2. Submit shop drawings, product data, and certified test results attesting to proposed product equivalence.
 - 3. Engineer will notify Contractor, in writing, of decision to accept or reject request.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION 01 60 00

SECTION 01 70 00 – EXECUTION REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Close out procedures.
- B. Final Cleaning.
- C. Adjusting.

1.2 CLOSE OUT PRODEDURES

- A. Submit written certification that Contract Documents have been reviewed, Work has been inspected, and is complete in accordance with Contract Documents and ready for Engineer's inspection.
- B. Provide submittals to Engineer that are required by governing or other authorities.
- C. Submit set of Record Documents indicating changes during construction as required in Section, Submittal Procedures.
- D. Submit final Application for Payment identifying total adjusted Contract Sum, previous payments, and final amount due.
- E. Submit the following with final Application for Payment:
 - 1. Affidavit of Release of Liens
 - 2. Consent of Surety for Final Payment
 - 3. Affidavit of Payment of Debts and Claims
 - 4. Final Certified Payroll Information
- F. Submit warranties as required by individual equipment specifications.

1.3 FINAL CLEANING

- A. Clean Project prior to final inspection. Project clean up shall include, but not be limited to, the following:
 - 1. Sweep paved areas.
 - 2. Rake clean landscaped surfaces.
 - 3. Remove waste, and surplus materials.
 - 4. Remove temporary construction facilities.

1.4 FINAL INSPECTION AND TESTS

- A. Complete punch list items within 30 days of receipt from Engineer. Owner may have work not completed within 30 days performed by others with the cost deducted from the Contractor's final payment. Additional engineering and inspection services required as a result of Contractor not completing punch list within 30 days shall be at Contractor's expense.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

SECTION 01 71 10 – CONSTRUCTION LAYOUT & AS-BUILT INFORMATION

PART 1 GENERAL

1.01 QUALIFICATIONS

- A. The Contractor shall employ a Land Surveyor licensed in the State of North Carolina and acceptable to the Engineer.

1.02 SURVEY REFERENCE POINTS

- A. The Engineer will identify on the plans base lines, control points, and bench mark(s), and will identify other pertinent monuments at the site of the work.
- B. The Contractor shall verify locations of survey control points prior to starting work and promptly notify Engineer of any discrepancies discovered.
- C. The Contractor shall protect survey control points, and preserve permanent reference points during construction. If any of the control points established by the Owner or Engineer are carelessly or willfully disturbed, the cost of replacing the control points shall be charged against the Contractor. The Contractor shall promptly report to Engineer the loss or destruction of any reference point or relocation required because of changes in grades or other reasons.

1.03 LAYING OUT WORK

- A. The Contractor shall, at his expense, provide all necessary survey services and shall provide and maintain accurate, detailed survey field notes and daily progress reports.
- B. From the lines, control points, and bench marks identified by the Engineer, the Contractor shall run all lines and levels, furnish, set and drive grade stakes, and do all other work necessary to lay out his work in accordance with the dimensions and elevations shown on the Drawings.
- C. The plans and supplementary drawings shall not be scaled and the Contractor shall verify all dimensions and elevations at the site prior to proceeding with the work. The Contractor shall also verify existing utility locations prior to purchasing materials affected by these locations.
- D. The Contractor shall locate and inform the Engineer as to the existence of any existing, conflicting utilities, prior to construction.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

SECTION 03 30 00 CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

This Section specifies cast-in place concrete, including formwork, reinforcing, mix design, placement procedures, and finishes.

Cast-in-place concrete includes the following:

- a) Foundations and footings.
- b) Slabs-on-grade.
- c) Tank walls.
- d) Elevated slabs.
- e) Equipment pads and bases.

1.3 SUBMITTALS

A. General: Submit the following according to Conditions of the Contract and Specification Section Submittal Procedures.

1. Product data for proprietary materials and items, including reinforcement and forming accessories, admixtures, patching compounds, waterstops, joint systems, curing compounds, dry-shake finish materials, and others if requested by Engineer.
2. Shop drawings for reinforcement detailing fabricating, bending, and placing concrete reinforcement. Comply with ACI 315 "Manual of Standard Practice for Detailing Reinforced Concrete Structures" showing bar schedules, stirrup spacing, bent bar diagrams, and arrangement of concrete reinforcement. Include special reinforcing required for openings through concrete structures. Engineer's review is for general compliance only. The Contractor will be responsible for size, number and lengths of reinforcing.
3. Shop drawings for formwork indicating fabrication and erection of forms for specific finished concrete surfaces. Show form construction including jointing, special form joints or reveals, location and pattern of form tie placement, and other items that affect exposed concrete visually. Engineer's review is for general applications and features only. Designing formwork for structural stability and efficiency is Contractor's responsibility
4. The testing laboratory shall submit three copies of results of concrete cylinder tests to Engineer together with one copy each to Owner, Contractor, and Concrete Supplier.
5. Ready-mixed concrete delivered shall be accompanied by delivery tickets showing the following:

- a) Date and time leaving the plant
 - b) Type of cement and weight
 - c) Quantity of water and time added
 - d) Admixtures and weight
 - e) Site arrival time
 - f) Site leaving time
 - g) Type of fly ash and weight
6. Laboratory test reports for concrete materials and mix design test. Contractor shall submit three (3) copies.
 7. Material certificates in lieu of material laboratory test reports when permitted by Engineer. Material certificates shall be signed by manufacturer and Contractor, certifying that each material item complies with or exceeds specified requirements. Provide certification from admixture manufacturers that chloride content complies with specification requirements.
 8. Hot weather and cold weather concreting plan shall include curing method and specific curing plan, ready mixed supplier plan, contingency plans, and materials list as a minimum. All hot weather plans shall meet requirements of ACI 305. All cold weather plans shall meet requirements of ACI 306.

1.4 QUALITY ASSURANCE

- A. Codes and Standards: Comply with provisions of the latest revision of the following codes, specifications, and standards, except where more stringent requirements are shown or specified:
 1. American Concrete Institute (ACI) 211 "Proportions for Normal, Heavyweight and Mass Concrete."
 2. American Concrete Institute (ACI) 301, "Specifications for Structural Concrete for Buildings."
 3. ACI 318, "Building Code Requirements for Reinforced Concrete."
 4. ACI 347 "Recommended Practice for Concrete Formwork."
 5. ACI 350 "Environmental Engineering Concrete Structures."
 6. Concrete Reinforcing Steel Institute (CRSI) "Manual of Standard Practice."
 7. ASTM C 94 Standard Specifications for Ready-Mix Concrete
 8. North Carolina State Building Code
- B. Concrete Testing Service: Owner will engage a testing agency to perform material evaluation tests.
- C. Materials and installed work may require testing and retesting at any time during progress of Work. Any retesting of rejected materials for installed Work, shall be done at Contractor's expense.
- D. Review requirements for submittals, status of coordinating work, and availability of materials. Establish preliminary work progress schedule and procedures for materials inspection, testing, and certifications. Require representatives of each entity directly concerned with cast-in-place concrete to attend conference, including, but not limited to, the following:

1. Contractor's superintendent.
2. Agency responsible for concrete design mixes.
3. Agency responsible for field quality control.
4. Ready-mix concrete producer.
5. Concrete subcontractor.
6. Primary admixture manufacturers.

PART 2 - PRODUCTS

2.1 FORM MATERIALS

- A. Forms for Exposed Finish Concrete: Plywood, metal, metal-framed plywood faced, or other acceptable panel-type materials to provide continuous, straight, smooth, exposed surfaces. Furnish in largest practicable sizes to minimize number of joints and to conform to joint system shown on drawings.
- B. Use plywood complying with U.S. Product Standard PS-1 "B-B (Concrete Form) Plywood," Class I, Exterior Grade or better, mill-oiled and edge-sealed, with each piece bearing legible inspection trademark.
- C. Forms for Unexposed Finish Concrete: Plywood, lumber, metal, or another acceptable material. Provide lumber dressed on at least two edges and one side for tight fit.
- D. Forms for Cylindrical Columns and Supports: Metal, glass-fiber-reinforced plastic, or paper or fiber tubes that will produce smooth surfaces without joint indications. Provide units with sufficient wall thickness to resist wet concrete loads without deformation.
- E. Form Release Agent: Provide commercial formulation form release agent with a maximum of 350 g/L volatile organic compounds (VOCs) that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.
- F. Form Ties: Factory-fabricated, adjustable-length, removable or snap-off metal form ties designed to prevent form deflection and to prevent spalling of concrete upon removal. Provide units that will leave no metal closer than 1-1/2 inches to the plane of the exposed concrete surface.
- G. Provide ties that, when removed, will leave holes not larger than 1 inch and no smaller than 1/2 inch in diameter in the concrete surface. Form ties for exposed concrete shall be of the cone-washer type. The cones shall be made of approved wood or plastic. Ties for liquid containment structures shall have an integral waterstop that is tightly welded to the tie. Common wire will not be allowed for form ties.

2.2 REINFORCING MATERIALS

- A. Reinforcing Bars: ASTM A 615 Grade 60 deformed.
- B. Steel Wire: ASTM A 82, plain, cold-drawn steel.
- C. Welded Wire Fabric: ASTM A 185, welded steel wire fabric.

- D. Supports for Reinforcement: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire fabric in place. Use wire bar-type supports complying with CRSI specifications.
- E. For slabs-on-grade, use supports with sand plates or horizontal runners where base material will not support chair legs.
- F. For exposed-to-view concrete surfaces where legs of supports are in contact with forms, provide supports with legs that are protected by plastic (CRSI, Class 1) or stainless steel (CRSI, Class 2).

2.3 CONCRETE MATERIALS

- A. Portland Cement: ASTM C 150, Type II.
- B. Fly Ash: ASTM C 618, Type F

Use one brand of cement and fly ash throughout Project unless otherwise acceptable to Engineer.

- C. Normal-Weight Aggregates: ASTM C 33 and as specified. Provide aggregates from a single source for exposed concrete.
- D. For exposed exterior surfaces, do not use fine or coarse aggregates that contain substances that cause spalling.

2.4 Water: Potable.

2.5 Admixtures, General: Provide concrete admixtures that contain not more than 0.1 percent chloride ions.

- A. Air-Entraining Admixture: ASTM C 260, certified by manufacturer to be compatible with other required admixtures.

1. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to, the following:

- a) Monex Air or Monex NVR, Monex Resources, Inc.
- b) Air-Tite, Cormix Construction Chemicals.
- c) Air-Mix or Perma-Air, Euclid Chemical Co.
- d) Darex AEA or Daravair, W.R. Grace & Co.
- e) MB-VR or Micro-Air, Master Builders, Inc.
- f) Sealtight AEA, W.R. Meadows, Inc.
- g) Sika AER, Sika Corp.

- B. Water-Reducing Admixture: ASTM C 494, Type A or D.

1. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to, the following

- a) Monex Resources, Inc
- b) Chemtard, ChemMasters Corp.
- c) PSI N, Cormix Construction Chemicals.

- d) Eucon WR-75, Euclid Chemical Co.
- e) WRDA, W.R. Grace & Co.
- f) Pozzoloth Normal or Polyheed, Master Builders, Inc.
- g) Metco W.R., Metalcrete Industries.
- h) Prokrete-N, Prokrete Industries.
- i) Plastocrete 161, Sika Corp.

C. High-Range Water-Reducing Admixture: ASTM C 494, Type F or Type G.

1. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to, the following:

- a) Monex SP or Mighty RD, Monex Resources, Inc.
- b) Super P, Anti-Hydro Company, Inc.
- c) Eucon 37, Euclid Chemical Company.
- d) WRDA 19 or Daracem, W.R. Grace and Company.
- e) Rheobuild or Polyheed, Master Builders, Inc.
- f) Superslump, Metalcrete Industries.
- g) PSP, Prokrete Industries
- h) Sikament 300, Sika Corp.

2.6 Calcium Chloride

The use of calcium chloride will not be permitted.

2.7 RELATED MATERIALS

- A. Reglets: Where sheet flashing or bituminous membranes are terminated in reglets, provide reglets of not less than 0.0217- inch-thick galvanized sheet steel. Fill reglet or cover face opening to prevent intrusion of concrete or debris.
- B. Dovetail Anchor Slots: Hot-dip galvanized sheet steel, not less than 0.0336 inch thick with bent tab anchors. Fill slot with temporary filler or cover face opening to prevent intrusion of concrete or debris.
- C. Waterstops: Provide ribbed, dumbbell-type waterstops at construction joints and other joints as indicated. Provide ribbed dumbbell type with centerbulb waterstops at expansion joints. All waterstops shall be a minimum of ½" thick x 9" wide. All waterstops shall be provided with either metal grommets or intergal tie wires located along the top and bottom of the waterstop spaced at 12".
- D. Polyvinyl Chloride Waterstops: Corps of Engineers CRD-C 572.
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:
 - a) The Burke Co.
 - b) Greenstreak Plastic Products Co.
 - c) Meadows, Inc.
 - d) Progress Unlimited.
 - e) Schlegel Corp.
 - f) Vinylex Corp.

- E. Sand Cushion: Clean, manufactured or natural sand.
- F. Vapor Retarder: Provide vapor retarder that is resistant to deterioration when tested according to ASTM E 154, as follows:

Polyethylene sheet not less than 8 mils thick.
- G. Water-resistant barrier consisting of heavy kraft papers laminated together with glass-fiber reinforcement and overcoated with black polyethylene on each side.
- H. Absorptive Cover: Burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd., complying with AASHTO M 182, Class 2.
- I. Moisture-Retaining Cover: One of the following, complying with ASTM C 171.
 - 1. Waterproof paper.
 - 2. Polyethylene film.
 - 3. Polyethylene-coated burlap.
- J. Epoxy Adhesive: ASTM C 881, two-component material suitable for use on dry or damp surfaces. Provide material type, grade, and class to suit Project requirements.
 - 1. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to, the following:
 - a) Burke Epoxy M.V., The Burke Co.
 - b) Spec-Bond 100, Conspec Marketing and Mfg. Co.
 - c) Resi-Bond (J-58), Dayton Superior.
 - d) Euco Epoxy System #452 or #620, Euclid Chemical Co.
 - e) Epoxite Binder 2390, A.C. Horn, Inc.
 - f) Epabond, L&M Construction Chemicals, Inc.
 - g) Concrecive Standard Liquid, Master Builders, Inc.
 - h) Rezi-Weld 1000, W.R. Meadows, Inc.
 - i) Metco Hi-Mod Epoxy, Metalcrete Industries.
 - j) Sikadur 32 Hi-Mod, Sika Corp.
 - k) Stonset LV5, Stonhard, Inc.
 - l) Series, Symons Corp.

2.8 PROPORTIONING AND DESIGNING MIXES

- A. Prepare design mixes for each type and strength of concrete by either laboratory trial batch or field experience methods as specified in ACI 301, ACI 211, and ACI 350. For the trial batch method, use an independent testing agency acceptable to Engineer for preparing and reporting proposed mix designs.
- B. Do not use the same testing agency for field quality control testing.
- C. Limit use of fly ash to not exceed 25 percent of the total cementitious content by weight. Fly ash shall be used as an admixture and will not be allowed to replace cement. Fly ash shall be used in all structural concrete.

- D. Submit written reports to Engineer of each proposed mix for each class of concrete at least 15 days prior to start of Work. Do not begin concrete production until proposed mix designs have been reviewed by Engineer.

2.9 Design mixes to provide concrete with the following properties as indicated on schedules:

<u>CLASS</u>	<u>7 DAY</u>	<u>28 DAY</u>	<u>MAXIMUM WATER - CEMENTITIOUS RATIO</u>	<u>MINIMUM CEMENTITIOUS MATERIAL (LBS/CY)</u>
Structural	2670	4000	0.44	611
Non-Structural	2000	3000	0.50	508
Structural, High Density	2670	4000	0.40	658

2.10 Structural, High Density Concrete shall be used in all structures where concrete is intended to be watertight in service.

2.11 Slump Limits: Proportion and design mixes to result in concrete slump at point of placement as follows:

- A. Ramps, slabs, and sloping surfaces: Not more than 3 inches.
- B. Reinforced foundation systems: Not less than 1 inch and not more than 3 inches.
- C. Concrete containing high-range water-reducing admixture (superplasticizer): Not more than 8 inches after adding admixture to site-verified 2 - 3 inch slump concrete.

2.12 Adjustment to Concrete Mixes: Mix design adjustments may be requested by Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant, as accepted by Engineer. Laboratory test data for revised mix design and strength results must be submitted to and accepted by Engineer before using in Work.

2.13 ADMIXTURES

- A. Use high-range water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs, concrete required to be watertight, and concrete with water-cement ratios below 0.50.
- B. Use air-entraining admixture in exterior exposed concrete unless otherwise indicated. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having total air content of 4% with a tolerance of plus or minus 1.0 percent.

2.14 Ready-Mixed Concrete: Comply with requirements of ASTM C 94, and as specified.

When air temperature is between 85 deg F and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes, and when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 GENERAL

- A. Coordinate the installation of joint materials, vapor retarder/barrier, and other related materials with placement of forms and reinforcing steel.

B. FORMS

General: Design, erect, support, brace, and maintain formwork to support vertical, lateral, static, and dynamic loads that might be applied until concrete structure can support such loads. Construct formwork so concrete members and structures are of correct size, shape, alignment, elevation, and position. Maintain formwork construction tolerances and surface irregularities complying with the following ACI 347 limits:

1. Provide Class A tolerances for concrete surfaces exposed to view.
2. Provide Class C tolerances for other concrete surfaces.

- C. Construct forms to sizes, shapes, lines, and dimensions shown and to obtain accurate alignment, location, grades, level, and plumb work in finished structures. Provide for openings, offsets, sinkages, keyways, recesses, moldings, rustications, reglets, chamfers, blocking, screeds, bulkheads, anchorages and inserts, and other features required in the Work. Use selected materials to obtain required finishes. Solidly butt joints and provide backup at joints to prevent cement paste from leaking.
- D. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces where slope is too steep to place concrete with bottom forms only. Kerf wood inserts for forming keyways, reglets, recesses, and the like for easy removal.
- E. Provide temporary openings for clean-outs and inspections where interior area of formwork is inaccessible before and during concrete placement. Securely brace temporary openings and set tightly to forms to prevent losing concrete mortar. Locate temporary openings in forms at inconspicuous locations.
- F. Chamfer all exposed corners and edges, using wood, metal, PVC, or rubber chamfer strips fabricated to produce uniform smooth lines and tight edge joints.
- G. Provisions for Other Trades: Provide openings in concrete formwork to accommodate work of other trades. Determine size and location of openings, recesses, and chases from trades providing such items. Accurately place and securely support items built into forms.
- H. Cleaning and Tightening: Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, or other debris just before placing concrete. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

3.2 PLACING REINFORCEMENT

- A. General: Comply with Concrete Reinforcing Steel Institute's recommended practice for "Placing Reinforcing Bars," for details and methods of reinforcement placement and supports and as specified.
- B. Avoiding cutting or puncturing vapor retarder/barrier during reinforcement placement and concreting operations. Repair damages before placing concrete.

- C. Clean reinforcement of loose rust and mill scale, earth, ice, and other materials that reduce or destroy bond with concrete.
- D. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcing by metal chairs, runners, bolsters, spacers, and hangers, as approved by Engineer.
- E. Place reinforcement to maintain minimum coverages as indicated for concrete protection. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement operations. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.
- F. Install welded wire fabric in lengths as long as practicable. Lap adjoining pieces at least one full mesh and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.

3.3 JOINTS

- A. Construction Joints: Locate and install construction joints so they do not impair strength or appearance of the structure, as acceptable to Engineer.
- B. Place construction joints perpendicular to main reinforcement. Continue reinforcement across construction joints except as indicated otherwise. Do not continue reinforcement through sides of strip placements.
- C. Use bonding agent on existing concrete surfaces that will be joined with fresh concrete.
- D. Waterstops: Provide waterstops in construction joints as indicated. Install waterstops to form continuous diaphragm in each joint. Support and protect exposed waterstops during progress of Work. Field-fabricate joints in waterstops according to manufacturer's printed instructions.
- E. Isolation Joints in Slabs-on-Grade: Construct isolation joints in slabs-on-grade at points of contact between slabs-on-grade and vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
- F. Joint fillers and sealants shall be as follows:
 - 1. Joint Fillers
 - a) Self-expanding Cork Joint Filler: Preformed strips complying with ASTM D 1752 for Type III.
 - b) Cork Joint Filler: Preformed strips complying with ASTM D 1752 for Type II.
 - c) Sponge Rubber Joint Filler: Preformed strips complying with ASTM D 1752 for Type I.
 - d) Bituminous Fiber Joint Filler: Performed strips complying with ASTM D 1751: Granulated cork with asphalt binder encased between 2 layers of saturated felt of glass-fiber felt of width and thickness indicated.

2. Joint Sealers shall be appropriate for their intended use and installations. Follow manufactures instruction for use and installation. All joint sealants shall be in accordance with ACI 504R.

3.4 Installing Embedded Items:

1. General: Set and build into formwork anchorage devices and other embedded items required for other work that is attached to or supported by cast-in-place concrete. Use setting drawings, diagrams, instructions, and directions provided by suppliers of items to be attached.
2. Forms for Slabs: Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and contours in finished surfaces. Provide and secure units to support screed strips using strike-off templates or compacting-type screeds.

3.5 PREPARING FORM SURFACES

- A. General: Coat contact surfaces of forms with an approved, nonresidual, low-VOC, form-coating compound before placing reinforcement.
- B. Do not allow excess form-coating material to accumulate in forms or come into contact with in-place concrete surfaces against which fresh concrete will be placed. Apply according to manufacturer's instructions.
- C. Coat steel forms with a nonstaining, rust-preventative material. Rust-stained steel formwork is not acceptable.

3.6 CONCRETE PLACEMENT

- A. Inspection: Before placing concrete, inspect and complete formwork installation, reinforcing steel, and items to be embedded or cast in. Notify other trades to permit installation of their work.
- B. General: Comply with ACI 304, "Guide for Measuring, Mixing, Transporting, and Placing Concrete," and as specified.
- C. Deposit concrete continuously or in layers of such thickness that no new concrete will be placed on concrete that has hardened sufficiently to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as specified. Deposit concrete to avoid segregation at its final location.
- D. Placing Concrete in Forms: Deposit concrete in forms in horizontal layers no deeper than 24 inches and in a manner to avoid inclined construction joints. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints.
- E. Consolidate placed concrete by mechanical vibrating equipment supplemented by hand-spading, rodding, or tamping. Use equipment and procedures for consolidation of concrete complying with ACI 309.
- F. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations no farther than the visible effectiveness of the

machine. Place vibrators to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to set. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mix to segregate.

- G. Placing Concrete Slabs: Deposit and consolidate concrete slabs in a continuous operation, within limits of construction joints or expansion joints, until completing placement of a panel or section.
- H. Consolidate concrete during placement operations so that concrete is thoroughly worked around reinforcement, other embedded items and into corners.
- I. Bring slab surfaces to correct level with a straightedge and strike off. Use bull floats or darbies to smooth surface free of humps or hollows. Do not disturb slab surfaces prior to beginning finishing operations.
- J. Maintain reinforcing in proper position on chairs during concrete placement.
- K. Cold-Weather Placement: Comply with provisions of ACI 306 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
- L. When air temperature has fallen to or is expected to fall below 40 deg F, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F and not more than 80 deg F) at point of placement.
- M. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
- N. Do not use salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise accepted in mix designs. Calcium chloride will not be allowed.
- O. Hot-Weather Placement: When hot weather conditions exist that would impair quality and strength of concrete, place concrete complying with ACI 305 and as specified.
- P. Cool ingredients before mixing to maintain concrete temperature at time of placement to be in accordance with ACI. Mixing water may be chilled or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
- Q. Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that steel temperature will not exceed the ambient air temperature immediately before embedding in concrete.
- R. Fog spray forms, reinforcing steel, and subgrade just before placing concrete. Keep subgrade moisture uniform without puddles or dry areas.
- S. Use water-reducing retarding admixture when required by high temperatures, low humidity, or other adverse placing conditions, as acceptable to Engineer.

3.7 FINISHING FORMED SURFACES

- A. **Rough-Formed Finish:** Provide a rough-formed finish on formed concrete surfaces not exposed to view in the finished Work or concealed by other construction. This is the concrete surface having texture imparted by form-facing material used, with tie holes and defective areas repaired and patched, and fins and other projections exceeding 1/4 inch in height rubbed down or chipped off. Finish shall be a Class C in accordance with ACI 347.
- B. **Smooth-Formed Finish:** Provide a smooth-formed finish on formed concrete surfaces exposed to view or to be covered with a coating material applied directly to concrete, or a covering material applied directly to concrete, such as waterproofing, dampproofing, veneer plaster, painting, or another similar system. This is an as-cast concrete surface obtained with selected form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch defective areas with fins and other projections completely removed and smoothed. Finish shall be a Class A in accordance with ACI 347.
- C. **Grout-Cleaned Finish:** Provide grout-cleaned finish on scheduled concrete surfaces that have received smooth-formed finish treatment.
1. Combine one part portland cement to one and one-half parts fine sand by volume, and a 50:50 mixture of acrylic or styrene butadiene-based bonding admixture and water to form the consistency of thick paint. Blend standard portland cement and white portland cement in amounts determined by trial patches so that final color of dry grout will match adjacent surfaces.
 2. Thoroughly wet concrete surfaces, apply grout to coat surfaces, and fill small holes. Remove excess grout by scraping and rubbing with clean burlap. Keep damp by fog spray for at least 36 hours after rubbing.
- D. **Related Unformed Surfaces:** At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike-off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.
- E. **Float Finish:** Apply float finish to monolithic slab surfaces to receive trowel finish and other finishes as specified; slab surfaces to be covered with membrane or elastic waterproofing, membrane or elastic roofing, or sand-bed terrazzo; and where indicated.
1. After screeding, consolidating, and leveling concrete slabs, do not work surface until ready for floating. Begin floating, using float blades or float shoes only, when surface water has disappeared, or when concrete has stiffened sufficiently to permit operation of power-driven floats, or both. Consolidate surface with power-driven floats or by hand-floating if area is small or inaccessible to power units. Finish surfaces to tolerances of F(F) 25 (floor flatness) and F(L) 20 (floor levelness) measured according to ASTM E 1155 (ASTM E 1155M). Cut down high spots and fill low spots. Uniformly slope surfaces to drains. Immediately after leveling, refloat surface to a uniform, smooth, granular texture. Class of surface shall be a class C surface in accordance with 347 R.
- F. **Nonslip Broom Finish:** Apply a nonslip light broom finish to exterior concrete platforms, steps, and ramps, and elsewhere as indicated.

1. Immediately after float finishing, slightly roughen concrete surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Engineer before application.
- G. Filling In: Fill in holes and openings left in concrete structures for passage of work by other trades, unless otherwise shown or directed, after work of other trades is in place. Mix, place, and cure concrete as specified to blend with in-place construction. Provide other miscellaneous concrete filling shown or required to complete Work. All grout shall be non-shrinking.
- H. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.
- I. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on drawings. Set anchor bolts for machines and equipment to template at correct elevations, complying with diagrams or templates of manufacturer furnishing machines and equipment.
- J. Steel Pan Stairs: Provide concrete fill for steel pan stair treads, landings, and associated items. Cast-in safety inserts and accessories as shown on drawings. Screed, tamp, and nonslip broom concrete surfaces.

3.8 CONCRETE CURING AND PROTECTION

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. In hot, dry, and windy weather protect concrete from rapid moisture loss before and during finishing operations with an evaporation-control material. Apply according to manufacturer's instructions after screeding and bull floating, but before power floating and troweling.
- B. Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing. Weather permitting, keep continuously moist for not less than 14 days.
- C. Curing Methods: Cure concrete by moist curing, by moisture-retaining cover curing, or by combining these methods, as specified.
1. Provide moisture curing by the following methods:
 - a) Keep concrete surface continuously wet by covering with water.
 - b) Use continuous water-fog spray.
 - c) Cover concrete surface with specified absorptive cover, thoroughly saturate cover with water, and keep continuously wet. Place absorptive cover to provide coverage of concrete surfaces and edges, with a 4 inch lap over adjacent absorptive covers.
 2. Provide moisture-retaining cover curing as follows:
 - a) Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width with sides and ends lapped at least 3 inches and sealed by waterproof tape or adhesive.

Immediately repair any holes or tears during curing period using cover material and waterproof tape.

3. Curing Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces, by moist curing with forms in place for the full curing period or until forms are removed. As soon as initial set has occurred, place a soil soaker hose along the tops of all walls to keep concrete forms wet during the curing period. If forms are removed, continue curing by methods specified above, as applicable, for the remainder of the curing period. If forms are removed before the end of the curing period, then the concrete shall be continuously moist for the remainder of the curing period by fog spraying or covering with moist burlap.
4. Curing Unformed Surfaces: Cure unformed surfaces, including slabs, floor topping, and other flat surfaces, by applying the appropriate curing method.
5. Final cure concrete surfaces to receive finish flooring with a moisture-retaining cover, unless otherwise directed.

3.9 SHORES AND SUPPORTS

- A. General: Comply with ACI 347 for shoring and reshoring in multistory construction, and as specified.
- B. Extend shoring from ground to roof for structures four stories or less, unless otherwise permitted.
- C. Remove shores and reshore in a planned sequence to avoid damage to partially cured concrete. Locate and provide adequate reshoring to support work without excessive stress or deflection.
- D. Keep reshores in place a minimum of 15 days after placing upper tier, or longer, if required, until concrete has attained its required 28-day strength and heavy loads due to construction operations have been removed.

3.10 REMOVING FORMS

- A. Formwork, such as beam soffits, joists, walls, and other structural elements, may not be removed until concrete has attained at least seventy percent (70%) of design minimum compressive strength at 28 days. Determine potential compressive strength of in-place concrete by testing field-cured specimens representative of concrete location or members.
- B. Form-facing material may be removed 4 days after placement only if shores and other vertical supports have been arranged to permit removal of form-facing material without loosening or disturbing shores and supports.

3.11 REUSING FORMS

- A. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-coating compound as specified for new formwork.

- B. When forms are extended for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms to close joints. Align and secure joint to avoid offsets. Do not use patched forms for exposed concrete surfaces except as acceptable to Engineer.

3.12 CONCRETE SURFACE REPAIRS

- A. **Patching Defective Areas:** Repair and patch defective areas with cement mortar immediately after removing forms, when acceptable to Engineer.
- B. **Repairing Formed Surfaces:** Remove and replace concrete having defective surfaces if defects cannot be repaired to satisfaction of Engineer. Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycomb, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning. Flush out form tie holes and fill with dry-pack mortar or precast cement cone plugs secured in place with bonding agent.
- C. Repair concealed formed surfaces, where possible, containing defects that affect the concrete's durability. If defects cannot be repaired, remove and replace the concrete.
- D. **Repairing Unformed Surfaces:** Test unformed surfaces, such as monolithic slabs, for smoothness and verify surface tolerances specified for each surface and finish. Correct low and high areas as specified. Test unformed surfaces sloped to drain for trueness of slope and smoothness by using a template having the required slope.
- E. Repair finished unformed surfaces containing defects that affect the concrete's durability. Surface defects include crazing and cracks in excess of 0.01 inch wide or that penetrate to the reinforcement or completely through nonreinforced sections regardless of width, spalling, popouts, honeycombs, rock pockets, and other objectionable conditions.
- F. Correct high areas in unformed surfaces by grinding after concrete has cured at least 14 days.
- G. Correct low areas in unformed surfaces during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete. Proprietary underlayment compounds may be used when acceptable to Engineer.
- H. Repair defective areas, except random cracks and single holes not exceeding 1 inch in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose reinforcing steel with at least 3/4 inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials to provide concrete of same type or class as original concrete. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.

3.13 QUALITY CONTROL TESTING DURING CONSTRUCTION

- A. **General:** The Owner will employ a testing agency to perform tests and to submit test reports. The testing agency shall be approved by the Engineer. Any retesting due to non-acceptable work or materials shall be at the Contractors expense.

- B. Sampling and testing for quality control during concrete placement may include the following, as directed by Engineer.
- C. Sampling Fresh Concrete: ASTM C 172, except modified for slump to comply with ASTM C 94.
- D. Slump: ASTM C 143; one test at point of discharge for each day's pour of each type of concrete; additional tests when concrete consistency seems to have changed or as directed by the Engineer.
- E. Air Content: ASTM C 173, volumetric method for lightweight or normal weight concrete; ASTM C 231, pressure method for normal weight concrete; one for each day's pour of each type of air-entrained concrete.
- F. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F and below, when 90 deg F and above, and one test for each set of compressive-strength specimens.
- G. Compression Test Specimen: ASTM C 31; one set of four standard cylinders for each compressive-strength test, unless otherwise directed. Mold and store cylinders for laboratory-cured test specimens except when field-cured test specimens are required.
- H. Compressive-Strength Tests: ASTM C 39; one set for each day's pour exceeding 5 cu. yd. plus additional sets for each 50 cu. yd. more than the first 25 cu. yd. of each concrete class placed in any one day; one specimen tested at 7 days, two specimens tested at 28 days, and one specimen retained in reserve for later testing if required.
- I. When frequency of testing will provide fewer than five strength tests for a given class of concrete, conduct testing from at least five randomly selected batches or from each batch if fewer than five are used.
- J. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, evaluate current operations and provide corrective procedures for protecting and curing the in-place concrete.
- K. Strength level of concrete will be considered satisfactory if averages of sets of three consecutive strength test results equal or exceed specified compressive strength and no individual strength test result falls below specified compressive strength by more than 500 psi.
- L. Test results will be reported in writing to Engineer, ready-mix producer, and Owner within 24 hours after tests. Reports of compressive strength tests shall contain the Project identification name and number, date of concrete placement, name of concrete testing service, concrete type and class, location of concrete batch in structure, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7-day tests and 28-day tests.
- M. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted but shall not be used as the sole basis for acceptance or rejection.
- N. Additional Tests: The testing agency will make additional tests of in-place concrete when test results indicate specified concrete strengths and other characteristics have not been attained in the structure, as directed by Engineer. Testing agency may conduct tests to

determine adequacy of concrete by cored cylinders complying with ASTM C 42, or by other methods as directed. These additional tests shall be at the Contractor's expense.

END OF SECTION 03 30 00

SECTION 05 50 00 - MISCELLANEOUS METAL WORK

PART I - GENERAL

1.1 **Description:** Work under this section includes all items of miscellaneous structural steel and other miscellaneous metal items shown on the drawings, specified herein or otherwise inferred or required for construction, including but not limited to, the trash bin fabrication and installation.

1.2 **Related Work Specified in Sections:**

Painting:	Section 09 90 00
Cast-In-Place Concrete:	Section 03 30 00

1.3 **Quality Assurance:**

Comply with requirements of the following standards unless otherwise indicated.

American Welding Society
Code D1. 1-80

American Society for Testing and Materials

ASTM A 27-81a
ASTM A 36-81a structural steel
ASTM A 47-77 malleable iron
ASTM A 48-76 gray iron castings
ASTM A 53-81a pipe, steel, black, and hot dipped zinc coated,
welded and seamless
ASTM A 123-78 zinc coatings/steel products
ASTM A 153-80 hot dipped galvanized
ASTM A 307-80 carbon steel externally threaded standard fasteners
ASTM A 366-79 cold rolled carbon steel sheets
ASTM A 386-78 zinc coating (hot-dip) welded and seamless
on assembled steel, product
ASTM A 525-81 steel sheet, zinc coated
ASTM A 526-80 galvanized carbon steel sheets
ASTM A 568-81 hot rolled carbon steel sheet and strips
ASTM A 569-79 hot rolled carbon steel sheet and strips
ASTM A 575-81 hot rolled carbon steel bars
ASTM A 269 seamless and welded austenitic stainless steel tubing
for general service

Steel Structures Painting Council
SSPC SP-7 - "Brush-off Blast Cleaning"

Federal Specifications

RR - G - 661
RR - G - 1602
QQ - S - 766

SECTION 05 50 00 - MISCELLANEOUS METAL WORK

1.4. Submittals:

- A. Shop drawings including anchor details and installation instructions for miscellaneous metal work shall be submitted for approval prior to fabrication. Six (6) copies are required.
- B. When work of this Section is to be used for support of other Sections, or is in any way allied with proper fitting or installation of work of other trades, carefully coordinate preparation of shop drawings with drawings of work of such other Section to the end that combined work of all Sections will provide a complete and satisfactory installation.

PART 2 - PRODUCTS

2.1 Materials:

- A. Structural Steel Plates, Shapes, and Bars: ASTM A 36
- B. Hot-Rolled Carbon Steel Bars (and Bar size shapes): ASTM - 575 grade as selected by fabricator
- C. Hot-Rolled Carbon Steel Sheets and Strips: ASTM A568 and ASTM A569, pickled and oiled
- D. Cold-Rolled Carbon Steel Sheets: ASTM A366
- E. Galvanized Carbon Steel Sheets: ASTM A526, with 1.25 oz. "commercial" galvanizing per ASTM A525
- F. Gray Iron Castings: ASTM A48, Class 30
- G. Steel Pipe: ASTM A53, type as selected; Grade A; black finish unless galvanizing is required; standard weight (Schedule 40), unless otherwise shown or specified
- H. Concrete Inserts: Threaded or wedge type stainless steel for submerged applications or, galvanized ferrous castings, either malleable iron ASTM A47 or cast steel - ASTM A27; provide bolts, washers, and shims as required, hot-dip galvanize per ASTM A153. Concrete inserts shall develop the following minimum strengths in 3000 psi concrete:

<u>Anchor Diameter</u>	<u>Tensile (Pullout) Strength - lbs</u>	<u>Shear Strength - lbs</u>
1/4"	1,200	1,190
3/8"	2,250	2,500
1/2"	3,750	6,600
5/8"	6,000	11,000
3/4"	9,100	14,000
1"	15,000	

SECTION 05 50 00 - MISCELLANEOUS METAL WORK

- I. Masonry Anchorage Devices: Expansion Shields as follows: Lead expansion shields for machine screws and bolts 1/4" and smaller, head-out embedded nut type, single unit class. Lead expansion shields for machine screws and bolts larger than 1/4" in size; head-out embedded nut type, multiple unit class.
- J. Bolt Anchor Expansion Shields for Lag Bolts: Zinc alloy, long shield anchor class
- K. Toggle Bolts: Tumble wing type, style as required
- L. Provide zinc-coated fasteners for exterior use or where built into exterior walls. Select fasteners for the type, grade and class required.

Bolts and Nuts: Regular hexagon head type: ASTM A 307, Grade A

Lag Bolts: Square head type

Machine Screws: Cadmium plated steel

Wood Screws: Flat head carbon steel

Lock Washers: Helical spring type, carbon steel

- M. Galvanizing:

ASTM A153 for galvanizing iron and steel hardware

ASTM A123 for galvanizing rolled, pressed and

forged steel shapes, plates, bars and strip 1/8" thick and heavier

ASTM A386 for galvanizing assembled steel products

- N. Floor gratings shall be designed to support a live load of 100 pounds per square foot for the spans indicated, and unless otherwise indicated shall conform to Federal Specification RR-G-661 or RR-G-1602. Edges of gratings shall be banded with bars 1/8" less in depth than the bearing bars. Banding bars shall be flush with top of bearing bars. Frames of steel shapes and all welded construction finished to match grating shall be provided as indicated. Frames shall be anchored to structural members with bolts, toggle bolts, or expansion shields and bolts. Floor gratings and frames shall be galvanized or aluminum as designated on the plans.
- O. Steel Lintels for Masonry Openings: Lintels to have 6" bearing minimum at each end. See drawings for size, but in no case shall lintel be less than 5" X 3 1/2" X 5/16" for each 4" thickness of masonry supported.
- P. Anchors and bolts, in addition to those indicated shall be provided where necessary for fastening work in place. They shall be embedded in the masonry work or inserted into existing construction, as the work progresses. Sizes, kinds and spacings of anchors not indicated or specified shall be as necessary for their purposes. Generally, anchors of strap type shall be 3/16" X 1" extending 8" into concrete and 12" into masonry, with ends bent up 2" and spaced approximately 2'-6" o.c.

PART 3 - EXECUTION

SECTION 05 50 00 - MISCELLANEOUS METAL WORK

3.1 Inspection: Inspect portions of work where miscellaneous metal work fabrication will take place, field measure prior to preparation of shop drawing and fabrication wherever possible.

3.2 Fabrication:

- A. All metal work shall be free of defects impairing strength, durability and appearance, shall be suitable for the intended use, and of the best commercial quality for the purpose intended. All finished and/or machined surfaces shall be true to line and level. All supplementary parts, accessories, and fastenings necessary for complete installation (including anchors and bolts, sockets, pipe sleeves and the like) shall be provided. Welded shall conform to the applicable requirements of Code D 1.1 of the American Welding Society.
- B. Furnish inserts and anchoring devices which must be set in concrete or built into masonry for installation of miscellaneous metal work. Provide setting drawings, templates, instructions and directions for installation or anchorage devices. Coordinate delivery with other work to avoid delay.
- C. Pre-assemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.
- D. For fabrication of miscellaneous metal work which will be exposed to view, use only materials which are smooth and free of surface blemishes, including pitting, seam marks, roller marks, rolled trade names, and roughness.
- E. Use materials of size and thickness shown, or if not shown, of required size and thickness to produce strength and durability in finished product. Work to dimension shown or accepted on shop drawings, using proven details of fabrication and support. Use type of materials shown or specified for various components or work.
- F. Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges. Ease exposed edges to a radius of approximately 1/32" unless otherwise shown. Form bent metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- G. Weld corners and seams continuously, complying with AWS recommendations. Grind exposed welds smooth and flush, to match and blend with adjoining surfaces.
- H. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of type shown, or, if not shown, use Phillips flat-head (countersunk) screws or bolts.
- I. Provide for anchorage of type shown, coordinated with supporting members. Fabricate and space anchoring devices as shown and as required to provide adequate support for intended use.

SECTION 05 50 00 - MISCELLANEOUS METAL WORK

- J. Cut, reinforce, drill and tap miscellaneous metal work as required to receive finish hardware and similar items.
- K. Use hot-rolled steel bars for work fabricated from bar stock, unless shown or specified to be fabricated from cold-finished or cold-rolled stock.
- L. Provide a zinc coating for those items shown or specified to be galvanized.
- M. Shop paint miscellaneous metal work, except members or portions of members to be embedded in concrete or masonry, surfaces and edges to be filed, welded and galvanized and aluminum surfaces unless otherwise specified. Remove scale, rust and other deleterious material before applying shop coat. Clean off heavy rust and loose mill scale in accordance with SSPC SP-7 "Brush-Off Cleaning". Remove oil, grease and similar contaminants in accordance with SSPC SP-1 "Solvent Cleaning".
- N. Immediately after surface preparation, brush or spray primer (Tnemec 37-77 Chem. Prime or approved equal) in accordance with manufacturer's instructions, and at rate to provide a minimum uniform dry film thickness of 2.0 mils for each coat. Use painting methods which will result in full coverage of joints, corners, edges, and exposed surfaces. Apply one shop coat to fabricated metal items, except apply 2 coats of paint to surfaces inaccessible after assembly or erection. Change color of second coat to distinguish it from the first.
- O. Insulate metals of different types from each other in a manner to prevent electrolysis between the two materials.
- P. Furnish bent or otherwise custom fabricated bolts, plates, anchors, hangers, dowels and other miscellaneous steel and iron shapes as required for framing and supporting woodwork, and for anchoring or securing woodwork to concrete or other structures.
- Q. Manufacture or fabricate items of sizes, shapes, and dimensions required. Furnish malleable iron washers for heads and nuts which bear on wood structural connections; elsewhere, furnish steel washers.
- R. Provide loose structural steel shape lintels for openings and recesses in masonry walls complete per guide.
- S. Miscellaneous Framing Supports: Provide miscellaneous steel framing and supports which are not a part of structural steel framework, as required to complete work.
- T. Fabricate miscellaneous units to sizes, shapes, and profiles shown, or if not shown, or required dimensions to receive adjacent other work to be retained by framing. Except as otherwise shown, fabricate from structural steel shapes and plates and steel bars, of welded construction using mitered corners, welded brackets and splice plates and minimum joints for field connection. Cut, drill and tap units to receive hardware and similar items.
- U. Galvanize exterior miscellaneous frames and supports as required.

END OF SECTION

SECTION 07 62 00 - SHEET METAL FLASHING AND TRIM

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Roof and sill flashings.
- B. Counterflashings over base flashings.
- C. Counterflashings at roof mounted mechanical equipment and vent stacks.
- D. Counterflashings for roof.

1.2 RELATED WORK

- A. Section 09 90 00: Painting

1.3 REFERENCES

- A. ASTM A525 - Steel Sheet, Zinc Coated, (Galvanized) by the Hot-Dip Process.
- B. ASTM 0226 - Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.
- C. NAAM - Metal Finishes Handbook.
- D. NRCA - (National Roofing Contractors Association) - Roofing Manual.
- E. SMACNA - Architectural Sheet Metal Manual.

1.4 SYSTEM DESCRIPTION

- A. Work of this Section is to physically protect roofing, base flashings, from damage that would permit water leakage to building interior.
- B. The roof contractor and the flashing contractor for roof components shall be the same.
- C. Base material and finish for metal roof flashings shall match standing shingles and shall have a 20 year non-prorated warranty. Color of finishes may differ from roof.

1.5 QUALITY ASSURANCE

SECTION 07 62 00 - SHEET METAL FLASHING AND TRIM

- A. Applicator: Company specializing in sheet metal flashing work with 5 years minimum experience.

1.6 SUBMITTALS

- A. Submit shop drawings and product data under provisions of Division 01.
- B. Describe profile, jointing pattern, jointing details, fastening methods, and installation details.
- C. Submit installers details to coordinate with the roofing.
- D. Submit samples under provisions of Division 01.
- E. Provide a 2 inch square sized sample of metal flashing illustrating finish.

1.7 STORAGE AND HANDLING

- A. Store products under provisions of Division 01.
- B. Stack preformed and prefinished material to prevent twisting, bending, or abrasion, and to provide ventilation.
- C. Prevent contact with materials during storage which may cause discoloration, staining, or damage.

PART 2 – PRODUCTS

2.1 SHEET MATERIALS

- A. Pre-coated Galvanized Steel: ASTM A525, G90; 24 gage core steel, shop pre-coated with a Kynar 500 coating of selected color to match roof panels. Color shall be selected from manufacturers standard colors. The metal shall be paint coated on both sides.

2.2 ACCESSORIES

- A. Fastener: Galvanized steel, Stainless steel. Finish exposed fasteners same as flashing metal.
- B. Underlayment: ASTM D266; No. 15 asphalt saturated roofing felt.
- C. Metal Primer: As recommended by the manufacturer.

SECTION 07 62 00 - SHEET METAL FLASHING AND TRIM

- D. Protective Backing Paint: Factory applied fluoropolymer base with a wash coat of .3-.4 mil similar to face coat.
- E. Sealant: Silicone type specified in Section 07 92 10.

2.3 FABRICATION

- A. Form sections true to shape, accurate in size, square, and free from distortion or defects.
- B. Fabricate cleats and starter strips of same material as sheet, interlockable with sheet.
- C. Form pieces in longest practical lengths.
- D. Hem exposed edges on underside 1/2 inch miter and seam corners.
- E. Form material with flat lock seam.
- F. Fabricate corners from one piece with minimum 18 inch long legs; seam for rigidity, seal with sealant.
- G. Fabricate vertical faces with bottom edge formed outward 1/4 inch and hemmed to form drip.
- H. Fabricate flashings to allow toe to extend 3 inches over roofing. Return and brake edges.

2.4 FINISH

- A. Shop prepare, prime and finish exposed ferrous metal surfaces and with Kynar 500 finish coating.
- B. Backpaint shall be a factory applied fluoropolymer coating 0.1 mil thickness and a finish coat of Kynar 500 .3 - .4 mil thick.

PART 3 – EXECUTION

3.1 INSPECTION

- A. Verify roof openings, curbs, pipes, sleeves, ducts, or vents through roof solidly set, cant strips and reglets in place, and nailing strips located.
- B. Verify membrane termination and base flashings are in place, sealed, and secure.

SECTION 07 62 00 - SHEET METAL FLASHING AND TRIM

- C. Beginning of installation means acceptance of existing conditions.

3.2 PREPARATION

- A. Field measure site conditions prior to fabricating work.
- B. Install starter and edge strips, and cleats before starting installation.
- C. Install surface mounted reglets true to lines and levels. Seal top of reglets with sealant.
- D. Secure flashings in place using concealed fasteners. Use exposed fasteners only in locations approved by Architect/Engineer.
- E. Lock and seal all joints.
- F. Apply plastic cement compound between metal flashings and felt flashings.
- G. Fit flashings tight in place. Make corners square, surfaces true and straight in planes, and lines accurate to profiles.
- H. Solder metal joints watertight for full metal surface contact. After soldering, wash metal clean with neutralizing solution and rinse with water.
- I. Seal metal joints watertight.

3.3 INSTALLATION

- A. Conform to drawing details and refer to the NAAM, SMACNA, and NRCA manuals.

END OF SECTION 07 62 00

SECTION 13 34 10-PRE-ENGINEERED METAL BUILDINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, apply to this Section.

1.2 DESCRIPTION OF WORK

- A. Deliver to the site and furnish all labor, materials, tools, and equipment, and perform all operations necessary to erect the rigid frame pre-engineered metal building structure indicated on the plans or in the specifications.
- B. The intent of these specifications and drawings is to establish a quality and performance level for structural design material durability and workmanship for a pre-engineered steel building system complete with all hardware and accessories.
- C. Bidder shall include in his bid any necessary flashing, sealants, etc. to prevent intrusion of insects, rodents, birds, and other pests. As a condition for final acceptance, building will be inspected to insure that no light is transmitted around wall panel base, component interfaces, wall penetrations or any other area of the completed structure.

1.3 QUALITY ASSURANCE

- A. All bidders must conform strictly to the intent of these specifications in their bid, and all material shall be new, unused, and free from defect.
- B. Building manufacturer shall be a member of Metal Building Manufacturers Association.
- C. The building system shall be single component (all items shall be from the same manufacturer).
- D. The following standards criteria (of most recent issue) shall be used where applicable in the structural design of the building covered by the specification:
 - 1. North Carolina Building Code.
 - 2. "Steel Construction Manual" - American Institute of Steel Construction.
 - 3. "Cold Formed Steel Design Manual" - American Iron and Steel Institute.
 - 4. "Aluminum Construction Manual" - The Aluminum Association.
 - 5. "Code for Welding in Building Construction" - American Welding Society.
- E. All welders will be qualified in accordance with AWS D1.1 conduct examinations by a recognized agency staffed and equipped for such purposes.

SECTION 13 34 10-PRE-ENGINEERED METAL BUILDINGS

- F. The primary and secondary framing should be stated to be designed in accordance with the AISC "Specifications for the Design, Fabrication, and Erection of Structural Steel for Buildings" and AISI "Specifications for the Design of Light Gauge, Cold-Formed Steel Structural Members".

1.4 DESIGN

- A. Manufacturer shall accomplish structural design of all members and their connections. Execute design in accordance with applicable standards set forth above unless otherwise noted or specified. A professional engineer duly registered in the state of North Carolina and qualified in the structural design of buildings shall design the members or directly supervise the design and affix his seal to all drawings and design calculations. Any design or detail changes required to accommodate approved substitutions will be accomplished at the general contractor's expense.
- B. The basic design loads shall include live, wind, and earthquake in addition to dead load in accordance with the North Carolina Building Code.
- C. The design wind velocity on the structure shall be proportioned and applied as horizontal and uplift forces according to the North Carolina Building Code.

1.5 SUBMITTALS

- A. In accordance with the Supplemental General Conditions.
- B. Submit manufacturers product information, specifications, and installation instructions for building components and accessories.
- C. Submit complete erection drawings showing anchor bolts settings, side-wall, end-wall, and roof framing, transverse cross section, covering and trim details, and accessory installation details to clearly indicate the proper assembly of building components.
- D. Submit written certification prepared and signed by a professional civil engineer, registered to practice in the State of North Carolina, verifying that the building design meets indicated loading requirements and the North Carolina State Building Code.
- E. Successful bidder must submit design calculations to the engineer in a neat and orderly form which can be easily reviewed. Calculations shall indicate all column axial loads, shears, moments and wind uplift due to the various loading conditions to facilitate foundation design.
- F. Submit samples of the following. Engineer's review will be for color and texture only. Compliance with all other requirements is the responsibility of the contractor.
 - 1. 1 - 12 inches long by actual width of roof and siding panels, with required finishes.

SECTION 13 34 10-PRE-ENGINEERED METAL BUILDINGS

2. Fasteners for application of roofing and siding panels.
3. Sealants and closures.

1.6 GUARANTEE

- A. Provide a 20-year guarantee warranting the roof and wall panels against rupture, structural failure or perforation due to normal atmospheric corrosion. Also, provide a 20-year guarantee on the wall panel finish against blistering, peeling, cracking, flaking, checking, chipping, chalking, or fading. Color change shall not exceed 5 N.B.S.units rating of 8 per ASTM D-659. Also provide a 20-year weather tightness guarantee which includes all roof penetrations and accessories. A specimen copy of the document must accompany the bid, clearly stating the conditions under which the guarantee is valid. Weather tightness guarantee shall have a limitation of coverage of no less than the initial cost to the owner of the pre-engineered building.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store prefabricated components, sheets, panels, and other manufactured items so that they will not be damaged or deformed. Stack materials on platforms or pallets, covered with tarpaulins or other suitable weather tight ventilated covering. Do not store metal sheets or panels in contact with other materials which might cause staining.

PART 2 - PRODUCTS

2.1 MANUFACTURERS - BUILDING SYSTEM

- A. Varco-Pruden Buildings.
- B. Butler Manufacturing Company.
- C. American Building Systems.
- D. Mesco
- E. Or equal.

2.2 PRIMARY FRAMING

- A. All primary framing shall be welded plat sections complete with connection plates, base plates, and factory-punched holes for field erection and assembly and consist of columns, beams and related primary members shall be as shown on the drawings. Sizing of each structural member to be determined by the manufacturer in accordance with all design criteria established by the drawings, specification, manufacturer's standards, and all applicable codes and standards. The bracing system for the building shall consist of moment resisting frames and/or cross-

SECTION 13 34 10-PRE-ENGINEERED METAL BUILDINGS

bracing rods. Metal panels and secondary framing members shall not be utilized to resist lateral loading conditions.

2.3 SECONDARY FRAMING

- A. All secondary framing members shall be as shown on the drawings. Sizing of each member to be determined by the manufacturer in accordance with all design criteria established by the drawings, specifications, manufacturer's standards, and all applicable codes and standards. The deflection of all framing members shall not exceed $L/180$ of its span when supporting applicable loads previously specified. The purlins, girts, eave struts, and endwall members should be cold-formed and factory-punched for field erection and assembly.

2.4 ROOF AND WALL COVERING

- A. The exposed metal roof covering shall be either 24-gage (minimum) commercially pure aluminum-coated or zinc-aluminum coated steel panels, and of such configuration to provide the specified load carrying capabilities and deflection requirements of this specifications. Roof panels shall have a 20-year guarantee. Roof panels shall be of "standing-seam with double flat lock seam interlocking" design and secured to the purlins with a concealed structural fastening system. The concealed system shall provide minimal through penetration of the exposed roofing surface and allow the roof covering to move independently of any differential thermal movement by the structural framing system. Except at the concealed fastener, there shall be no thermal contact of the roof panels with the supporting purlin. The standing seams shall have a factory-applied, non-hardening sealant, and the seams shall be continuously locked or crimped together by mechanical means during erection. Roof panels with lap-type side (longitudinal) joints and exposed structural fasteners shall be adequately spaced and sized to resist uplift loads as established by codes, standards, and these specifications. Thermal spacers between purlins and roof panels are required.
- B. Contractor shall furnish certificate from building manufacturer that roof system is designed, fabricated and installed to provide a UL Class 90 Uplift rating.
- C. Roof panels shall be fastened to the purlins with a concealed clip or backing device of steel having a protective metallic coating. Through penetration of the roofing surface by exposed fasteners shall occur only at terminal locations of the roof panels. Such fasteners shall be stainless steel or aluminum screws with weather-seal washers.
- D. End splices of roof panels shall occur only at and be securely fastened to purlins.
- E. Deflection of the roof panel shall not exceed $L/180$ of its span when supporting the applicable vertical live loads previously described.

2.5 WALL PANELS

SECTION 13 34 10-PRE-ENGINEERED METAL BUILDINGS

- A. Wall panels shall be 24-gage steel or heavier G-90 galvanized ribbed panels and shall conform to ASTM A446, Grade D or E.
- B. Panel finish shall be a Kynar based high gloss factory applied finish. Color to be selected by Owner from manufacturer's standards. Panel finish shall have a 20-year guarantee.

2.6 FASTENERS

- A. Provide stainless steel self-tapping screws, 5/8 inch long with 3/8 inch hex head. Where required for weather-tightness, fasteners shall have neoprene washers. Fasteners spacing shall be sufficient to withstand specified wind loads. Heads of fasteners for wall shall be color coated to match finish of wall. Maximum o.c. spacing shall be 12 inches u.n.o.

2.7 METAL FLASHING, CLOSURES, GUTTERS AND DOWN SPOUTS

- A. Provide 24 gauge minimum flashing, closures trim gutter and down spouts at rake, corners, eaves, building ridge, framed openings and elsewhere as required for weather-tightness and a finished appearance. All flashing, closures trim, gutters and down spouts shall be of same material, and finish to match adjoining exposed construction.

2.8 CLOSURE AND SEALANTS

- A. Rib closures shall be closed cell sponge rubber conforming to ASTM D1056 with a density of 15 to 19 pcf, performed to match the contours of the panels and shall be installed at eaves door headers and panel bases.
- B. Sealing tape shall be 100% solids, pressure sensitive grey polyisobutylene compound tape with release paper backing. Not less than 1/2 inch wide and 1/8 inch thick, non-sag, non-toxic, non-staining, and permanently elastic.
- C. Joint sealant shall be one-part elastomeric, polyurethane, polysulfide or silicone rubber as recommended by building manufacturer.

2.9 ROOF CURBS FOR POWER VENTILATORS

- A. Curbs shall be supplied by HVAC contractor. Roof flashing collar-profile conforming to roof configuration shall be supplied by the General Contractor. Curb and collar flashing shall be installed by the General Contractor.

SECTION 13 34 10-PRE-ENGINEERED METAL BUILDINGS

2.10 INSULATION

- A. Blanket type fiberglass insulation shall have white vinyl film vapor barrier shall have Underwriters' Laboratories rating of 25 flame spread or less. Insulation thickness shall be three inches (3") on roof and two inches (2") on walls, and the fiberglass shall have a minimum density of 0.60 pounds per cubic foot. Aluminum retained strips shall be used on all insulation seams.

2.11 TRANSLUCENT PANELS

- A. White translucent panels shall be furnished as shown on the plans which shall have the configuration as the specified covering. The panels shall be polyester resin reinforced glass fiber, weather and sun resistant. Panels shall have a nominal weight of eight ounces per square foot.

2.12 BUILDING ANCHORAGE

- A. The building anchor bolts shall be designed to resist the column reactions. The sizes and design shall be as specified by the building manufacturer. The building manufacturer shall furnish anchor bolt setting plans. The Contractor shall furnish anchor bolts unless provided by the building manufacturer.

PART 3 - EXECUTION

3.1 GENERAL

- A. Shop fabricate all structural framing members for high strength bolt field assembly. Clearly mark all components and parts for identification and assembly.

3.2 SHOP CONNECTIONS

- A. Weld all shop connections in accordance with AWS D1.1.

3.3 FINISH

- A. Prepare all structural framing members, not galvanized by removing all dirt, oil, and loose mill scale. Shop-prime steel with one coat of rust-inhibitive primer, not less than 1.0 mils dry film thickness.

3.4 BUILDING FOUNDATION

- A. The Contractor shall construct a concrete foundation for the pre-engineered metal building in accordance with details shown on the plans. Anchor bolts of the size and design specified by the metal building manufacturer shall be set in the concrete foundation, in accordance with the setting plan furnished by the metal building manufacturer. No further work shall be accomplished on the building foundation until the concrete has cured for a minimum of seven (7) days.

SECTION 13 34 10-PRE-ENGINEERED METAL BUILDINGS

3.5 ERECTION

- A. Erection of the metal building, accessories, doors, and the interior finish, if applicable, shall be performed by one of the following:
 - 1. Authorized dealers or builders of the manufacturer.
 - 2. Building manufacturer's crews.
 - 3. Other erectors authorized by the manufacturer as trained and qualified to erect that manufacturer's product. In this case, the manufacturer shall inspect the work and certify its correctness in order to validate all guarantees.

3.6 STRUCTURAL FRAMING

- A. Erect framing in accordance with reviewed shop drawings and MBMA "Code of Standard Practices", Part IV. Make all primary field connections with high strength bolts ASTM A325. Secondary connections may be ASTM A307.

3.7 ROOFING AND SIDING

- A. Erect roofing and siding sheets in accordance with reviewed shop drawings and manufacturer's instructions. Field position and align all sheets in accordance with the pre-punched holes in structural. Make any necessary laps a minimum 6 inches on roof. All necessary end laps shall occur at structural members. Seal all side and end laps in roofing before fastening. Seal all side laps, end laps, and flashing, as recommended by manufacturer.

3.8 FIELD PAINTING

- A. After erection, touch-up marred, scratched or otherwise defaced factory-finished and shop-primed surfaces installed under this specification with matching finish and paint. Total dry film thickness of the prime coat and finish coat shall be 6 mils.

3.9 CLEANUP AND ADJUSTMENT

- A. After completion of building erection, the Contractor shall clean up the work area, remove all excess material, trash, debris from the job site. The Contractor shall make whatever adjustments are required including removal and replacement of faulty panels, insulation, fasteners, or other components. If directed by the Engineer, the Contractor shall correct any misaligned or out-of-plumb framing. Any scratched or scraped surfaces of the framing system shall be touched up painted. Any and all leaks detected shall be corrected by the Contractor.
- B. Final cleanup and adjustment shall meet the approval of the Engineer and the Owner with all defects and deficiencies promptly corrected.

PART 4 - PAYMENT

SECTION 13 34 10-PRE-ENGINEERED METAL BUILDINGS

4.1 Payment for pre-engineered buildings shall be lump sum as indicated on the Bid Form.

END OF SECTION 13 34 10

Section 26 05 01 - GENERAL REQUIREMENTS - ELECTRICAL

PART I - GENERAL

1.01 Description of Work:

- A. This section covers the furnishing and installing of all electrical work for the project. The work includes items and systems listed below, as shown on the Contract Drawings or required in connection with the project, but not otherwise specified. The applicable parts of the General and Supplemental Conditions as well as the General Requirements, if any shall be included in and made part of this section of the Contract Specifications. Examine all Contract Drawings and all other sections of the Contract Specifications for requirements therein affecting the work of this trade.
- B. The electrical power supplier is Progress Energy. The available power supply is 120/240 volts, three-phase, 60 hertz, three (3) wire. The Contractor shall contact the power supplier prior to commencing work to coordinate and verify the type, location, and installation of power service.
- C. The major components included in the work are:
 - 1.0 Miscellaneous Items:
 - a. Wiring of pump stations;
 - b. Extension of power to pump stations;
 - c. Lighting and receptacles.

1.02 Definitions:

- A. Products noted in the Contract Specifications or on the Contract Drawings by manufacturer or product name shall be understood to include all necessary appurtenances for installation in the finished project, whether or not those appurtenances are specifically noted.

1.03 Contract Drawings:

- A. Locations of equipment, outlets, etc. as given on the Contract Drawings are approximately correct, but are subject to minor modifications as found necessary at the time installation in order to meet job conditions. Such changes shall be made by the Contractor at no additional cost to the Owner.
- B. The Contractor is responsible for verifying all equipment, locating stub-up dimensions, electrical characteristics, etc. prior to routing cable runs. He shall make connections per manufacturer's wiring diagrams.

1.04 Submittals:

- A. Submittals to the Engineer for review shall include, but not be limited to, the following items:
 - 1. Catalog Cuts:
 - a. Wire and cable.
 - b. Switches.
 - c. Motor starters.
 - d. Multi-outlet assembly.
 - e. Conduit.
 - f. Wireway.
 - h. Wiring devices.

- i. Specialty boxes and devices.
 - j. Special systems equipment.
 - k. Control stations.
 - l. Splicing materials.
 - m. Terminal blocks.
 - n. Cable terminations.
- B. Any material or equipment furnished by the Contractor that fails to comply with these Contract Specifications or the Contract Drawings will be rejected and shall be replaced with approved materials or equipment at no additional cost to the Owner.
- C. The Contractor shall submit to the Engineer for review only named products or those products that meet or exceed the requirements of the Contract Documents.
- 1. Any alternate to a named product must be reviewed and approved in writing by the Engineer at least 10 working days prior to the day of the bid. Information sufficient to determine compliance with the Contract Specifications must be submitted to the Engineer at least 15 working days prior to the bid date to be considered for approval.
 - 2. For an alternate product to be reviewed, the following samples and technical information must be supplied to the Engineer:
 - a. Where practical, a working sample of the alternate product complete with all accessories that will be supplied for its installation shall be submitted. For convenience, the Engineer may require a sample that operates at 120 volts.
 - b. A complete listing of all standards with which the alternate product is compliant shall be submitted.
 - c. A copy of the current catalog data sheet with catalog numbers for the alternate product shall be submitted. Modified data sheets are unacceptable.
 - d. Performance tests by an independent laboratory which shows that the performance of the alternate product meets or exceeds published performance data for the specified product may be required by the Engineer.
 - 3. Where the substitution of an alternate product has been reviewed and approved, the Contractor shall include in his bid price all costs for other architectural, mechanical, and electrical changes to the design that shall be required for the proper installation and operation of the substituted product. These changes shall be documented in the submittal of the substituted product.
 - 4. Submittals for any alternate to specified products which do not meet the requirements of Paragraphs 1 through 3 above will not be approved for installation.
- D. A review of a submittal by the Engineer shall not release the Contractor from his responsibility to provide a complete and functional system. Also, no act, service, drawing review, or construction review by the Owner, the Engineer, or their representatives is intended to include a review of the adequacy of the Contractor's safety measures in, on, or near the construction site.
- E. Where the Contract Specifications call for an installation to be made in accordance with the manufacturer's recommendations, a copy of such recommendations or a letter from the manufacturer describing such recommendations shall be made part of the Contractor's submittal.

1.05 Record Drawings and Maintenance Manuals:

- A. The Contractor shall maintain an accurate and complete set of the Contract Drawings at job site, with all deviations and changes in work recorded in red ink thereupon. Upon completion of the project, the Contractor shall submit these record drawings to the Engineer. Final

payment will not be approved until the record drawings are completed in a satisfactory manner.

- B. The Contractor shall compile and bind all maintenance manuals, equipment and parts lists, instructions, and descriptive literature furnished by the manufacturers of the equipment to assist the Owner in the proper maintenance and operation of equipment. These maintenance manuals shall be turned over to the Engineer. Each brochure shall include one (1) copy each of all approved shop drawings, catalog pages, instruction sheets, operating instructions, installation and maintenance instructions, and spare part bulletins.

1.06 Document Discrepancies:

- A. The Engineer is sole interpreter and arbitrator of his own Contract Documents. It is the responsibility of the Contractor to bring to the Engineer's attention any apparent inconsistencies or discrepancies in the plans or specifications, and he shall abide by the Engineer's interpretation, ruling, or decision.

1.07 Connection to the Work of Others:

- A. This project will require connection to control panels, instruments, and equipment provided by others. Such connections will be made in strict accordance with manufacturer's instructions.
- B. The Contractor is solely responsible for coordination of all trades, sub-contractors, etc. All electrical work shall be completed with consideration of all civil, architectural, mechanical, and structural work completed or to be completed as a result of this Construction Contract.
- C. The Contractor shall consult with the Engineer before continuing with any work that is in conflict with the Contract Documents.

1.08 Space Conditions:

- A. Staging, lay-down, storage, and trailer areas will be assigned by the Engineer in consultation with the Owner. Equipment shall be confined to the space allowed. If the assigned space is not sufficient, the Contractor shall notify the Engineer.

1.09 Damage:

- A. The Contractor shall protect and leave in like-new condition all existing materials, apparatus, fittings, fixtures and trim on the Owner's property. Should any items be damaged or broken, the work must be corrected and damaged items replaced with new items by the Contractor at no additional cost to the Owner. Any work that requires correction because of damage shall be done by the skilled trade that originally performed the work.
- B. Any adjustments between Contractors and sub-contractors, relative to damage to work or materials, shall not be the responsibility of the Owner, the Engineer, or their representatives.

1.10 Cleaning Up:

- A. The Contractor shall keep his job site in an orderly and clean condition and shall periodically, or when directed by the Engineer to do so, cleanup and remove accumulated rubbish from the construction site.
- B. After installation is complete, the Contractor shall thoroughly clean all fixtures, machines, and apparatus as well as touchup any places or parts that have become marred with paint matching the original.

1.11 Permits:

- A. The Contractor shall secure and pay for all licenses, permits, and inspection fees required by federal, state, and local agencies having jurisdiction over the work. The Contractor, by submitting his bid, agrees to furnish any additional labor or material required for compliance to all federal, state, and local agencies at no additional cost to the Owner. The Contractor

shall obtain certificates of inspection and approval from all authorities having jurisdiction and shall forward copies of same to the Engineer for completion of his files.

PART 2 - PRODUCTS

2.01 Materials:

- A. All materials and equipment shall be new and shall be listed by Underwriters' Laboratories, Inc. (UL) for the intended use, when a standard for such material and use exists. Material and equipment shall display a UL label or marking as part of the product.
- B. All materials and equipment shall be compatible with each other and compatible with other work that shall interface with work completed by the Contractor. For exposed work, the Contractor shall coordinate the colors and finishes of electrical materials and equipment with the Engineer.
- C. Where several units of one type of equipment or product are used, all units shall be the product of the same manufacturer.
- D. Bay lighting and fixtures to be metal halide, 400W as manufactured by Holophane (or approved equal).

PART 3 - EXECUTION

3.01 Examination:

- A. Bidders, before submitting their proposals, shall examine the site as well as the Contract Documents in order to determine the exact extent of the work required. Bidders shall include in their proposals all items of labor and materials necessary to complete all work indicated and required, even though these items are not shown or noted in the Contract Documents, but which are reasonably implied by the nature of the work.
- B. Should the bidders have any questions as to the intent of the Contract Drawings and/or Contract Specifications, quality of materials to be used, and work to be performed, written questions shall be submitted to the Engineer who will issue an Addendum to the Contract Documents to all bidders.
- C. Claims for extra payment due to unfamiliarity with the work to be performed by other trades, existing conditions at the construction site, federal, local or state laws and codes, as well as alterations due to field conditions will not be allowed.

3.02 Service:

- A. The Contractor may and should advise the Engineer of changes necessitated by job conditions or for explanations of functions of equipment, controls, operation, etc.
- B. Should it become necessary for the Engineer to spend time in the field to correct defects due to Contractor failure to test or adjust a system properly, the Contractor will be charged for such time at the rate of \$85.00 per hour (plus all travel and overhead expenses). Final payment to the Contractor will be withheld pending settlement of such charges.

3.03 Supervision:

- A. The Contractor must provide a competent foreman or superintendent on site at all times during construction. The Engineer reserves the right to remove from the job anyone he deems incapable of performing satisfactorily. The removed party shall be immediately replaced. The foreman or superintendent assigned to the project shall not be withdrawn without written consent from the Engineer.

3.04 Miscellaneous Supports:

- A. The Contractor is to provide all piers, supports, shelving, foundations, anchor bolts, strut, hardware, etc. necessary to support equipment installed by him, unless specifically indicated

otherwise. All concrete electrical equipment pads shall be provided by the electrical contractor.

3.05 Guarantee:

- A. The Contractor shall furnish the Owner one (1) year's guarantee on materials and workmanship furnished and performed under this Construction Contract. This shall apply to all items except those specifically excluded, or items wherein a longer period of service and guarantee is required. All guarantees shall be effective for a minimum of one (1) calendar year from the date of the Certificate of Final Completion issued by the Engineer.

3.06 Responsibility:

- A. The Engineer shall evaluate construction plans that result in a conflict between trades and assign responsibility for any corrective work that is required. The Engineer's decision shall be binding on all trades affected.

3.07 Excavation, Cutting and Patching:

- A. The Contractor shall perform all excavation required for his work. The Contractor shall also backfill and grade all excavation. He shall remove all water from excavations before installing any work.
- B. The Contractor shall be responsible for all cutting, patching and fitting of his work that may be required to make its several points come together properly. He shall also be responsible for fitting his work to receive or be received by work of other trades shown or reasonably implied by the Contract Drawings. The Contractor shall complete his work as the Engineer directs.
- C. The Contractor shall not endanger any work by cutting or patching and shall not cut or alter installed work without the consent of the Engineer.

3.08 Standardization of Equipment:

- A. All materials, devices, appliances, and specialties, when in multiple use, shall be of a single manufacturer to simplify spares and repairs.

3.09 Testing:

- A. Performance testing, if required for a particular item of equipment, will be performed as described in the appropriate section of these Contract Specifications.

END OF SECTION 26 05 01

SECTION 26 05 13 – WIRES AND CABLES

A. GENERAL

1. All conductors shall be properly marked showing manufacturer's name, insulation type, voltage rating and wire size. All insulation is to be rated for minimum of 600 volts.
2. Wire sizes shall be as shown. No wire smaller than No. 14 AWG shall be used.
3. No. 10 AWG conductors shall be used for 20 ampere branch circuit home runs exceeding 100 feet to the junction point. The Contractor shall provide and connect all cable and accessories required for the circuits shown on the Contract Drawings or required by these Contract Specifications. This includes connection to motors, control panels, instruments, and all other equipment and accessories to be provided by others.

B. PRODUCT

1. Unless noted otherwise on the Drawings, all conductors shall be copper and shall conform to Underwriters' Laboratories standards. Where applicable, all wire shall be color coded as follows, or approved by the Engineer:
 - a. 277/480 volt system:
 - 1) Phase A - Brown
 - 2) Phase B - Orange
 - 3) Phase C - Yellow
 - 4) Neutral - Gray
 - 5) Ground - Green
 - b. 120/208 volt system:
 - 1) Phase A - Black
 - 2) Phase B - Red
 - 3) Phase C - Blue
 - 4) Neutral - White
 - 5) Ground - Green
 - c. 120/240 volt, single phase system:
 - 1) Phase A - Black
 - 2) Phase C - Blue
 - 3) Neutral - White
 - 4) Ground - Green
 - d. 120/240 volt, 3 phase (high leg) system:
 - 1) Phase A - Black
 - 2) Phase B - Orange (high leg)
 - 3) Phase C - Blue
 - 4) Neutral - White
 - 5) Ground - Green
2. Insulation type shall be labeled for the appropriate type of use and temperature. Insulation types are as follows unless otherwise specified or required for submersible pump wiring:

- a. Type THW, THHW or XHHW for feeders and branch circuit conductors.

C. INSTALLATION

1. Conductors shall be run in conduit and shall be continuous from outlet to outlet. Splices will not be permitted except within accessible outlet or junction boxes, secondary pedestals, troughs, or gutters.
2. The cable runs on the Contract Drawings are schematic in depiction and do not show exact routings. The endpoints of each run are identified in the wiring and panel schedules. It is the responsibility of the Contractor to determine exact cable lengths.
3. All conductors in any conduit shall be at one specific voltage. Conductors of different voltages shall be run in separate conduits.
4. Make conductor lengths for parallel circuits equal.
5. Pull all conductors into a raceway at the same time. Use listed wire pulling lubricant for pulling #4 AWG and larger wires.
6. Install wire in raceway after interior of building has been physically protected from the weather and all mechanical work likely to injure conductors has been completed.
7. All current carrying phase conductors and neutrals shall be tested as installed, and before connections are made, for insulation resistance and accidental grounds. This shall be done with a 500 volt megger. The procedures listed below shall be followed:
 - a. Minimum readings shall be one million (1,000,000) or more ohms for #6 AWG wire and smaller, 250,000 ohms or more for #4 AWG wire or larger, between conductors and between conductor and the grounding conductor.
 - b. After all fixtures, devices and equipment are installed and all connections completed to each panel, the Contractor shall disconnect the neutral feeder conductor from the neutral bar and take a megger reading between the neutral bar and the grounded enclosure. If this reading is less than 250,000 ohms, the Contractor shall disconnect the branch circuit neutral wires from this neutral bar. He shall then test each one separately to the panel and until the low readings are found. The Contractor shall correct troubles, reconnect and retest until at least 250,000 ohms from the neutral bar to the grounded panel can be achieved with only the neutral feeder disconnected.
 - c. The Contractor shall send a letter to the Engineer certifying that the above has been done and tabulating the megger readings for each panel. This shall be done at least four (4) days prior to final inspection.
 - d. At final inspection, The Contractor shall furnish a megger and show the Engineer's representatives that the panels comply with the above requirements. He shall also furnish a hook-on type ammeter and voltmeter to take current and voltage readings as directed by the representatives.
8. A green grounding conductor, sized in accordance with the latest issue of the NEC, shall be installed in all conduits with circuit conductors.
9. All exposed wiring shall be contained in a minimum of ½" conduit or surface mounted raceway. This shall include, but not be limited to, fire alarm, security, power distribution, intercom, telephone and communication wiring. Wiring located above a ceiling or inside walls shall not be

considered exposed.

10. Conductors for branch circuits shall be sized to prevent a voltage drop exceeding three percent (3%) at the farthest outlet of power, heating and lighting loads, or any combination of such loads. The maximum total voltage drop on both feeders and branch circuits to the farthest outlet shall not exceed five percent (5%).
 - a. Where the conductor length from the panel to the first outlet on a 277 volt circuit exceeds 125 feet, the branch circuit conductors from the panel to the first outlet shall not be smaller than #10 AWG.
 - b. Where the conductor length from the panel to the first outlet on a 120 volt circuit exceeds 100 feet, the branch circuit conductors from the panel to the first outlet shall not be smaller than #10 AWG.
11. All tests specified shall be completely documented indicating time of day, date, temperature and all pertinent test information. All required documentation of readings shall be submitted to the Engineer prior to, and as one of the prerequisites for, final acceptance of the project.

D. REFERENCES

1. Underwriters' Laboratories, Inc. (UL):
2. American Society for Testing and Materials (ASTM):
3. National Fire Protection Association (NFPA):
4. Insulated Cable Engineers Association (ICEA):
5. "Electrical Properties of Materials (ICEA S-68-516)."

END OF SECTION 26 05 13

SECTION 26 05 33 – CONDUIT AND CONDUIT FITTINGS

A. GENERAL

1. Conduit shall be delivered to the project site in bundles of full length pipes, each length marked with the trademark of the manufacturer and the Underwriters' Laboratories, Inc. stamp. Each conduit length shall be straight, true and free from scales, blisters, burrs and other imperfections.
2. Within the building perimeters and above the floor slab, the rigid steel conduit specified shall be used unless specifically noted otherwise.
3. Conduit size for control wiring shall be a minimum of one-half (1/2) inch conduit. All branch circuit conduit shall be a minimum of 1/2". All conduit located exterior to the building shall be one (1) inch minimum size.
4. All conduit shall be installed in accordance with the National Electric Code.
5. Non-metallic wall conduit described in this specification shall be a minimum of Schedule 40 unless specifically noted otherwise.
11. In all areas where fire rated walls, floors, and ceilings are installed, all penetrations of electrical conduits or other related electrical material shall be properly sealed with approved fire rated materials to maintain the rating of the building construction.

B. PRODUCT

1. Thin Wall Conduit and Fittings
 - a. Electrical metallic tubing (EMT) shall be cold-rolled steel tubing with zinc coating on the outside and protected on the inside by a zinc, enamel or equivalent corrosion-resistant coating conforming to the latest requirements of ANSI. Conduit shall meet the Rigid Conduit Association Standards.
 - b. Electrical metallic tubing fittings shall be all steel plated hexagonal threaded compression type. No pot metal set screws or indenter fittings shall be used. EMT connectors shall have insulated throats.
2. Rigid Steel Conduit and Fittings
 - a. Rigid steel conduit, including elbows and nipples, shall be standard weight, mild steel pipe, hot dipped galvanized, sherardised or zinc-coated conforming to the requirements of ANSI C80.1, 1966 or later edition. Rigid steel conduit shall also meet the latest requirements of Underwriters' Laboratories, Inc. Standards for Rigid Metallic Conduit.
 - b. Fittings shall be of approved types, made of malleable iron hot dipped galvanized.
3. Flexible Metal Conduit and Fittings
 - a. Flexible metal conduit shall be of the best grade interlocking spiral strip steel. The interlocking spiral strip construction shall be such as to permit bending of the conduit to a radius of four (4) times its internal diameter without distorting at any point. The interior and the exterior of the flexible conduit shall be smooth and free of burrs, sharp edges, or other defects which could damage the wire.

- b. All connectors shall be steel compression fittings with insulated throats.
- c. Where water tight flexible conduit is required, it shall have an outer sheath of material similar to PVC.

4. Non-metallic Conduit

- a. Non-metallic conduit shall be listed, for its particular application. It shall be resistant to sunlight and chemical and moisture atmospheres, and rated for use with 90 degrees Celsius conductors.
- b. The installation and usage of rigid non-metallic conduit shall comply with Article 347 of the National Electrical Code, along with any related or referenced sections.

C. INSTALLATION

1. General

- a. All conduit shall be run tight against walls, columns or ceilings.
- b. The conduit shall bend cold 90 degrees about a radius equal to ten (10) times its own diameter without signs of flaw or fracture in either pipe or protective coverings. All bends and offsets shall be made on a forming tool to prevent the conduit or its coating from being damaged in the bending.
- c. Where conduits join any couplings or threaded fittings, the ends shall be made watertight.
- d. All conduits shall be carefully cleaned before and after erection. After cleaning, all ends of conduits shall be free from burrs and inside surfaces shall be free from imperfections likely to injure the wires or cables.
- e. In every instance, conduit shall be installed in such a manner that the conductors may readily and easily be drawn or pulled in without strain or damage to the insulation; and, also, so that defective conductors may be readily and easily withdrawn and replaced by new conductors. Long radius bends and a sufficient number of approved pull and junction boxes shall be approved for this purpose, and as may be directed by the Engineer. All conduit shall be securely supported and grounded.
- f. In unfinished areas, exposed conduit shall be run to conform to the building lines with special emphasis on neatness. Location of outlet boxes to support suspended lighting fixtures shall be determined by means of templates prepared to match fixtures. Turns shall be made with galvanized outlet boxes, junction boxes, factory fittings and/or symmetrical bends. Locknuts and bushings shall be employed to provide full grounding and adequate protection of insulation.
- g. Support for all conduit shall be in accordance with the National Electrical Code. Conduit shall be supported by approved pipe straps or clamps, secured by means of toggle bolts on hollow masonry; expansion shields and matching screws or standard pre-set inserts on concrete or solid masonry, machine screws or sheet metal screws on metal surfaces, and wood screws on wood construction.
- h. All empty conduit systems shall be capped or terminated in a junction box and shall be provided with nylon pull cord inside for future use.

- i. Conduit terminating below grade shall be provided with means to prevent entry of dirt or moisture. Depth of burial shall not be less than two (2) feet below grade. All termination points shall be accurately marked and dimensioned on the As-Built Plans.
- j. MC cable and flexible metal conduit can only be used as "fixture whip" and related type equipment connection in lengths up to 6'-0" only. EMT conduit and rigid conduit shall be used inside the building as outlined in this specification section.

2. Thin Wall Conduit and Fittings

- a. Except for service and feeder conduits, electrical metallic tubing and fittings may be installed in lieu of rigid conduit for 2" (two inch) or smaller in dry construction in furred spaces, ceiling cavities, chase spaces, interior portions other than concrete and solid plaster, or for exposed work except on mechanical structure or supports.
- b. Electrical metallic tubing shall not be installed where subject to severe physical damage, nearer than four (4) feet from finished floor in exposed areas, subject to severe corrosive conditions, in trade sizes larger than two (2) inches, located in exterior walls, or in poured concrete.
- c. A transition between a run of rigid conduit concealed in a wall and a run of thin wall conduit along a ceiling shall be made in an outlet box above the ceiling, if accessible, near the wall.

3. Rigid Steel Conduit and Fittings

- a. All conduit terminations shall be provided with insulating bushings.
- b. Condulet fittings shall not be used in lieu of pull boxes.
- c. Except where located under the ground floor slab, all service and feeder conduit shall be heavy wall (rigid galvanized).
- d. Rigid steel conduit shall be installed in exterior masonry walls, in wet locations where subject to severe physical damage, or where conduit trade size is two and one half (2 1/2) inches or larger.

4. Flexible Metal Conduit and Fittings

- a. Flexible metallic conduit shall be provided at the end of each conduit run terminating at the conduit box on electric motors, transformers or other equipment.
- b. In ceiling cavities, flexible metallic conduit may be installed from an outlet box to the lighting fixture as a "fixture whip". Conduit smaller than 1/2" shall be limited to lengths of 6 feet or less.
- c. The length of flexible conduit shall be in accordance with the National Electric Code.

5. Non-Metallic Conduit

- a. Except as listed below, non-metallic conduit shall be used only where specifically noted on the plans.
- b. Thin wall rigid non-metallic conduit shall be used for concrete encasement.
- c. When noted on the plans, heavy wall rigid non-metallic conduit shall be used when located above ground, or below ground for direct burial.

- d. Except where embedded in concrete, conduit shall be supported to permit adequate lineal movement to allow for expansion and contraction of conduit due to temperature change. Where a temperature change in excess of 14 degrees Celsius is anticipated, such as direct burial, exposed outside of the building, or in uninsulated spaces inside the building (attics, crawl spaces, etc.), expansion joints shall be installed in accordance with the manufacturer's specifications.
- e. Heavy wall non-metallic conduit shall be used where conduits are direct buried exterior to the building.
- f. Where conduit is installed under the ground floor slab within the building foundations, thin wall rigid non-metallic conduit shall be used. At the Contractor's option, this installation may consist of rigid steel conduit with a minimum of 15 mils of PVC coating. Where thin wall non-metallic conduit under the ground floor slab penetrates the slab surface or passes above the slab surface level within a wall, the conduit shall be converted at the slab surface to the metallic type conduit specified for use in that area.

END OF SECTION 26 05 33

SECTION 26 24 16 – PANELBOARDS AND CIRCUIT BREAKERS

A. GENERAL

1. The Electrical Contractor shall provide all panelboards and circuit breakers as shown on the plans in accordance with this specification.
2. All equipment shall meet of the NEC, UL and any other applicable standards.
3. All panelboards shall be equipped with a main circuit breaker or main lugs as indicated on the drawings.
4. All panelboards shall be equipped with branch circuit breakers as shown on the drawings. Maximum number of breakers in a panelboard shall not exceed 42 poles. Breakers to be inverse time unless otherwise noted.
5. All panelboards identified on the drawings for use as service equipment shall be so labeled and listed for such use.
6. Full size insulated copper neutral bars shall be included in all panelboards. Neutral bussing and ground bussing shall have suitable lugs for outgoing "branch circuits. A full size copper ground bus and copper neutral bus shall be included in all panelboards sized for 100% terminations.
7. All current-carrying parts of the bus assembly shall be copper.
8. Circuit breakers shall be fully rated for the amount shown on the plans. Series rating of the circuit breaker is not allowed.
9. The word "spare", unless noted otherwise on the panel schedules, shall be a single pole, 20 amp circuit breaker.
10. The word "space", unless noted otherwise on the panel schedules, shall be for a space in the panelboard for a standard size, single pole circuit breaker.
11. Terminals for feeder conductors to the panelboard mains and neutral shall be listed as suitable for the type of conductor specified by a third party agency accredited by the NCBCC. Terminals for branch circuit wiring, both breaker and neutral, shall be UL listed as suitable for the type of conductor specified.
12. Feed-thru panels are not permitted.
13. The use of series-rated breakers is not acceptable.
14. Flash protection boundary and the incident energy for the electrical equipment shall be determined in accordance with IEEE 1584 and NFPA 70E requirements. Provide "arc flashing" warning labels on all power panels, enclosed circuit breakers, and other equipment where required by NFPA 70E.
17. The number of the branch circuit shall be identified with permanent wire tag attached to the wire.
18. Circuit breakers feeding sleeping areas, such as dorms, shall be arc fault.

B. PRODUCT

1. The minimum AIC shall be listed on the Panel diagrams on the drawings.
 - a. Panelboards shall be Square D Company , Siemens/ ITE, Eaton (Cutler Hammer), or General

Electric, and shall be door in door type construction.

- b. Bus bar connections to the branch circuit breakers shall be the "distributed phase" or "phase sequence" type.
- c. The panelboard bus assembly shall be enclosed in a steel cabinet or as otherwise noted on drawings. The size of the wiring gutters and gauge of steel shall be in accordance with NEMA, a third party agency accredited by the NCBCC, and National Electrical Code requirements for panelboards. The box shall be fabricated from galvanized steel or equivalent rust-resistant steel. Surface mounted cans shall be galvanized and without preformed knockouts.
- d. Fronts shall include doors and have flush, brushed stainless steel, cylinder tumbler-type locks with catches and spring-loaded door pulls. The flush lock shall not protrude beyond the front of the door. All panelboard locks shall be keyed alike. All panelboards shall have fronts trim with 1-piece "door in door" type construction to allow access to the panel gutter without removal of the entire panel cover, available flush or surface mounted as scheduled, ANSI 49 gray. Fronts shall not be removable with door in the locked position. A circuit directory frame with a clear plastic covering and a directory card shall be provided on the inside of the door. Fronts shall be of code gauge, full finished steel with rust-inhibiting primer and baked enamel finish.
- e. Panelboard trims shall cover all live parts. Switching device handles shall be accessible.
- f. NEMA ratings of panelboards shall be as shown on drawings.

1. Molded Case Circuit Breakers

- a. This specification covers molded case circuit breakers rated 15 through 225 amperes 120VAC, 240VAC, 277VAC, and 480VAC. Any breakers larger than 225 amp shall be adjustable trip type with long time, short time, instantaneous, I^{2T} settings.

Breakers covered under this specification may be installed in switchboards, panelboards, motor control centers, combination motor starters, busway plugs and individual enclosures.

- b. Circuit breakers shall be manufactured by Square D Company of the size as indicated on the drawings or approved equivalent by Siemens/ITE, Cutler Hammer, General Electric, or Challenger.
- c. All circuit breakers shall have a bolt-on, quick-break over center toggle type mechanism. The handle mechanism shall be trip-free to prevent holding contacts closed against a short circuit or sustained overload. All circuit breakers shall assume a position between on and off when tripped automatically. Multi-pole circuit breakers shall be common trip such that an overload or short circuit on any one pole will result in all poles opening simultaneously. Arc extinction is to be accomplished by magnetic arc chutes. All ratings shall be clearly visible.
- d. Automatic operation of all circuit breakers shall be obtained by means of thermal-magnetic tripping devices located in each pole providing inverse time delay and instantaneous circuit protection. Circuit breakers shall be calibrated to carry 100% rated current in an ambient of 40 degrees Celsius. Circuit breakers shall be ambient compensating in that, as the ambient temperature increases over 40 degrees Celsius, the circuit breaker automatically derates itself so as to better protect its associated conductor. The instantaneous magnetic trip shall be adjustable and accessible from the front of all circuit breakers on frame sizes 250 amps and above.

- e. The interrupting rating of each circuit breaker shall be as indicated on the drawings. The interrupting rating of the circuit breakers shall be at least equal to the available short circuit current at the line terminals of the circuit breaker and correspond to UL listed integrated short circuit current rating specified for the panelboards and switchboards.
- f. UL Class A (5 milliampere sensitivity) ground fault circuit protection shall be provided on 120 V ac branch circuits as specified on the plans or panelboard schedule. This protection shall be an integral part of the branch circuit breaker which also provides overload and short circuit protection for branch circuit wiring. Tripping of a branch circuit containing ground fault circuit interruption shall not disturb the feeder circuit to the panelboard. A single pole circuit breaker with integral ground fault circuit interruption shall require no more panelboard branch circuit space than a conventional single pole circuit breaker.
- g. Motor starters, and other applications as indicated on drawings, shall be furnished with magnetic-only type molded case circuit breakers. Each breaker shall be provided with a single magnetic adjustment that will set all poles to the same trip current. Adjustment shall be continuous throughout the adjustable trip range. The magnetic trips shall be accessible from the front of these circuit breakers.

C. INSTALLATION

- 1. Panelboards shall be flush or surface mounted as shown on the plans.
- 2. Panel enclosures shall not be used as junction or pull boxes for splicing conductors.
- 3. Each flush mounted panel shall be equipped with two empty one inch conduits sealed in the wall from a panel to a six inch square flush mounted box installed above a lay-in type ceiling or flush in the wall at the ceiling for a plaster or spline type acoustical tile ceiling.
- 4. All panels shall be equipped with neatly typed directory cards attached on the inside of the door. Directory notations shall include room number (using signage designations where available) that branch circuit serves.
- 5. GFI circuits shall be tested by the Contractor prior to the pre-final inspection.
- 6. An engraved nameplate shall be provided for each panel.

END OF SECTION 26 24 16

SECTION 26 27 26 - WIRING DEVICES

PART 1 - GENERAL

1.01 Description of Work

A. This section includes the furnishing, installation, and connection of wiring devices.

1.02 References

A. National Electrical Manufacturers' Association (NEMA):

1. "Wiring Devices (NEMA WD-1)."
2. "Dimensional Wiring Devices (NEMA WD-6)."
3. "Enclosures for Industrial Controls (NEMA ICS 6)."

B. National Fire Protection Association (NFPA):

1. "National Electric Code (NFPA-70)."

C. Underwriters' Laboratories, Inc. (UL):

1. "Snap Switches (UL-20)."
2. "Plugs and Receptacles (UL-498)."
3. "Switches, Enclosed and Dead Front (UL-98)."

PART 2 - PRODUCTS

2.01 Receptacles

A. Standard duplex receptacles shall be listed per UL 498.

1. Receptacle face and back-body shall be constructed of a high impact-resistant thermoplastic material. The receptacle shall provide a back and side-wired termination. The receptacle shall be two (2)-pole, three (3)-wire with a green equipment ground screw and an automatic grounding system attached to the strap.

2. All receptacles shall be ivory-colored.

3. Receptacle manufacturers shall be as follows:

<i>NEMA Configuration</i>	<i>Pass & Seymour</i>	<i>Hubbell</i>	<i>Arrowhart</i>
5 - 15 R	5262-I	5262-I	5262-I
5 - 20 R	5362-I	5362-1	5362-I

2.02 Tumbler Switches

- A. Standard flush tumbler switches shall be listed per UL-20.
 - 1. Switches shall include a green ground screw attached to the mounting strap. The device shall be rated for 20 amperes, 120/277 volt AC, and have side and back-wire terminations. Switches shall be single-pole, double-pole, and either three (3)-way or four (4)-way as indicated on the Contract Drawings.
 - 2. All switches shall be ivory-colored.
 - 3. Where more than one switch is shown at an outlet, switches shall be installed under a gang plate.
 - 4. Switch manufacturers shall be as follows:

<i>Type</i>	<i>Pass & Seymour</i>	<i>Hubbell</i>	<i>Arrowhart</i>
SPST	20AC1-I	1221-I	1221-I
Three (3)-Way	20AC3-I	1222-I	1222-I
Four (4)-Way	20AC4-I	1224-I	1224-I

- B. Switches controlling or disconnecting fractional horsepower motor loads shall be horsepower-rated and approved for motor control service. Switches shall be Square D Type F or equal, complete with a properly-rated overload device and pilot lamp, if indicated.

2.03 Disconnect Switches, Heavy-Duty

- A. Switches shall be as manufactured by Square D Company, General Electric, Siemens, Cutler Hammer or approved equal.
- B. Switch Interior
 - 1. All switches shall have switch blades which are visible when the switch is off and the cover is open.
 - 2. Lugs shall be front-removable and UL-listed for 75 degree Celsius copper conductors. If fused, 30- through 100-ampere switches shall be equipped with factory-installed fuse pullers.
 - 3. Switches shall have removable arc suppressors to facilitate easy access to line side lugs.
 - 4. Switches in NEMA Type 4X stainless steel enclosures shall have all copper current-carrying parts, plated to resist corrosion.
- B. Switch Mechanism
 - 1. Switch operating mechanism shall be quick-make/quick-break designed so that, during normal operation of the switch, the operation of the contacts is not restrained by the operating handle after the closing or opening action of the contacts has started.
 - 2. The operating handle shall be an integral part of the box, not the cover.
 - 3. The switch shall have provisions for padlocking in the off position with up to three (3) padlocks.
 - 4. The handle position shall travel at least 90 degrees between "OFF" and "ON" positions to clearly distinguish and indicate handle position.
 - 5. Switch operating handles shall be provided with a dual-colored, red/black position indication.

6. All switches shall have a dual cover interlock mechanism to prevent unintentional opening of the switch cover when the switch is on and to prevent turning the switch on when the cover is open. The cover interlock mechanism shall have an externally-operated override, but the override shall not permanently disable the interlock mechanism. The tool used to override the cover interlock mechanism shall not be required to enter the enclosure in order to override the interlock.

C. Switch Enclosure

1. Switch enclosures shall be as called for on the Contract Drawings. In general and unless otherwise indicated, interior switch enclosures are to be NEMA Type 1, and exterior and process equipment switch enclosures are to be NEMA 4X stainless steel.
2. NEMA Type 1 enclosures shall be finished with gray baked enamel paint electrodeposited on cleaned, phosphate pre-treated steel. NEMA Type 4X enclosures shall have a brush finish on Type 304 stainless steel.
3. NEMA Type 1 enclosures shall have tangential knockouts to facilitate conduit entry.
4. NEMA Type 4X stainless steel enclosures shall contain no knockouts. Supply watertight hubs at conduit entry points. NEMA Type 4X cover sealing means for switches rated through 200 amperes shall be quick release trunk latches.
5. Switch covers shall be attached with welded pin-type hinges.
6. Switch enclosures shall have "ON" and "OFF" position markings stamped into the cover.

D. Switch Rating

1. Switches shall be horsepower rated and sized, with number of poles, as indicated on the Contract Drawings.
2. Fuses, where called for, shall be Class H or K. Fuses shall comply with "Section 16181 - Fuses" of these Contract Specifications.

2.03 Wiring Device Plates

- A. Plates for flush-mounted devices shall be standard size and manufactured of Type 302 stainless steel with a brushed finish. Device plates shall be of the one-piece type and of a suitable shape to cover the devices. The use of sectional device plates will not be permitted. Blank plates shall be installed on all unused outlets.

2.04 GFCI Receptacles

- A. GFCI receptacles shall be Class A UL-rated with a five (5)-milliampere ground fault trip level and a 20-ampere feed-through rating. The device shall have side wire termination.
1. All GFCI receptacles shall be constructed of a high-impact resistant thermoplastic material.
 2. All GFCI receptacles shall be installed with the ground pin in the up position.
 3. GFCI receptacle manufacturers shall be as follows:

<i>NEMA Configuration</i>	<i>Pass & Seymour</i>	<i>Hubbell</i>	<i>Arrowhart</i>
5 - 15 R	1591 SI	GF5252-I	GF5242-I
5 - 20 R	2091 SI	GF5350-I	GF5342-I

PART 3 - EXECUTION

3.01 Wiring Devices

- A. Wiring devices shall be as noted by the symbol schedule on the Contract Drawings. Unless specifically noted otherwise, the mounting height from finished floor to the center of the device shall be as follows:
 - 1. Tumbler Switches: 48 inches.
 - 2. Convenience Receptacles: 16 inches in finished spaces and 48 inches in shops and other unfinished spaces.
- B. During construction, all wiring devices and plates shall be taped or covered to prevent paint from getting in devices.
- C. Wall-mounted devices shall be flush-mounted in finished walls and surface-mounted on unfinished interior walls or on existing masonry walls.
- D. Provide a suitable mounting support at the location of each heavy-duty disconnect switch. Exterior units are to be mounted on galvanized strut which is attached to the structure by appropriate bolts or clamps.
- E. Mount equipment disconnect switches as close as practical to the served equipment.

END OF SECTION 26 27 26

SECTION 31 00 00 - CLEARING, GRADING AND EXCAVATION

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

- A. Drawings and general provisions of the Contract, including General and Supplemental Conditions and Division I Specification Sections, apply to this Section.
- B. This item shall consist of the removal and satisfactory disposal of all materials excavated within the limits specified by the Engineer including the road right-of-way, unsuitable subgrade material, and the replacement with satisfactory materials and such excavation as is necessary for berm, inlet, outlet, and lateral drainage ditches and for the formation, compaction, and shaping of all embankments, fills, subgrade, shoulders, slopes, and roadways to conform to the lines and grades and typical cross-sections shown on the Plans.
- C. It shall also include the removal and proper disposal of all stripping, fence, trees, hedge rows, pipes, walls, steps and existing asphalt and concrete surfaces, existing sidewalk and curb and gutter, raising and/or adjusting the tops of all existing valve boxes and manhole tops, as required.
- D. Prior to the Contractor's beginning the work of this section in Division 2 of the project, the Owner's personnel will perform initial clearing, grading and excavation. The Contractor will be responsible for continuing the work to completion. Conditions at the beginning of the Contractor's work will differ from the existing conditions shown on the Plans. The quantities of the Contractor's work shall be those involved in continuing the work from the conditions at the beginning of his work to completion. Measurements of conditions affecting unit prices shall be made prior to the Contractor's beginning work.

1.2 RELATED WORK IN OTHER SECTIONS

- A. Control of Erosion, Siltation, and Pollution: Section 31 25 00
- B. Seeding and Mulching: Section 32 92 00

1.3 QUALITY ASSURANCE

- A. Contractor shall consult with the Owner and the Engineer prior to beginning clearing. A full understanding shall be reached as to procedure. The Contractor shall then conduct clearing and/or grubbing operations in strict accordance with these agreements.

- B. Compaction shall be completed in accordance with the standards of ASTM D-698 as amended.
- C. The Owner will retain the services of a testing laboratory to perform all tests required at the project site. In areas of fill and backfill, field density tests shall be performed in sufficient numbers to ensure that the specified density is obtained. These tests shall be made at no cost to the Contractor, except as follows.
 - 1. Areas in which testing reveals compaction below the specified density shall be reworked, or removed and replaced by the Contractor until specified compaction is obtained. In the event results fail after reworking material, the Contractor shall be liable for retesting.
 - 2. The Contractor shall be responsible for the cost of testing of borrow material which shall include standard density tests (Proctor curves).

1.4 CLASSIFICATION OF EXCAVATION

- A. The following classifications of excavation will be made:
- B. Earth excavation includes excavation of obstructions visible on the surface; other items indicated to be demolished and removed; together with earth and other materials encountered that are not classified as solid rock, undercut excavation, or unauthorized excavation.
- C. Rock and Boulder Excavation:
 - 1. The following material classifications, based on the type of excavation equipment required, shall be used to identify materials for payment:
 - a) Soil, Partially Weathered Rock, or Rippable Rock – Soil, partially weathered rock (PWR), or Rippable Rock shall be defined as any material that can be removed by a Caterpillar 350 excavator or equivalent.
 - b) Rock- Rock shall be defined as any material that cannot be removed by a Caterpillar 350 excavator or equivalent. The methodology for excavating such material shall be approved by the ENGINEER per North Carolina Department of Environment and Natural Resources (NCDENR) approval. **BLASTING WILL NOT BE ALLOWED**, in portions of the project delineated on the plans.

- c) Intermittent drilling, blasting, or ripping performed to increase production and not necessary to permit excavation of material encountered will be classified as earth excavation.
- d) Do not perform rock excavation work until material to be excavated has been cross-sectioned and classified by the Contractor, and such information provided to the Engineer for approval. Such excavation will be paid on basis of Contract Conditions relative to changes in work.
- e) Rock payment lines are limited to the following:
 - (1) Two (2) feet outside of concrete work, for which forms are required, except foundations.
 - (2) One (1) foot outside perimeter of foundations.
 - (3) In pipe trenches, six (6) inches below invert elevation of pipe and two (2) feet wider than inside diameter of pipe, but not less than three (3) feet minimum trench width.
 - (4) Outside dimensions of concrete work where no forms are required.
 - (5) Under slabs on grade, six (6) inches below bottom of concrete slab.
- D. Where rock is encountered, it shall be uncovered but not excavated until measurements have been made in the presence of the ENGINEER. The means of excavation shall be subject to approval by the ENGINEER. There will not be additional payment for excavation of partially weathered rock or rippable rock.
- D. Undercut excavation shall consist of the excavation and disposal of unsuitable materials below the proposed subgrade, as directed by the Engineer, and the proper disposal of the material at designated areas on-site or off-site as provided by the Contractor.
- E. Off-site select material shall consist of the excavation, hauling, placement, and compaction of select material, only for the replacement of undercut areas, as directed by the Engineer, from a location off the project site as arranged by the Contractor.
- F. On-site select material shall consist of the excavation, movement, placement, and compaction of the select material, only for the replacement of undercut areas, as directed by the Engineer. This work shall be included in the unit price for common excavation.

1.5 GEOTECHNICAL DATA

- A. A subsurface (geotechnical) investigation and soil analyses have been performed. The report and test boring records from the investigation are included in the Appendix with the boring logs keyed to the site plan.
- B. Subsurface test boring records, analyses, and formal reports are provided for information, and neither the Engineer nor the Owner guarantee subsurface conditions to actually be as shown, indicated, or implied.

PART 2 - PRODUCTS

2.1 BORROW MATERIAL

Borrow material shall consist of a sandy-clay or clayey-sand soil, which shall be free from trash, debris, stone, vegetable matter, or other indigenous material. It shall have an optimum, compacted dry unit weight of approximately 120 pcf or greater. The source of borrow materials shall be approved by the Engineer. The Contractor shall submit Proctor density curves for each source of borrow material for approval.

2.2 CRUSHED STONE

Crushed stone for foundation preparation or for use as backfill in event of over excavation, shall be uniform, clean and shall conform to ASTM C-33, size no. 57, or size no. 67 as directed by the Engineer.

2.3 CONCRETE

Concrete for use as backfill in event of over excavation, as directed by the Engineer, shall have a compressive strength of 2,000 psi or greater.

2.4 TOPSOIL

Topsoil shall consist of natural loamy soil suitable as surfacing for lawns or roads, occurring usually in a surface layer of 6" to 18" thick. Topsoil shall be removed from the work sites and shall be stockpiled for subsequent use.

PART 3 - EXECUTION

3.1 PRELIMINARY WORK

Key sedimentation and soil erosion control measures shall be installed prior to beginning significant clearing operations. The Contractor shall install all measures not installed by the Owner's personnel.

3.2 CLEARING, GRUBBING, AND STRIPPING

- A. Where trees or brush exist at the site of the work, the construction areas shall be cleared and trees, stumps, and roots grubbed. All areas shall be stripped to such depth as to remove turf, roots, organic matter, and other objectionable materials. Only those trees that seriously interfere with construction shall be cut and care shall be exercised to protect remaining trees and adjacent property. All brush, stumps, laps, roots, and logs shall be removed from the entire construction area and disposed of offsite to the Engineer's satisfaction. Marketable wood mass shall be harvested and sold with revenue belonging to the Contractor. No open burning shall be allowed. Minor debris, pipes, and debris that may be on the site shall be removed and disposed of to the satisfaction of the Engineer.
- B. The operations of the Contractor shall be conducted with full consideration of all the proper and legal rights of the Owner, and of adjacent property owners and the public, and with the least possible amount of inconvenience to them.
- C. All pollutable waste material shall be properly disposed in the nearest landfill unless otherwise approved by the Engineer. Other wastes shall be disposed at a convenient site located by the Contractor, subject to the approval of the Engineer.

3.3 GENERAL

- A. Excavation and grading shall include all site grading, roadway and driveway, trench and structure excavation, backfill, dike, and embankment construction. Excavation and grading shall also include borrow, disposal of excess material off-site as indicated, procuring and placing topsoil, cleanup, and dressing off. This item shall also include all necessary dewatering, soil aeration (drying), sheathing, bracing, cofferdam work, pumping, blasting, and protection.
- B. All excavation and grading shall be confined to the construction area, as shown on the Plans, and shall be done in an approved manner, with proper equipment.
- C. Comply with local codes, ordinances, and requirements of agencies having jurisdiction.
- D. All construction operations shall be accomplished in accordance with applicable regulations of the North Carolina Department of Labor, Occupational Safety and Health Division. Copies of these standards may be obtained from the North Carolina Department of Labor, 413 North Salisbury Street, Raleigh, North Carolina.

- E. Slope sides of excavations are to comply with codes, ordinances, and requirements of agencies having jurisdiction. Shore and brace where sloping is not possible because of space restrictions or stability of material excavated. Maintain side slopes of excavations in a safe condition until completion of backfilling.
- F. The Contractor shall be responsible for any dewatering required for site grading. The Contractor shall provide and maintain whatever means required for dewatering including ditching, drains, pumping, bailing, and well pointing.
- G. Prevent surface water and subsurface or groundwater 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.
 - 2. Establish and maintain temporary drainage ditches and other diversions outside excavation limits to convey rain water and water removed from excavations to collecting or runoff areas. Do not use trench excavations as temporary drainage ditches.
- H. Site grading shall conform to the grades indicated by the finish contours, cross-sections, and/or spot elevations on the Plans. Accuracy of finished grades shall be ± 0.1 ft. Where topsoil, stone base, or other items are shown or called for, the rough grade shall be finished to such depth below finish grade as is necessary to accommodate these items. Excavation shall be made to the elevations, slopes, and limits called for on the Plans.
- I. All exposed soils in areas of cuts shall be proof rolled with a 15 to 20 ton pneumatic roller to locate any unconsolidated material. Should soft or unsuitable material be encountered at subgrade elevation, such material shall be removed and replaced with acceptable compacted borrow material, as directed by the Engineer.
- J. Fills, berms, dikes, and embankments shall be constructed of material that is reasonably free from grass, roots, rock, or other objectionable material. Where natural slopes exceed 4:1, horizontal benches shall be cut to receive fill material. Slopes of less than 4:1 and other areas shall be scarified prior to placing fill material. Keyways under dikes shall be constructed where indicated.

- K. Fills shall be formed of acceptable material placed in successive layers of not over 8 inches loose thickness for the full width of section, where practical. Where rock is excavated along with other material, it may be incorporated in fill sections which are not to support pavement or structures, and which lie outside the core areas of dikes (defined as the area within a 1:2.5 slope from the top edges of dikes). Rock shall be evenly distributed. Rock fragments larger than 4 inches in greatest dimension will not be allowed in the top 12 inches of fills or slopes. Voids between rock material are to be well filled with good material, and all rock shall be covered with at least 24 inches of earth.
- L. Materials for fills shall be spread evenly and the compaction equipment routed over the work to obtain uniform compaction. Fills under areas designated for structures and in dikes shall be compacted by approved equipment, to ninety-five percent (95%) of the Standard Proctor Maximum Dry Density as defined by ASTM D-698 as amended, except within two feet of subgrade where the fill shall be compacted to at least ninety-eight percent (98%) of Standard Proctor Maximum Dry Density. Fills under roadways and future paved surfaces shall be compacted to ninety-five percent (95%) of Standard Proctor Maximum Dry Density. Fills in other areas shall be compacted to at least ninety percent (90%) of Standard Proctor Maximum Dry Density.
- M. Compaction moisture control shall be maintained between -1 and +3 percent optimum moisture content as determined by ASTM D-698 or as directed by the Engineer. Material that is too dry for proper compaction shall be moistened by suitable watering devices, turned and harrowed to distribute the moisture, and then properly compacted. When material is too wet for proper compaction, fill soils shall be dried prior to compaction. The soils shall be dried by aeration disking, harrowing, or other methods until the materials can be compacted to the specified density. Select material, as needed, will be provided from the work site or other acceptable source.
- N. All cuts, fills, and slopes shall be neatly dressed off to the required grade or subgrade, as indicated on the Plans.
- O. At locations designated on the Plans and/or as designated by the Engineer, the Contractor shall remove unsuitable material within the limits as directed and backfill with suitable material properly compacted to the finished subgrade. Undercut material may be used elsewhere on the project if the Engineer determines that it is suitable for the purpose. If it cannot be used, the Contractor shall dispose of it as directed herein before.
- P. Foundation excavations shall be made at the locations shown on the plans and to the exact subgrade required. Bottoms of excavations are to

be level and in firm, solid, material, with soft material or voids treated as specified below. Excavated area shall be kept free of water during the construction period. Space shall be provided outside of footings and walls for placing forms and pointing masonry.

- Q. Where necessary, the sides of excavation shall be shored and sheathed, or cofferdams built, as required for protection of the work and employees.
- R. Should soft or unsuitable material be encountered at subgrade elevation, such material shall be removed and replaced with acceptable compacted select material, obtained on-site or off-site at the direction of the Engineer. Any other excavation below grade shall be replaced with good material, without additional compensation therefor.
- S. Should the specified depth for foundations prove insufficient to reach firm ground, the Engineer shall be notified and shall furnish instructions for proceeding with the work. Wherever footing elevations change, step-downs shall be made at a 2:1 ratio, unless otherwise shown. Connections between step-downs shall be of poured concrete of the same cross-section as the footing connected.
- T. Where blasting is required, it shall be done by experienced personnel and every needed precaution taken to protect persons and property from injury. No blasting for rock excavation will be allowed whenever there are existing structures or pipelines except by permission of the Engineer, and only when the Contractor provides a suitable vibration-monitoring device and can demonstrate that vibrations to adjacent structures and piping will not cause damage. All responsibility for damages rest on the Contractor.
- U. Backfill around structures and other facilities shall be completed as soon as possible, in conformance with the following:

Backfill not required for structural fill shall consist of clean acceptable earth, free from trash, brick bats, wood, large rocks, vegetable matter and other injurious material. It shall be placed in 8" layers and thoroughly compacted by mechanical tamps to 90% of the Standard Proctor Maximum Dry Density as defined by ASTM D-698 as amended, with any subsequent settlement being refilled. Care shall be taken to protect piping or other utilities during backfill operations. Excessively wet, soupy or mucky material shall be removed from the area around structures prior to backfill being placed and no such material shall be used for backfill purposes.

Backfill around non-waterholding structures shall be completed upon completion of the structure above finish grade, and all piping has been properly installed and tested. Unless approved by the Engineer, structures that are to contain liquids shall not be backfilled until

successfully tested for leakage. It shall be the responsibility of the Contractor to protect all structures from damage due to floatation prior to backfill being placed.

3.4 FINE GRADING, PLACEMENT OF TOPSOIL, AND CLEANUP

- A. Upon completion of excavation, grading, and backfill, the entire work area shall be fine graded and dressed off to the indicated grades. At least 4" of topsoil shall be placed on all disturbed non-paved areas, except for the interior slopes and bottom of storage lagoon, with the final level of topsoil conforming to the design finished elevations. Topsoil shall be obtained from off-site sources if required. Topsoil shall be free of debris, sticks, excessive amounts of weeds, and other deleterious substances.
- B. Upon completion of the fine grading and placement of topsoil, the entire site shall be cleaned up and dressed off and all excess material and debris disposed of to the Owner's and the Engineer's satisfaction. All areas to be seeded shall be "broom dragged" and/or hand raked.

END OF SECTION 31 00 00

SECTION 31 25 00 - CONTROL OF EROSION, SILTATION AND POLLUTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This section covers the furnishing of materials, labor, and equipment necessary to minimize erosion, siltation, and pollution on the project or projects covered by these specifications. In Project 1, Division 1.2, the Owner's personnel will install some of the control measures shown on the drawings. The Contractor shall install all additional measures that are shown or that are found to be necessary. The Contractor shall maintain all control measures on the site from the time he begins work to completion of the project and shall remove control measures following completion as directed by the Engineer.
- B. The Contractor shall take whatever measures are necessary to minimize soil erosion and siltation, water pollution, and air pollution. The Contractor shall also comply with the applicable regulations of all legally constituted authorities relating to pollution prevention and control. The Contractor shall keep himself fully informed of all such regulations which in any way affect the conduct of the work. In the event of conflict between such regulations and the requirements of these specifications, the more restrictive requirements shall apply.
- C. Failure on the part of the Contractor to perform the necessary measures to control erosion, siltation, and pollution will result in the Engineer's notifying the Contractor to take such measures. In the event that the Contractor fails to perform such measures within 24 hours after receipt of such notice, the Engineer may suspend the work with no extension of contract time, or may proceed to have such measures performed by others at the Contractor's expense, or both.

D. Related Work in Other Sections:

Clearing Grading and Excavation:	Section 31 00 00
Seeding and Mulching	Section 32 92 00

1.3 QUALITY ASSURANCE

Quality Assurance: Erosion and sedimentation control shall conform to the requirements of the North Carolina Sedimentation Pollution Control Act of 1973.

PART 2 - PRODUCTS

- 2.1 Seeding and seeding materials shall conform to the requirements of Section 32 92 00.
- 2.2 Silt fences shall conform to the details shown on plans.
- 2.3 Check dams and jute mat shall conform to the details shown on the plans.

PART 3 - EXECUTION

- 3.1 The Contractor shall exercise every reasonable precaution throughout the life of the project to prevent the eroding of soil and the siltation of rivers, streams, lakes, reservoirs, ditches, ground surfaces, or other property. Should any erosion or siltation occur, the Contractor shall take immediate action to correct the situation. The Contractor shall remove and properly dispose of any material washed into rivers, streams, lakes, reservoirs, ditches, storm sewers, or other property. The Contractor shall be liable for any damage to private or public property resulting from insufficient erosion and siltation control measures.
- 3.2 Construction operations in rivers, streams, ditches, and water impoundments shall be restricted to those areas which must be entered for the performance of work shown on the plans. Excavated materials shall not be deposited in rivers, streams, ditches, or impoundments except that temporary earth dikes may be used when approved by the Engineer, but such dikes shall be completely removed in such manner as to prevent siltation. Frequent fording of flowing streams with equipment will not be permitted. Temporary bridges or other structures shall be used wherever frequent stream crossings are necessary.
- 3.3 Temporary and permanent erosion control measures shall be provided as shown on the plans or as directed by the Engineer. Temporary sediment control devices must be installed to the extent possible prior to initiation of grading and excavation. The devices must be maintained at a minimum of 50% of the original sediment storage capacity and may not be removed until the areas they serve have been stabilized. Temporary erosion control measures shall include, but not be limited to, the use of temporary berms, dikes, drainage ditches, silt basins, silt ditches, slope drains, structures, stone check dams, vegetation, mulches, mats, netting, gravel, or other necessary methods. Temporary erosion control may include work outside the construction limits.
- 3.4 The Engineer may limit the area over which excavation, embankment, and grading operations are performed whenever the Contractor's operations are not effectively minimizing erosion and/or siltation.
- 3.5 All disturbed, non-paved areas shall be seeded and fertilized, mulched, and tacked as soon as practical after cleanup in accordance with the detailed

technical specifications therefore. In no case shall a total area of one acre or more be left ungrassed for a period of **fifteen (15)** days when construction has been completed in the area.

- 3.6 The Contractor shall take every precaution throughout the life of the project to prevent the pollution of rivers, streams, and water impoundments. Pollutants such as chemicals, fuels, lubricants, bitumens, sewage, and other harmful waste shall not be discharged into or alongside rivers, streams, or impoundments, or into natural or manmade channels leading thereto. The Contractor shall also comply with all Federal, State, and local water and air pollution laws.
- 3.7 Contractor shall maintain all erosion control measures until such time as the appropriate State authority approves and releases the site at which time the Contractor shall remove all erosion control measures as directed by the Engineer.

END OF SECTION 31 25 00

SECTION 32 11 23 - AGGREGATE BASE COURSE

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

- A. Work under this section consists of furnishing all plant, labor, materials, and equipment for the construction of an aggregate base composed of approved aggregate materials hauled to the parking/drive area or road, placed on the prepared subgrade, compacted, and shaped to conform to the lines, grade, depths, and typical cross-sections indicated on the plans.
- B. Drawings and general provisions of the Contract, including conditions and other Specification Sections, apply to this Section.

1.2 RELATED WORK IN OTHER SECTIONS

- A. Clearing, Grading, and Excavation: Section 31 00 00

1.3 QUALITY ASSURANCE

The source and type of aggregate base course shall be approved by the Engineer prior to placement. If requested, samples of the materials shall be submitted to the Engineer for approval.

PART 2 - PRODUCTS

- 2.1 Aggregate base course shall consist of crushed stone or crushed gravel and shall conform to the requirements of Section 520 of the N.C. Department of Transportation Standard Specifications for Roads and Structures.
- 2.2 Asphalt prime coat shall consist of 0.4 to 0.6 gallons per square yard of medium curing asphalt. Prime coat shall be asphalt grade RC-30 meeting the latest AASHTO specifications for that grade.

PART 3 - EXECUTION

3.1 HAULING AND PLACING MATERIALS

- A. The aggregate material shall be placed on the subgrade to the specified depth and in such a manner as to prevent segregation. Where the required compacted thickness of base is 8 inches or less, the base material may be spread and compacted in one layer. Where the compacted thickness is more than 8 inches, the base material shall be spread and compacted in two or more lifts approximately 4-6 inches.

Each layer of material shall be compacted tested, and approved before placing succeeding layers of base material or pavement.

- B. No material shall be placed on frozen subgrade or base. Hauling equipment shall not be operated on subgrade or a previously completed layer of base material soft enough to rut or weave beneath the equipment. The maximum speed of trucks traveling over any part of the subgrade or base shall be 20 miles per hour.
- C. The Contractor shall utilize methods of handling, hauling, and placing material which will minimize segregation and contamination. If segregation occurs, the Engineer may require that changes be made in the Contractor's methods to minimize segregation, and may also require mixing in place which may be necessary to correct any segregated material. No additional compensation will be allowed for work of in-place mixing as may be required. Aggregate which is contaminated with foreign materials to the extent the base course will not adequately serve its intended use shall be removed and replaced by the Contractor at no additional cost to the Owner regardless of prior acceptance.

3.2 SHAPING AND COMPACTION

- A. Immediately after the placing of a layer of the base, the Contractor shall begin machining and compacting the layer. Each layer shall be maintained to the required cross-section during compacting and each layer shall be compacted to the required density prior to placing the next layer. Each layer of the base shall be compacted to a density equal to at least 100% of that obtained by compacting a sample of the material in accordance with AASHTO T99. The base material shall be compacted at a moisture content which is approximately that required to produce the maximum density indicated by the above test method. The Contractor shall dry or add moisture to the material when required to provide a uniformly compacted and acceptable base.
- B. The final layer (or top surface for a single layer) of the base material shall be shaped to conform to the lines, grade, and typical sections shown on the plans or established by the Engineer. Where no such section exist the top surface shall be flush with adjacent surfaces. When completed, the base course shall be smooth, hard, dense, unyielding, and well bonded. A broom drag shall be used in connection with the final finishing and conditioning of the surface of the base course. After final shaping and compacting of the base, the Engineer will check the surface of the base for conformance to grade and typical section and will determine the base thickness. The thickness of the base shall be within a tolerance of plus or minus 1/2 inch of the base thickness specified.

3.3 MAINTENANCE

Where the base material is placed in a trench section, the Contractor shall provide adequate drainage through the shoulders to protect the subgrade and base until such time as the shoulders are completed. The Contractor shall maintain the surface of the base by watering, machining and rolling or dragging where necessary to prevent damage to the base by weather or traffic. Where the base or subgrade is damaged, the Contractor shall repair the damaged area; reshape the base to the required lines, grades, and typical sections; and recompact the base to the required density at no additional cost to the Owner.

END OF SECTION 32 11 23

SECTION 32 12 16 - ASPHALT PAVEMENT

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Hot-mix asphalt paving.
 - 2. Hot-mix asphalt overlays.
 - 3. Pavement-marking paint.
- B. Related Sections include the following:
 - 1. Clearing, Grading, and Excavation Section 31 00 00

1.2 SYSTEM DESCRIPTION

- A. Provide hot-mix asphalt pavement according to the materials, workmanship, and other applicable requirements of the standard specifications of the state or of authorities having jurisdiction.
 - 1. Comply with requirements of North Carolina Department of Transportation (DOT).

1.3 SUBMITTALS

- A. Product Data: For each product specified. Include technical data and tested physical and performance properties.
- B. Job-Mix Designs: Certification, by DOT, of approval of each job mix proposed for the Work.
- C. Qualification Data: For firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- D. Material Test Reports: Indicate and interpret test results for compliance of materials with requirements indicated.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced installer who has completed hot-mix asphalt paving similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.
- B. Manufacturer Qualifications: Engage a firm experienced in manufacturing hot-mix asphalt similar to that indicated for this Project and with a record of successful in-service performance.
- C. Regulatory Requirements: Conform to applicable standards of authorities having jurisdiction for asphalt paving work on public property.
- D. Asphalt-Paving Publication: Comply with AI's "The Asphalt Handbook," except where more stringent requirements are indicated.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver pavement-marking materials to Project site in original packages with seals unbroken and bearing manufacturer's labels containing brand name and type of material, date of manufacture, and directions for storage.
- B. Store pavement-marking materials in a clean, dry, protected location and within temperature range required by manufacturer. Protect stored materials from direct sunlight.

SECTION 32 12 16 - ASPHALT PAVEMENT

1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Do not apply asphalt materials if substrate is wet or excessively damp or if the following conditions are not met:
 - 1. Tack Coats: Minimum surface temperature of 60 deg F.
 - 2. Asphalt Base Course: Minimum surface temperature of 40 deg F and rising at time of placement.
 - 3. Asphalt Surface Course: Minimum surface temperature of 60 deg F at time of placement.
- B. Pavement-Marking Paint: Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature of 40 deg F for oil-based materials, 50 deg F for water-based materials, and not exceeding 95 deg F.
 - 1. Product specified on the drawings.

PART 2 - PRODUCTS

2.1 AGGREGATES

- A. General: Use materials and gradations that have performed satisfactorily in previous installations.
- B. Coarse Aggregate: Sound; angular crushed stone; crushed gravel; or properly cured, crushed blast-furnace slag; complying with ASTM D 692.
- C. Fine Aggregate: Sharp-edged natural sand or sand prepared from stone; gravel, properly cured blast-furnace slag, or combinations thereof; complying with ASTM D 1073.
- D. Mineral Filler: Rock or slag dust, hydraulic cement, or other inert material complying with ASTM D 242.

2.2 ASPHALT MATERIALS

- A. Asphalt Cement: ASTM D 3381 for viscosity-graded material; ASTM D 946 for penetration-graded material.
- B. Tack Coat: ASTM D 977, emulsified asphalt or ASTM D 2397, cationic emulsified asphalt, slow setting, factory diluted in water, of suitable grade and consistency for application.
- C. Water: Potable.

2.3 AUXILIARY MATERIALS

- A. Sand: ASTM D 1073, Grade Nos. 2 or 3.
- B. Pavement-Marking Paint: Alkyd-resin type, ready-mixed, complying with FS TT-P-115, Type I, or AASHTO M-248, Type N.

2.4 MIXES

- A. Hot-Mix Asphalt: Provide dense, hot-laid, hot-mix asphalt plant mixes approved by authorities having jurisdiction; designed according to procedures in AI's "Mix Design Methods for Asphalt Concrete and Other Hot-Mix Types"; and complying with the following requirements:
 - 1. Provide mixes with a history of satisfactory performance in geographical area where Project is located.

SECTION 32 12 16 - ASPHALT PAVEMENT

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that subgrade is dry and in suitable condition to support paving and imposed loads.
- B. Proof-roll subbase using heavy, pneumatic-tired rollers to locate areas that are unstable or that require further compaction.
- C. Notify Architect in writing of any unsatisfactory conditions. Do not begin paving installation until these conditions have been satisfactorily corrected and approved by the Architect.

3.2 COLD MILLING

- A. Clean existing paving surface of loose and deleterious material immediately before cold milling. Remove existing asphalt pavement, including hot-mix asphalt and, as necessary, unbound-aggregate base course, by cold milling to grades and cross sections indicated.
 1. Repair or replace curbs, manholes, and other construction damaged during cold milling.

3.3 PATCHING AND REPAIRS

- A. Patching: Saw cut perimeter of patch and excavate existing pavement section to sound base. Recompact new subgrade. Excavate rectangular or trapezoidal patches, extending 12 inches into adjacent sound pavement, unless otherwise indicated. Cut excavation faces vertically.
 1. Tack coat faces of excavation and allow to cure before paving.
 2. Fill excavation with dense-graded, hot-mix asphalt base mix and, while still hot, compact flush with adjacent surface.
 3. Partially fill excavation with dense-graded, hot-mix asphalt base mix and compact while still hot. Cover asphalt base course with compacted, hot-mix surface layer finished flush with adjacent surfaces.
- B. Portland Cement Concrete Pavement: Break cracked slabs and roll as required to reseat concrete pieces firmly.
 1. Pump hot undersealing asphalt under rocking slabs until slab is stabilized or, if necessary, crack slab into pieces and roll to reseat pieces firmly.
 2. Remove disintegrated or badly broken pavement. Prepare and patch with hot-mix asphalt.
- C. Leveling Course: Install and compact leveling course consisting of dense-graded, hot-mix asphalt surface course to level sags and fill depressions deeper than 1 inch in existing pavements.
 1. Install leveling wedges in compacted lifts not exceeding 3 inches thick.
- D. Crack and Joint Filling: Remove existing filler material from cracks or joints to a depth of 1/4 inch. Refill with asphalt joint-filling material to restore watertight condition. Remove excess filler that has accumulated near cracks or joints.
- E. Tack Coat: Apply uniformly to existing surfaces of previously constructed asphalt or portland cement concrete paving and to surfaces abutting or projecting into new, hot-mix asphalt pavement. Apply at a uniform rate of 0.05 to 0.15 gal./sq. yd. of surface.
 1. Allow tack coat to cure undisturbed before paving.
 2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.

3.4 SURFACE PREPARATION

- A. General: Immediately before placing asphalt materials, remove loose and deleterious material from substrate surfaces. Ensure that prepared subgrade is ready to receive paving.
 1. Sweep loose granular particles from surface of unbound-aggregate base course. Do not dislodge or disturb aggregate embedded in compacted surface of base course.

SECTION 32 12 16 - ASPHALT PAVEMENT

3.5 HOT-MIX ASPHALT PLACING

- A. Machine place hot-mix asphalt mix on prepared surface, spread uniformly, and strike off. Place asphalt mix by hand to areas inaccessible to equipment in a manner that prevents segregation of mix. Place each course to required grade, cross section, and thickness, when compacted.
 - 1. Spread mix at minimum temperature of 250 deg F.
 - 2. Begin applying mix along centerline of crown for crowned sections and on high side of one-way slopes, unless otherwise indicated.
 - 3. Regulate paver machine speed to obtain smooth, continuous surface free of pulls and tears in asphalt-paving mat.
- B. Place paving in consecutive strips not less than 10 feet wide, except where infill edge strips of a lesser width are required.
 - 1. After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips. Complete asphalt base course for a section before placing asphalt surface course.
- C. Promptly correct surface irregularities in paving course behind paver. Use suitable hand tools to remove excess material forming high spots. Fill depressions with hot-mix asphalt to prevent segregation of mix; use suitable hand tools to smooth surface.

3.6 JOINTS

- A. Construct joints to ensure continuous bond between adjoining paving sections. Construct joints free of depressions with same texture and smoothness as other sections of hot-mix asphalt course.
 - 1. Clean contact surfaces and apply tack coat.
 - 2. Offset longitudinal joints in successive courses a minimum of 6 inches.
 - 3. Offset transverse joints in successive courses a minimum of 24 inches.
 - 4. Construct transverse joints by bulkhead method or sawed vertical face method as described in AI's "The Asphalt Handbook."
 - 5. Compact joints as soon as hot-mix asphalt will bear roller weight without excessive displacement.
 - 6. Compact asphalt at joints to a density within 2 percent of specified course density.

3.7 COMPACTION

- A. General: Begin compaction as soon as placed hot-mix paving will bear roller weight without excessive displacement. Compact hot-mix paving with hot, hand tampers or vibratory-plate compactors in areas inaccessible to rollers.
 - 1. Complete compaction before mix temperature cools to 185 deg F.
- B. Breakdown Rolling: Accomplish breakdown or initial rolling immediately after rolling joints and outside edge. Examine surface immediately after breakdown rolling for indicated crown, grade, and smoothness. Repair surfaces by loosening displaced material, filling with hot-mix asphalt, and rerolling to required elevations.
- C. Intermediate Rolling: Begin intermediate rolling immediately after breakdown rolling, while hot-mix asphalt is still hot enough to achieve specified density. Continue rolling until hot-mix asphalt course has been uniformly compacted to density meeting DOT requirements.
- D. Finish Rolling: Finish roll paved surfaces to remove roller marks while hot-mix asphalt is still warm.
- E. Edge Shaping: While surface is being compacted and finished, trim edges of pavement to proper alignment. Bevel edges while still hot, with back of rake or smooth iron. Compact thoroughly using tamper or other satisfactory method.

SECTION 32 12 16 - ASPHALT PAVEMENT

- F. Repairs: Remove paved areas that are defective or contaminated with foreign materials. Remove paving course over area affected and replace with fresh, hot-mix asphalt. Compact by rolling to specified density and surface smoothness.
- G. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.
- H. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

3.8 INSTALLATION TOLERANCES

- A. Thickness: Compact each course to produce, as a minimum, the thickness indicated within the following tolerances:
 - 1. Base Course: Plus 1/2 inch, no minus.
 - 2. Surface Course: Plus 1/4 inch, no minus.
- B. Surface Smoothness: Compact each course to produce a surface smoothness within the following tolerances as determined by using a 10-foot straightedge applied transversely or longitudinally to paved areas:
 - 1. Base Course: 1/4 inch.
 - 2. Surface Course: 1/8 inch.
 - 3. Crowned Surfaces: Test with crowned template centered and at right angle to crown. Maximum allowable variance from template is 1/4 inch.

3.9 PAVEMENT MARKING

- A. Do not apply pavement-marking paint until, paint product, layout, colors, and placement have been verified with Architect.
- B. Allow paving to cure for 30 days before starting pavement marking.
- C. Sweep and clean surface to eliminate loose material and dust.
- D. Apply paint with mechanical equipment to produce pavement markings of dimensions indicated with uniform, straight edges. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of 15 mils.

3.10 FIELD QUALITY CONTROL

- A. Testing Agency: Contractor will employ a qualified independent testing agency, at no additional cost to the Owner as part of base bid work, to perform field inspections and tests and to prepare test reports.
 - 1. Testing agency will conduct and interpret tests and state in each report whether tested Work complies with or deviates from specified requirements.
 - 2. Test reports shall be supplied to the Engineer within 7 days of said testing.
- B. Additional testing, at Contractor's expense, will be performed to determine compliance of corrected Work with specified requirements.
 - 1. Engineer is to be notified within 24 hours of failing tests.
- C. Thickness: In-place compacted thickness of hot-mix asphalt courses will be determined according to ASTM D 3549.
- D. Surface Smoothness: Finished surface of each hot-mix asphalt course will be tested for compliance with smoothness tolerances.
- E. In-Place Density: Samples of uncompacted paving mixtures and compacted pavement will be secured by testing agency according to DOT requirements.
 - 1. In-place density of compacted pavement will be determined by testing core samples according to ASTM D 1188 or ASTM D 2726.

SECTION 32 12 16 - ASPHALT PAVEMENT

- a. One core sample will be taken for every 1000 sq. yd. or less of installed pavement, but in no case will fewer than 3 cores be taken.
 - b. Field density of in-place compacted pavement may also be determined by nuclear method according to ASTM D 2950 and correlated with ASTM D 1188 or ASTM D 2726.
- F. Remove and replace or install additional hot-mix asphalt where test results or measurements indicate that it does not comply with specified requirements.

END OF SECTION 32 12 16

SECTION 32 31 13 - CHAIN LINK FENCE

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK:

- A. Work under this section consists of furnishing all plant, labor, materials, and equipment for installation and erection of chain link fence with associated gates and connections to existing fencing. Fencing shall be or 6' high chain link with 3 strands of barbed wire over top rail as indicated on the plans.
- B. Drawings and general provisions of the Contract, including General and Supplementary Conditions, apply to this Section.

1.2 RELATED WORK IN OTHER SECTIONS:

- A. Cast-In-Place Concrete: Section 03 30 00

1.3 QUALITY ASSURANCE:

- A. Shop drawings and descriptive data of all fence materials shall be submitted to the Engineer for approval. Three (3) copies are required.

PART 2 - PRODUCTS

2.1 GENERAL:

- A. All weights and dimensions are nominal and are taken from standard weight schedules adopted by manufacturers. Square, round, "H", "U", or other sections for post and rails are optional with the Contractor provided they are of equal or greater strength as compared to the steel pipe specified herein. All pipe post, pipe sections, and appurtenance shall meet ANSI standards for Schedule 40 pipe.

2.2 COATING:

- A. The steel wire shall be either zinc-coated (galvanized) by the hot-dip process after fabrication, or aluminum coated, hot-dipped before weaving. Zinc-coated thickness shall be a minimum of 1.2 ounces of zinc per square foot of wire surface. Aluminum coating thickness shall be a minimum of 0.40 ounces of aluminum per square foot of uncoated wire surface.
- B. The steel posts and appurtenances shall be zinc-coated (galvanized) by the hot-dip process. Zinc-coating thickness shall be a minimum of 1.2 ounces of zinc per square foot of surface area.
- C. Fabric shall be chain link copper-bearing (minimum .20-.30% copper) basic open hearth steel wire, hot-dip galvanized after weaving, number 9 gauge wire woven in 2" mesh, both selvages twisted and barbed. Fabric shall be full height of the

fence. Dress barbed selvage at the top of fence just above top rail. Minimum tensile strength after galvanizing shall be 95,000 pounds per square inch for number 9 gauge wire.

- D. Line posts shall be 2-1/2" O.D. galvanized steel posts weighing 3.65 pounds per foot of posts, furnished for setting 36" deep in concrete complete with all necessary fittings.
- E. Top rail shall be 1-5/8" O.D. steel pipe weighing 2.27 pounds per foot of fence, copper bearing and hot dip galvanized; furnished with self centering sleeves designed to permit expansion at joints. Top rail to be securely fastened to terminal posts by pressed steel connections.
- F. Terminal Posts: End, corner, and pedestrian gate posts shall be 2-7/8" O.D. steel pipe weighing 5.79 pounds per foot, copper bearing and hot dip galvanized; furnished for setting 36" deep in concrete complete with all necessary fittings. Posts for double hung gates shall be minimum 3" O.D. steel.
- G. Post tops shall be heavy malleable iron, fitting over top and outside of posts, and provided with means of passing top rail in the case of line posts.

Bracing: End, corner, and gate posts shall be furnished with 1-5/8" O.D. horizontal braces, complete with adjustable rods for all fencing.

- H. Malleable Fittings: All cast fittings shall be first grade malleable iron heavily hot dip galvanized. Post tops and rail-and-brace end connections shall be socket type, designed to exclude moisture from the inside of posts and rails.
- I. Terminal Post Bands: Tension bands and brace bands shall be made from beveled edge copper bearing steel, heavily hot dip galvanized.
- J. Fabric Ties: Preformed tie wires for attaching fabric to line posts shall be made from high tensile strength aluminum wire designed for self-tying. Ties shall be spaced approximately 24" apart on top rail and 14" on line posts.
- K. Stretcher bars for attaching fabric to terminal posts shall be 3/4" high carbon steel attached to post by means of beveled edge bands.
- L. Gate frames shall be 2" O.D. hot dipped galvanized pipe weighing 2.72 pounds per foot. Fabric shall be same as in fence and shall be securely attached to the frame and adequately cross-braced. Gates shall be furnished with malleable iron ball and socket hinges, stops, and locking devices.
- M. Tension wire to be 7 gauge galvanized or aluminum coated coiled spring wire for bottom of fence.
- N. Truss rod shall be 3/8" diameter galvanized steel rod complete with galvanized truss tightener and all accessories for connection.

PART 3 - EXECUTION

- 3.1 The Contractor shall erect the fence in such a manner so as to have the bottom barb of the fence fabric 1" above finished grade.
- 3.2 Barbed wire (three strands) shall be installed on top of the fence with the support arms extending through the outside face of the fence.
- 3.3 Line post shall be spaced in the line of the fence, not to exceed 10' center to center.
- 3.4 All concrete footings shall be "crowned" to shed water and protect post at the ground line. Diameters of footing shall not be less than 10" for line post and 12" for end, terminal, or gate post.
- 3.5 Work shall be done in a neat, substantial, craftsmanlike manner with each plane of fencing straight and plumb.
- 3.6 Upon completion of fence installation, all material and debris shall be removed from the job site and the fence fabric shall be adjusted as required by the Engineer or Owner for a first class installation.

PART 4 - PAYMENT

- 4.1 Chain Link Fence shall be paid for at the unit price per foot as indicated on the Bid Form.

END OF SECTION 32 31 13

SECTION 32 92 00 - SEEDING AND MULCHING

PART 1 - GENERAL

RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Special Project Sections, apply to this Section.

SUMMARY

- A. The work of seeding and mulching shall be performed immediately upon completion of grading. The Contractor shall adapt his operations to variations in weather or soil conditions as necessary for the establishment and growth of the grasses or legumes. In all operations, care shall be taken to preserve the required line, grade, and cross-section of the area.
- B. Related Work in Other Sections:
 - C. Control of Erosion, Siltation, and Pollution Section 31 25 00

PART 2 - PRODUCTS

SEED

- A. Seed shall be certified by and comply with the rules and regulations of the NC Department of Agriculture. Only high quality seed shall be used. Wet, moldy, or otherwise damaged seed or seed containing an excess of noxious weeds will not be acceptable. Each variety of seed shall be furnished and delivered in separate bags. If seed is to be mixed before sowing, it shall be mixed by methods, which will mix the seed thoroughly and uniformly without causing damage to the seed. During handling and storage, seed shall be protected from damage from any cause.

FERTILIZER

- A. Fertilizer shall comply with the rules and regulations of the NC Department of Agriculture. It shall be manufactured from cured stock and have an analysis of 5-10-10. During handling and storage, the fertilizer shall be protected against hardening, caking, or loss of plant food values. Any hardened or caked fertilizer shall be pulverized to its original condition before being used.

LIME

- A. Lime shall comply with the rules and regulations of the NC Department of Agriculture. It shall be agricultural grade ground dolomitic limestone containing not less than 85% of combined calcium and magnesium carbonates. It shall be so graded that 100% will pass a No. 10 sieve and 40% will pass a No. 100 sieve.

During handling and storage, lime shall be protected against hardening and caking. Any hardened or caked lime shall be pulverized to its original condition before being used.

MULCH

Mulch shall consist of clean grain straw reasonably free from mature seed bearing stalks, roots, or bulblets of Johnson Grass, Nutgrass, Sanbur, Wild Garlic, Wild Onion, Bermuda Grass, Crotalaria, Witchweed, and restricted noxious weeds as defined by the NC Department of Agriculture at the time of use. Mulch that is matted or lumpy shall be loosened and separated before being used.

PART 3- EXECUTION

The Seedbed shall be properly prepared and true to line and grade with lime and fertilizer worked into the soil 4" to 6" deep. All weeds and other unacceptable growth shall be cut and disposed of properly. Uneven and rough areas shall be smoothed to provide a uniform surface. The soil shall be loosened to a minimum depth of 5" and all clods shall be broken up. The top 2" or 3" of soil shall be worked into an acceptable seedbed by the use of approved methods. On cut slopes greater the 2:1, the Engineer may permit the depth of preparation to be reduced, but in all cases the slope surface shall be scarified, grooved, trenched, or punctured so as to provide places in which the seeding materials can lodge.

Lime and fertilizer shall be distributed uniformly over the prepared seedbed at the specified rates and then harrowed, raked, or otherwise thoroughly worked or mixed into seedbed. Seed shall be distributed uniformly over the prepared seedbed at the specified rate and immediately harrowed, dragged, raked, or otherwise worked so as to cover the seed with a layer of soil. Immediately after seed has been properly covered, the seedbed shall be compacted by means approved by the Engineer.

Within 24 hours after the completion of seeding, all areas shall be mulched. Mulch shall be spread uniformly by hand or by approved mechanical spreaders which will provide an acceptable application. An acceptable application will be that which will allow some sunlight to penetrate and air to circulate but also partially shade the ground, reduce erosion, and conserve soil moisture.

Mulch shall be held in place by applying a sufficient amount of asphalt emulsion or other approved binding material. The rate and method of application shall meet the approval of the Engineer. When the binding material is not applied directly with the mulch, it shall be applied immediately following the mulch application. During the application of the binding material, adequate precautions shall be taken to prevent damage to traffic, structures, traffic control devices, and other appurtenances. When any damage does occur, the Contractor shall repair it, including any necessary cleaning. The Contractor shall take precautions to

prevent mulch from entering drainage structures and shall promptly remove any blockages which may occur.

Unless specified otherwise, the type of seed and the rates for seed, fertilizer, lime and mulch shall be as listed below:

Shoulders, Side Ditches, Slopes (Max. 3:1)

<u>DATE:</u>	<u>TYPE:</u>	<u>PLANTING RATES:</u>
Aug 15 - Nov 1	Tall Fescue	300 lbs./acre
Nov 1 - Mar 1	Tall Fescue and Abruzzi Rye	300 lbs./acre 25 lbs./acre
Mar 1 - Apr 15	Tall Fescue	300 lbs./acre
Apr 15 - Jun 30	Hulled Common Bermudagrass	25 lbs./acre
Jul 1 - Aug 15	Tall Fescue <u>and</u> ***Browntop Millet *** <u>or</u> Sorghum - Sudan Hybrids	120 lbs./acre 35 lbs./acre 30 lbs./acre

Slopes (3:1 to 2:1)

Mar 1 - Jun 1 (Mar 1 - Apr 15)	Sericea Lespedeza (scarified) and <u>Add</u> Tall Fescue	50 lbs./acre 120 lbs./acre
(Mar 1 - Jun 30)	<u>Or Add</u> Weeping Lovegrass	10 lbs./acre
(Mar 1 - Jun 30)	<u>Or Add</u> Hulled Common Bermudagrass	25 lbs./acre
Jun 1 - Sep 1	***Tall Fescue and ***Browntop Millet *** or Sorghum - Sudan Hybrids	120 lbs./acre 35 lbs./acre 30 lbs./acre
Sep 1 - Mar 1	Sericea Lespedeza (unhulled - unscarified) and Tall Fescue	70 lbs./acre 120 lbs./acre
(Nov 1 - Mar 1)	<u>Add</u> Abruzzi Rye	25 lbs./acre

OR

NCDOT

Sept. 1 - April 1

75# Ky 31 Fescue
50# Pensacola Bahiagrass
500# 10-20-20 Fertilizer
4000# Limestone

April 1 - Sept. 1

75# Pensacola Bahiagrass
50# Ky 31 Fescue
500# 10-20-20 Fertilizer
4000# Limestone

3.6 As directed by the Engineer, the Contractor shall reseed with like grasses on adjacent property along the utility line route.

3.7 SEEDBED PREPARATION

- A. Chisel compacted areas and spread topsoil 3" deep over adverse soil conditions, if available.
- B. Rip the entire area to 6" depth.
- C. Remove all loose rock, roots, and other obstructions leaving surface reasonably smooth and uniform.
- D. Apply agricultural lime, fertilizer, and superphosphate uniformly and mix with soil (see below*).
- E. Continue tillage until a well-pulverized, firm, reasonably uniform seedbed is prepared 4" to 6" deep.
- F. Seed on a freshly prepared seedbed and cover seed lightly with seeding equipment or cultipack after seeding.
- G. Mulch immediately after seeding and anchor mulch.
- H. Inspect all seeded areas and make necessary repairs or reseeded within the planting season, if possible. If stand should be over 60% damaged reestablish following original lime, fertilizer and seeding rates.
- I. Consult the Conservation Inspector on maintenance treatment and fertilization after permanent cover is established.
- J. Apply: Agricultural Limestone - 2 tons/acre or 3 tons/acre in clay soils.
- K. Fertilizer - 1000 lbs/acre (10-10-10)
- L. Superphosphate - 500 lbs/acre (20%)
- M. Mulch - 2 tons/acre (small grain straw)
- N. Anchor - asphalt emulsion at 450 gal./acre
- O. Consult the Conservation Engineer or the Soil Conservation Service for additional information concerning other alternative for vegetation of denuded areas. The above vegetation rates are those which do well under local conditions, other seeding rate combinations are possible.
- P. *****Temporary** - Reseed according to optimum season for desired permanent vegetation, Do not allow temporary cover to grow over 12" in height before mowing, otherwise fescue may be shaded out.
- Q. The Contractor shall maintain seeded areas in a satisfactory condition until final acceptance of the project. Areas of damage or failure due to any cause shall be corrected by being repaired or by being completely redone as may be directed by the Engineer. Damage or failure resulting from poor seed, the

Contractor's operation, or his failure to provide erosion control shall be repaired or replaced at the Contractor's expense.

- R. The Contractor shall maintain adequate drainage on the project at all times. In the event water pockets are formed, they shall be drained by the Contractor and all wet and unstable material shall be removed and disposed of and the area backfilled and compacted with suitable material. Such remedial work caused by the failure of the Contractor to keep the area adequately drained shall be performed at his expense.

END OF SECTION 32 92 00

SECTION 33 05 23 – DIRECTIONAL DRILLING

PART 1 - GENERAL

1.1 DESCRIPTION

A. General

1. Contractor shall furnish all labor, materials, equipment and incidentals required to perform the successful installation of water mains at locations shown on the plans by using horizontal directional drilling methods.
2. Pipeline shall be complete with all accessories and shall have passed all required testing.
3. The Contractor shall have made all inspections of the area(s) within the vicinity of the project and the immediate area of the Work and become thoroughly familiar with the natural and man-made features encompassed about the project.

1.2 QUALITY ASSURANCE

A. Requirements

1. The Contractor shall have proven experience in the technique of directional drilling pipelines and have a minimum of 5 years experience in this work. Additionally, the Contractor shall have performed at least one prior project with length and pipe diameter equal to or greater than that required by this project.
2. Requirements of Regulatory Agencies:
 - a) Comply with North Carolina OSHA Standards and requirements of all other authorities having jurisdiction.
3. Manufacturer shall have manufacturing and quality control facilities capable of producing and assuring the quality of the pipe and fittings required by these specifications. Qualified manufacturers shall be approved by the Engineer.

B. Reference Standards

1. Comply with applicable provisions and recommendation of the following, except as otherwise shown or specified.
 - a) AWWA C906, Polyethylene (PE) Pressure Pipe and Fittings, 4-inch through 63-inch, for Water Distribution
 - b) ASTM D3261 – Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing

- c) ASTM D3350 – Standard Specifications for Polyethylene Plastic Pipe and Fittings Materials
- d) PPI TR-4 Recommended Hydrostatic Strengths and Design Stresses for Thermoplastic Pipe and Fittings Compounds
- e) NSF Standard #14 – Plastics Piping Components and Related Materials

1.3 SUBMITTALS

- A. Catalog Data on Pipe Material
- B. Certificates: Submit certificates of compliance with referenced standards, where requested by Engineer.
- C. Field installation drawings indicating layout and depth of drilled pipe
- D. Record Drawings: During progress of the Work, keep an up to date set of drawings showing field and shop drawing modifications. The drawings shall show all piping on plans and in sections, with all reference dimensions and elevations required for complete record drawings of the piping systems.
- E. Erosion control plan for the drilling mud pit and work area
- F. Written verification of required pressure testing

PART 2 – PRODUCTS

2.1 MATERIALS

- A. Material shall be high density polyethylene pipe, SDR 9, Class 200
- B. Pipe shall be butt heat fusion welded

2.2 PIPE

- A. Polyethylene pipe shall be manufactured in accordance with AWWA C906
- B. Permanent identification of piping service shall be provided by co-extruding longitudinal blue stripes into the pipe's outside surface. The striping material shall be the same material as the pipe material except for color. Stripes printed or painted on the pipe outside surface shall not be acceptable.

2.3 FITTINGS

- A. Polyethylene fittings shall be made from material meeting the same requirements as the pipe. Polyethylene fittings shall be molded or fabricated by the manufacturer of the pipe.
- B. Where applicable, fittings shall meet the requirements of AWWA C906.

- C. Molded fittings shall be manufactured in accordance with ASTM D3261 (butt fused) and shall be so marked.
- D. Mechanical fittings used with polyethylene pipe shall be specifically designed for, or tested and found to be acceptable for use with polyethylene pipe. Mechanical fittings designed for other materials shall not be used unless authorized by the mechanical fitting manufacturer. Special precautions may exist with certain mechanical fittings or additional components may be required—consult the manufacturer of the fitting prior to its use.

2.4 TESTING

- A. Pipe shall be pressure tested and leak tested in accordance with Section 02713 – Water Mains.
- B. On each day butt fusions are to be made, the first fusion of the day shall be a trial fusion. The trial fusion shall be allowed to cool completely, and then fusion test straps shall be cut out. The test strap shall be 12" or 30 times the wall thickness in length (minimum) and 1" or 1.5 times the wall thickness in width (minimum). Bend the test strap until the ends of the strap touch. If the fusion fails at the joint, a new trial fusion shall be made, cooled completely and tested. Butt fusion of pipe to be installed shall not commence until a trial fusion has passed the bent strap test.
- C. Owner's representative shall be available during the testing.

2.5 STORAGE AND HANDLING

- A. Handle all pipe and accessories carefully with approved handling devices. Do not drop or roll pipe off trucks. Do not otherwise drop, roll or skid pipe. Materials cracked, gouged, chipped, dented or otherwise damaged will not be approved.
- B. Pipe and appurtenances shall be unloaded opposite to or as close to the place where they are to be laid as is practical to avoid unnecessary handling. Interiors shall be kept completely free from dirt and foreign matter.
- C. Contractor shall be responsible for the proper support of the piping to ensure that the pipe is not over stressed or damaged.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. General:
 - 1. The Work shall be performed by the Directional Drill Technique. In general, the Work will proceed as follows:
 - a) Drill a pilot hole from one side of the crossing to the other. The pilot hole follows the design centerline of the pipe with the path

recorded and controlled using a specially designed instrument package situated behind the drill bit.

- b) A washover pipe is rotated over the pilot drill string behind the pilot drill bit and exits with the drill bit on the other side of the crossing.
- c) The drill bit and drill string is withdrawn back through the washover pipe, leaving the washover pipe in place.
- d) A series of tools are connected between the end of the washover pipe and the main. A fly cutter widens the drilled hole to its final diameter. A barrel reamer smooths the wall of the hole and directs bentonite to the fly cutter for transport of cuttings to the surface. A swivel is installed between the barrel reamer and the main to ensure that no torque is transmitted to the pipe main.
- e) After the tools are connected between the washover pipe and the main, the drill rig will rotate and pull the washover pipe along the drilled path, with the pipe following slowly behind.
- f) After the pipe is in place, it shall be pigged, flushed, sterilized, pressure tested and leak tested per Section Water Mains.

B. Drill Path Geometry

- 1. Contractor is responsible for horizontal and vertical alignment of the pilot drill and final installed pipe. The pilot drill should conform to the pipeline alignment as shown on the Contract Drawings. Contractor shall submit all proposed changes to the vertical alignment shown on the Drawings to the Engineer for approval prior to commencing work. Under no circumstances shall installed pipe be at a higher elevation than that shown on the Drawings or vary by more than 2½ feet from the horizontal alignment shown on the Drawings.
- 2. The accuracy of the drill exit point shall be within a 2½ foot horizontal radius of the design exit point.
- 3. Entry and exit points shall be located as shown on the Contract drawings.
- 4. Contractor shall map the location of each pilot drill string joint to a minimum horizontal and vertical scale of 1 inch equals 20 feet. The map shall be posted in the Contractors trailer for visitor inspection.
- 5. Should the Contractor exceed the limits described above, a new pilot drill shall be performed at the expense of the Contractor and at no cost to the Owner.

6. If requested by the Owner, Contractor shall provide full explanation of details regarding any technical means, methods or equipment necessary to accomplish the work described herein.

C. Job Conditions

1. Existing Utilities: The Contractor shall be responsible to field locate existing underground utilities in the areas of Work.
 - a) Should uncharted or incorrectly charted piping or utilities be encountered during the work, consult piping or utility owner and Engineer immediately for instructions. Cooperate with Owner and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to satisfaction of utility owner.
 - b) Do not interrupt existing utilities serving facilities occupied and used by Owner or others, except when permitted in writing by Engineer and then only after acceptable temporary utility services have been provided.
 - c) Coordinate with utility companies for shut-off of services, if required and the lines are active.
2. Use of Explosives: Do not bring explosives onto site or use in the Work. Use of explosive materials is specifically prohibited.
3. Dust Control: Contractor shall conduct all of his operations and maintain area of his activities, including sweeping and sprinkling of roadways, so as to minimize creation and dispersion of dust.

D. Installation Specialist:

1. Contractor shall provide the full time services of a competent installation specialist during the Directional Drilling to assist in technical matters relating to the Work. He shall advise the Contractor on matters to include but not limited to drilling, pipe support, mapping of the pipe location, quality assurance of the Work, safety or other items as necessary. Installation specialist may be the Contractor's superintendent.

E. Completion of Work

1. Interior of all pipe and fittings shall be inspected and all dirt, gravel, sand, debris, or other foreign material shall be completely removed from pipe interior. A bulkhead shall be attached to the end of the pipe prior to attaching the swivel and barrel reamer to ensure inside of pipe remains clear during pullback operation.
2. Install all pipe accurately to line and grade shown unless otherwise approved by Engineer.

3. Any time that pipe work is not actively in progress, the open ends of pipe shall be closed by a watertight cap.
4. Field cutting pipe, where required, shall be made with a machine specially designed for cutting piping. Cuts shall be carefully done, without damage to pipe, so as to leave a smooth end at right angles to the axis of pipe. Cut ends shall be tapered and sharp edges filed off smooth.
5. At completion of installing pipe, the pipe shall be stubbed two feet above grade at both ends and capped with watertight cap.

3.2 ENVIRONMENTAL CONTROLS

A. Disposal Site:

1. The drilling mud shall not be disposed of on the project site.
2. Off-site disposal of the drilling mud is the Contractor's responsibility.
3. Contractor shall comply with all applicable laws and regulations regarding the transport and off-site disposal of the drilling mud and all excess excavated materials.
4. All costs for proper transport and disposal of drilling mud and excess excavated materials shall be included in the price bid for the work.

B. All operations involving drilling mud shall be controlled and monitored by the Contractor to ensure containment.

1. The Contractor shall establish bermed or sandbagged pits of sufficient size to accommodate the volume of drilling mud anticipated plus a two-foot freeboard. The bermed areas shall be maintained and designed by the Contractor to ensure containment and prevent loss of drilling mud.
2. Transportation of the disposal materials off-site by public roads shall meet all North Carolina Department of Transportation requirements.
3. Transportation of materials by barge or scow shall be in accordance with the Corps of Engineers and U.S. Coast Guard requirements. No bottom open vessels shall be allowed.

PART 4 – PAYMENT

- 4.1 The main installed shall be paid on a unit price basis as indicated in the bid for HDPE pipe installed by horizontal directional drilling. Unit price shall include all material costs, installation of bore pits, transition fitting and pipe, thrust collars, testing, cleanup for a complete installation as detailed in plans.

END OF SECTION 33 05 23

SECTION 33 30 00 - SANITARY SEWERS

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

Work under this section consists of furnishing all plant, labor, materials, and equipment for the installation of sanitary sewers and appurtenances.

1.2 ADDITIONAL SPECIFICATIONS

Work under this section shall conform to these specifications and to the Harnett County Standard Specifications "Development of Water and Sewer Utilities in Harnett County Water and Sewer Districts, August 2009."

1.3 QUALITY ASSURANCE

A. Standards:

1. American Association of State Highway Transportation Officials
 - a) AASHTO T99
2. American National Standards Institute
 - a) ANSI A21.50 Ductile cast iron pipe
 - b) ANSI A21.51 Ductile cast iron pipe
3. American Society for Testing and Materials
 - a) ASTM A74 cast iron soil pipe
 - b) ASTM A252 encasement pipe
 - c) ASTM C12 clay pipe
 - d) ASTM C14 concrete sewer pipe (18 in. and smaller)
 - e) ASTM C32 manhole brick
 - f) ASTM C33 crushed stone
 - g) ASTM C76 concrete sewer pipe (larger than 18 in.)
 - h) ASTM C91 masonry cement
 - i) ASTM C139 concrete manhole block
 - j) ASTM C230 grout and mortar
 - k) ASTM C301 clay pipe
 - l) ASTM C425 pipe joints
 - m) ASTM C443 pipe joint material and fittings
 - n) ASTM C478 precast concrete manholes
 - o) ASTM C594 flexible couplings and fittings
 - p) ASTM C700 clay pipe
 - q) ASTM D1869 pipe fittings
 - r) ASTM D2152 pipe testing
 - s) ASTM D2321 pipe installation
 - t) ASTM D2412 pipe testing

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- u) ASTM D2444 pipe testing
- v) ASTM D2680 ABS composite pipe
- w) ASTM D2751 ABS sewer service line
- x) ASTM D3034 PVC gravity sewer pipe

- 4. Federal Specifications
 - a) WW-P-421 ductile cast iron pipe

B. Soil Testing

- 1. The Contractor shall retain the services of a testing laboratory to perform all tests required at the project site. In areas of fill and backfill, field density tests shall be performed in sufficient numbers to insure that the specified density is obtained. These tests shall be performed at no cost to the Owner.
- 2. The Contractor shall be responsible for the cost of testing borrow material which shall include standard density tests (Proctor curves).
- 3. All defective work or material shall be repaired and/or replaced by the Contractor at no cost to the Owner. Areas in which testing indicates compaction below the specified density shall be reworked, or removed and replaced by the Contractor, at no expense to the Owner, until specified compaction is obtained.

C. Soil Erosion Control

Siltation, sedimentation, and erosion shall be kept to a minimum at all times during construction. Sedimentation and erosion control methods shall be employed by the Contractor during construction in order to comply with the requirements of the N.C. Sedimentation Pollution Control Act of 1973, and to plan requirements.

D. Material Testing

- 1. **Vitrified Clay Pipe**
 - a) Clay pipe shall be tested at the pipe factory with their own in-house quality control methods in accordance with ASTM Specifications C301 and a test certificate shall be furnished to the Engineer by the factory for each 5,000' of pipe shipped to the site, showing that each joint of pipe conforms to these specifications. Each joint of pipe shall be stenciled with the manufacturer's initials and any pipe arriving at the job site unstenciled will be rejected. The Owner reserves the right to have the same test run by an independent

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laboratory and the results of the test furnished to the Engineer. The Owner will pay all cost of testing by an independent laboratory not normally conducted by the pipe manufacturer.

2. PVC, PVC Truss Pipe, and ABS Truss Pipe

PVC, PVC truss pipe, and ABS truss pipe shall be tested at the pipe factory with their own in-house quality control methods in accordance with ASTM Specifications D2412, D2152, and D2444 for PVC pipe and appropriate sections of ASTM D2680 for ABS truss pipe. A test certificate shall be furnished to the Engineer by the factory for each 5,000' of pipe shipped to the site, showing that each joint of pipe conforms to these specifications. Each joint of pipe shall be stenciled with the manufacturer's initials and any pipe arriving at the job site unstenciled will be rejected. The Owner reserves the right to have the same test run by an independent laboratory and the results of the test furnished to the Engineer. The Owner will pay all cost of testing by an independent laboratory not normally conducted by the pipe manufacturer.

3. Other Materials

Other material shall be subject to such testing as the Engineer may require should its acceptability be questioned.

4. Cost for Testing Method

All costs for testing of materials by an independent laboratory not normally conducted by the factory shall be paid for by the Owner.

E. Inspection, Testing, and Acceptance - New Pipelines

1. Inspection

- a)** Upon completion of each section of sewer or at such time as the Engineer may direct, a block or section of sewer shall be cleaned and inspected. All repairs shown necessary by the inspection shall be made. Broken or cracked pipe shall be replaced; defective joints, if any, replaced; all deposits removed; and the sewer left true to line and grade, entirely clean, free from lumps or protruding jointing material, etc., and ready for use. Each section of sewer between manholes shall show, upon examination from either end, a reasonably full circle of light.

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- b) Manholes shall be true circles of acceptable brick or block work, or for precast manhole, shall have no major defects. Tops shall be properly placed, and castings securely in place. Manholes shall show absolutely no evidence of leakage through the walls or bottom.

2. Testing

- a) Infiltration and exfiltration shall be kept to the minimum amount possible. The allowable limit of groundwater infiltration/exfiltration for any or more selections of sewer with any type joint, including service lines, allowable under these specifications (all sizes), shall not exceed 100 gallons per 24 hours per mile of sewer line per inch of diameter.
- b) Any line that does not meet this specification will be rejected and must be repaired at the Contractor's expense.
- c) No infiltration tests will be made until normal infiltration conditions are established. Tests shall be made before existing sewers or connections are made to new service lines and shall be measured by means of a V-notch weir inserted into the line at a manhole or built in a manhole. These tests will be conducted over a period of time sufficient to determine the correct rates of groundwater infiltration. Weir measurements shall be made at points designated by the Engineer along the completed pipelines, and at least one measurement shall be made for each pipe segment between manholes if requested by the Engineer. All expense of the above test or tests shall be borne by the Contractor and be included in the unit price bid per foot of sewer under each respective size of sewer. When infiltration occurs in excess of the specified amounts as hereinabove given, defective pipe or joints shall be located and repaired at the expense of the Contractor. If the defective portions cannot be so located, the Contractor shall, at his own expense, remove and reconstruct as much of the original work as necessary to obtain a sewer within the allowable infiltration limits upon retesting.
- d) Where lines are above the ground water table, exfiltration testing will be required. Also for lines that may be seasonally under the ground water table or flood levels but, due to dry conditions, upon completion of construction normal infiltration conditions are not present (or the normal wet weather ground water level is not present), the Contractor has the option of conducting exfiltration tests in lieu of infiltration tests. Test procedure shall be as follows:

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- (1) Plug lower end of section to be tested.
- (2) Fill line and manholes with water so that the level in the manhole furthest upstream is at least 3' above the top of the pipe, or a level as determined by the Engineer that models the height of the wet weather groundwater table or the local surface level during flood conditions.
- (3) Let water stand overnight or at least 4 hours to allow all air to escape and sewer line to reach its maximum absorption.
- (4) After pipe has reached its maximum absorption, refill upstream manhole to original depth. After test period specified by the Engineer, record difference in elevation of water level and compute exfiltration rate. Minimum test period shall be six (6) hours.
- (5) When the leakage exceeds the specified amount, satisfactory correction shall be made. Both the measurement and the correction shall be made at no additional cost to the Owner.
- (6) Deflection Tests: All PVC, ABS composite, and PVC composite pipe shall be tested 30 days after installation and backfill to insure that deflection of the pipe does not exceed 5%. All pipe segments with deflections in excess of 5% shall be promptly relayed with proper bedding and retested for 5% deflection at the Contractor's expense. The deflection test shall require passing a mandrel with a calibrated diameter through each pipe segment. Deflection tests shall be conducted and paid for by the Contractor.

F. Inspection, Testing, and Acceptance - Rehabilitated Lines and Manholes

1. Inspection

- a) All repaired lines will be inspected for proper materials, and installation practices at the time each line repair is made. New pipeline sections shall be completely free of debris and shall be clean. Pipe shall be properly bedded and aligned. Upon completion of manhole rehabilitation work, the manhole shall be completely free of inflow and leaks.

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2. Testing

- a) Existing manholes and sewer lines that have been rehabilitated shall be smoke tested by the contractor after completion of all work. The engineer will check to see that smoke does not escape through holes in the newly rehabilitated manhole and that smoke can travel from one manhole to the next manhole in the sewer line section that has been repaired indicating that the blockage and problems have been corrected.
- b) All cost for testing work shall be borne by the contractor and included in the cost of all other work. No extra compensation will be forthcoming.

1.4 SUBMITTALS

- A. Shop drawings shall be submitted to the Engineer in accordance with the General Conditions for the following items:
 - 1. Precast manholes
 - 2. Metal castings
 - 3. Transition couplings
- B. Product data shall be submitted to the Engineer for the following:
 - 1. Tapping sleeves
 - 2. Valves
- C. Manufacturer's certifications shall be submitted to the Engineer certifying that the following materials meet all requirements of the specifications:
 - 1. Sewer Main Pipe
 - 2. Sewer Service Pipe
 - 3. Sewer Pipe Fittings
 - 4. Manhole Brick or Block
- D. Mix designs for concrete and asphalt shall be submitted to the Engineer for approval, if requested by the Engineer.
- E. Three (3) copies of all submittals are required. None of the above listed equipment or materials shall be used on the project unless the necessary approval for that particular item has been given by the Engineer.

1.5 SUBSURFACE INVESTIGATIONS

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- A. Subsurface investigations have been performed. **It shall be the Contractor's responsibility to review this information, as included in the Contract Documents as Appendix A and perform any additional investigations deemed necessary before submitting a bid.**

1.6 DELIVERY, STORAGE AND HANDLING

- A. Preparation for Transport: Prepare valves, including fire hydrants, according to the following:
 - 1. Protect valves against damage to threaded ends and flange faces.
 - 2. Set valves in best position for handling. Set valves closed to prevent rattling.
- B. During Storage: Use precautions for valves, including fire hydrants, according to the following.
 - 1. Do not remove end protectors, unless necessary for inspection; then reinstall for storage.
 - 2. Protect from weather. Store indoors and maintain temperature higher than ambient dew-point temperature.
 - 3. Support off the ground or pavement in watertight enclosures when outdoor storage is necessary.
- C. Handling: Use sling to handle valves and fire hydrants whose size requires handling by crane or lift. Rig valves to avoid damage to exposed valve parts. Do not use handwheels or stems as lifting or rigging points.
- D. Deliver piping with factory-applied end-caps. Maintain end-caps through shipping, storage, and handling to prevent pipe-end damage and to prevent entrance of dirt, debris, and moisture.
- E. Protect flanges, fittings, and specialties from moisture and dirt.

PART 2 - PRODUCTS

2.1 GENERAL

- A. All materials and appurtenances shall meet the following minimum standard requirements therefor. It shall be each manufacturer's responsibility to check the proposed installation and to furnish material that will be fully capable of performing its intended function.
- B. Pipe shall be of the type, size, class, and diameter as hereinafter specified and called for by the Plans and/or Bid. Pipe shall be ductile cast iron, ABS composite type, PVC composite type, and/or polyvinyl chloride.

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- C. Trench width for buried pipe design shall be considered as the outside diameter of the pipe plus 2', at the bottom and up to 1' above the top of the pipe.
- D. Buried pipe shall be designed for laying condition A, B and C (see standard sewer detail) to withstand all internal pressures and external loads with a minimum depth to cover of 3', and greater depths of cover where required by the Plans, plus an H-20 live load in accordance with A.A.S.T.H.O. Specifications.

2.2 CONCRETE SEWER PIPE

- A. Concrete sewer pipe 18" in diameter and smaller shall conform to ASTM Specification C-14 and shall be Class 3 or stronger. Concrete sewer pipe larger than 18" in diameter shall be reinforced type in accordance with ASTM Specification C-76-72 with minimum Class III pipe used with trench depth up to 12' and Class IV pipe used with trench depths equal to or greater than 12'.
- B. Joints for all concrete sewer pipe shall be rubber gasketed, O-ring type accordance with ASTM Specification C443-72.
- C. Interior lining for concrete sewer pipe shall consist of a heavy bitumastic coating applied to a dry film thickness of at least 14 mils. Bitumastic coating shall be applied in strict accordance with the manufacturer's instructions, particularly in regard to surface moisture and ambient temperature. The coating shall be Koppers Super Service Black, Pittsburgh's Bitumastic or equal. The lining in the pipe shall be guaranteed for adherence and erosion resistance for a period of two (2) years.

2.3 **Vitrified Clay Pipe:** Vitrified clay pipe for sewer lines shall be extra strength clay pipe conforming to ASTM Specification C700. Nominal laying lengths shall be 4' or 5' with minimum 4' lengths. Joints shall be bell and spigot resilient type conforming to ASTM Specification C425. Dimensions shall conform to ASTM C700 and all pipe shall be smooth, free from cracks, blisters, or other imperfections and shall be true theoretical shape throughout its length. Each joint shall be clearly and legibly marked with the manufacturer's name or identifying symbol, and the letters ES shall be indented on the exterior of the pipe near the socket.

2.4 Ductile Iron Pipe:

- A. Ductile iron pipe shall be centrifugally cast of ductile iron having a

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minimum tensile strength of 60,000 psi, a minimum yield strength of 42,000 psi, and a minimum elongation of 10 percent (Grade 60-42-10). It shall be designed, manufactured, and shall conform to the requirements of ANSI A21.51 (AWWA C151) Standards.

- B. Nominal laying lengths shall be 18 or 20 feet nominal maximum of 20 percent of each size for each order being as much as 24 inches shorter than the nominal laying length and additional 10 percent as much as 6 inches shorter than nominal laying length.
 - C. Dimensions shall conform to the requirements of ANSI A21.6, ANSI A21.8, ANSI A21.11, and WW-P-421 C, as applicable. Dimensions shall be gauged at sufficiently frequent intervals to assure dimensional control. Insides of sockets and outside of spigot ends shall be tested with circular gages.
 - D. Wall thickness shall be determined for the design depth of cover shown in accordance with ANSI A21.50 - 1976. Minimum allowable wall thickness shall be Class 50.
 - E. All pipes shall be tested at the factory in accordance with ANSI requirements for each type.
 - F. Each pipe shall be coated on the outside with standard bituminous coating of either coal-tar or asphalt base approximately one mil thick. The coating shall be continuous, smooth, and strongly adherent to the pipe and shall not become brittle from cold or sticky from heat. Pipe shall be coated on the interior with Sewper Coat as manufactured by Lafarge Calcium Aluminate or Protecto 401 ceramic lining as manufactured by U.S. Pipe, or equal.
 - G. Each pipe shall be weighed prior to placing of the inside lining. Weight, nominal thickness, sampling period, and class of pipe shall be shown on each pipe. The manufacturer's year of production and the letters DI or DUCTILE shall be clear and legible and on, or near, the bell end.
- 2.5 ABS Composite Pipe: ABS composite pipe and fittings shall conform to ASTM D2680, Type SC (solvent cemented joints). Standard lengths shall be 12.5' maximum.
- 2.6 Polyvinyl Chloride (PVC) Gravity Sewer Pipe: PVC gravity sewer pipe shall be type PSM conforming to ASTM D3034, SDR-35, with bell and spigot rubber O-ring gasketed joints. The standard length of pipe shall be 12.5' "1". All fittings and accessories shall have bell and spigot configurations identical to pipe.

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- 2.7 Polyvinyl Chloride (PVC) Large Diameter Gravity Sewer Pipe: PVC large diameter gravity sewer pipe and fittings shall be type PSM conforming to ASTM F679 (latest edition), SDR-35, with bell and spigot rubber O-ring gasketed joints. The standard laying lengths shall be 12.5' for 18" diameter and 12' for 12", 24", and 27" diameter pipe. All fittings and accessories shall have bell and spigot configurations identical to the pipe.
- 2.8 Polyvinyl Chloride (PVC) Large Diameter Closed Profile Gravity Sewer Pipe: PVC closed profile gravity sewer pipe and fittings based on controlled inside diameter shall conform to ASTM F794 (latest edition) with bell and spigot elastomeric seals. The standard laying lengths shall be 13'. All fittings and accessories shall have bell and spigot configurations identical to the pipe.
- 2.9 Polyvinyl Chloride (PVC) Composite (Truss) Pipe: PVC composite pipe and fittings shall be type PSM and shall conform to ASTM D2680, Type SC (solvent cemented joints). Standard lengths shall be 12.5' maximum. The manufacturer shall submit written certification from an independent testing laboratory that the PVC composite pipe meets all requirements of ASTM D2680, except for material composition.
- 2.10 Steel Encasement Pipe: Steel encasement pipe shall be bituminous coated inside and outside. Bituminous coating shall be 6 mil. minimum thickness. Encasement pipe for installation under highways and railroads shall be spiral welded steel pipe conforming to ASTM Specification A252-61, Grade 2. Encasement pipe shall conform to DOT specifications for pipe laying for highway crossings and to AREA specifications for railroad crossings.
- 2.11 Service Lines: Temporary and permanent service lines shall be cast iron soil pipe, vitrified clay, polyvinyl chloride (PVC), or ABS pipe as specified or noted. Cast iron soil pipe shall be stamped SV or XH and shall be rubber gasketed, push-on type. VC service pipe shall be extra strength, conforming to ASTM C700 and C425. PVC service pipe shall have a minimum wall thickness of 0.125" and shall conform to ASTM specification D3034-78. ABS service pipe shall be the solvent cemented joint type conforming to ASTM Specification D2751., SDR 23.5.
- 2.12 Tees, Wyes, and Miscellaneous Fittings: Fittings for service connections on new main lines shall be the same material as the main and shall conform to the above applicable specifications. A tapping saddle shall be used for service taps on existing mains. All fittings for cleanout assemblies shall be the same material as the service line pipe including combination wye and bend, vertical riser, and cleanout plug and cap. All service connections shall conform to the details as shown on the Plans.
- 2.13 VALVES

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- A. Nonrising-Stem, Metal-Seated Gate Valves, 3-Inch NPS and Larger: AWWA C500, gray- or ductile-iron body and bonnet; with cast-iron or bronze, double-disc gate, bronze gate rings, bronze stem, and stem nut. Include 200-psig minimum working-pressure design; interior coating according to AWWA C550; and mechanical-joint ends, unless otherwise indicated.
- B. Nonrising-Stem, Resilient-Seated Gate Valves, 3-Inch NPS and Larger: AWWA C509, gray- or ductile-iron body and bonnet; with bronze or gray- or ductile-iron gate, resilient seats, bronze stem, and stem nut. Include 200-psig minimum working-pressure design, interior coating according to AWWA C550, and push-on- or mechanical-joint ends.
- C. Valve Boxes: Cast-iron box with top section and cover with lettering "SEWER," bottom section with base of size to fit over valve and barrel approximately 5 inches in diameter, and adjustable cast-iron extension of length required for depth of bury of valve.
- D. Tapping Sleeve and Tapping Valve: Complete assembly, including tapping sleeve, tapping valve, and bolts and nuts. Use sleeve and valve compatible with tapping machine.
 - 1. Tapping Sleeve: Cast- or ductile-iron, 2-piece bolted sleeve with flanged outlet for new branch connection. Sleeve may have mechanical-joint ends with rubber gaskets or sealing rings in sleeve body. Include sleeve matching size and type of pipe material being tapped and of outlet flange required for branch connection.

2.14 MANHOLE MATERIAL

- A. Manhole material shall consist of brick, concrete block, or precast concrete in accordance with the following requirements. All material shall be approved by the Engineer prior to use.
- B. Brick shall be no. 2 Common, or equal, hard clay, or shale, free from cracks and defects that would impair their strength of usefulness. Brick shall conform to ASTM C32, Grade MM.
- C. Concrete manhole blocks shall be units meeting the requirements of ASTM Specification C139. Masonry units shall consist of barrel and cone block 6" thick, 72" high and not over 152" long. Barrel block shall be cast to a radius which will result in approximately 12 units to the course for a 4' diameter manhole, and proportionally thereto for manholes of greater diameter than 4'. Cone block shall be cast to produce a reduction of 6" in diameter per course. All units shall have a vertical groove at the ends.

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- D. Precast concrete manholes shall consist of precast reinforced concrete sections, a conical or flat top section as required, and a base section conforming in general to the details shown on the Plans. Precast manhole sections shall be manufactured in accordance with ASTM Specification C478. The minimum compressive strength of the concrete for all sections shall be 4,000 psi. The maximum allowable absorption of the concrete shall not exceed 8% of the dry weight.
 - E. The manhole shall have flexible coupling cast into the manhole making it an integral part of the manhole at each inlet and outlet hole. This coupling shall be rigid, secure, and provide water tightness, yet provide flexibility at the pipeline to manhole connection.
- 2.15 Masonry Cement: Masonry cement shall be of best grade, conforming to ASTM Specification C91, Type II, of a brand approved by the Engineer. It shall be newly manufactured, well housed, and kept dry and protected at all times.

2.16 CASTINGS AND STEPS

- A. Castings and steps shall be provided for each manhole. Frames, covers, and steps shall be of cast iron of superior quality, tough and even texture, and of not less than 40% pig. They shall be clear of blow holes, and holes, cracks, or other defects, properly finished and bituminous coated while hot.
 - B. Manhole covers, frames, and steps shall conform to the details for each type manhole on the Plans, or to similar plans differing in detail but of equally good design, provided such castings are approved by the Engineer prior to use. Covers and frames shall be machined to provide plane, smooth surfaces for uniform seating and interchangeability of covers. Rings and covers that provide imperfect seating will be rejected. All covers and frames shall be suitable for traffic service. Minimum opening shall be 22" in diameter, minimum weight of cover shall be 120 pounds and minimum weight of frame shall be 190 pounds.
 - C. Special frames and covers shall be provided for sealing manholes water tight at locations shown on the Plans. These frames and covers shall conform to the above specifications and shall be provided with a one piece rubber gasket seated into the manhole frame. Covers shall be secured with 4 minimum 2" lug bolts. Such frames and covers shall be manufactured by Neenah Foundry, Dewey Brothers, Inc., or equal.
- 2.17 Concrete: Refer to Section 03300 for concrete.

2.18 GROUT AND MORTARS

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- A. Non-shrink, high strength grout shall be a non-shrink catalyzed metallic mortar that provides high strength, and does not need rigid confinement. It shall be premixed and used in proportion with water as recommended by the manufacturer. It shall be compatible with other grouts and mortars used. It shall be manufactured by Master Builders, Five Star, W.R. Grace Company, or equal.
 - B. Hydraulic cement grout shall be a cement base, quick set compound which effectively and permanently stops hydrostatic water infiltration through concrete or masonry. It shall be used as recommended by the manufacturer. It shall be "waterplug" as manufactured by Thoro System Products, "Preco Plug" as manufactured by Fosroc Preco, or equal.
 - C. Hydraulic waterproof sealant shall be cementitious base grouting compound designed specifically for providing a hydraulic waterproof coating for concrete or masonry walls, which when applied, becomes an integral part of the concrete or masonry surface. It shall be "Thoro-seal" as manufactured by Thoro System Products, "Brush-Bond" as manufactured by Fosroc Preco, or equal.
- 2.19 Crushed Stone: Crushed stone for pipe bedding shall conform to ASTM C33, size no. 57.
- 2.20 Pipe Adapters: Connections between dissimilar pipe materials or pipe with different diameters shall be made using flexible couplings with stainless steel bands conforming to ASTM Specification C594-70, or using PVC adapter "donut" fittings conforming to applicable portions of ASTM Specifications C443, C425, C594, and D1869. A Smith-Blair Type 242 or 243 with 6" band width, CLOW CORP., Type 1202 or 1212, or equal, all purpose repair clamp will be acceptable. Concrete collars will not be allowed unless specifically called for or directed by the Engineer in the field.

PART 3 - EXECUTION

3.1 LOCATIONS

Pipework shall be installed at the locations shown on the Plans and to the position, alignment, and grade shown thereon. Prior to beginning work at any location, the Contractor shall consult with the Engineer and Owner to determine that all rights-of-way, permits, or other legalities are in order. He shall familiarize himself with all conditions and/or limitations of such rights-of-way or permits and shall fully comply with all such requirements.

3.2 RELATION OF SEWERS TO WATER MAINS

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- A. Crossing a sewer under a water main: Whenever it is necessary for a sewer to cross under a water main, the sewer shall be laid at such elevation that the top of the sewer is at least 24" below the bottom of the water main, unless local conditions or barriers prevent a 24" vertical separation -- in which case both the water main and sewer shall be constructed of ferrous materials and with joints that are equivalent to water main standards for a distance of 10' on each side of the point of crossing.

- B. Crossing a sewer over a water main: Whenever it is necessary for a sewer to cross over a water main, the sewer shall be laid at such elevation that the bottom of the sewer is at least 24" above the top of the water main. Both the water main and the sewer shall be constructed of ferrous materials and with joints equivalent to water main standards for a distance of 10' on each side of the point of crossing. A section of water main pipe shall be centered at the point of crossing.

3.3 CLEARING AND GRUBBING

- A. Clearing and grubbing, where required, shall be done prior to beginning of pipe installation. It shall be done in accordance with applicable portions of items of General Conditions and the following:
 - 1. The Contractor shall consult with the Owner and Engineer prior to starting clearing and a full understanding is to be reached as to procedure. The Contractor shall then conduct clearing and grubbing operations in strict accordance with these agreements.

 - 2. Clearing of trees and brush along the pipeline shall be carefully done so that no damage will occur outside of the limits of the right-of-way. Trees and brush must be cut by hand and trees felled within the right-of-way limits. Only trees that would seriously interfere with construction shall be cut down and all others shall be saved and protected. Trees 6" or more in diameter shall be trimmed, cut into usable lengths of 3', or as DIRECTED BY THE OWNER and the logs neatly stacked on the edge of the right-of-way or disposed in a manner approved by the Engineer. Burning of trees, brush, and debris will not be permitted.

 - 3. Grubbing of stumps that are in the way of construction shall be done in any convenient manner which will not cause damage to remaining trees or adjacent property. Stumps shall be disposed as for brush or laps above.

 - 4. Limits of the pipe-laying operation shall be confined to the right-of-way and easements. The width of clearing shall be held to a

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minimum and in no case more than the easement, without the written consent of the Engineer.

5. Clearing and grubbing shall be performed in accordance with Section 31 00 00.

3.4 WORK ON HIGHWAY RIGHT-OF-WAY

- A. The contractor shall not begin work on any property of the Department of Transportation until necessary permits are in hand. He shall conform to all requirements of the Department of Transportation or its authorized representatives in the prosecution of this portion of the work. It shall be the responsibility of each Bidder to contact the local highway representative and to determine the exact requirements for work to be done. Requirements shall include, but are not limited to the following:
 - B. Where a pipeline crosses under a highway, it shall be installed either by open cut, in tunnel or in encasement under the highway. Materials and method of crossing shall be as indicated on the plans for each crossing. Where pipe is installed by open cut, at least one full lane for traffic shall be kept open and clear at all times.
 - C. The Contractor shall provide full-time flagmen, with appropriate red flags, at all times when work is in progress.
 - D. Necessary warning and descriptive signs shall be provided and placed at each end of the working area while work is in progress along highways. These signs shall be well tended and shall be placed at sufficient distances from the site of the work so that ample warning is given to approaching traffic. Signs shall be adequately lighted at night.
 - E. The Contractor shall keep all streets open to traffic at all times unless permitted otherwise by the Engineer or Department of Transportation as applicable. The Contractor shall provide, place and maintain temporary traffic control devices as directed by the Engineer or Department of Transportation. The latest edition of the *Manual on Uniform Traffic Control Devices for Streets and Highways* as prepared by the National Joint Committee on Uniform Traffic Control Devices shall be used as a guide in the placement of devices and all devices shall meet the requirements of said manual.
 - F. Where pipe is installed in open cut across a highway, the cut shall be immediately backfilled and all work of repairing the pavement completed immediately. Any subsequent settlement shall be immediately corrected and repaired.

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- G. Where pavement is cut and replaced, the Contractor shall cut the edges to a straight and even line before repairing the pavement. No ragged edges will be allowed or accepted.
- H. Where asphalt pavement or bituminous surfacing is cut, the entire area to be repaired shall be primed with an asphalt prime coat, acceptable to the Department of Transportation before the pavement is replaced.
- I. When required, the Contractor shall furnish to the Department of Transportation a 100% Performance Bond for the amount of paving to be cut and replaced along highways. Bond is required in North Carolina.
- J. Unless otherwise indicated, no excavated material shall be placed on the pavement side of the ditch, along State Highways. The least possible amount of trench will be left open when work is not in progress and equipment shall be removed from the pavement and shoulders during shutdown periods.
- K. Shoulders of roadways shall be left in good, acceptable condition and all topsoil and grass that is disturbed shall be replaced. Grassing shall include seeding fertilizing, and mulching to conform with the Department of Transportation requirements.
- L. The Contractor shall pay the cost of all Department of Transportation inspectors time, if required on the job.

3.5 WORK ON RAILROAD RIGHT-OF-WAY

- A. The Contractor shall not begin work on any property of the railroad until he has secured necessary permits. He shall conform to all requirements of the railroad, or its authorized representatives, in the prosecution of this portion of the work, including but not limited to the following:
- B. Where a pipeline crosses under a railroad, the work shall be done in accordance with requirements of the Railway Company. Pipe shall be installed by boring and jacking (or open cut as designated). Excavation shall be done ahead of the pipe. The encasement must be kept on accurate line and slightly below grade. A tolerance of 2% will be allowed on short lines in good soil and not over 1% in any case.
- C. The Contractor shall furnish the Railway Company the following:
 - 1. Certificate of Worker's Compensation or Employer's Liability Insurance according to the laws of the State.

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2. Certificate of the Contractor's Public Liability Insurance to protect the Contractor and Subcontractor for loss of life or injury to persons in an amount not less than \$1,000,000 for any one person, not less than \$1,000,000 for any one accident; and for property loss or damage in an amount not less than \$1,000,000 for any one accident and not less than \$1,000,000 aggregate or as required by the Railroad Company.
 3. The original policy of Railroad Protective Liability Insurance naming the Railway Company as the insured for loss of life or injury to persons in an amount not less than \$1,000,000 for one person, and not less than \$1,000,000 for any accident and for property loss or damage in an amount not less than \$1,000,000 aggregate. The Railroad Protective Liability Policy should show the location and description of work and name of Owner for whom the work is done.
- D. The Contractor shall also pay the cost of flagmen or other expenses of the railroad in protecting traffic. He shall notify the railroad of the time that the work will be done and shall not begin work until authorized by railroad officials.

3.6 BORED ENCASUREMENT INSTALLATION

- A. Encasement pipe which is dry bored under highways and railroads for installation of sewer lines shall be installed at the locations, to the gradients, and within the tolerances (if any), as shown on the plans. In event the encasement is installed off grade or seriously out of line, then another encasement pipe will be dry bored as close as practical to the original pipe with no additional compensation allowed therefor. The original encasement must be sealed with a watertight concrete plug (min. 3' deep) at each end.
- B. Any additional pipe or other work required for realignment of the water line with an alternate encasement location which was required due to improper gradient or misalignment in the original installation, shall be completed at the Contractor's expense.
- C. In event an obstruction is encountered during encasement boring operations which cannot be overcome, a second encasement shall be bored at a location designated by the Engineer. No additional compensation will be allowed for the second encasement installation. In event an obstruction is encountered in the second installation, at the direction of the Engineer, a third attempt shall be made to complete the encasement installation. Consideration will be given for additional compensation in event a third installation attempt is required. All

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abandoned encasement pipes shall be sealed as specified in paragraph 3.3.A above.

- D. Pipelines installed through steel encasement shall meet specifications herein described and all Department of Transportation or Railroad specifications and guidelines for installing pipelines through steel encasement pipe. Upon insertion of the pipeline through the encasement pipe, the ends of the encasement pipe shall be sealed with brick and mortar. Brick and mortar shall be as herein specified, and the seal shall be such to withstand hydrostatic pressure from ground water and all backfill loads. Contractor shall provide means to prevent water line from floating within the encasement pipe. Grouting procedure will not be allowed.
- E. Casing pipe and joints shall be of leakproof construction, capable of withstanding railway or traffic loading. The diameter of the casing pipe shall be at least 2" greater than the largest outside diameter of the carrier pipe, joints, or couplings for carrier pipe less than 6" in diameter and at least 4" greater for carrier pipe, 6" in diameter and greater, unless indicated differently on drawings. Further, the casing pipe shall be of great enough diameter to allow carrier pipe to be removed subsequently without disturbing the case pipe and immediate areas.
- F. Steel encasement pipe shall be as specified in item 2.10 of this section.

3.7 TRENCH EXCAVATION

- A. Trench excavation shall be made along the lines designated by the Engineer and to the depth necessary for laying the sewer to the required grade.
- B. Sides of trenches shall be kept as nearly vertical as is allowable by the Occupational Safety and Health Administration. They shall be at least 12" and not more than 24" wider at the top of the pipe than the outside diameter of the pipe plus sheathing where it is necessary. Where pavement is to be cut. It shall be cut in advance of trenching 1' wider than the required width of the trench.
- C. Where soil conditions prohibit vertical walls, the trench width at the bottom and to 1' above the top of the pipe shall be as specified above with the remainder being held to the least possible width greater than that specified. Where soil conditions prevent ditch excavation without excessive widths, or where directed by the Engineer, wood or steel sheeting, as hereinafter specified, shall be driven to support the trench walls, or a suitably reinforced steel trench box shall be employed.

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- D. Trench bottoms shall be hand graded to provide uniform and continuous bearing for the pipe along its entire length, with bell holes being dug for pipe bells. No ridges, sags, or undercutting will be allowed. Excess excavating below grade shall be backfilled at the Contractor's expense with suitable material which shall be thoroughly stamped.
- E. If approved by the Engineer and subject to suitable soil conditions, the trench may be excavated a few inches below the established subgrade and backfilled with selected material (from the excavation, if available) well compacted and so shaped as to give the pipes uniform bearing throughout their lengths at the established grade. Bell holes shall be dug to relieve the bells of load and to provide for completing the joints.
- F. Where the material at grade is unstable, soft, and incapable of supporting the pipe, the trench shall be excavated below grade, as directed by the Engineer, and refilled to grade with crushed stone or gravel to form a foundation for the pipe.
- G. When authorized by the Engineer, the Contractor shall dispose of material excavated from the trench that is unsuitable for backfill material. The Contractor shall provide the place select borrow material to replace unsuitable material for backfilling the trench as directed.
- H. Stone shall be compacted and graded to provide stable foundation and a uniform bearing for the pipe. Bell holes shall be provided as in other types of foundations.
- I. Should ground water be encountered in the bottom of the trench, causing the trench bottom to be unstable, the material, as directed by the Engineer, shall be excavated below grade sufficiently to allow a bed of crushed rock or gravel to be place in which to bed the pipe. The work shall be done as for unstable foundations. The depth of cut below grade shall be only the minimum amount to accomplish the purpose, and shall be as directed by the Engineer.
- J. The Contractor shall furnish all machinery for pumping, bailing, and/or well pointing and shall pump, bail, or otherwise remove any water which may be found or shall accumulate in the trenches, and shall perform all work necessary to keep them clear of water while the pipe is being laid. The disposal of water after removal shall be satisfactory to the Engineer.
- K. Whenever necessary, the side of the trench shall be braced and rendered secure and either open or close sheathing used to the satisfaction of the Engineer; such sheathing and bracing to be left in place until the trench is refilled to a safe limit, not less than 2' above the top of the pipe. The top portion may be then cut off, but the lower portion shall remain

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undisturbed. In lieu of sheeting, suitable trench boxes may be employed. All sheeting, bracing, trench boxes, and trench construction methods shall conform to the latest Department of Labor Safety and Health Regulations for construction promulgated under the Occupational Safety and Health Act of 1970. No extra payment will be made for sheeting and bracing. Such cost shall be included in the cost of installing the pipe.

- L. All existing water, sewer, and gas lines, buried electrical and telephone cable, and other known utilities intersecting the lines of construction, if requested by the Engineer, shall be uncovered by the Contractor at his expense and exposed to the Engineer at least 100' ahead of pipe laying operations to insure the correctness of grades. Existing utilities shown on the Plans are as accurately located as existing records and field surveys allow; however, the Contractor shall verify with the various utility companies before excavating and shall save harmless the Owner from any claims for damages as a result of this work.
- M. The Contractor shall at all times take necessary precautions in preventing gutters, catch basins, ditches and other drainage facilities from being clogged that might cause flooding conditions and damage to public or private properties.
- N. Rock Removal, Blasting
 - 1. In rock or other unyielding material, the excavation shall be made at least 6" below subgrade elevation. The trench shall be refilled with select material compacted in place as specified for ordinary excavation. Suitable material from excavation may be used, if available. If not, it shall be hauled in. Select material used in trench after rock excavation shall be included in the cost of rock excavation.
 - 2. If rock is encountered, it shall be paid for at the unit price set forth in the Bid. Only solid rock requiring blasting or drilling for its removal will be classified as rock excavation. Allowance will be made for a width of the trench not in excess of 16" greater than the outside diameter of the bell of the pipe and a depth from the surface of the rock to be established subgrade of the pipeline. Rock excavated in excess of these limits will not be paid for. The Engineer shall measure the amount of rock excavation to be classified as such before the trench is backfilled. No payment will be made for rock excavation which is backfilled before measurement by the Engineer.
 - 3. All blasting, where required, shall be done under the personal supervision of a man thoroughly skilled in this class of work. All

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necessary measures to protect life and property shall be taken. When in close proximity to buildings, transmission lines, telephone lines or other facilities, timber mats or other means of preventing damage from flying debris shall be used. Ample and suitable signals shall be given in proximity to the work before each blast, and flagmen shall be placed on all roads, beyond the danger zone, in every direction to warn traffic. All responsibility for damage rests on the Contractor.

- O. Upon completion of the backfilling and repair operation, all excess earth, broken pavement, rock, shoring and all left over materials and debris resulting from the Contractor's operations shall be removed from the work areas and disposed of by the Contractor. The Contractor shall provide his own disposal site. He shall comply with all State of North Carolina, County and Local regulations, rules and ordinances regarding the disposal of such material. All costs arising from the disposal of the material shall be borne by the Contractor at no additional cost to the Owner. The work areas and adjoining areas used by the Contractor shall be left clean and free of evidence resulting from the Contractor's presence.

3.8 PIPE INSTALLATION

A. Concrete Pipe

1. Concrete pipe shall be protected during handling against impact shocks and free fall. On the subgrade prepared as specified in Section 3.7, the pipe shall be laid so as to produce a straight line of pipe on a uniform grade, each pipe laid to form a close joint with the preceding pipe and so as to form a smooth inside flow line. Pipe joints shall be in strict accordance with the manufacturer's written recommendations.
2. Concrete pipe shall be laid with preformed plastic gasket joints or as specified by the manufacturer.

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B. Clay Pipe

1. Clay pipe shall be protected during handling against impact shocks and free fall, and shall be kept clean at all times.
2. On the subgrade prepared as specified in Section C.7., the sewer pipe shall be laid so as to produce a straight line of pipe on a uniform grade, each pipe laid to form a close joint with the preceding pipe so as to form a smooth inside flow line. Bell shall be up grade.
3. Resilient type factory joints shall be assembled in accordance with manufacturer's directions.
4. During the process of laying the pipe, care shall be taken to protect both pipe and joint from disturbance. The open end of the pipe shall be protected or blocked to keep out debris. Clay pipe shall be installed in accordance with ASTM C12.

C. Iron Pipe

1. Iron pipe in trench shall be laid as required for clay pipe. Joints in iron sewers in trench shall be completed with rubber gaskets in accordance with Federal Specification WW-P-421b.

D. ABS Composite Pipe

1. ABS Composite pipe shall employ solvent cemented joints which shall be made strictly in accordance with manufacturer's instructions. Pipe shall be uniformly supported for its entire length on lower quadrant, and installed in accordance with ASTM D2680.

E. PVC Gravity Sewer Pipe

PVC gravity sewer shall be installed as ABS Truss pipe and in accordance with ASTM D2321-74.

F. PVC Composite Pipe

PVC Composite pipe shall be installed as ABS Truss pipe.

G. All sewer pipe shall be bedded as shown on standard sewer details and/or installed as called for above.

H. All sanitary sewer pipe (except ABS Truss and PVC Truss, see manufacturer's instructions) for pipe sizes up to 24" in diameter shall be assembled by using a bar and wood block to push the pipe into the "home" position. The wood block shall be placed across the end of the pipe to act as a fulcrum point and protect the joint end during assembly.

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When absolutely necessary, the sanitary sewer pipe may be assembled by using the excavating equipment to apply pressure when pushing the pipe into the "home" position. When this method is used, a wood block shall be provided at the end of the pipe for protection of the end joint, and the pipe shall be held in a horizontal position with a "sling" and perfectly aligned with the preceding joints before assembly. The Contractor shall have the approval of the Engineer before assembling sanitary sewer pipe using the excavating equipment as a means of pushing the pipe into the "home" position. Notwithstanding the Engineer's approval, the Contractor shall be liable for any damage to the pipe as a result of using the excavation equipment. Pipe which is not true to alignment, or which shows settlement after laying, shall be taken up and relayed without extra compensation.

I. Pipe on Piers

1. Pipe on piers shall be ductile iron and shall be installed as shown on the plans. Each length of ductile iron shall be supported behind the bell end at spacings not to exceed the nominal length of the pipe joint (18' to 20').
2. The concrete pier shall be located a distance not greater than 18" from the face of each bell. Concrete piers shall be constructed as shown on the Plans.
3. **Connecting to Existing Sewers:** Where shown on plans or directed by the Engineer, new sewers shall be connected to existing sewers by constructing a manhole or by cutting through the wall of an existing manhole. After construction of the new manhole, the old sewer shall be broken out and the inverts properly formed. For an existing manhole an opening shall be completely filled around the pipe with cement mortar and brick so as to be watertight. A channel shall then be formed over the manhole floor, or the floor cut through and the channel formed in it, as may be required by the grade. No additional payment will be made for this work. Temporary pipe work that may be required to handle sewage before turning it into the new line and/or bypass pumping shall be included in the cost of all other work.

3.9 VALVE INSTALLATION

- A. **General Application:** Use mechanical-joint-end valves for 3-inch NPS and larger underground installation.
- B. **AWWA-Type Gate Valves:** Comply with AWWA C600. Install underground valves with stem pointing up and with cast-iron valve box.

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3.10 MANHOLES

A. Manholes shall be constructed in accordance with details on the Plans and shall be of true dimension and form. They shall be so constructed as to exclude all ground water. On all lines having an inside diameter greater than 21", 5' diameter manholes shall be constructed.

B. Brick Manholes

1. Brick manholes shall be constructed as follows:

Manhole bottom shall be constructed of 3000 psi concrete and shall conform to the shape and form detailed on the Plans. Inverts shall be carefully and properly installed to suit the needs of each location.

2. Mortar shall consist of one part Portland Cement, one part hydrated lime, and six parts sand; or two parts Masonry cement and six parts sand. All mortar shall be mixed with the least amount of water required for workability and shall be used before initial set has occurred. Retempering of mortar will not be permitted.

3. Brick manholes shall be constructed by experienced manhole masons. Brick shall be laid in level courses in mortar, as specified below, with mortar joints approximately 2" thick. The joints shall be completely filled with mortar and inside joints struck flush. Each fifth course shall be a stretcher course, the intervening courses being headers. Outside walls shall be completely plastered with a 2" thickness of mortar as specified in C.9.b. (2) of this section, and the inside walls plastered up to the top of the cylindrical section. They shall be properly aligned and set level. Cast iron frames and covers shall be properly set in a bed of mortar and aligned to fit the brickwork.

4. Manhole steps shall be placed inside of the manhole when it is more than 3' in depth. Steps shall also be provided on the outside of all manholes rising more than 4' above the finished ground level. Manhole steps shall be 15" apart beginning 2' from the bottom and ending 2'-6" from the top of the manhole casting. The steps shall be set in the masonry as the work is built up, thoroughly banded, and accurately spaced and aligned.

5. Castings shall be set in full mortar beds and shall conform to the line and grade. The manhole shall be cleared of scaffolds, surplus

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mortar, and all other foreign matter before the casting is set or the backfill placed.

C. Concrete Block Manholes

1. Concrete block manholes shall be constructed as follows:

Bottoms shall be poured as previously specified for brick manholes. Masonry units shall be laid using a full 2" bed joint. Absolutely no trenching of mortar will be allowed. Masonry units shall be laid while dry and head joints shall be thoroughly filled with mortar and rodded upon completion of each course.

2. Cast iron steps shall be placed in each manhole at each second course. They shall be properly aligned and set level. Steps shall otherwise conform to the above requirements.
3. Castings shall be set as specified above.

D. Precast Manholes

1. Precast manholes shall be constructed as follows:

Precast base sections shall be installed on stabilized foundation so prepared to prevent settlement and misalignment. Pipe openings shall be exactly aligned to that of the pipe entering and leaving the manhole.

2. Rubber ring joints or semi-rigid composition joints shall be carefully made in accordance with the manufacturer's instructions and generally in the following manner. Bells shall be wiped clean, be free of all dirt or other matter, and liberally lubricated for receiving the spigot ends. The gasket groove and gasket shall be well cleaned and lubricated prior to placing.
3. Cement mortar joints shall be carefully made to the manufacturer's requirements. Grout shall be as stiff as possible to be consistent with good practice and all joints shall be well filled.
4. Sewer pipe shall be placed in the openings provided in the base section and properly aligned and set to grade. They shall be firmly held in place by the flexible coupling and the base opening shall be filled with an expanding type grout well rammed into place.
5. Steps shall be properly placed at 15" intervals and to the other requirements specified for brick manholes.

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6. Cast iron frames and covers shall be properly set in a bed of mortar and aligned to fit the top section of the manhole. Concrete brick set in mortar shall be used to adjust the top to finished grade, however, no more than four courses of brick will be used for adjustment.
 7. When using 5' diameter manholes, the Contractor may use 5' diameter sections for the full depth or he may use a reducing section to reduce the inside diameter to 4' at a minimum height of 42" from the floor of the manhole.
- E. **Manhole Drops:** Manhole drops shall be supported and encased in brick work, and the backfill very thoroughly compacted. Should the trench for the upper sewer be excavated below grade beyond the brick work, enough cast iron pipe shall be used to provide a bearing of 2' on original ground.
- F. **Manhole Tops:** Manhole tops shall be set to the proper elevation as dictated by the location, or as directed by the Engineer. Care shall be exercised to set the tops at the proper elevation. Where manholes are located in streets or roads, the tops shall be set to conform to the finished grade of the roadway. Tops of manholes located in yards, roadway shoulders or populated areas shall be set flush with the ground elevation, unless directed otherwise by the Engineer. In cultivated fields, wooded areas and along outfall sewers the manhole tops shall be set approximately 1' above the elevation of the ground unless the line is subject to flooding or other hazards. In such instances manhole tops shall be set to the elevations given by the Engineer.

3.11 BACKFILLING

- A. All trash, forms, debris, and other foreign material shall be cleared from around all pipes and structures before backfilling.
- B. Backfilling around the pipe and to a depth of at least 1' above the top of pipe shall be placed by hand in layers of not over 6". Only select material containing no rocks or other objectionable material shall be used for this portion of the backfill. As fast as the material is placed, it shall be cut under the haunches of the pipe with a shovel and thoroughly compacted with mechanical tamps for the full width of the trench to provide support for the bottom and sides of the pipe. Filling shall be carried up evenly on both sides.
- C. The balance of the backfill shall be placed and tamped to prevent excessive settlement in a manner satisfactory to the Engineer. If the

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trench backfill is located under miscellaneous paved areas, areas to be paved, or unpaved streets, the trench shall be backfilled with suitable material free from large stones or clods in 8" layers (loose measurement) and thoroughly tamped and compacted to 95% of maximum as established by AASHTO specification T99, method A, with mechanical tampers, so as to avoid future settlement. Where applicable, the compaction shall be acceptable to the Department of Transportation or Owner. For trenches located in streets and highways trench backfilling shall be in accordance with the requirements of item 3.12 of this section, Cutting and Replacing Pavement.

- D. For pipe outside street limits, compaction shall be at least 90% of maximum as established by AASHTO Specification T99, Method A.
- E. Excess material shall be promptly removed from the site, and the pavement or road surface cleaned of objectionable material. The pavement and/or road surface shall be cleaned daily with a mechanical broom and/or washed if requested by the Engineer. The Contractor shall correct any future settlement within the guarantee period.
- F. In unpaved streets and shoulders the top 6" of trench shall be filled with well compacted crusher-run stone. In paved areas the top of the trench shall be filled with the specified base for pavement, well mixed and compacted. Any settlement of backfill below finish grade shall be promptly corrected.
- G. On outfall lines and at other points where damage to the system or property will not occur, the backfill material more than 1' above the top of the pipe may be placed in 12" layers and compacted with mechanical tampers. The upper portion of the backfill, more than 5' above the pipe may be compacted by rolling with wheeled equipment. Excess material may be mounded on the trench. The Contractor will be responsible for all final subsidence of all trenches and shall leave the same flush with the original ground after all settlement has taken place. Trenches must be protected against scour due to surface drainage.
- H. Backfilling around manholes shall, in general, conform to requirements for backfilling trenches, except that no backfill shall be placed around manholes until all mortar has properly set, and backfilling shall be carried up symmetrically around structures.

3.12 DUST CONTROL

- A. The Contractor shall control dust throughout the life of the project within the project area and at all other areas affected by the construction of the project. Dust control shall not be considered effective where the amount

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of dust creates a potential or actual unsafe condition, public nuisance, or condition endangering the value, utility, or appearance of any property. The Contractor will not be directly compensated for any dust control measures necessary, as this work will be considered incidental to the work covered by the various contract items. The Contractor will provide dust control measures as directed by the Engineer.

3.13 CUTTING AND REPLACING PAVEMENT AND STONE SURFACING

- A. Where pavement is cut for installation of pipe or other utilities, the Contractor shall cut it neatly in advance of trenching for a width greater than the trench width by 12 inches on each side and shall replace the pavement with base and new pavement. Base and new pavement shall be as shown on the Drawings or, if not shown, as specified herein.
- B. Where roadways maintained by NCDOT are cut, the pavement shall be patched the same day that it is cut. Where other paved areas are cut, requirements of the owner of the pavement shall be complied with. Where no such requirements exist, the base course of the patch shall be laid and compacted immediately following trench backfill and compaction and the patch shall be completed within fifteen days.
- C. At locations of pavement cutting and replacement, trench backfilling shall be done in layers not over 6" thick and each layer shall be thoroughly compacted. Compaction shall be done by acceptable means, approved by the Engineer. Within 8 inches of the finished pavement surface the backfill shall be compacted to a density of 100% of Standard Proctor density and below this depth to a density of 95% of Standard Proctor density as established by AASHTO Specification T99, as modified by NCDOT in NCDOT roadways.
- D. Unless shown differently on the Drawings, the courses of base and pavement in patches for the different classifications of pavement shall be equal to the existing pavement but not less than the following courses.
 - 1. For residential and commercial concrete pavement, 6 inches of aggregate base course and 4 inches of concrete.
 - 2. For residential and commercial asphalt pavement, 6 inches of aggregate base course and 2 inches of asphalt concrete Type S9.5A.
 - 3. For industrial concrete pavement, 6 inches of aggregate base course and 6 inches of concrete reinforced with 6" x 6" W2.9 x W2.9 welded wire fabric.
 - 4. For industrial asphalt pavement, 6 inches of asphalt concrete Type B25.0B, 3 inches of asphalt concrete Type 19.0B and 2 inches of asphalt concrete Type S9.5A.

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5. For all public roads and streets, as required by the owner of the facility.

Aggregate base course shall be compacted to a density of 100% of Standard Proctor density. Where an asphalt patch is applied over aggregate base course, the base course shall be coated with prime material as specified in Section 32 11 33 and all edges of adjoining pavement shall be tacked with asphalt emulsion immediately prior to asphalt placement.

Concrete shall have a compressive strength of 4000 psi and shall be air entrained.

- E. Where excavation is done in areas surfaced with gravel or crushed stone the surface shall be repaired with similar material of the same thickness as the existing material but not less than 4 inches. The repair material shall be compacted to a density of 95% of Standard Proctor density.

3.14 REMOVING AND REPLACING SIDEWALK, OTHER ITEMS

- A. Where pipe is to be placed under existing concrete sidewalk, the concrete shall be removed in construction units unless their length is more than 10', in which case the concrete shall be cut as specified in paragraph 3.11.2. of this section. The backfill shall be thoroughly compacted for the entire depth of the trench.
- B. The sidewalk shall be replaced with 3000 psi concrete, 4" thick, except for driveways where it shall be 6" thick. The concrete shall be placed monolithic and dressed off with a wooden float, brush and edging tool. Where pipe is to be placed under concrete walk, the Contractor may, with the permission of the Engineer, install the pipe by tunneling instead of removing and replacing the walk. If pipe is to be placed under curb and gutter, it shall be done by tunneling. No additional payment will be made therefor.
- C. The Contractor shall be responsible for removing and replacing items such as mail boxes, fences, shrubbery, walls, steps, and any other private ornamental items that are in direct conflict with the water line work. No additional payment will be made therefor.

3.15 PIERS AND PROTECTION WORK

- A. Concrete piers: Foundation for piers shall be adequate to support the intended load and will be subject to the Engineer's approval prior to pouring concrete. Concrete piers shall have a rubbed finish.

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- B. Protection concrete shall be poured in such locations as shown on the plans or directed by the Engineer. It shall consist of one part Portland Cement, two parts sand and four parts crushed stone.

3.16 MISCELLANEOUS ITEMS

The Contractor shall be responsible for removing and replacing miscellaneous items in conflict with the sewer line work such as mail boxes, signs, fences, walls, shrubbery, private ornamental items, etc. Shrubby and plantings shall be preserved by proper root protection and watering until replanted. Tree limbs shall be protected where possible. Damaged trees shall be repaired with an approved tree dressing. No additional payment will be made for removing and replacing miscellaneous items.

3.17 REPAIRS TO DAMAGED SERVICES AND UTILITIES

Repairs to damaged services and utilities shall be promptly made at the Contractor's expense. The Contractor shall use every effort to avoid damaging or breaking water, sewer, gas, power, telephone or other utility services. Utility lines shall be properly supported across the pipe trench until backfilling is completed. Should damage occur, immediate action shall be initiated to effect satisfactory repairs. All repair work shall be satisfactory to the Engineer and owner of the damaged utility.

3.18 CLEANUP

- A. All pipeline rights-of-way and pipework areas shall be cleaned up and left in satisfactory condition.
- B. Cleanup of work along highways or roads shall be made immediately upon completion of the backfill operation. Ditching and pipe laying shall be stopped at any time that cleanup work lags and shall not be resumed until cleanup progress is satisfactory to the Engineer. Final cleanup and condition of the work area shall be subject to the approval of the State Highway Representative, the Owner, and the Engineer.
- C. Cleanup of work for cross-country locations shall follow immediately upon the completion of any major part of the work or upon instructions by the Engineer. Topsoil shall be replaced on all areas disturbed by the pipeline work throughout the length of the sewer main, and to the full satisfaction of the property owner. Topsoil may be removed from the line of work and stockpiled for future use. It shall be carefully removed, stockpiled, protected, respread, dressed off, and the entire right-of-way left in condition acceptable to the Engineer and property owner. If topsoil is not stockpiled and protected, suitable, approved material from other sources

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shall be provided. Where the line is located on pasture land, grassed areas, or roadway shoulders, grass shall be replaced.

- D. All disturbed pipeline area shall be seeded in accordance with Section 32 92 00.

3.19 REHABILITATION OF EXISTING SEWER SYSTEM

- A. **Excavating and Trenching:** Contractor shall perform all excavation required to uncover existing sewer line segments designated for repair or removal and replacement. All excavation and trenching shall conform to C.7. of this section.
 - 1. The Contractor shall provide pipe plugs, pumping equipment and conduits as required to bypass the sewage between manholes while a section of pipe line is being repaired. The bypass shall be maintained in continuous operating condition, without undue disturbance to the inhabitants of the adjacent property, until the line under repair may be returned to service.
 - 2. Excavation work shall be executed in such manner and with such equipment as to prevent damage to the existing sewer pipe.
- B. **Removal of Damaged Pipe:** The Contractor shall remove the damaged pipe and such sections as may be necessary to permit insertion of the new pipe.
- C. **Backfilling:** Backfilling shall be accomplished using methods described under item C.10. of this section.
- D. **Street Repair:** Street repair shall be accomplished using methods described under item C.12. of this section.
- E. **Safety Precautions:** Excavations and backfilling operations shall be performed under rules and regulations of North Carolina Occupational Safety and Health Standards for the Construction Industry, promulgated by the Occupational Safety and health Administration of the North Carolina Department of Labor.
- F. **Pumping:**
 - 1. Excavations shall be kept free from water while construction therein is in progress. The downstream sewer shall be plugged to prevent entrance of mud and debris.

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2. **Well Pointing:** Should ordinary pumping operations not properly control entrance of water or flowing earth to the excavations, a well point system shall be installed to depress and maintain the water table approximately 2' below the lowest excavation level. Dewatering shall be maintained until backfilling has proceeded above the natural ground water table and the pipe line is stable. The Contractor shall employ a person experienced in well point work to install a well point system that shall be adequate in every respect.

G. Sewer Line Cleaning:

1. **General Requirements:** This work consists of providing all labor, materials, apparatus, services and equipment required to completely clean designated sewer lines, and manhole walls, of dirt, grease, sand, sludge, roots, and all other solid or semi-solids materials in order to facilitate location of repairs and making said repairs. The Contractor shall employ one or more, or all three of the methods specified herein. The equipment employed shall be subject to the approval of the Engineer.
2. **Hydraulic Cleaning Method:** This method shall employ the use of a movable type dam constructed in such way that the dam may be collapsed at any time during the cleaning operation to protect against flooding of the sewer. Sewer cleaning balls or other such equipment which cannot be collapsed instantly will not be considered as acceptable cleaning equipment. Other equipment, equally effective that will permit passage of sewage when in use, may be approved. The movable dam shall be of equal diameter to the pipe being cleaned and shall provide a flexible scraper around the periphery to insure total removal of grease.
3. **High Velocity Jet Cleaning Method:** This method shall employ high pressure water streams containing cleaning and sanitizing chemicals ejected through hose nozzles and pressure gun. The truck mounted mobile equipment shall carry a 1000 gallon water tank capable of holding corrosive or caustic cleaning or sanitizing chemicals, auxiliary engines, pumps, and a hydraulically driven hose reel. Refiller pipe to the tank shall have a minimum 4" air gap to prevent backflow and contamination of the county water system.
 - a) There shall be included a minimum of 500' of 1" I.D. high pressure hose with a selection of two or more high velocity nozzles. The nozzles shall have a minimum capacity of 60 gpm at the nozzle head and a working pressure of 950 to 1250 psi. The nozzles shall be capable of producing a

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scouring action from 15E to 45E in all size lines designated to be cleaned.

- b) There shall be included a high velocity gun for washing and scouring manhole walls and floor. The gun shall be capable of producing flows from a fine spray to a long distance solid stream and shall be operated from the high pressure hose.

4. Mechanical Cleaning Equipment:

- a) Bucket machines shall be in pairs with each machine powered with a minimum of a 25 HP engine to insure sufficient pulling power. Each machine shall be equipped with a two speed transmission and shall be capable of pulling at rates of 150' per minute in high speed and 100' per minute in low speed.
- b) Power rodding machines shall be capable of holding a minimum of 800' of rod. The rod shall be of specially treated steel. The machine shall have a positive rod drive and produce a 1000 pound rod pull. To insure safe operation, the machine shall have a fully enclosed body and an automatic safety throw out clutch.

5. Cleaning Operations: Satisfactory precautions shall be taken to protect the sewer lines from damage that might be inflicted by the improper use of cleaning equipment.

- a) When hydraulic propelled cleaning tools, which depend upon water pressure to provide cleaning force, or any tools which retard the flow of water in the sewer line are used, precautions shall be taken to insure that the water pressure created causes no damage or flooding to public or private property being served by the manhole section involved.
- b) The flow of sewage in the sewer lines shall be utilized to provide necessary pressures for hydraulic cleaning devices whenever possible. Additional quantities of water from fire hydrants may be used to avoid delay in normal working procedures.
- c) When fire hydrants are used, permission shall first be granted by the local Fire Department and hydrants in use shall be fully opened at all times. Hydrants shall be immediately released to fire fighters in an emergency.

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- d) **Collection of Refuse:** All sludge, dirt, roots, sand, rocks, grease, and other solid or semi-solid material resulting from the cleaning from the cleaning operations shall be removed at the downstream manhole of the section being cleaned. Passing material from manhole section to manhole section will not be permitted.
 - e) **Hydraulic Cleaning:** A suitable temporary weir or dam shall be constructed in the downstream manhole so that both liquid and solids are trapped. The trapped material, both solid and liquid, shall be pumped from the manhole into an above ground, mobile, retention chamber. The chamber shall be completely enclosed and shall contain not less than two baffles to insure complete separation and settlement of the solids. The chamber may be equipped with a piping system which will permit the relatively clean liquid to return to the sewer.
 - f) **Cleaning by Bucket Machine:** A suitable container shall be provided to receive the materials dumped from the buckets and return liquids to the sewer without spillage of any kind. Under no circumstances shall liquid sewage or solids removed from the sewer be dumped onto the streets, into ditches, into catch basins or storm drains.
 - g) **Cleaning of Manholes:** All manholes within the system that need cleaning to facilitate repair work shall have the walls and floor thoroughly cleaned to the bare masonry and concrete by means of the specified high velocity jet gun, or other means approved by the engineer.
 - h) **Disposal of Refuse:** All debris collected from cleaning lines and manholes shall be disposed of at the local approved county landfill or other sites approved by the Owner. Absolutely no dumping of refuse into storm drains or street gutters will be tolerated.
- H. **Replacing Sewer Pipe:**
- 1. Pipe to replace damaged pipe in existing sewers shall generally be of the same type as the existing or one of the six types specified in this section. Types of sewer pipe used for replacement shall conform to item B.1. of this section.

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2. Where mortar type joints are encountered, the new connections to the existing sewer shall be made with flexible couplings as described in item 2.17. of this section.

 3. Where replacement of pipe or service connection is designated, the Contractor shall excavate and discover the damaged section or joint. He shall remove only such number of joints which will enable him to install the new joints. New joints shall be made with mechanical compression type seals and/or flexible couplings. Excavation, bedding, backfilling, and other repairs shall be made as specified in item C. of this section. It shall be the Contractor's responsibility not to destroy any excess existing pipe. Sewer line repairs at the designated locations will involve blockages caused by roots, sand, mud, collapsed pipe sections, and storm drain pipe conflicts. The Contractor is charged with the responsibility to locate the sewer line obstruction or problem in certain line sections designated on the drawings and in the bid form. This may be accomplished by inserting power rodding equipment, and/or closed circuit television cameras into the sewer lines. The Contractor will made the appropriate pipeline repair as described above after location of the problem. Other sewer line sections shown on the drawings and scheduled for repairs show the exact location of the problem and repairs to be made. The Contractor will not be required to internally inspect these sewer line sections. For the sewer line sections that call for internal inspection by T.V. camera prior to repairs being made, it is intended that those lines be completely cleaned of roots, grease, sand, and other debris. The cost for cleaning and inspection of the designated sewer line shall be included in the cost of sewer line repair. Some pipeline repairs will involve storm drain conflicts and separations to be made between the storm drain and the sewer line. The Contractor will be required to assure complete separation of the storm drain and sewer line and a firm foundation under each line. The Contractor is directed to the detail for storm drain and sewer line separations on the drawings. Repairs to a storm drain and sewer line conflict may involve replacement of both or separate lines. The Contractor will be compensated as indicated in the bid form.
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- I. Replacing Existing Service Taps: Replacement of existing service taps shall be in accordance with the detail shown on the plans. Should structural conditions allow, the Contractor, after approval by the Engineer or his representative, may exercise the option of using a "service saddle" instead of a wye to replace the existing damaged tap. The service saddle shall be of a type specifically designed for this type of use and be bound to the sewer main with an appropriate sealant and at least two tightening bands. Both the saddle and all hardware associated with the tightening

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bands shall be of a non-corrosive material. During replacement of a service tap, should it appear that the structural condition of the service line is unsound, the Contractor, after approval of the Engineer or his representative, shall excavate further and replace the service line as needed. New service line pipe shall be 4" and as specified in Section B-9 and called for in the bid form.

- J. **Manhole Repair and Rehabilitation:** The Contractor will be responsible for repair and rehabilitation of existing manholes within the sanitary sewer system. The manhole locations and numbers are shown on the location drawing, construction drawings, and described in the Appendix. Work will include cleaning the manhole prior to repair work if necessary. Repair work will consist of, but will not be limited to: invert and shelf work, pointing holes in walls, grouting existing rings in place, and replacing broken rings and covers.
- K. **By-Pass Pumping:**
1. The Contractor shall provide pipe plugs, manhole dams, pumping equipment, and conduits as required to bypass sewage between manholes while a section of pipe is being repairs. The bypass shall be maintained in continuous operation without undue disturbance to the inhabitants of the adjacent property until the line under repair may be returned to service.
 2. The Contractor shall provide barricades and warning signs and lights, and provide walkways and traffic ways at intersections over and/or around his conduits, and power to his pumps, as may be required, to provide for the movement of traffic and pedestrians in and around the area of the work. No street or intersection shall be blocked without notification to and permission of the Owner.
- L. **Disposal of Surplus Material:** Upon completion of the backfilling and repair operations, all excess earth, broken pavement, rock, shoring, and all left over materials and debris resulting from the Contractor's operations shall be removed from the work areas and disposed of by the Contractor. The Contractor shall provide his own disposal site. He shall comply with all State of North Carolina, County, and local regulations, rules and ordinances regarding the disposal of such material. All costs arising from the disposal of the material shall be borne by the Contractor at no additional cost to the Owner. The work areas and adjoining areas used by the Contractor shall be left clean and free of evidence resulting from the Contractors' presence.
- M. **As-built Survey Requirements:** Refer to Section 01 71 10.

END OF SECTION 33 30 00

PART 1 – GENERAL

1.1 Description of Work

1.1.1 Work under this section consists of furnishing and installing submersible pump stations as detailed on the plans and specified herein. It shall include all labor, materials, site grading, structures, excavation, sheeting, backfill, reinforced concrete, masonry, carpentry, yard piping, equipment piping, miscellaneous piping, equipment, electrical work, controls, incidental painting, and all other items or material and work required to construct structures and furnish and install equipment for a complete installation as hereinafter specified.

1.2. Additional Specifications

1.2.1. Work under this section shall conform to these specifications and to the Harnett County Standard Specifications "Development of Water and Sewer Utilities in Harnett County Water and Sewer Districts, August 2009."

1.3. Submittals

1.3.1. Shop drawings shall be submitted to the Engineer for the following items:

- Pumps
- Drives
- Controls
- Precast Concrete Structures

1.3.2. Manufacturer's data shall be submitted to the Engineer for the following:

- Pumps
- Drives
- Controls
- Lifting System
- Hatches
- Hoist
- Fittings
- Valves

1.3.3. Certificates of Compliance shall be submitted to the Engineer for the following:

- Pumps
- Drives
- Controls

1.4 Operation and Maintenance Manuals

- 1.4.1 Furnish three copies of the manufacturer's operating and service manual for each item below. The manual shall contain complete descriptions of each item of equipment and a complete parts list showing factory parts numbers. It shall also contain complete operating and service instructions and shall be tabbed and indexed for easy use.

Pumps
Drives
Controls

PART 2 - MATERIALS

2.1. General:

- 2.1.1. The contractor shall furnish and install the following equipment where shown on the Plans, complete with all incidental and appurtenances required for a complete, finished installation. All equipment components shall be adequately sized to carry all loads and stresses occurring during fabrication and erection and resulting from normal and emergency operation in the installation shown on the Plans and under the conditions specified and/or implied.

2.2. Submersible Pumps:

2.2.1. Pumps

- 2.2.1.1. Pumps shall be submersible, centrifugal non-clog capable of passing solids as specified with hydraulic sealing diaphragms, pump mounting plates and base elbows with bottom rail supports, stainless steel upper rail supports, stainless steel lifting cable, schedule 40-A stainless steel guide rails, and stainless steel cable supports. Pump housing shall be of heavy cast iron construction. All fasteners shall be 303 stainless steel or approved equal. Each pump shall be capable of being hoisted vertically out of the wetwell, and returned to operation without requiring the operator to enter the wetwell. It is the intent of these specifications that the pumps, base plates, guide rails, hoisting cable and connections to the control system (including panel, starters and circuit breakers), be provided by the pump manufacturer as an integral system. The impeller shall be of bronze, ductile iron, or other durable, corrosion-resistant approved material. The pump impeller shall be of semi-open non-clog design and shall have back vane(s) to prevent build up of solids behind the impeller. The impeller shall be rigidly fixed to the motor shaft with a key(s) or other approved fastener (so designed to prevent separation under rotational loading). The motor shaft shall be stainless steel, supported by upper and

lower bearings. The upper bearing shall be a self-lubricating ball bearing. The lower bearing shall be a sleeve bearing or double row ball bearing lubricated from an oil chamber. Shaft and bearing shall have sufficient section to withstand all rotational and axial loading to be reasonably expected under normal wastewater pumping situations.

2.2.1.2. The shaft shall be sealed from the volute with an oil-lubricated mechanical seal system. The oil chamber shall be equipped with a seal sensor system to detect any leakage around the seal system. Pumps shall be tungsten carbide, double type. One replacement seal for each pump must be used. Carbon ceramic will be acceptable for the upper seal.

2.2.1.3. The motor chamber shall be suitably sealed from the other chambers of the pump and from the exterior so as to be entirely suitable for submerged operation. The motor chamber may either be of oil-filled or air-filled design.

2.2.1.4. Pumps shall be as manufactured by Meyers, Flygt or Homa.

2.2.2. Motors

2.2.2.1. Pump motors shall be of the sealed submersible type meeting UL Class I, Group D, Division I - Explosion proof requirements. The maximum rpm of the motor shall be 1200, unless approved by the Utilities Department. Motors shall meet NEMA thermal rating MGI - 12.42. All leads are to be epoxy sealed.

2.2.2.2. Moisture sensing probes and thermal protectors shall be furnished. Motor frame and end shield shall be corrosion resistant cast iron. Insulation shall be compatible Class B rated system with Class F material rated for continuous duty in 40-degree C liquids. Motor shaft shall be type 416 stainless steel. All hardware shall be stainless steel. Motors shall be Reliance or equal. Motors shall not be overloaded at any point within the operating range.

2.2.2.3. Motors shall be furnished with a minimum of 50 feet of submersible, waterproof, and multi-conductor power and control cable for direct feed to control panel without splicing. Cable size shall be sufficient to meet motor requirements.

2.2.3. External Chamber Seals and Connections:

2.2.3.1. The pumping chamber shall be sealed tightly together utilizing "O"-

rings or resilient gasketing material. The power cable connection shall provide for a positive clamping action to seal the electrical connection and relieve strain on the cable strands.

2.3. Pump Controls:

- 2.3.1. The pump manufacturer shall provide the pump control panel and accessory equipment. The contractor shall install the controls as shown on the drawings and manufacturer's instructions. The control system shall include all motor starters, alternator, relay, level control switches, control panel, circuit breakers, alarm apparatus, and internal wiring.
- 2.3.2. For smaller stations (generally 350 gpm or smaller), discrete cable supported displacement switches shall be employed for level control. For larger stations, the level control system shall consist of an approved bubble arrangement with duplex air compressors and manually adjustable set points.

2.4. Control Sequence:

- 2.4.1. On rising liquid level in the wetwell, a mercury-type float switch shall start the lead pump. As the liquid level continues to rise, the second mercury float switch shall start the lag pump. The pump(s) will continue to operate until the liquid level recedes to the level of the third mercury float switch that shall stop the pumps. The fourth mercury float switch shall energize the alarm circuit, should the liquid level rise above the lag pump cut-on-level.
- 2.4.2. The pumps shall automatically alternate between the "lead" and "lag" positions by means of an electric alternator in the panel.
- 2.4.3. Provided with the pump and control equipment shall be electrical contacts, an alarm light and alarm horn which shall be mounted on the exterior of the station. The alarm equipment shall be interlocked with wetwell controls to be actuated upon high wet well levels or loss of power. The alarm circuits shall be low voltage.

2.5. Control Panel:

- 2.5.1. Control panel for the pump station shall be shipped to the site, completely prewired, pre-assembled and ready for service. The control panel enclosure shall be NEMA 4X, stainless steel, with hinged door and lockable handle. Panel shall have a back mounting panel and a front inside hinged panel to make the control panel "dead-front" when outside door is open. The control panel shall have a rainhood sized to shelter **all** cabinets including ATS, telemetry, control panel, etc., and be mounted on a concrete pad of minimum 4" thickness as shown on plans. For pump stations with above 75

SECTION 33 32 14 – WASTEWATER PUMP STATIONS

horsepower pumps, a prefabricated, ventilated, walk-in enclosure shall be provided. The enclosure shall be approved by the County prior to installation. The control panel shall contain the following accessories:

- 2.5.1.1. Hand/Off/Auto switch with speed indicator and speed adjusting potentiometer for each pump and labeled.
- 2.5.1.2. High water alarm relay wired to alarm circuit..
- 2.5.1.3. Motor moisture and thermal sensing relays wired to alarm circuit.
- 2.5.1.4. Multi-colored (or equivalent markings) circuitry to facilitate troubleshooting.
- 2.5.1.5. Waterproof button lights labeled "Pump Run" mounted on door for each pump.
- 2.5.1.6. Elapsed time meter to indicate running time for each pump.
- 2.5.1.7. All necessary internal wiring, relays, etc., to provide operation as previously described.
- 2.5.1.8. Phase monitoring capability which shall override and stop the normal operation of the pumps.
- 2.5.1.9. Waterproof button type alarm lights labeled "Motor temperature" and "Motor Moisture" for each pump, "High Water", "Power Failure", and "Loss of Phase".
- 2.5.1.10. Provide 120-volt alarm light with red globe and guard and horn with the silencer buttons mounted on the enclosure for the alarm conditions. Provide the alarm lights and horns loose for external mounting. Alarm light shall be mounted on rainhood to be viewed from 360°.
- 2.5.1.11. Provide a voltage free dry contact as a composite for all alarm conditions and provide a voltage free dry contact for each alarm status.
- 2.5.1.12. Branch circuit breakers as required.
- 2.5.1.13. Automatic electric alternator.
- 2.5.1.14. Time delay for the low level circuit to delay restarting of the pumps.
- 2.5.1.15. Install a relay to enable both pumps to run on emergency power..

- 2.5.1.16. All necessary internal relays etc. to provide intrinsically safe operation as previously described.
- 2.5.1.17. Provide a separate NEMA 4X stainless steel enclosure for a SCADA panel to be provided by the Owner.
- 2.5.1.18. Contacts and wiring as required for a remote on/off station for each pump to override and stop the operation of each pump.
- 2.5.1.19. Magnetic starter for each motor with under-voltage release and quick-trip ambient-compensated overload protection for each leg. Starting shall be “across the line” except where motor horsepower is greater than 25, in which case, reduced voltage soft starters shall be required.
- 2.5.1.20. 120-volt auxiliary duplex weatherproofing GFI power receptacle mounted on the bottom on the enclosure.
- 2.5.1.21. Mercury Displacement Switches for Level Controls
 - 2.5.1.21.1. Float switches shall be of the mercury-tube type, encapsulated in polyurethane or vinyl floats. The units shall be waterproof, shockproof, explosion proof, and equipped with sufficient submersible cable to extend to the control panel from the wetwell without splicing. Any required weights shall be provided. Switches shall be suspended in the wetwell on a suitable stainless steel rack.

2.6. SCADA:

- 2.6.1. Supervisory control and data acquisition (SCADA) equipment for the pump station will be provided by Custom Controls Unlimited under a separate contract with the Harnett County Department of Public Utilities. Provide a NEMA-4X stainless steel enclosure for the equipment and an empty conduit from the SCADA equipment enclosure to the area light pole for SCADA antenna wiring.

2.7. Wetwell and Appurtenances:

- 2.7.1. Pump station wetwell shall be precast concrete with monolithic base. Minimum dimensions shall be as indicated on the Plans. The precast wetwell shall meet ASTM C913 and ASTM C478 specifications. Inside of wetwell shall be factory epoxy coated minimum 50 mils. surface dry. A thicker base shall be provided if required to prevent flotation. A minimum 12" thick foundation shall be provided for the wetwell base. Concrete shall be

reinforced to withstand the internal and external loads indicated plus a 100-psf live load on the top slab. Cover to be precast concrete reinforced to withstand 300-psf-live load. Access hatch to be per 2.7.10 of this section. Hatch frame to be mounted to precast concrete lid per manufacturer's recommendation or cast in place.

- 2.7.2. Joints shall be sealed with butyl rubber mastic (Ramneck), or "O-ring" gasket installed in accordance with the manufacturer's instructions. All joints shall be parged on the interior and exterior with type "C" mortar.
- 2.7.3. Interior of wetwell shall be factory epoxy coated with a minimum 50 mil surface dry. Epoxy sealer prime coating and finish coating shall be NSP 100 and NSP 120, respectively, or approved equal.
- 2.7.4. The wetwell shall have, mounted at 18" above wetwell top, a stainless steel junction box to enable quick disconnect of power leads to pump motors when pulling pumps out for maintenance.
- 2.7.5. The wetwell shall be equipped with vent pipe with insect screen. Vent pipe may be PVC or Ductile Iron.
- 2.7.6. The wetwell shall be equipped with an aluminum access hatch as shown on the plans that shall be of adequate dimensions to pull out pumps with no obstruction.
- 2.7.7. A steel jib crane shall be provided for pump removal.
- 2.7.8. All bolts, brackets, hardware, etc. for fastening items or bolting piping located in the wetwell shall be stainless steel.
- 2.7.9. A sloped invert of non-shrink grout shall be constructed at the base of the wetwell. The invert shall have sufficient slope to prevent build-up of solids in the wetwell bottom.
- 2.7.10. Aluminum access hatches shall be exterior sidewalk, single or double leaf type as required or shown suitable for 300 psf live load. Doors shall be equipped with slam lock, and automatic hold-open arm with release handle, safety chain, and compression spring operator. The frame shall be provided with drainage channel. Hatches shall be Type "J" or "JD" as manufactured by the Bilco Company, Darp Associates, Haliday, or equal. For 6' to 8' diameter structures, Halliday type RIR hatches are preferred.

2.8. Valves

- 28.1 Check valve shall be the horizontal swing type with an outside weighted swing arm.

28.2 A tap for pressure gages shall be supplied on both sides of the check valve for each pump. One (1) oil-filled pressure gage shall be installed on the discharge side of the check valve for each pump.

2.9 Pump Station Site

- 2.9.1 Pump station site shall be enclosed by 6' high chain link fence as described in standard sewer details.
- 2.9.2 Wetwell shall be accessible on at least one side by service truck with crane mounted on rear passenger side.
- 2.9.3 Positive drainage away from all structures shall be provided.
- 2.9.4 Control panel shall be within site distance and panel shall be facing wetwell.
- 2.9.5 Electrical conduits shall be installed from the control panel to both the valve vault and the RPZ 'Hot-Box' for electrical outlets to be mounted in each.

PART 3 - EXECUTION

- 3.1. The Contractor shall install all pumps, motors, variable speed drives, and controls specified herein in accordance with the plans and as recommended by the manufacturer. Pump manufacturer shall provide pumps, motors, variable speed drives, controls and all other necessary items to make a complete installation.
- 3.2. The manufacturer's field engineer or representative shall inspect and check the installation after erection and prior to start-up and shall certify that the completed installation is ready for start-up. The manufacturer's field representative shall check the proper rotation, operating speed, and starting and running electrical characteristics of the operational pumping equipment and certify that they are correct. The field representative shall also make himself available to the Owner's operating staff in addressing operational and trouble-shooting concerns that they might have. The Contractor shall provide labor, testing water and shall assist the Engineer in performing field testing to check operating conditions of all pumps. The testing procedures shall be performed by the Contractor.
- 3.3. A representative of the Harnett County Department of Public Utilities shall inspect the subgrade before the setting of the wetwell.
- 3.4. Soil shall be backfilled around wetwell in 1' lifts or shallower and shall be compacted to 95% Standard Proctor maximum dry density at optimum moisture content. Refer to Section 01 45 00 – Quality Control.

3.5. Painting & Touch-Up

- 3.5.1. All metal components with the exception of the stainless steel guide rails shall be painted in accordance with Manufacturers' recommendations.
- 3.5.2. After all equipment and appurtenances have been installed, the Contractor shall touch-up any abrasions, scratches, or patches in the surface protection of any furnished item of work. Any mud, grease, or other extraneous material shall be removed from the completed work using suitable solvents or detergent solutions.

3.6. Repairs to Wetwell

- 3.6.1. All openings made in the wetwell for anchorages, conduit runs, pipe runs, etc., shall be sealed using a cement grout. The grout shall be neatly applied to the vacancy and shall be trowelled in, and excess grout shall be immediately removed from the wetwell. Grout shall be high strength, non-shrink type.

3.7. Testing of Wet Well

After all influent pipes have been connected the wet well shall be tested for leakage as follows:

- a. All influent pipes shall be plugged watertight.
- b. The wet well shall be filled with water to a level 4 feet above the crown of the highest influent pipe and the water shall be left in place for 24 hours.
- c. At the end of the 24 hour period, in the presence of the Engineer or his representative, make-up water shall be added as necessary to bring the water level to the original level.
- d. The water shall then be left in place for 2 hours, during which time no water shall be added. The Engineer or his representative will take 3 readings of the water level at the beginning of the 2-hour period and 3 readings at the end of the period. The average of each set of 3 readings will be used to calculate the leakage rate.

The maximum allowable leakage rate during the test is 0.353 gallons per cubic foot-day, with the water depth taken to be the distance from the invert of the lowest influent pipe to the water level at the beginning of the test.

END OF SECTION 33 32 14

PART 1 – GENERAL

1.1 Description of Work

1.1.1 Work under this section consists of furnishing and installing submersible leachate pumps and controls in existing leachate sumps as detailed on the plans and specified herein. It shall include all labor, materials, equipment piping, miscellaneous piping, equipment, electrical work, controls, incidental painting, and all other items or material and work required to furnish and install equipment for a complete installation as hereinafter specified.

1.2. Additional Specifications

1.2.1. Work under this section shall conform to these specifications.

1.3. Submittals

1.3.1. Shop drawings shall be submitted to the Engineer for the following items:

Pumps
Drives
Controls

1.3.2. Manufacturer's data shall be submitted to the Engineer for the following:

Pumps
Drives
Controls
Fittings
Valves

1.3.3. Certificates of Compliance shall be submitted to the Engineer for the following:

Pumps
Drives
Controls

1.4 Operation and Maintenance Manuals

1.4.1 Furnish three copies of the manufacturer's operating and service manual for each item below. The manual shall contain complete descriptions of each item of equipment and a complete parts list showing factory parts numbers. It shall also contain complete operating and service instructions and shall be tabbed and indexed for easy use.

Pumps

Drives
Controls

PART 2 - MATERIALS

2.1. General:

2.1.1. The contractor shall furnish and install the following equipment where shown on the Plans, complete with all incidental items and appurtenances required for a complete, finished installation. All equipment components shall be adequately sized to carry all loads and stresses occurring during fabrication and erection and resulting from normal and emergency operation in the installation shown on the Plans and under the conditions specified and/or implied.

2.2. Leachate Pumps:

2.2.1. Pumps

2.2.1.1. Pumps shall be submersible, centrifugal effluent pumps capable of passing ¾" diameter solids. Pump housing shall be of cast iron construction. All fasteners shall be stainless steel or approved equal. Each pump shall be capable of being hoisted vertically out of the sump and returned to operation without requiring the operator to enter the sump. It is the intent of these specifications that the pumps and control system (including panel, starters and circuit breakers), be provided by the pump manufacturer as an integral system. The pump impeller shall be of non-clog design. Shaft and bearings shall have sufficient section to withstand all rotational and axial loading to be reasonably expected under normal effluent pumping situations.

2.2.1.2. The motor chamber shall be suitably sealed from the other chambers of the pump and from the exterior so as to be entirely suitable for submerged operation. The motor chamber shall be of oil-filled design.

2.2.1.3. Pumps shall be ME40 series and ME series, as manufactured by F. E. Meyers or approved equal.

2.2.2. Motors

2.2.2.1. Pump motors shall be of the sealed submersible type.

2.2.2.2. Motors rated 4/10 hp shall be equipped with overload protection. Motors rated ½ hp or more shall be equipped with over temperature

and overload protection.

- 2.2.2.3. Motors shall be furnished with a minimum of 50 feet of submersible, waterproof, and multi-conductor power and control cable for direct feed to control panel without splicing. Cable size shall be sufficient to meet motor requirements.

2.3. Pump Controls:

- 2.3.1. The pump manufacturer shall provide the pump control panel and accessory equipment. The contractor shall install the controls as shown on the drawings and manufacturer's instructions. The control system shall include all motor starters, relay, level control switches, control panel, circuit breakers, alarm apparatus, and internal wiring.

2.4. Control Sequence:

- 2.4.1. On rising liquid level in the sump, a float switch shall start the pump. The pump will continue to operate until the liquid level recedes to the level of the second float switch that shall stop the pumps. The third float switch shall energize the alarm circuit, should the liquid level rise above the pump cut-on-level.
- 2.4.2. Provided with the pump and control equipment shall be electrical contacts, an alarm light and alarm horn which shall be mounted on the exterior of the station. The alarm equipment shall be interlocked with pump controls to be actuated upon high liquid level in the sump or loss of power. The alarm circuits shall be low voltage.

2.5. Control Panel:

- 2.5.1. Control panel for the pump station shall be shipped to the site, completely prewired, pre-assembled and ready for service. The control panel enclosure shall be NEMA 4X, stainless steel, with hinged door and lockable handle. Panel shall have a back mounting panel and a front inside hinged panel to make the control panel "dead-front" when outside door is open. The control panel shall have a rainhood sized to shelter all cabinets including ATS, telemetry, control panel, etc., and be mounted on a concrete pad of minimum 4" thickness as shown on plans. The control panel shall contain the following accessories:

- 2.5.1.1. Hand/Off/Auto switch with speed indicator and speed adjusting potentiometer for each pump and labeled.

SECTION 33 32 15 – LEACHATE PUMP STATIONS

- 2.5.1.2. High water alarm relay wired to alarm circuit..
 - 2.5.1.3. Motor moisture and thermal sensing relays wired to alarm circuit.
 - 2.5.1.4. Multi-colored (or equivalent markings) circuitry to facilitate troubleshooting.
 - 2.5.1.5. Waterproof button lights labeled “Pump Run” mounted on door for each pump.
 - 2.5.1.6. Elapsed time meter to indicate running time for each pump.
 - 2.5.1.7. All necessary internal wiring, relays, etc., to provide operation as previously described.
 - 2.5.1.8. Waterproof button type alarm lights.
 - 2.5.1.9. Provide 120-volt alarm light with red globe and guard and horn with the silencer buttons mounted on the enclosure for the alarm conditions. Provide the alarm lights and horns loose for external mounting. Alarm light shall be mounted on rainhood to be viewed from 360°.
 - 2.5.1.10. Provide a voltage free dry contact as a composite for all alarm conditions and provide a voltage free dry contact for each alarm status.
 - 2.5.1.11. Branch circuit breakers as required.
 - 2.5.1.12. All necessary internal relays etc. to provide intrinsically safe operation as previously described.
 - 2.5.1.13. Magnetic starter for each motor with under-voltage release and quick-trip ambient-compensated overload protection for each leg. Starting shall be “across the line” except where motor horsepower is greater than 25, in which case, reduced voltage soft starters shall be required.
 - 2.5.1.14. 120-volt auxiliary duplex weatherproofing GFI power receptacle mounted on the bottom on the enclosure.
 - 2.5.1.15. Float Switches for Level Controls
- 2.5.2. The wetwell shall be equipped with vent pipe with insect screen. Vent pipe may be PVC or Ductile Iron.

2.6. Valves

- 28.1 Check valve shall be the horizontal swing type with an outside weighted swing arm.
- 28.2 A tap for pressure gages shall be supplied on both sides of the check valve for each pump. One (1) oil-filled pressure gage shall be installed on the discharge side of the check valve for each pump.

PART 3 - EXECUTION

- 3.1. The Contractor shall install all pumps, motors and controls specified herein in accordance with the plans and as recommended by the manufacturer. Pump manufacturer shall provide pumps, motors, controls and all other necessary items to make a complete installation.
- 3.2. The manufacturer's field engineer or representative shall inspect and check the installation after erection and prior to start-up and shall certify that the completed installation is ready for start-up. The manufacturer's field representative shall check the proper rotation, operating speed, and starting and running electrical characteristics of the operational pumping equipment and certify that they are correct. The field representative shall also make himself available to the Owner's operating staff in addressing operational and trouble-shooting concerns that they might have. The Contractor shall provide labor, testing water and shall assist the Engineer in performing field testing to check operating conditions of all pumps. The testing procedures shall be performed by the Contractor.

3.3. Painting & Touch-Up

- 3.3.1. All metal components shall be painted in accordance with Manufacturers' recommendations.
- 3.3.2. After all equipment and appurtenances have been installed, the Contractor shall touch-up any abrasions, scratches, or patches in the surface protection of any furnished item of work. Any mud, grease, or other extraneous material shall be removed from the completed work using suitable solvents or detergent solutions.

END OF SECTION 33 32 15

PART 1 – GENERAL

1.1 Description of Work

1.1.1 Work under this section consists of furnishing and installing a groundwater extraction and pumping system, including well points, well point header pipe, well point pump station and groundwater line, as detailed on the plans and specified herein. It shall include all labor, materials, piping, equipment, electrical work, controls, incidental painting, and all other items or material and work required to furnish and install equipment for a complete installation as hereinafter specified.

1.2. Submittals

1.2.1. Shop drawings shall be submitted to the Engineer for the following items:

Pumps
Drives
Controls

1.2.2. Manufacturer's data shall be submitted to the Engineer for the following:

Well points
Pipe
Pumps
Drives
Controls
Fittings
Valves
Phase conversion equipment

1.2.3. Certificates of Compliance shall be submitted to the Engineer for the following:

Pumps
Drives
Controls

1.4 Operation and Maintenance Manuals

1.4.1 Furnish three copies of the manufacturer's operating and service manual for each item below. The manual shall contain complete descriptions of each item of equipment and a complete parts list showing factory parts numbers. It shall also contain complete operating and service instructions and shall be tabbed and indexed for easy use.

Pumps
Drives
Controls

PART 2 - MATERIALS

2.1. General:

- 2.1.1. The contractor shall furnish and install the following equipment where shown on the Plans, complete with all incidental items and appurtenances required for a complete, finished installation. All equipment components shall be adequately sized to carry all loads and stresses occurring during fabrication and erection and resulting from normal and emergency operation in the installation shown on the Plans and under the conditions specified and/or implied.
- 2.1.2. System shall be installed to create an approximate 2' depression in the groundwater table along the length of the well point header. Pumps and well-points shall be sized by the Contractor to meet this requirement.

2.2. Well Points:

Well points shall be up to 30 feet in length and capable of extracting groundwater at a rate of up to 10 gallons per day per foot of header pipe. Each well point shall have a valve by which flow can be adjusted and a connection to the well point header pipe. Header pipe shall be either PVC or HDPE of sufficient strength to withstand anticipated operating conditions and sized to handle 16,000 gallons per day of extracted groundwater. Joints shall be water- and airtight.

2.3. Well Point Pump Station:

The well point pump station shall include all pumps, motors, controls, air separation chamber, piping, valves and appurtenances necessary to extract groundwater at a rate of up to 16,000 gallons per day from a depth below the ground surface of up to 30 feet and to discharge it to the leachate management pump station shown on the Drawings. All components of the well point pump station shall be furnished pre-assembled and mounted on steel skids. The well point pump station shall be designed and furnished by a company regularly engaged in the design and manufacture of such stations.

2.3.1. Vacuum Pump

Vacuum pump shall be a rotary vane vacuum pump capable of lifting water up to 30 feet by suction. Pump shall automatically prime and re-prime as groundwater

enters and is extracted from the well points. Pump shall be suitable for extended dry operation. Pump shall be driven by a separate electric motor or by the accompanying pressure pump.

2.3.2. Pressure Pump

Pressure pump shall be a centrifugal pump capable of pumping 30 gallons per minute at a total dynamic head of 11 feet. Pump shall be driven by an electric motor.

2.3.3. Air Separation Chamber

Air separation chamber shall be capable of removing all air from groundwater extracted by the vacuum pump.

2.3.4. Motors

One or two motors may be provided to run the pumps. Motor(s) may be single-phase or three-phase. If three-phase motor(s) is(are) provided, suitable equipment shall be provided to convert the single-phase power available at the site to three-phase power.

2.3.5. Pump Controls:

Pump controls shall enable pumps to run unattended to extract all ground water reaching the well points and to maintain the water table near the level of the bottoms of the well points. Controls shall be mounted in a weatherproof enclosure

2.4. Groundwater Line:

The groundwater line conveying groundwater from the well point pump station to the leachate management pump station shall be of 4" x 8" HDPE dual containment pipe with butt-fused joints.

PART 3 - EXECUTION

3.1. The Contractor shall install all well points, piping and well point pump station specified herein in accordance with the plans and as recommended by the manufacturer. The well point supplier shall determine the size and spacing of well points to extract 16,000 gallons of groundwater per day. Leachate lines shall be connected to the groundwater force main as shown on the drawings.

3.2. The manufacturer's field engineer or representative shall inspect and check the

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installation after erection and prior to start-up and shall certify that the completed installation is ready for start-up. The manufacturer's field representative shall check the proper rotation, operating speed, and starting and running electrical characteristics of the operational pumping equipment and certify that they are correct. The field representative shall also make himself available to the Owner's operating staff in addressing operational and trouble-shooting concerns that they might have. The Contractor shall provide labor, testing water and shall assist the Engineer in performing field testing to check operating conditions of all pumps. The testing procedures shall be performed by the Contractor.

3.3. Painting & Touch-Up

- 3.3.1. All metal components shall be painted in accordance with Manufacturers' recommendations.
- 3.3.2. After all equipment and appurtenances have been installed, the Contractor shall touch-up any abrasions, scratches, or patches in the surface protection of any furnished item of work. Any mud, grease, or other extraneous material shall be removed from the completed work using suitable solvents or detergent solutions.

END OF SECTION 33 32 30

SECTION 33 34 00 - FORCE MAINS

PART 1 - GENERAL

1.1 SCOPE

Work covered under this section of these specifications consists of the construction of force main lines and miscellaneous pipework, including all valves, fittings, and appurtenances. The scope of work shall be as detailed on the plans and itemized in the bid and shall include all material, equipment, labor and other items required for proper **acceptable** completion.

1.2 ADDITIONAL SPECIFICATIONS

Work under this section shall conform to these specifications and to the Harnett County Standard Specifications "Development of Water and Sewer Utilities in Harnett County Water and Sewer Districts, August 2009."

1.3 WORK IN OTHER SECTIONS

A. Sanitary Sewers: Section 33 30 00

1.4 QUALITY ASSURANCE

A. Standards:

1. *American Society for Testing and Materials*

- a) ASTM D2241
- b) ASTM D1784
- c) ASTM D1598
- d) ASTM D1599
- e) ASTM D2152

B. Commercial Standard

1. CS C5 256

1.5 SUBMITTALS

A. Shop drawings shall be submitted to the Engineer for the following items:

- 1. Gate Valves
- 2. Precast Manholes
- 3. Air Release Valves
- 4. Vacuum Valves
- 5. Plug Valves

B. Manufacturer's certifications shall be submitted to the Engineer certifying that the following materials meet all requirements of the specifications:

- 1. Force Main Pipe
- 2. Force Main Pipe Fittings

C. Mix designs for concrete and asphalt shall be submitted to the Engineer for approval, if requested by the Engineer.

PART 2 - PRODUCTS

2.1 GENERAL

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- A. All material and appurtenances shall meet the following minimum standard requirements therefore. It shall be each manufacturer's responsibility to check the installation and to furnish material that will be full capable of performing its intended function.
- B. Pipe shall be of the type, size, class and diameter as hereinafter specified and called for by the Plans and/or Bid.
- C. Trench width for buried pipe design shall be considered as the outside diameter of the pipe plus 2', at the bottom and up to 1' above the top of the pipe.
- D. Buried pipe shall be designed for laying condition shown on construction drawing to withstand all internal pressures and external loads with a minimum depth to cover of 3', for pipelines 8" and smaller in diameter, and 3'-6" for lines 10" and larger in diameter, and greater depths of cover where required by the Plans, plus an H-20 live load in accordance with A.A.S.H.T.O. Specifications.
- E. Design pressure shall consist of 100 psi working pressure plus 100 psi surge allowance for force mains designated for Class 160 pipe and 150 psi working pressure plus 100 psi surge allowance for force mains designated for 150 psi working pressure.
- F. Pipe diameters shown or called for shall be the minimum net inside diameter of the pipe after any required lining is placed, with a maximum tolerance of ¼" on the minus side, for sizes through 36" diameter.
- G. Pipe fittings shall be of the size, configuration and type called for by the plans. All fittings shall be of at least the same class as the pipe with which they are used. Ductile or gray cast iron fittings shall be used with all ductile iron, gray cast iron, and PVC pipe (4" or larger in diameter).
- H. Valves shall be of the type, size, and class required by the plans and all valves shall have standard mechanical joint ends, except where flanged or other type ends are specifically required. Valves, where required, shall be furnished with operating nuts, or handwheels as necessary, except in instances where other operating devices are specified or shown. All valves shall be of at least the same class of pipe with which they are used. A valve box shall be provided for each underground valve, except where shown differently on the plans. Concrete pipe vaults; or brick or precast manholes with crete pipe vaults; or brick or precast manholes with cast iron covers shall be provided for all air valves.

2.2 DUCTILE CAST IRON PIPE

- A. Ductile cast iron pipe shall be centrifugally cast of ductile cast iron having a minimum tensile strength of 60,000 psi, a minimum yield strength of 42,000 psi, and a minimum elongation of 10% (Grade 60-42-10). It shall be designed, manufacture, and shall conform to the requirements of ANSI A21.51 (AWWA C151) Standards, for a minimum 150 psi operating pressure plus a minimum allowance of 100 psi for surge.
- B. Nominal laying lengths shall be 18' or 20' nominal maximum of 20% of each size for each order being as much as 24" shorter than the nominal laying length and an additional 10% as much as 6" shorter than nominal laying length.
- C. Exterior pipe joints shall be mechanical or push joint type with retainer glands and flanged ends are required for interior piping.
- D. Dimensions shall conform to the requirements of ANSI A21.6, ANSI A21.8, ANSI A21.11, and WW-P-421 C, as applicable. Dimensions shall be gaged at sufficiently frequent

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intervals to assure dimensional control. Insides of sockets and outside of spigot ends shall be tested with circular gages.

- E. Wall thickness shall be determined for the design working pressing and depth of cover shown in accordance with ANSI requirements for each type.
- F. Each pipe shall be coated on the inside and outside with standard bituminous coating of either coal-tar or asphalt base approximately one mil thick. The coating shall be continuous, smooth, strongly adherent to the pipe and shall not become brittle from cold nor sticky from heat. As indicated, the interior coating shall be Protecto 401 ceramic lining as manufactured by U.S. Pipe, Sewper Coat as manufactured by Lafarge Calcium Aluminum, or equal. All linings and coatings shall be per manufacturer's specifications and conform to ANSI/AWWA C151/A21.51.
- G. Each pipe shall be weighed prior to placing of the inside lining. Weight nominal thickness, sampling period, and class of pipe shall be shown on each pipe.
- H. The manufacturer's year of production and the letters DI or DUCTILE shall be clear and legible and on, or near, the bell end.

2.3 POLYVINYL CHLORIDE PIPE

PVC pipe shall be rigid polyvinyl chloride with integrally formed, factory fabricated rubber ring type joints. It shall be suitable for all conditions imposed by plan locations and for a minimum working pressure of 165 or 200 psi (as called for in the Bid) at 73°F. Pipe shall be Type 1, made from clear virgin material and shall conform to the requirements of cell class 12454-B as defined by ASTM D1784, and shall conform to all requirements of AWWA C-905 with standard dimension ratio of DR 25, Class 165, or DR 21, Class 200 pipe. All pipe shall bear the National Sanitation Foundation Seal of Approval, the manufacturer's name, and the class of pipe. Provisions must be made for expansion and contraction at each joint, through the rubber gasket and pipe bell with laying lengths of 20' ±1".

2.4 DUCTILE CAST IRON FITTINGS

Ductile cast iron fittings shall conform to the requirements of ANSI Specification A21.10, with mechanical joint ends conforming to ANSI Specification A339, Grade 80-60-3. All fittings shall have exterior and interior coatings as required for pipe. Where flanged ends may be required, flanges shall conform to applicable requirements of ANSI B16.1 and ANSI B16b.

2.5 GRAY CAST IRON FITTINGS

Gray cast iron fittings shall conform to the requirements of ANSI Specification A21.10, with mechanical joint ends conforming to ANSI Specification A21.11. They shall be of 18/40 gray iron. All fittings shall be bituminous coated as required for pipe. Where flanged ends may be required, flanges shall conform to applicable requirements of ANSI B16.1 and ANSI B16b.

2.6 PVC FITTINGS

PVC fittings and adapters shall conform to the same requirements as for pipe and shall be the same class as the pipe.

2.7 JOINT MATERIAL

- A. Gaskets for pipe and fittings shall be continuous ring of rubber material compounded to resist deterioration and of a texture to assure a permanent and watertight seal. They shall have smooth surfaces, free from pitting, blisters, porosity or any other defects. Gaskets

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shall conform to the requirements of AWWA Specification C301 and Federal Specification WW-P-421b.

- B. Gasket lubricant shall be a potable hydrogenated vegetable oil, insoluble in cold water, non-toxic and shall not support the growth of bacteria. It shall contain no deleterious ingredients and shall have no deteriorating effects on the gaskets. The lubricant shall be semi-paste, easily applicable, readily adherent to the inside of the bell and shall remain in a usable state throughout the range of temperature in which pipe is normally installed. Lubricant shall be delivered to the job site in unopened containers bearing the manufacturer's name and trade name or trademark.

2.8 RESTRAINED JOINT PIPE AND FITTINGS

Restrained joint pipe and fittings shall be ductile iron manufactured in accordance with AWWA C151 and C153. The restraining method shall be by a snap in place flexing restraining ring at the joint. The pipe and fittings shall be American Flex-Ring, Griffin Snap-Lok, US, T.R. Flex, or equal.

2.9 BALL AND SOCKET JOINT PIPE

Ball and socket joint pipe shall be ductile iron manufactured in accordance with AWWA C151 and C110. The ball and socket shall be boltless, flexible joint with a locking retainer gland.

2.10 GATE VALVES

- A. Gate valves, larger than 2" shall be iron body, resilient seat non-rising stem and provided with suitable stem seals. They shall comply with AWWA C-509, designed for a minimum operating pressure of 150 psi.
- B. Gate valves 2" and smaller shall be standard all brass valves with inside screw, rising stem and handwheel operator, suitable for 125 psi.

2.11 PLUG VALVES

- A. Plug valves shall be of the non-lubricated, eccentric type with resilient faced plugs, with flanged ends for installation within structures and mechanical joint ends for buried service. Port areas shall be at least 80% of full pipe area for pipes 6" to 16" in diameter and 70% of full pipe area for valves larger than 16" diameter. Valves smaller than 6" in diameter shall have 100% full pipe area. Bodies shall be semi-steel, gray cast iron, or ductile iron. Seats in 3" and larger valves shall have a welded in overlay of not less than 90% pure nickel on all surfaces containing the plug face. Valves shall have stainless steel permanently lubricated upper and lower plug stem bushings. All 4" and larger valves shall be of the bolted bonnet design. All nuts, bolts, springs, and washers shall be cadmium plated.
- B. Plug valves 4" and smaller for non-buried service shall be equipped with (true) manual gear type operators with position indicators. Plug valves 6" and larger for non-buried service and all sizes for buried services shall be equipped with manual gear actuators. All gearing shall be enclosed, submersible with seals provided on all shafts to prevent entry of water into actuator. All shaft bearing shall be furnished with permanently lubricated bronze bearing bushings. Actuators of nonburied service shall clearly indicate valve position and an adjustable stop shall be provided to set closing torque. Valve packing adjustment shall be accessible without disassembly of the actuator. Valves for non-buried services shall be furnished with a handwheel, except valves mounted inaccessibly high shall be provided with chain operators. Plug valves for buried service shall have gear operators and shall be provided with nut operator and extension stem of suitable length.

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C. Valves and actuators shall be as manufactured by Dezurik, Keystone, Kennedy, or equal.

2.12 CHECK VALVES

Standard check valves shall be iron body, bronze, mounted, full opening external lever weight loaded, 125 lb. ANSI Standard flanged, and suitable for at least 150 psi pressure. Check valves shall have two ½" threaded taps on the side upstream and downstream from the clapper. A ½" galvanized nipple and ½" bronze gate valve shall be installed in each tap.

2.13 CUSHION CHECK VALVE

Cushion check valves shall be controlled closing swing check valves. Valve body, cover, and lever shall be heavy duty cast iron, ASTM A126-B. Disc arm shall be cast steel keyed to the hinge shaft. Hinge shaft shall be 18-8 stainless steel, sized to withstand a complete hydraulic unbalanced pressure of 125 psi on the valve disc. A single oil-filled cushioning device shall be allowed for field adjustment of the valve closing speed at the final portion of the disc travel. Valve shall have ANSI 125 pound flanged connections. Valves shall be rated for 150 psi working pressure and 100 psi surge pressure.

2.14 BALL CHECK VALVES

Ball check valves shall be high density PVC with threaded connections or ductile iron body with flanged connection rated 125 psi and 150°F as required. Ball shall be hollow steel and coated to prevent wear and deterioration. Valve shall be suitable for mounting in either horizontal or vertical direction.

2.15 VALVE BOXES

Valve boxes shall be of cast iron, three-piece, screw type with covers and bases. They shall be of suitable size for the valve with which they are used and fully adjustable for depth of setting, extension pieces being furnished where necessary. Drop type covers shall be provided for each box with the proper work designating the valve service cast into its top surface. Oval type bases shall be provided and shall be so designed to fully support the box without weight of the box and/or superimposed load being transmitted to any part of the valve or adjacent pipe on either side.

2.16 CONCRETE

Concrete for protection and a thrust blocks shall be composed of Portland Cement, sand, coarse aggregate, water and such admixtures as may be allowed, in such proportions as to provide in minimum compressive strength of 3,000 psi. The source of concrete and mix design shall be approved by the Engineer to use.

2.17 CRUSHED STONE

Crushed stone for pipe bedding shall conform to ASTM C33, size no. 67 with a range of ¼" to 1.

2.18 DETECTABLE TAPE

A. A detectable tape for protection of force mains shall be used when PVC or other non-metallic pipe is used as a material for the pipeline. The tape shall be an inert, bonded layer plastic with a metalized foil core and shall be highly resistant to alkalis, acid, or other destructive chemical components likely to be encountered in soils. The tape shall be

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brightly colored to contrast with soil and shall bear an imprint identifying the type of line buried below. The tape shall be a minimum of 2" wide.

- B. The tape shall be buried a maximum of 12" below the ground surface directly above the pipeline with printed side up. The Contractor shall take necessary precaution to insure that the tape is not pulled, distorted or otherwise misplaced in completed the trench backfill.

2.19 MANHOLE MATERIAL

- A. Manhole material shall consist of brick, concrete block, precast concrete in accordance with the following requirements. All material shall be approved by the Engineer prior to use.
- B. Brick shall be No. 2 Common, or equal; hard clay or shale; free from cracks and defects that would impair strength or usefulness. Brick shall conform to ASTM C32, Grade MM.
- C. Concrete manhole blocks shall be units meeting the requirements of ASTM Specification C139. Masonry units shall consist of barrel and cone block 6" thick, 7½" high and not over 15½" long. Barrel block shall be cast to a radius which will result in approximately 12 units to the course for a 4' diameter manhole, and proportionally thereto for manholes of greater diameter than 4'. Cone block shall be cast to produce a reduction of 6" in diameter per course. All units shall have a vertical groove at the ends.
- D. Precast concrete manholes shall consist of precast reinforced concrete sections, a conical or flat top section as required, and a base section conforming in general to the details shown on the Plans. Precast manhole sections shall be manufactured in accordance with ASTM Specification C478. The minimum compressive strength of the concrete for all sections shall be 4,000 psi. The maximum allowable absorption of the concrete shall not exceed 8% of the dry weight.
- E. The interior surfaces of manholes shall be factory coated as indicated in the plans.

2.20 MASONRY CEMENT

Masonry cement shall be of best grade, conforming to ASTM Specification C91, Type II, of a brand approved by the Engineer. It shall be newly manufactured, well housed, and kept dry and protected at all times.

2.21 CASTINGS AND STEPS

- A. Castings and steps shall be provided for each manhole. Frames, covers, and stops shall be of cast iron of superior quality, tough and even texture, and of not less than 40% pig. They shall be clear of blow holes, holes and cracks, or other defects; properly finished and bituminous coated while hot.
- B. Manhole covers, frames, and steps shall conform to the details for each type manhole on the Plans, or to similar plans differing in details, but of equally good design; provided such castings are approved by the Engineer prior to use. Covers and frames shall be machined to provide plane, smooth surfaces for uniform seating and interchangeability of covers. Rings and covers that provide imperfect seating will be rejected. All covers and frames shall be suitable for traffic service. Minimum opening shall be 22" in diameter; minimum weight of cover shall be 120 lbs.; and minimum weight of frame shall be 230 lbs.

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- C. Special frames and covers shall be provided for sealing manholes water tight at location shown on the Plans. These frames and covers shall conform to the above specifications and shall be provided with a one piece rubber gasket seated into the manhole frame. Covers shall be secured with 4 minimum ½" lug bolts. Such frames and covers shall be manufactured by Neenah Foundry, Dewey Brothers, Inc., or equal.

2.22 AIR RELEASE VALVES

- A. Air release valves shall be the long stem and body type designed to keep the valve operating mechanism as free from contact with the sewage as possible. Valves shall have 2" threaded inlet, with 1" blow off connection with 1" blow off valve (gate valve), ½" back flushing attachments with ½" outlet. Outlet and back flushing connections shall be quick couplings. Valve shall have a minimum of ¼" diameter orifice.
- B. Valve body shall be cast iron; mechanism and seat, bronze; lever pins, stainless steel; and float, stainless steel. Valves shall be suitable for 150 psi working pressure. Valves shall be as manufactured by the Multiplex Manufacturing Company, the Valve and Primer Company, Val-Matic Manufacturing Corporation, or equal.

2.23 AIR AND VACUUM SEWER VALVES

- A. Air and vacuum sewer valves shall be the long stem and body type designed to keep the valve operating mechanism as free from contact with the sewage as possible. Valves shall have 2" threaded inlet; 1" blow off connection with 1" blow off valve (gate valve); and □" back flushing attachments with □" outlet. Outlet and back flushing connections shall be quick couplings. Valve shall have a minimum of 1" diameter orifice.
- B. Valve body shall be cast iron. Valve and float shall be stainless steel. Valves shall be suitable for 150 psi working pressure. Valves shall be as manufactured by the Multiplex Manufacturing Company, the Valve and Primer Company, Val-Matic Manufacturing Corporation, or equal.

2.24 STEEL ENCASEMENT PIPE

Steel encasement pipe shall bituminous coated inside and outside. Bituminous coating shall be 6 mil. minimum thickness. Steel encasement pipe shall have a minimum thickness as indicated in the plans for bores under highways and shall meet ASTM Specifications A252 with a minimum yield strength of 35,000 psi.

PART 3 - MATERIAL TESTING

Material shall be tested in accordance with the General Conditions of these Specifications and the following:

3.1 PIPE

- A. Each joint of pipe shall be subjected to and successfully meet hydrostatic proof test in accordance with ANSI requirements for each type. Cast iron pipe shall be tested prior to lining. Certified test results shall be furnished to the Engineer, for each shipment of pipe.
- B. PVC pipe shall be given the Quick Burst Test in accordance with ASTM D1599; Sustained Pressure Test in accordance with ASTM D1598; Acetone Immersion Test in accordance with ASTM D2152; Vise Flattening Test (compress 2" long ring in less than one minute to 100% flattening without evident of splitting or shattering); and Drop Impact Test C. (single impact load from free falling missile having a ½" diameter rounded, 1" long nose

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compacted on a 6" long horizontal specimen. No shattering or splitting shall occur at the following energies 1½" nominal size - 24 ft-lb, 2" - 57 ft-lb, 4" - 86 ft-lb, and 6" 100 ft-lb).

3.2 PIPE FITTINGS

Pipe fittings shall be subject to inspection and testing in accordance with standard manufacturing practice.

3.3 GASKETS

Gaskets shall be tested, if required, in accordance with Section 3-4 of ANSI A21.11.

3.4 VALVES

Valves shall be tested to double the design working pressure and test result submitted to the Engineer upon request.

3.5 OTHER MATERIAL

Other material shall be subject to such testing as the Engineer may require should its acceptability be questioned.

PART 4 - CONSTRUCTION PROCEDURES

All items of material and appurtenances shall be installed in accordance with best practice, manufacturer's instructions and to the following specifications or the Engineer's direction:

4.1 LOCATION

Pipework shall be installed at the locations shown on the plans and to the position, alignment and grade shown thereon. Prior to beginning work at any location, the Contractor shall consult with the Engineer and Owner to determine that all rights-of-way, permits, or other legalities are in order. He shall familiarize himself with all conditions and/or limitations of such rights-of-way or permits and shall fully comply with all such requirements. All work shall be confined to rights-of-way or permit limits and any encroachment beyond such limits shall be the Contractor's liability.

4.2 CLEARING AND GRUBBING

- A. Clearing and grubbing, where required, shall be done prior to beginning of pipe installation. It shall be done in accordance with applicable portions of items of General Conditions and the following:
- B. The Contractor shall consult with the Owner and Engineer prior to starting clearing and a full understanding is to be reached as to procedure. The Contractor shall then conduct clearing and grubbing operations in strict accordance with these agreements.
- C. Clearing of trees and brush along the pipeline shall be carefully done so that no damage will occur outside of the limits of the right-of-way. Trees and brush must be cut by hand and trees felled within the right-of-way limits. Only trees that would seriously interfere with construction shall be cut down and all others shall be saved and protected. Trees 6" or more in diameter shall be trimmed, cut into usable lengths of 3', or as DIRECTED BY THE OWNER and the logs neatly stacked on the edge of the right-of-way or disposed of in a manner approved by the Engineer.

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- D. Brush, laps, roots, etc., shall be disposed off-site in a manner approved by the Engineer. Burning of trees, brush and debris will not be permitted.
- E. Grubbing of stumps that are in the way of construction shall be done in any convenient manner which will not cause damage to remaining trees or adjacent property. Stumps shall be disposed as for brush or laps above.
- F. Limits of the pipe-laying operation shall be confined to the right-of-way and easements. The width of clearing shall be held to a minimum and in no case wider than the right-of-way or easement.

4.3 WORK ON HIGHWAY RIGHT-OF-WAY

- A. The Contractor shall not begin work on any property of the Department of Transportation until he has secured necessary permits and obtained a copy of the R.O.W. encroachment contract from the Owner. He shall conform to all requirements of the Department of Transportation; or its authorized representative in the prosecution of this portion of the work. It shall be the responsibility of each Bidder to contact the local DOT representative and to determine the exact requirements for work to be done. Requirements shall include, but are not limited to the following:
 - B. Where a pipeline crosses under a highway, it shall be installed either by open cut in tunnel or in encasement under the highway. Materials and method of crossing shall be as indicated on the plans for each crossing. Where pipe is installed by open cut at least one full lane for traffic shall be kept open and clear at all times.
 - C. The Contractor shall provide full-time flagmen, with appropriate red flags, at all times when work is in progress along highways.
 - D. Necessary warning and descriptive signs shall be provided and placed at each end of the working area while work is in progress along highways. These signs shall be well tended and shall be placed at sufficient distances from the site of the work so that ample warning is given to approaching traffic. Signs shall be adequately lighted at night and meet Department of Transportation requirements.
 - E. The Contractor shall keep all streets open to traffic at all times unless permitted otherwise by the Engineer or Department of Transportation as applicable. The Contractor shall provide, place, and maintain temporary traffic control devices as directed by the Engineer or Department of Transportation. The latest edition of the Manual on Uniform Traffic Control Devices for Streets and Highways as prepared by the National Joint Committee on Uniform Traffic Control Devices shall be used as a guide in the placement of devices and all devices shall meet the requirements of said manual. The removal of road signs shall be done in accordance with and subject to the approval of the North Carolina Department of Transportation. Temporary signs shall be furnished and installed by the Contractor as necessary and as required. All Regulatory Signs shall be replaced immediately following backfilling or at the end of each day, whichever occurs first.
 - F. Where pipe is installed in open cut across a highway, the cut shall be immediately backfilled and all work of repairing the pavement completed immediately. Any subsequent settlement shall be immediately corrected and repaired.
 - G. Where pavement is cut and replaced, the Contractor shall cut the edges to a straight and even line before repairing the pavement. No ragged edges will be allowed or accepted.
 - H. Where asphalt pavement is cut, the entire area to be repaired shall be primed with an asphalt prime coat, acceptable to the Department of Transportation, before the pavement is replaced.

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- I. When required, the Contractor shall furnish to the Department of Transportation a 100% Performance Bond for the amount of paving to be cut and replaced along highways. Bond is required in North Carolina.
 - J. Unless otherwise indicated, no excavated material shall be placed on the pavement side of the ditch, along State highways. The least possible amount of ditch will be left open when work is not in progress and equipment shall be removed from the pavement and shoulders during shut-down periods.
 - K. Shoulders of roadways shall be left in good, acceptable condition and all topsoil and grass that is disturbed shall be replaced. Grassing shall include seeding, fertilizing, and mulching to conform with Department of Transportation requirements.
 - L. The Contractor shall pay the cost of all Department of Transportation inspector's time, if required on the job.
- M. WORK ON RAILROAD RIGHT-OF-WAY:
- A. The Contractor shall not begin work on any property of the railroad until he has secured necessary permits. He shall conform to all requirements of the railroad, or its authorized representatives, in the prosecution of this portion of the work, including but not limited to the following:
 - 1. Where a pipeline crosses under a railroad, the work shall be done in accordance with requirements of the Railway Company. Pipe shall be installed by boring and jacking (or open cut as designated). Excavation shall be done ahead of the pipe. The encasement must be kept on accurate line and slightly below grade. A tolerance of 0.5% will be allowed on short lines in good soil and not over 1% in any case.
 - B. The Contractor shall furnish the Railway Company the following:
 - 1. Certificate of Workers' Compensation or Employer's Liability Insurance according to the laws of the State.
 - 2. Certificate of the Contractor's Public Liability Insurance, to protect the contractor and subcontractor for loss of life or injury to persons in an amount not less than \$1,000,000 for any one person and not less than \$1,000,000 for any accident, and for property loss or damage in an amount not less than \$1,000,000 for any one accident and not less than \$1,000,000 aggregate or as required by the Railroad Company.
 - 3. The original policy of Railroad Protective Liability Insurance naming the Railway Company as the insured for loss of life or injury to persons in an amount not less than \$2,000,000 for one person, and not less than \$2,000,000 for any accident and for property loss or damage in an amount not less than \$2,000,000 for any one accident and not less than \$2,000,000 aggregate or as required by the Railroad Company. The Railroad Protective Liability Policy should show the location and description of work and name of Owner for whom the work is done.
 - 4. The Contractor shall also pay the cost of flagmen or other expenses of the railroad in protecting traffic. He shall notify the railroad of the time that the work will be done and shall not begin work until authorized by railroad officials.

4.2 BORED ENCASEMENT INSTALLATION

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- A. Encasement pipe which is dry bored under highways and railroads for installation of force mains shall be installed at the locations, to the gradients, and within the tolerances (if any), as shown on the plans. In event the encasement is installed off grade or seriously out of line, then another encasement pipe will be dry bored as close as practical to the original pipe with no additional compensation allowed therefor. The original encasement must be sealed with a watertight concrete plug (min. 3' deep) at each end.
- B. Any additional pipe or other work required for realignment of the force main with an alternate encasement location which was required due to improper gradient or misalignment in the original installation, shall be completed at the Contractor's expense.
- C. In event an obstruction is encountered during encasement boring operations which cannot be overcome, a second encasement shall be bored at a location designated by the Engineer. No additional compensation will be allowed for the second encasement installation. In event an obstruction is encountered in the second installation, at the direction of the Engineer, a third attempt shall be made to complete the encasement installation. Consideration will be given for additional compensation in event a third installation attempt is required. All abandoned encasement pipes shall be sealed as specified in paragraph 4.5.1 above.
- D. Pipelines installed through steel encasement shall meet specifications herein described and all Department of Transportation or Railroad specifications and guidelines for installing pipelines through steel encasement pipe. Upon insertion of the pipeline through the encasement pipe, the ends of the encasement pipe shall be sealed with brick and mortar. Brick and mortar shall be as herein specified, and the seal shall be such to withstand hydrostatic pressure from ground water and all backfill loads. Contractor shall provide means to prevent water line from floating within the encasement pipe. Grouting procedure will not be allowed.
- E. Casing pipe and joints shall be of leakproof construction, capable of withstanding railway or traffic loading. The diameter of the casing pipe shall be at least 2" greater than the largest outside diameter of the carrier pipe, joints, or couplings for carrier pipe less than 6" in diameter and at least 4" greater for carrier pipe, 6" in diameter and greater, unless indicated differently on drawings. Further, the casing pipe shall be of great enough diameter to allow carrier pipe to be removed subsequently without disturbing the case pipe and immediate areas.
- F. Steel encasement pipe shall be as specified in item 2.23 of this section.

4.3 TRENCH EXCAVATION

- A. Trenches for pipe shall be dug true to line and grade and to the following requirements. Depth of cover shall not be less than 3'-6" for pipe 10" and larger in diameter, measured to the top of pipe, unless shown differently on the profile or authorized by the Engineer.
- B. Sides of trenches shall be kept as nearly vertical as possible. They shall be at least 12", and not more than 24" wider at the top of the pipe than wide diameter of the pipe, plus sheathing where it is necessary. Where paving is to be cut, it shall be cut in advance of trenching 1' wider than the specified width of the trench.
- C. Where soil conditions prohibit vertical walls, the trench width at the bottom and to 1' above the top of the pipe shall be as specified above with the remainder being held to the least possible width greater than that specified. Where soil conditions prevent ditch excavation without excessive widths, or where directed by the Engineer, wood or steel

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sheeting, as hereinafter specified, shall be driven to support the trench walls, or a suitably reinforced steel trench box shall be employed.

- D. Trench bottoms shall be hand graded to provide uniform and continuous bearing for the pipe along its entire length, with bell holes being dug for pipe bells. No ridges, sags or undercutting will be allowed.
- E. If approved by the Engineer and subject to suitable solid conditions, the trench may be excavated a few inches below the established subgrade and backfilled with selected materials (from the excavation, if available) well compacted and so shaped as to give the pipes uniform bearing throughout their lengths at the established grade. Bell holes shall be dug to relieve the bells of load and to provide for completing the joints.
- F. Where the material at grade is unstable, soft, and incapable of supporting the pipe, the trench shall be excavated below grade, as directed by the Engineer, and refilled to grade with crusher-run stone or gravel so as to form a firm foundation for the pipe. None shall be compacted and graded so as to provide stable foundation and a uniform bearing for the pipe. Bell holes shall be provided as in other types of foundations.
- G. Where the material excavated from the trench is unsuitable for backfill material, it shall be hauled off and disposed of and selected material hauled in for backfilling the trench.
- H. Should ground water be encountered in the bottom of the trench, causing the trench bottom to be unstable the material, as directed by the Engineer shall be excavated below grade sufficiently to allow a bed of crushed rock or gravel to be placed in which to bed the pipe. The work shall be done as for unstable foundations. The depth of cut below grade shall be only the minimum amount to accomplish the purpose, and shall be as directed by the Engineer.
- I. The Contractor shall furnish all machinery for pumping, bailing, and/or pointing and shall pump, bail, or otherwise remove any water which may be found or shall accumulate in the trenches, and shall perform all work necessary to keep them clear of water while the pipe is being laid. The disposal of water after removal shall be satisfactory to the Engineer.
- J. Whenever necessary, the side of the trench shall be braced and rendered secure and either open or close sheeting used to the satisfaction of the Engineer; such sheeting and bracing to be left in place until the trench is refilled to a safe limit, not less than 2' above the top of the pipe. The top portion may then be cut off, but the lower portion shall remain undisturbed. In lieu of sheeting, suitable trench boxes may be employed. All sheeting, bracing, trench boxes, and trench construction methods shall conform to the latest Department of Labor Safety and Health Regulations for construction promulgated under the Occupational Safety and Health Act of 1970. No extra payment will be made for sheeting and bracing. Such cost shall be included in the cost of installing the pipe.
- K. In rock or other unyielding material, the excavation shall be made at least 6" below subgrade elevation. The trench shall be refilled with select material compacted in place as specified for ordinary excavation. Suitable material from excavation may be used, if available. If not, it shall be hauled in.
- L. If rock is encountered, it shall be paid for at the unit price set forth in the Bid. Only solid rock requiring blasting or drilling for its removal will be classified as rock excavation. Allowance will be made for a width of the trench not in excess of 16" greater than the outside diameter of the bell of the pipe and a depth from the surface of the rock to the established subgrade of the pipeline. Rock excavated in excess of these limits will be paid for. The Engineer shall measure the amount of rock excavation to be classified as such before the trench is backfilled before measurement by the Engineer.

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- M. All blasting, where required, shall be done under the personal supervision of a man thoroughly skilled in this class of work. All necessary measures to protect life and property shall be taken. Where in close proximity to building, transmission lines, telephone lines, or other facilities, timber mats or other means of preventing damage from flying debris shall be used. Ample and suitable signals shall be given in proximity to work before each blast, and flagmen shall be placed on all roads, beyond the danger zone, in every direction to warn traffic. All responsibility for damage rests on the Contractor.
- N. All existing water, sewer, and gas lines, buried electrical and telephone cable, and other known utilities intersecting the lines of construction, if requested by the Engineer, shall be uncovered by the Contractor at his expense and exposed to the Engineer at least 100' ahead of pipe laying operations to insure the correctness of grades. Existing utilities shown on the plans area as accurately located as existing records and field surveys allow; however, the Contractor shall verify with the various companies before excavating and shall save harmless the Owner from any claims for damages as a result of his work.
- O. The Contractor shall at all time take necessary precautions in preventing gutters, catch basins, ditches and other drainage facilities from being clogged that might cause flooding conditions and damage to public or private properties.
- P. During the course of pipeline construction, benching, early seeding or grass cover, and whatever means necessary shall be carried out to prevent siltation and bank erosion.

4.4 INSTALLATION OF FORCE MAINS AND APPURTENANCES

- A. The Contractor shall haul the pipe and appurtenances to the site of work and distribute them neatly along the trench prior to laying. The pipe shall be carefully handled to prevent damage, mechanical hoists or other approved methods being used in the handling. Depth of cover shall not be less than 3'-0" for pipe up to 8" in diameter or 3'-6" for pipes 10" and larger in diameter, measured to the top of pipe, except where shown differently on a profile or specifically authorized by the Engineer.
- B. Pipe and appurtenances shall be kept clean and open ends securely plugged when pipe laying is not in progress. The inside of pipe and bell and spigots shall be thoroughly inspected and cleaned prior to lowering into the ditch and care shall be exercised after the pipe is in place to prevent dirt or other extraneous material from getting into the pipe or bells and into the spigot.
- C. Spigots shall be fully seated in the bells and the pipe shall be uniformly bedded on the bottom of the trench for its entire length with bells lying in previously dug bell holes sufficiently large to allow proper bedding and jointing. Fittings, valves and other appurtenances shall be located where shown on the plans or directed by the Engineer, with the pipe being cut where necessary. After jointing, a reasonable amount of deflection may be made in the joint. Such deflection shall not exceed the allowable amount specified by the manufacturer for each size of pipe.
- D. Pipe shall be laid in accordance with the manufacturer's instructions, applicable portions of AWWA Specification C600, and the following:
- E. For mechanical joint pipe, Type II, the rubber rings shall be properly lubricated and the spigots and bells cleaned before assembling the joint. Nuts of bolted joints shall be tightened with special torque limiting wrenches set to provide the proper strain on the bolt, and all nuts tightened to that limit.

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- F. Rubber ring joints, Type III, shall be assembled in accordance with the manufacturer's instructions. The bell and spigot shall be absolutely clean prior to seating of the gasket. The gasket shall be wiped clean, flexed and properly inserted into the socket and seated evenly and properly. Care shall be taken to eliminate any bulges which might interfere with the proper entry of the spigot. A thin film of lubricants, shall be applied to the inside surface of the gasket. The spigot shall then be completed by forcing the spigot into the bell until it makes contact with the bottom of the socket. This shall be done by use of pipe jack and assembly, or other methods as approved by the Engineer.
- G. Fittings shall be installed where shown on the plans or directed by the Engineer. They shall be handled and installed in the same manner as the pipe and all shall be well blocked as hereinafter specified.
- H. Concrete for blocking and protection shall be poured in accordance with the following requirements. All fittings, bends, dead ends, etc., shall be acceptably blocked with concrete having bearing on undisturbed earth in the side and/or bottom of the trench. Bearing area shall be equal to that shown on the plans and greater if deemed necessary by the Engineer. No concrete shall be poured or splattered on fittings bells, glands, or bolts.
- I. Where shown on the plans, or directed by the Engineer, concrete supports, walls, or other protective work shall be constructed.
- J. Contractor shall take elevation shots every 100 feet on the installed force main pipe along the entire route to ensure positive and uniform grades to each air release valve. The elevations shall be recorded by the Contractor with a record provided to the Engineer.

4.5 BACKFILLING OF TRENCHES

- A. Backfilling of trenches shall be completed after the installation of each section of pipe laying to the satisfaction of the Engineer.
- B. Backfilling around the pipe and to a depth of at least 1' above the top of pipe shall be placed by hand in layers of not over 6". Only select material containing no rock or other objectionable material shall be used for this portion of the backfill. As fast as the material is place, it shall be cut under the haunches of the pipe with a shovel and thoroughly compacted with mechanical tamps for the full width of the trench to provide support for the bottom and sides of the pipe. Filling shall be carried up evenly on both sides.
- C. The balance of the backfill shall be placed and tamped to prevent excessive settlement in a manner satisfactory to the Engineer. If the trench backfill is located under miscellaneous paved areas, areas to be paved, or unpaved streets, the trench shall be backfilled with suitable material free from large stones or clods in 8" layers (loose measurement) and thoroughly tamped and compacted to 95% of maximum as established by AASHTO Specification T99, Method A, with mechanical tampers, so as to avoid future settlement. Where applicable, the compaction shall be acceptable to the Department of Transportation or Owner.
- D. For pipe outside street limits, compaction shall be at least 90% maximum as established by AASHTO Specification T99, Method A.
- E. Excess material shall be promptly removed from the site, and the pavement or roads surface cleaned of objectionable material. The pavement and/or road surface shall be cleaned daily with a mechanical broom and/or washed if requested by the Engineer. The Contractor shall correct any future settlement within the guarantee period.

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- F. In unpaved streets, the top 6" of the trench shall be filled with well compacted crusher-run stone. In paved areas, the top of the trench shall be filled with the specified base for pavement, well mixed and compacted. Any settlement of backfill below finish grade shall be promptly corrected.
- G. On cross country lines and at other points where damage to the system or property will not occur, the backfill material more than 1' above the top of the pipe may be placed in 12" layers and compacted with mechanical tamps. The upper portion of the backfill, more than 5' above the pipe, may be compacted by following with wheeled equipment. Excess material may be mounded on the trench. The Contractor will be responsible for all final subsidence of all trenches and shall leave the same flush with the original ground after all settlement has taken place. Trenches must be protected against scour due to surface drainage.
- H. Backfilling around manholes shall, in general, conform to requirements for backfilling trenches, except that no backfill shall be placed around manholes until all mortar has properly set and backfilling shall be carried up symmetrically around structures.

4.6 CUTTING AND REPLACING PAVEMENT

- A. Where pavement is to be cut for installation of pipe or other utilities, the Contractor shall cut it neatly in advance of trenching and shall replace the pavement with base and new pavement.
- B. All pavement shall be neatly cut to a straight edge in advance of trenching with the method of cutting being subject to approval of the Engineer. Pavement shall be cut 12" wider than the excavated area on each side. Ragged or irregular edges will not be allowed and work completed with barred edges shall be redone. Concrete pavement shall be sawed with suitable concrete saw cutting equipment.
- C. Trench backfilling shall be done in layers not over 6" thick and thoroughly compacted. Compacted shall be such as to prevent future settlement and shall be done by acceptable means, approved by the Engineer. Rolling with rubber-tired vehicles or track-type equipment will not be allowed. Compaction shall be at least 95% of maximum as established by AASHTO Specification T99, Method A.
- D. Base for pavement shall be crusher run stone for all non-NCDOT maintained streets, HB binder for all secondary highways, and reinforced concrete for all primary highways. All base shall be placed in accordance with plan and/or encroachment permit details. Base width shall be shown on the plans and/or encroachment permits for various types of pavement cuts.
 - 1. Crusher run stone shall conform to the requirements of Section 02231. It shall be well mixed and compacted by tamping and rolling. Compaction shall be to such degree as to preclude settlement. Crusher run base material shall be placed at the same time that the trench is backfilled. Backfilling to top of ditch, to be cut out and replaced with base material at a later date, will not be allowed.
 - 2. Crusher run base for highway pavement and adjacent drives shall be 8" of stone, stabilized with 5% Portland Cement. It shall be thoroughly mixed prior to compacting.
 - 3. Crusher run base for non-highway pavement and drives shall be 8" of stone without the addition of cement.

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4. Binder base for secondary roads shall be a minimum of 6" HB binder conforming to specifications of the Department of Transportation.
 5. Concrete base shall consist of 8" of concrete, reinforced with #4 reinforcing steel bars placed at 8" on center in the transverse direction and #4 tie bars in the longitudinal direction. Concrete shall be designed to produce a compressive strength of 3000 psi at 28 days. The design of the mix and source of supply shall be subject to approval of the Engineer.
- E. Pavement shall be replaced with the same type of pavement that exists prior to cutting and shall consist of either bituminous surface course (double treatment), 2" of hot plant mix asphaltic concrete, or 8" of Portland Cement concrete; all conforming to specifications of the Department of Transportation for each type.
1. All pavement shall be repaired within the same week that it is cut. Should inclement weather delay pavement replacement, the Contractor shall not cut additional pavement until he has notified the Engineer and received specific permission and instructions.
 2. For asphalt pavement or bituminous surfacing, the entire area to be resurfaced (including edges of existing pavement) shall be primed with an acceptable asphalt prime coat just prior to placing new pavement.

4.7 REPAIRS TO DAMAGED SERVICES AND UTILITIES

Repairs to damaged services and utilities shall be promptly made at the Contractor's expense. The Contractor shall use every effort to avoid damaging or breaking water, sewer, gas, power, telephone or other utility services. Utility lines shall be properly supported across the pipe trench until backfilling is completed. Should damage occur, immediate action shall be initiated to effect satisfactory repairs. All repair work shall be satisfactory to the Engineer and the Owner of the damaged utility.

4.8 DUST CONTROL

The Contractor shall control dust throughout the life of the project within the project area and at all other areas affected by the construction of the project. Dust control shall not be considered effective where the amount of dust creates a potential or actual unsafe condition, public nuisance, or condition endangering the value, utility, or appearance of any property. The Contractor will not be directly compensated for any dust control measures necessary, as this work will be considered incidental to the work covered by the various contract items. The Contractor will provide dust control measures as directed by the Engineer.

4.9 MISCELLANEOUS ITEMS

The Contractor shall be responsible for removing and replacing miscellaneous items in conflict with the pipe work such as mail boxes, signs, fences, walls, shrubbery, private ornamental items, etc. Shrubby and plantings shall be preserved by proper root protection and watering until replanted; however, the Contractor will not be required to guarantee replanted items. No additional payment will be made for removing and replacing miscellaneous items.

PART 5 - TESTING AND CLEAN-UP

All pipelines shall be tested in accordance with the following requirements:

5.1 PRESSURE TESTING

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- A. Prior to pressure testing, the Contractor shall pig the line with a properly sized pig. The Contractor shall provide the necessary water for flushing the pig through the entire pipe length in order to remove debris and trash from the line.
- B. Each section of the pipeline shall be subjected to and successfully meet a pressure test of 150 psi. The line shall be slowly filled with water and all air expelled through the air valves or other means. A suitable test pump, furnished by the Contractor, shall be connected to the line by means of a tap in the line, or other suitable methods, and the proper test pressure slowly applied to the line. The pressure test shall be maintained for at least one hour, at full test pressure. Leaks, if found, shall be immediately repaired.
- C. After the pressure test is complete, a leakage test shall be conducted. Leakage test shall be conducted by measuring, by suitable and accurate methods (measuring devices to be furnished by the Contractor), the amount of water which enters the test section under maximum operating pressures for a period of at least two hours.
- D. No pressure pipe installation will be accepted until leakage is less than the number of gallons per hour for each section tested, as determined by the following formula:

$$L = \frac{ND(P)^{1/2}}{3700}$$

- L - Allowable leakage, in gals. per hour
- N - Number of joints in the length of line under test
- D - Nominal diameter of the pipe, in inches
- P - Average test pressure, in psi

Should any test disclose leakage greater than that allowed above, the Contractor shall, at his own expense, locate and repair the defect until the leakage is within the specified allowance.

- E. **Water for testing one times the volume of the new lines total will be furnished by the Owner at no cost to the Contractor after which normal water usage charges will be made.** Contractor shall furnish all necessary pipe or hose extensions or transportation to the point of use and shall exercise care in the use of water.

5.2 CLEAN-UP

- A. All pipeline rights-of-way and pipework areas shall be cleaned up and left in satisfactory condition.
- B. Clean-up of work along highways or roads shall be performed immediately upon completion of the backfill operation. Pipe laying shall be stopped at any time that clean-up work lags and shall not be resumed until clean-up progress is satisfactory to the Engineer.
- C. Clean-up of work for cross country locations shall follow immediately upon completion of any major part of the work or upon instruction by the Engineer. Topsoil shall be replaced on all areas of disturbed by the pipeline work throughout the length of the water mains, and to the full satisfaction of the property owner. Topsoil may be removed from the line of

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work and stockpiled for future use. It shall be carefully removed, stockpiled, protected, respread, dressed off, and the entire right-of-way left in condition acceptable to the Engineer and property owner. If topsoil is not stockpiled and protected, suitable, approved material from other sources shall be provided. Where the line is located on pasture land, grassed areas, or roadway shoulders, grass shall be replaced.

PART 6 - GRASSING

- 6.1 The disturbed pipeline area shall be seeded in accordance with Section 32 92 00, Seeding and Mulching.

PART 7 - INSPECTION AND ACCEPTANCE

- 7.1 All work shall be subject to inspection and approval prior to final acceptance and payment. Final acceptance shall be contingent upon the following:
- 7.2 All pressure and leakage tests shall yield satisfactory results.
- 7.3 Final clean-up will meet the approval of the Engineer, the Owner, and property owners where applicable, with all defects in ditch settlement, pavement patches or other deficiencies being promptly corrected.

END OF SECTION 33 34 00

APPENDIX A

NCDOT RIGHT-OF-WAY ENCROACHMENT AGREEMENT



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

BEVERLY EAVES PERDUE
GOVERNOR

EUGENE A. CONTI, JR.
SECRETARY

June 8, 2011

Division Six - District Two
Harnett County

Harnett County Department of Public Utilities
Post Office Box 1119
Lillington, North Carolina 27546

SUBJECT: Encroachment Agreement on NC Highway 55, SR 1723 (Turlington Road) and SR 1724 (Daniels Road) for the installation of 9,520± LF of sanitary sewer force main and various appurtenances in Harnett County (Sequence # 11056).

Dear Sir:

Attached is an approved R/W form 16.1 and plans for the installation of 9,520± LF of 6"φ PVC (SDR-21) sanitary sewer force main and various appurtenances on NC Highway 55, SR 1723 (Turlington Road) and SR 1724 (Daniels Road) in Harnett County as shown on the attached plans.

Location:

Route	At a point	Towards
NC 55	1,300'± south of the intersection of NC Highway 55 and SR 1723 (Turlington Road).	The north
SR 1723	At the intersection NC Highway 55 and SR 1723 (Turlington Road).	SR 1724
SR 1724	At the intersection SR 1723 (Turlington Road) and SR 1724 (Daniels Road).	End of maintenance.

This encroachment is approved subject to the following:

1. Mr. K. L. Anderson, Highway Maintenance Engineer at (910) 893-4020, and Mr. Troy L. Baker, Assistant District Engineer at (910) 486-1496 shall be notified a minimum of three (3) days before construction is to begin.
2. Traffic will be maintained and proper signs, signal lights, flagmen and other warning devices will be provided for the protection of traffic, in conformance with the latest **MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS**. All contractor personnel will be required to wear a class II ANSI approved safety vest while working within the DOT right of way.
3. All lanes of traffic on NC Highway 55, SR 1723 (Turlington Road) and SR 1724 (Daniels Road) are to be open during the hours of 6:00 A.M. to 9:00 A.M. and from 4:00 P.M. to 6:00 P.M. No lane of traffic shall be closed on holidays, special events, or as directed by the engineer. Traffic shall be maintained at all times.

4. Any asphalt that is damaged as a result of the installation of the 6"Φ sanitary sewer force main shall be repaired at the encroaching party's expense. An NCDOT approved asphalt mix shall be used for all repairs within NCDOT rights of way. Contact Mr. Troy L. Baker, Assistant District Engineer for acceptance of asphalt mix designs.
5. Excavations inside the theoretical 1:1 slope from the existing edge of pavement to the bottom of the nearest excavation wall should be made in accordance with the following conditions:
 - The trench backfill material should meet the Statewide Borrow Criteria. The trench should be backfilled in accordance with Section 300-7 of the 2006 NCDOT Standard Specifications for Roads and Structures, which basically requires the backfill material to be placed in layers not to exceed 6 inches loose and compacted at least 95% of the density obtained by compacting a sample in accordance with AASHTO T99 as modified by the NCDOT.
 - All trench excavation inside the limits of the theoretical 1:1 slope, as defined by the policy, should be completely backfilled and compacted at the end of each construction day. No portion of the trench shall be left open overnight.
6. The proposed 6"Φ sanitary sewer force main, manholes, cleanouts, and other associated appurtenances are to be placed 5' off of the Right-of-Way Lines of all NCDOT roadways affected by the construction of this project. All associated appurtenances must be placed behind the ditch line. No manhole, clean out or any other associated appurtenance will be allowed to be placed in the ditch line or on the shoulder of the road.
7. The proposed 6"Φ sanitary sewer force main shall be constructed 2' under all existing culverts and/or the future extension of existing culverts. Minimum separation shall be maintained between the proposed 6"Φ sanitary sewer force main and all existing culverts at all locations.
8. Disturbed areas shall have an established stand of vegetation according to the attached specifications for erosion control.
16. A copy of this agreement and letter of approval will be required to be available at the construction site at all times.
17. Written notice of the completion of the work will be furnished to the District Engineer, P. O. Box 1150, Fayetteville, North Carolina 28302, when the work has been completed.
11. All fill areas/backfill shall be compacted to 95% density in accordance with AASHTO T99 as modified by the North Carolina Department of Transportation. All material to a depth of 8 inches below the finished surface shall be compacted to a density equal to at least 100% of that obtained by compacting a sample of the material in accordance with AASHTO T99 as modified by the department. The subgrade shall be compacted at a moisture content which is approximately that required to produce the maximum density indicated by the above test method. The contractor shall dry or add moisture to the subgrade when required to provide a uniformly compacted and acceptable subgrade. The trench backfill material shall meet the Statewide Borrow criteria. The trench should be backfilled in accordance with Section 300-7 of the NCDOT Standard Specifications for Roads and Structures and Amendments or Supplementals thereto. Test results shall be provided to the District office for verification within two (2) weeks of the sewer line construction.

12. **All open cuts will require full depth patching with 5" Asphalt Concrete Intermediate Course Type I 25.0 B and 2" Asphalt Concrete Surface Course Type S 9.5 B the same day as cut is made on NCDOT roadways.**
13. **The cut will be patched back the same day and allowed to settle for a period of 90 days.** After the 90 day settling period, if any area of the patch has settled to an unacceptable state as defined by the District Engineer or his/her representative. The area shall require repair by either full depth patching or leveling to be determined on a case by case basis.
14. **Eight inches of ABC will be used as the base. Compaction tests shall be performed at the location of every open cut that crosses NCDOT roadways. The owner will be required to have an approved laboratory furnish the District office a copy of the test results.**
15. The party of the second part agrees to provide traffic control devices, lane closures, road closures, positive protection and/or any other warning or positive protection devices necessary for the safety of motorists and workers during construction and any subsequent maintenance. This shall be performed in conformance with the latest NCDOT Roadway Standard Drawings and Standard Specifications for Roads and Structures and Amendments or Supplementals thereto. When there is no guidance provided in the Roadway Standard Drawings or Specifications, comply with the Manual on Uniform Traffic Control Devices for Streets and Highways and Amendment or Supplemental thereto. Information as to the above rules and regulations may be obtained from the Division Engineer of the party of the first part. **All contractor personnel will be required to wear a class II ANSI approved safety vest while working within the DOT right of way.**
16. SDR-26 PVC pipe shall not be used on N.C.D.O.T. Right of Way for lines under pressure.
17. Please be reminded that all OSHA Standards regarding trenching and shoring should be strictly adhered to.
18. The Contractor shall comply with all OSHA requirements and provide a competent person on site to supervise excavation at all times.
19. **No material storage shall be allowed along the shoulders of the roadway, and during non-working hours, equipment shall be parked as close to the right of way line as possible and shall be properly barricaded so that no equipment obstruction shall be within the Clear Recovery Area.**
20. The Department of Transportation does not guarantee the right of way on this road, nor will it be responsible for any claim for damages brought by any property owner by reason of the installation.
21. The encroaching party shall comply with all applicable federal, state, and local environmental regulations, and shall obtain all necessary federal, state, and local environmental permits, including but not limited to, those related to sediment control, stormwater, wetland, streams, endangered species, and historical sites.
22. Excavation within 500 feet of a signalized intersection will require notification by the party of the second part to the Division Traffic Engineer at telephone number 910-486-1452. All traffic signal or detection cables must be located prior to excavation.
23. Trenching, bore pits and/or other excavations shall not be left overnight. The contractor shall comply with all OSHA requirements and provide a competent person on site to supervise excavation at all times.

24. Any work requiring equipment or personnel within 5' of the edge of travel lane of an undivided facility and within 10' of the edge of any travel lane of a divided facility shall require a lane closure with appropriate tapers.
25. Any drainage structure disturbed or damaged shall be restored to its original condition as directed by the District Engineer.
26. Any disturbed guardrail shall be reset according to the applicable standard or as directed by the District Engineer.
27. All driveways altered during construction shall be returned to a state comparable with the condition of the driveways prior to construction.
28. All roadway signs which are removed which are removed due to construction shall be reinstalled as soon as possible.
29. Any proposed driveway connections onto NCDOT roadways will require an approved driveway permit. The approval of this Two Party encroachment (RW 16.1) does not constitute approval of any proposed driveway connections. For further information, contact Mr. Troy L. Baker, Assistant District Engineer at (910) 486-1496.
30. Excavated areas adjacent to pavement having more than a 2" drop shall be safed up at a 6:1 or flatter slope and designated by appropriate delineation during periods of inactivity, including, but not limited to, night and weekend hours. Excavated material shall not be placed on the roadway at any time.
31. **NCDOT reserves the right to further limit, restrict, or suspend operations within the Right of Way if, in the opinion of NCDOT, safety or traffic conditions warrant such action.**
32. It shall be the responsibility of the encroaching party to determine the location of other utilities within the encroachment area. The encroaching party shall be responsible for notifying other utility owners and providing protection and safeguards to prevent damage or interruption to existing facilities and to maintain accessibility to existing utilities.
33. **A qualified NCDOT inspector should be on site at all times during construction. The encroaching party should be required to reimburse NCDOT for the cost of providing the inspector. If NCDOT cannot supply an inspector, the encroaching party (not the utility contractor) should make arrangements to have a qualified inspector under the supervision of a Professional Engineer registered in North Carolina, on site at all times. The Registered Engineer should be required to certify that the utility was installed in accordance with the encroachment agreement and that the backfill material meets the Statewide Borrow Criteria.**
34. All temporary and final paving markings are the responsibility of the encroaching party. Final pavement markings and sign plans shall be submitted to the Division Traffic Engineer at telephone number 910-486-1452 for review and approval.

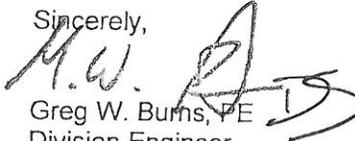
NCDOT WORK ZONE TRAFFIC CONTROL QUALIFICATIONS AND TRAINING PROGRAM

The North Carolina Department of Transportation is in the process of developing a Work Zone Traffic Control Qualification & Training program that will begin its implementation in 2010. This program will require qualified and trained Work Zone Flaggers in every flagging operation (July 2010) and qualified and trained Work Zone Traffic Control Supervisors on Significant Projects (July 2011). It is intended for the program to include anyone working within NCDOT Right of Way including work associated with NCDOT construction and encroachment agreements as well as all NCDOT operations.

Training for this certification will be provided by NCDOT approved training sources and/or private entities that have been pre-approved to train themselves. Additional information will be provided as this program progresses. If you have questions, visit our web site at www.ncdot.org/~wztc, or contact Stuart Bourne, PE with NCDOT Traffic Management Unit at (919) 662-4338 or sbourne@ncdot.gov.

If further information or assistance is needed in reference to this project, please feel free to call Mr. Lee R. Hines, Jr. (Richie), PE, District Engineer at (910) 486-1496.

Sincerely,


Greg W. Burns, PE
Division Engineer

GWB:tlb

cc: Mr. Robert J. Memory, State Utility Agent, w/attachments
Mr. Lee R. Hines, Jr. (Richie), PE, District Engineer, w/attachments
Mr. Keith L. Anderson, Highway Maintenance Engineer, w/attachment

TRAFFIC CONTROL AND WORK ZONE SAFETY

The Contractor shall maintain traffic during construction and provide, install, and maintain all traffic control devices in accordance with these project guidelines, the Project Special Provisions, North Carolina Department of Transportation Standard Specifications for Roads and Structures 2006, and the current edition of the Manual of Uniform Traffic Control Devices (MUTCD).

The Contractor shall utilize complete and proper traffic controls and traffic control devices during all operations. All traffic control and traffic control devices required for any operation shall be functional and in place prior to the commencement of that operation. Signs for temporary operations shall be removed during periods of inactivity. The Contractor is required to leave the project in a manner that will be safe to the traveling public and which will not impede motorists.

Traffic movements through lane closures on roads with two way traffic shall be controlled by flaggers stationed at each end of the work zone. In situations where sight distance is limited, the Contractor shall provide additional means of controlling traffic, including, but not limited to, two-way radios, pilot vehicles, or additional flaggers. Flaggers shall be competent personnel, adequately trained in flagging procedures, and furnished with proper safety devices and equipment, including, but not limited to, safety vests and stop/slow paddles.

All personnel when working in traffic areas or areas in close proximity to traffic shall wear an approved safety vest, or shirt or jacket which meets the color requirements of the Manual of Uniform Traffic Control Devices (MUTCD).

The Contractor shall comply with all applicable Federal, State, and local laws, ordinances, and regulations governing safety, health, and sanitation, and shall provide all safeguards, safety devices, and protective equipment, and shall take any other needed actions, on his own responsibility that are reasonably necessary to protect the life and health of employees on the job and the safety of the public, and to protect property in connection with the performance of the work covered by the contract.

Failure to comply with any of the requirements for safety and traffic control of this contract shall result in suspension of work as provided in subarticle 108-7(2) of the Standard Specifications.

SPECIFICATIONS FOR EROSION CONTROL

Erosion control shall be performed as detailed in Section 1600 (et al.) in the STANDARD SPECIFICATIONS FOR ROADS AND STRUCTURES – January 1, 2006.

The use of temporary erosion control measures shall be included to prevent the infiltration of silt and other sediments into waterways and adjacent property. The use of silt basins, brush barriers, and temporary seeding and mulching as needed is strongly recommended.

Permanent erosion control shall be performed as follows. All disturbed areas shall be graded to typical sections, thereafter plowed to a depth of five inches. The top two inches shall be pulverized to provide a uniform seedbed. NOTE: Lime should be applied before plowing operation. Lime, seed, and fertilizer shall be applied with necessary equipment to give uniform distribution of these materials. The "hand/bucket" method is NOT acceptable.

Seeding and Mulching:

The kinds of seed and fertilizer, and the rates of application of seed, fertilizer, and limestone, shall be as stated below. During periods of overlapping dates, the kind of seed to be used shall be determined by the Engineer. All rates are in pounds per acre (kilograms per hectare).

March 1 - August 31		September 1 - February 28	
50# (55kg)	Tall Fescue	50# (55kg)	Tall Fescue
5# (6kg)	Centipede	5# (6kg)	Centipede
25# (28kg)	Bermudagrass (hulled)	35# (40kg)	Bermudagrass (unhulled)
500# (560kg)	Fertilizer	500# (560kg)	Fertilizer
4000# (4500kg)	Limestone	4000# (4500kg)	Limestone

Slopes 2: 1 and steeper and Waste and Borrow Locations:

January 1 - December 31			
75# (85kg)	Tall Fescue	75# (85kg)	Tall Fescue
25# (28kg)	Bermudagrass (hulled)	35# (40kg)	Bermudagrass (unhulled)
500# (560kg)	Fertilizer	500# (560kg)	Fertilizer
4000# (4500kg)	Limestone	4000# (4500kg)	Limestone

Note: 50# (55 kg) of Bahiagrass may be substituted for either Centipede or Bermuda grass only upon Engineer's request.

Approved Tall Fescue Cultivators:

Adventure	Adventure II	Amigo	Anthem	Apache	Apache II	Arid
Austin	Brookstone	Bonanza	Bonanza II	Chapel Hill	Chesapeake	Chieftain
Coronado	Crossfire II	Debutante	Duster	Falcon	Falcon II	Finelawn Petite
Finelawn	Finelawn I	Genesis	Grande	Guardian	Houndog	Jaguar
Guar III	Kentucky 31	Kitty Hawk	Monarch	Montauk	Mustang	Olympic
Mercer	Phoenix	Pixie	Pyramid	Rebel	Rebel Jr.	Rebel II
Negade	Safari	Shenandoah	Tempo	Titan	Tomahawk	Trailblazer
Subute	Vegas	Wolfpack	Wrangler			

cut and fill slopes 2:1 or steeper add 20# (23kg) Sericea Lespedeza January 1 - December 31.

fertilizer shall be 10-20-20 analysis. Upon written approval of the Engineer, a different analysis of fertilizer may be used provided the 1-2-2 ratio is maintained and the rate of application adjusted to provide the same amount of plant food as a 10-20-20 analysis.

Fertilizer / Topdressing:

Fertilizer used for topdressing on all roadway areas except slopes 2:1 and steeper shall be 10-20-20 written approval of the Engineer, a different analysis of fertilizer may be used provided grade and shall be applied at the rate of 500 pounds per acre (560 kg per acre). Upon the 1-2-2 ratio is maintained and the rate of application adjusted to provide the same amount of plant food as 10-20-20 analysis. Fertilizer used for topdressing on slopes 2:1 and steeper and waste and borrow areas shall be 16-8-8 grade and shall be applied at the rate of 500 pounds per acre (560 kg per hectare). Upon written approval of the Engineer, a different analysis of fertilizer may be used provided the 2-1-2 ratio is maintained and the rate of application adjusted to provide the same amount of plant food as 16-8-8 analysis.

Crimping / Tacking Straw Mulch:

Crimping shall be required in areas adjacent to any section of roadway where traffic is to be allowed during construction. In areas within six (6) feet (2 meters) of the edge of pavement, straw is to be crimped and then immediately tacked with asphalt tack sufficient to hold straw in place. Crimping will be limited to slopes 4:1 or flatter unless the Contractor can demonstrate to the Engineer that steeper slopes can be negotiated without altering the typical section. Straw mulch is to be of sufficient length and quality to withstand the crimping operation and provide adequate ground cover. Crimping equipment including power source shall be subject to the approval of the Engineer providing that maximum length of crimper blades shall not exceed 8 inches.

Excelsior matting shall be used in areas where steep grades could cause ditch erosion. Use of jute mesh, excelsior matting, or fiberglass roving is acceptable. Ditch treatment shall be installed before mulching operation.

Special ProvisionsUntrenched Construction

Under no condition shall jetting or wet boring, with water, or utility pipelines or encasements under pavements be allowed.

Boring and Jacking

Smooth wall or spiral weld steel pipe may be jacked through dry bores slightly larger than the pipe bored progressively ahead of the leading edge of the advancing pipe as spoil is mucked by the auger back through the pipe. As the dry boring operation progresses, each new section of the encasement pipe shall be butt-welded to the section previously jacked into place. Encasements shall extend at shoulder sections as shown on Attachment # 2. Encasements shall extend to a point outside of the 1:1 projection from three (3) feet behind curbs to the bottom of the nearest pit excavation wall in curb and gutter sections as shown on Attachment # 3.

If voids are encountered or occur outside the encasement pipe, grout holes shall be installed in the top section of the encasement pipe at ten (10) foot centers and the voids filled with 1:3 Portland Cement Grout at sufficient pressure to prevent settlement in the roadway.

In the event an obstruction is encountered during boring and jacking operations, the auger is to be withdrawn and the excessive pipe is to be cut off, capped and filled with 1:3 Portland Cement Grout at sufficient pressure to fill all voids before moving to another site.

Size and wall thickness (3' min. to 10' max. cover) of smooth wall or spiral welded encasement pipe for boring and jacking is as follows:

<u>Pipe Sizes (O.D.)</u>	<u>Wall Thickness</u>
4' to 12-3/4"	0.188
16" to 24"	0.250
30"	0.312
36"	0.375
48"	0.500

The Engineer on record is responsible for the encasement pipe design for cover greater than 10'.

Materials, joints, protective coating, grouting, wall thickness of carrier pipe, welds and cathodic protection shall be in accordance with the applicable industry or governmental codes, as well as the specifications of the Department of Transportation.

Casing pipe shall be sealed at the ends to prevent flowing water and debris from entering the annular space between the casing and the carrier. Plug with concrete, brick link seal, or other material approved by the District Engineer. Ensure drainage of encasement by leaving a 1 inch diameter weep hole in the seal of the lower end of the encasement.

Pump or place flowable fill into the annular void between the carrier pipe and casing pipe 36 inches or larger.

The grade of the top of the pipe or casing within rights-of-way should provide minimum bury as follows:

- | | | |
|----|---|---------------------------|
| A. | Longitudinal installations | 3' |
| B. | Crossings under roadways | 3' (Below travel surface) |
| C. | Crossings under ditches (Paved & unpaved) | 2' |

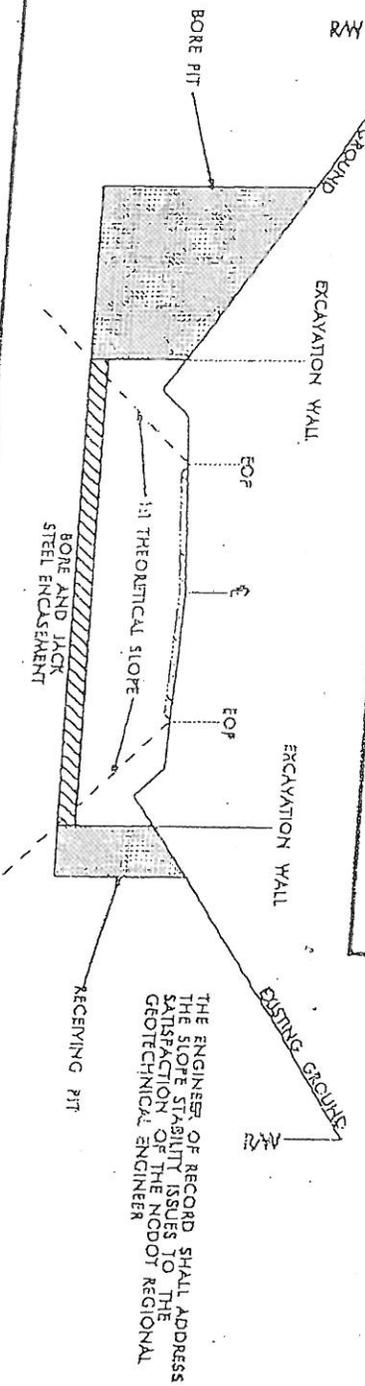
Pipelines carrying flammable, corrosive, expansive energized or unstable transmittants must comply with State, Federal and Utility Codes. In no case shall the depth of bury be less than as indicated above.

REV. 2/11/09

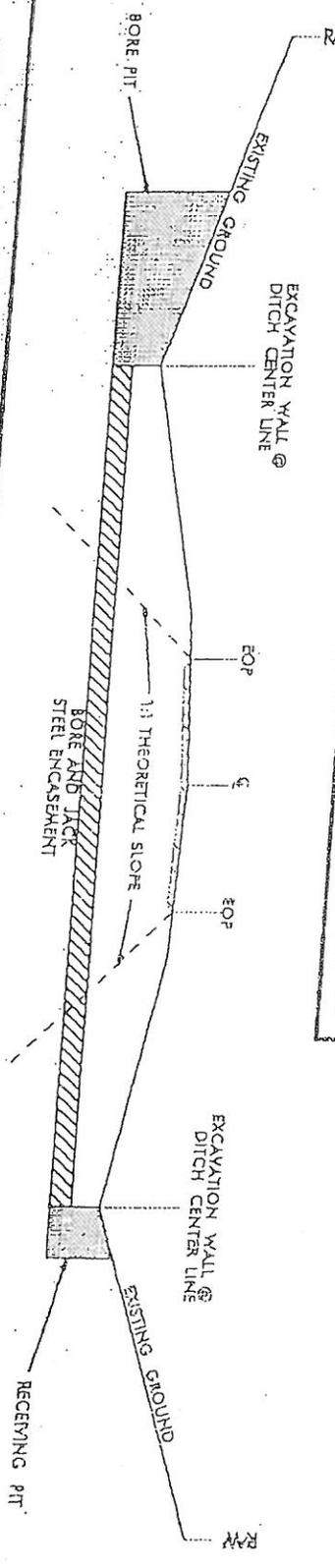
SHOULDER SECTIONS

ATTACHMENT # 2

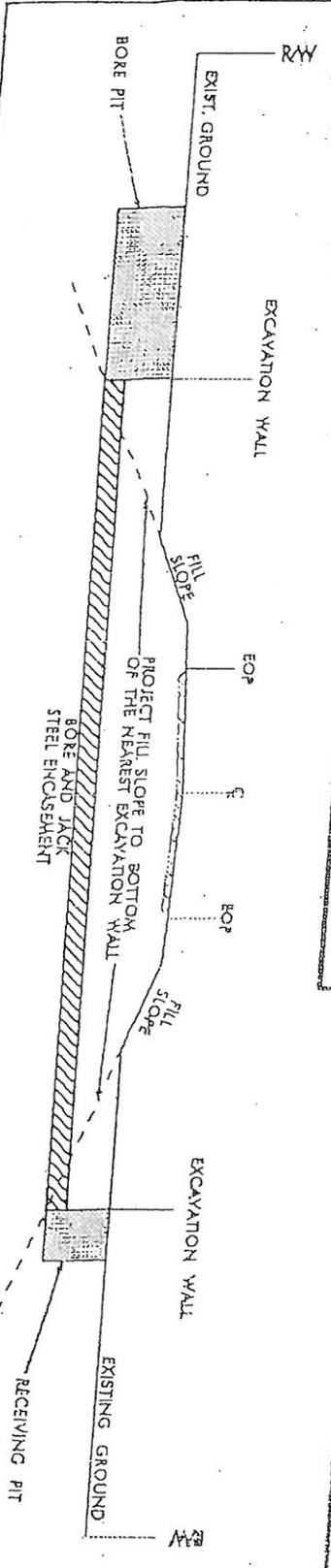
TYPICAL BORE AND JACK INSTALLATION IN ROADWAY CUT SECTION OUTSIDE THEORETICAL 1:1 SLOPE FROM THE EDGE OF PAVEMENT



TYPICAL BORE AND JACK INSTALLATION IN ROADWAY CUT SECTION WITH DITCHES OUTSIDE THEORETICAL 1:1 SLOPE FROM THE EDGE OF PAVEMENT



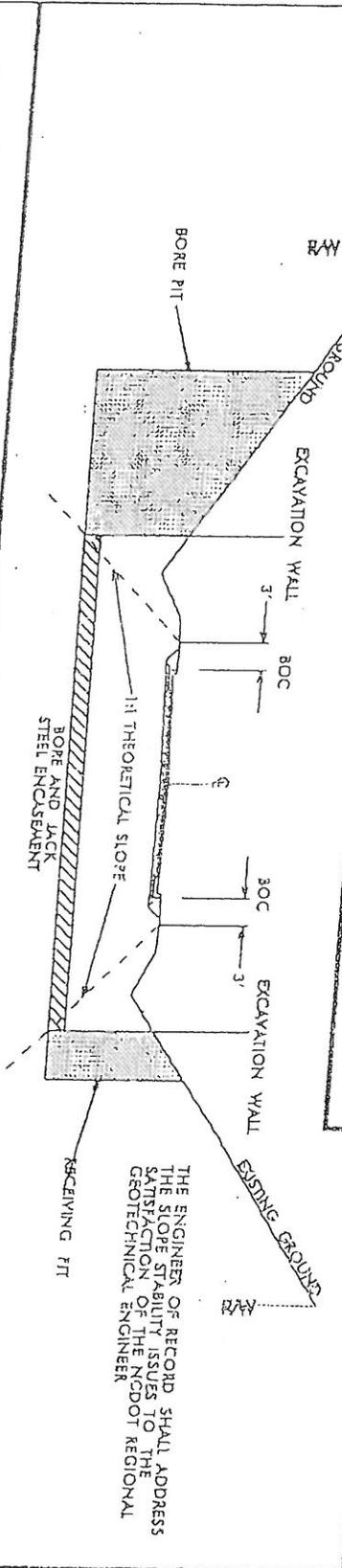
TYPICAL BORE AND JACK INSTALLATION IN ROADWAY IN FILL SECTION



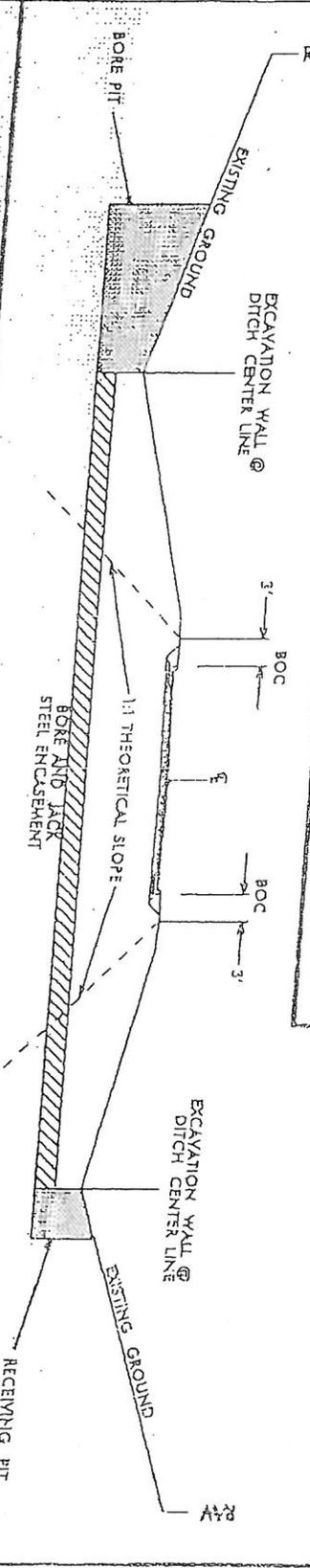
REV. 3/11/09

CURB AND GUTTER SECTIONS

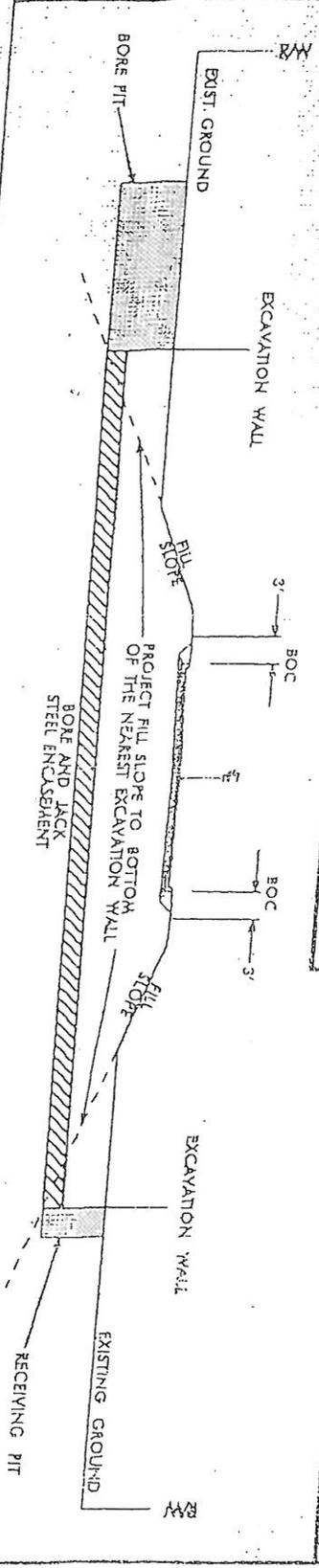
TYPICAL BORE AND JACK INSTALLATION IN ROADWAY CUT SECTION OUTSIDE THEORETICAL 1:1 SLOPE FROM 3' BACK OF CURB



TYPICAL BORE AND JACK INSTALLATION IN ROADWAY CUT SECTION WITH DITCHES OUTSIDE THEORETICAL 1:1 SLOPE FROM 3' BACK OF CURB



TYPICAL BORE AND JACK INSTALLATION IN FILL SECTION



AEV
Singer

DEPARTMENT OF TRANSPORTATION

RECEIVED

RIGHT OF WAY ENCROACHMENT AGREEMENT

-AND-

PRIMARY AND SECONDARY HIGHWAYS

Harnett County Dept of Public Utilities

P. O. Box 1119, Lillington, NC 27546

FEB 21 2011

THIS AGREEMENT, made and entered into this the 8 day of June 20 11 by and between the Department of Transportation, party of the first part; and Harnett County Department of Public Utilities (HCDPU) party of the second part,

WITNESSETH

THAT WHEREAS, the party of the second part desires to encroach on the right of way of the public road designated as Route(s) NC 55, SR1723(Turlington Rd), SR1724(Daniels Rd), located 2.7 miles south of the intersection of NC 27 & NC 55

with the construction and/or erection of: a 6" SDR-21 PVC force main 9,520 LF from the pump station located at the Dunn-Erwin Landfill to an existing sanitary sewer manhole located in the right-of-way along NC 55 near the Coats-Erwin School per the attached plans designed by C. T. Clayton, Jr., C. T. Clayton, Sr. P.E., Inc.

WHEREAS, it is to the material advantage of the party of the second part to effect this encroachment, and the party of the first part in the exercise of authority conferred upon it by statute, is willing to permit the encroachment within the limits of the right of way as indicated, subject to the conditions of this agreement;

NOW, THEREFORE, IT IS AGREED that the party of the first part hereby grants to the party of the second part the right and privilege to make this encroachment as shown on attached plan sheet(s), specifications and special provisions which are made a part hereof upon the following conditions, to wit:

That the installation, operation, and maintenance of the above described facility will be accomplished in accordance with the party of the first part's latest POLICIES AND PROCEDURES FOR ACCOMMODATING UTILITIES ON HIGHWAY RIGHTS-OF-WAY, and such revisions and amendments thereto as may be in effect at the date of this agreement. Information as to these policies and procedures may be obtained from the Division Engineer or State Utility Agent of the party of the first part.

That the said party of the second part binds and obligates himself to install and maintain the encroaching facility in such safe and proper condition that it will not interfere with or endanger travel upon said highway, nor obstruct nor interfere with the proper maintenance thereof, to reimburse the party of the first part for the cost incurred for any repairs or maintenance to its roadways and structures necessary due to the installation and existence of the facilities of the party of the second part, and if at any time the party of the first part shall require the removal of or changes in the location of the said facilities, that the said party of the second part binds himself, his successors and assigns, to promptly remove or alter the said facilities, in order to conform to the said requirement, without any cost to the party of the first part.

That the party of the second part agrees to provide during construction and any subsequent maintenance proper signs, signal lights, flagmen and other warning devices for the protection of traffic in conformance with the latest Manual on Uniform Traffic Control Devices for Streets and Highways and Amendments or Supplements thereto. Information as to the above rules and regulations may be obtained from the Division Engineer of the party of the first part.

That the party of the second part hereby agrees to indemnify and save harmless the party of the first part from all damages and claims for damage that may arise by reason of the installation and maintenance of this encroachment.

That the party of the second part agrees to restore all areas disturbed during installation and maintenance to the satisfaction of the Division Engineer of the party of the first part. The party of the second part agrees to exercise every reasonable precaution during construction and maintenance to prevent eroding of soil; silting or pollution of rivers, streams, lakes, reservoirs, other water impoundments, ground surfaces or other property; or pollution of the air. There shall be compliance with applicable rules and regulations of the North Carolina Division of Environmental Management, North Carolina Sedimentation Control Commission, and with ordinances and regulations of various counties, municipalities and other official agencies relating to pollution prevention and control. When any installation or maintenance operation disturbs the ground surface and existing ground cover, the party of the second part agrees to remove and replace the sod or otherwise reestablish the grass cover to meet the satisfaction of the Division Engineer of the party of the first part.

That the party of the second part agrees to assume the actual cost of any inspection of the work considered to be necessary by the Division Engineer of the party of the first part.

That the party of the second part agrees to have available at the construction site, at all times during construction, a copy of this agreement showing evidence of approval by the party of the first part. The party of the first part reserves the right to stop all work unless evidence of approval can be shown.

Provided the work contained in this agreement is being performed on a completed highway open to traffic; the party of the second part agrees to give written notice to the Division Engineer of the party of the first part when all work contained herein has been completed. Unless specifically requested by the party of the first part, written notice of completion of work on highway projects under construction will not be required.

That in the case of noncompliance with the terms of this agreement by the party of the second part, the party of the first part reserves the right to stop all work until the facility has been brought into compliance or removed from the right of way at no cost to the party of the first part.

That it is agreed by both parties that this agreement shall become void if actual construction of the work contemplated herein is not begun within one (1) year from the date of authorization by the party of the first part unless written waiver is secured by the party of the second part from the party of the first part.

During the performance of this contract, the second party, for itself, its assignees and successors in interest (hereinafter referred to as the "contractor"), agrees as follows:

- a. Compliance with Regulations: The contractor shall comply with the Regulations relative to nondiscrimination in Federally-assisted programs of the U. S. Department of Transportation, Title 49, Code of Federal Regulations, Part 21, as they may be amended from time to time, (hereinafter referred to as the Regulations), which are herein incorporated by reference and made a part of this contract.
- b. Nondiscrimination: The contractor, with regard to the work performed by it during the contract, shall not discriminate on the grounds of race, color, or national origin in the selection and retention of subcontractors, including procurements of materials

and leases of equipment. The contractor shall not participate either directly or indirectly in the discrimination prohibited by Section 21.5 of the Regulations, including employment practices when the contract covers a program set forth in Appendix B of the Regulations.

- c. **Solicitations for Subcontracts, including Procurements of Materials and Equipment:** In all solicitations either by competitive bidding or negotiation made by the contractor for work to be performed under a subcontract, including procurements of materials or leases of equipment, each potential subcontractor or supplier shall be notified by the contractor of the contractor's obligations under this contract and the Regulations relative to nondiscrimination on the grounds of race, color, or national origin.
- d. **Information and Reports:** The contractor shall provide all information and reports required by the Regulations, or directives issued pursuant thereto, and shall permit access to its books, records, accounts, other sources of information, and its facilities as may be determined by the Department of Transportation or the Federal Highway Administration to be pertinent to ascertain compliance with such Regulations or directives. Where any information required of a contractor is in the exclusive possession of another who fails or refuses to furnish this information, the contractor shall so certify to the Department of Transportation, or the Federal Highway Administration as appropriate, and shall set forth what efforts it has made to obtain the information.
- e. **Sanctions for Noncompliance:** In the event of the contractor's noncompliance with the nondiscrimination provisions of this contract, the Department of Transportation shall impose such contract sanctions as it or the Federal Highway Administration may determine to be appropriate, including, but not limited to,
 - (1) withholding of payments to the contractor under the contract until the contractor complies, and/or
 - (2) cancellation, termination or suspension of the contract, in whole or in part.
- f. **Incorporation of Provisions:** The contractor shall include the provisions of paragraphs "a" through "f" in every subcontract, including procurements of materials and leases of equipment, unless exempt by the Regulations, or directives issued pursuant thereto. The contractor shall take such action with respect to any subcontract or procurement as the Department of Transportation or the Federal Highway Administration may direct as a means of enforcing such provisions including sanctions for noncompliance: Provided, however, that, in the event a contractor becomes involved in, or is threatened with, litigation with a subcontractor or supplier as a result of such direction, the contractor may request the Department of Transportation to enter into such litigation to protect the interests of the State, and, in addition, the contractor may request the United States to enter into such litigation to protect the interests of the United States.

R/W (161) : Party of the Second Part certifies that this agreement is true and accurate copy of the form R/W (161) incorporating all revisions to date.

IN WITNESS WHEREOF, each of the parties to this agreement has caused the same to be executed the day and year first above written.

DEPARTMENT OF TRANSPORTATION

BY: _____

DIVISION ENGINEER

ATTEST OR WITNESS:

Gina Wheeler-Clerk to the Board (County of Harnett)

P O BOX 759 LILLINGTON, NC 27546

Steve Ward - Director of HCDPU

P O BOX 1119 LILLINGTON, NC 27546
Second Party

INSTRUCTIONS

When the applicant is a corporation or a municipality, this agreement must have the corporate seal and be attested by the corporation secretary or by the empowered city official, unless a waiver of corporate seal and attestation by the secretary or by the empowered City official is on file in the Raleigh office of the Manager of Right of Way. In the space provided in this agreement for execution, the name of the corporation or municipality shall be typed above the name, and title of all persons signing the agreement should be typed directly below their signature.

When the applicant is not a corporation, then his signature must be witnessed by one person. The address should be included in this agreement and the names of all persons signing the agreement should be typed directly below their signature.

This agreement must be accompanied, in the form of an attachment, by plans or drawings showing the following applicable information:

1. All roadways and ramps.
2. Right of way lines and where applicable, the control of access lines.
3. Location of the existing and/or proposed encroachment.
4. Length, size and type of encroachment.
5. Method of installation.
6. Dimensions showing the distance from the encroachment to edge of pavement, shoulders, etc.
7. Location by highway survey station number. If station number cannot be obtained, location should be shown by distance from some identifiable point, such as a bridge, road, intersection, etc. (To assist in preparation of the encroachment plan, the Department's roadway plans may be seen at the various Highway Division Offices, or at the Raleigh office.)
8. Drainage structures or bridges if affected by encroachment (show vertical and horizontal dimensions from encroachment to nearest part of structure).
9. Method of attachment to drainage structures or bridges.
10. Manhole design.
11. On underground utilities, the depth of bury under all traveled lanes, shoulders, ditches, sidewalks, etc.
12. Length, size and type of encasement where required.
13. On underground crossings, notation as to method of crossing - boring and jacking, open cut, etc.
14. Location of vents.

GENERAL REQUIREMENTS

1. Any attachment to a bridge or other drainage structure must be approved by the Head of Structure Design in Raleigh prior to submission of encroachment agreement to the Division Engineer.
2. All crossings should be as near as possible normal to the centerline of the highway.
3. Minimum vertical clearances of overhead wires and cables above all roadways must conform to clearances set out in the National Electric Safety Code.
4. Encasements shall extend from ditch line to ditch line in cut sections and 5' beyond toe of slopes in fill sections.
5. All vents should be extended to the right of way line or as otherwise required by the Department.
6. All pipe encasements as to material and strength shall meet the standards and specifications of the Department.
7. Any special provisions or specifications as to the performance of the work or the method of construction that may be required by the Department must be shown on a separate sheet attached to encroachment agreement provided that such information cannot be shown on plans or drawings.
8. The Department's Division Engineer should be given notice by the applicant prior to actual starting of installation

HARNETT COUNTY DUNN-ERWIN LANDFILL PROJECT 1

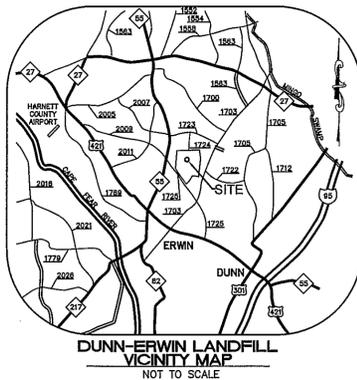
DIVISION 1.1, SANITARY SEWER PUMP STATION AND FORCE MAIN

DIVISION 1.2, GROUNDWATER EXTRACTION SYSTEM

SEPTEMBER 2012



Clayton, Sr., P.E., Inc.
CIVIL & ENVIRONMENTAL ENGINEERING
 46 WEST WASHINGTON STREET
 COATS, NORTH CAROLINA 27521
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DUNN-ERWIN LANDFILL CONTACT PERSON
 RANDY SMITH, SOLID WASTE OPERATIONS MANAGER 440 DANIELS RD 897-3222 OR JERRY BLANCHARD, SOLID WASTE DIRECTOR PO BOX 940 LILLINGTON NC 27546 893-7536



811
 Know what's below.
 Call before you dig.
 North Carolina One-Call Center

CALL NORTH CAROLINA ONE CALL CENTER, 811 OR 800-632-4949, AT LEAST 48 HOURS BEFORE DIGGING OR EXCAVATION TO LOCATE ALL EXISTING UTILITIES.

GENERAL SITE AND CONSTRUCTION NOTES:

- EXISTING UTILITY SERVICES ARE NOT TO BE INTERRUPTED PRIOR TO APPROVAL BY THE PROPERTY OWNER AND ENGINEER. TEMPORARY UTILITY SERVICE SHALL BE AVAILABLE DURING INTERRUPTION. A MINIMUM NOTICE OF 72 HOURS IS REQUIRED PRIOR TO INTERRUPTION. WRITTEN PERMISSION FOR INTERRUPTION MUST BE GIVEN PRIOR TO PROCEEDING.
- ENGINEER DOES NOT GUARANTEE THE ACCURACY OF UTILITIES SHOWN OR THAT ALL UTILITIES ARE SHOWN, ABOVE OR BELOW THE SURFACE. THE CONTRACTOR IS RESPONSIBLE FOR SUBSURFACE UTILITY LOCATION PRIOR TO CONSTRUCTION TO DETERMINE THE EXISTENCE AND/OR EXACT LOCATIONS, BOTH HORIZONTAL AND VERTICAL. CALL "NC ONE CALL" (1-800-632-4949) AT LEAST 48 HOURS PRIOR TO DIGGING OR EXCAVATION, AND CONTACT INDIVIDUAL UTILITY COMPANIES FOR ASSISTANCE IN LOCATION OF UTILITIES.
- CONTRACTOR SHALL VERIFY THE LOCATIONS AND SIZES OF ALL EXISTING FEATURES PRIOR TO CONSTRUCTION. THE ENGINEER SHALL BE IMMEDIATELY NOTIFIED OF ANY DIFFERENCE(S) FROM THAT SHOWN ON THE DRAWINGS. CONTRACTOR SHALL SUBMIT SCALED DRAWING(S) OF THE DIFFERENCE(S) OR FORMERLY UNKNOWN FEATURE(S) TO THE ENGINEER ALONG WITH A WRITTEN REQUEST FOR FURTHER INSTRUCTION AND DIRECTION.
- CONTRACTOR SHALL LOCATE ALL EXISTING UTILITIES PRIOR TO CONSTRUCTION.
- CONTRACTOR SHALL REPAIR ANY DAMAGES TO EXISTING UTILITIES RESULTING FROM CONSTRUCTION ACTIVITIES.
- ANY CONCRETE, ASPHALT, CURB & GUTTER OR OTHER TYPE OF PAVEMENT SHALL BE SAW-CUT AT EXTENT OF REMOVAL PRIOR TO THE REMOVAL. CONCRETE ITEMS SHALL BE SAW-CUT AT THE NEAREST CONTROL JOINT TO THE REMOVAL AREA.
- CONTRACTOR SHALL COORDINATE ANY REQUIRED WORK, RELOCATION, INSTALLATION, OR REMOVAL OF EXISTING UTILITIES WITH THE APPROPRIATE UTILITY COMPANY PRIOR TO THE BEGINNING OF CONSTRUCTION.
- TIE-INS TO EXISTING PAVEMENT SHALL BE FLUSH AND EVEN. WHEN INSTALLING NEW ASPHALT TO EXISTING SURFACES, EXISTING SURFACES SHALL BE COATED WITH ASPHALT SPRAY TACK.
- FINE-GRADE AREAS TO DRAIN TO INTENDED DRAINAGE STRUCTURES IN ORDER TO PREVENT ANY STANDING WATER. IF THERE IS ANY QUESTION ON THE COMPLETION OF THE FINAL GRADING, THE CONTRACTOR SHALL CONTACT THE ENGINEER PRIOR TO CONSTRUCTION.

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FINAL DRAWINGS
 RELEASED FOR BID
 NOT FOR CONSTRUCTION

3	ISSUED FOR BID	9/20/12
2	REVISED PROJECT NAME	8/13/12
1	NC DOT COMMENTS	4/1/11
No.	Revision/Issue	Date

DESIGNED CTC Jr DATE: 1/21/11
 DRAWN WLF CTC PROJ. # 03002B
 CHECKED CTC Jr DWG FILE: 03002B Force Main.dwg
 PROJ. ENG. CTC Jr. P.E.



Clayton, Sr.
 9-21-2012 DATE

GENERAL EROSION AND SEDIMENT CONTROL NOTES

- THESE NOTES APPLY TO ALL WORK DEPICTED BY THIS DRAWING SET.
- AT NO TIME SHALL MORE THAN 7,000 TOTAL LINEAR FEET OF R-O-W AND/OR MORE THAN 0.9 ACRES BE DISTURBED BEFORE THE DISTURBED AREA HAS BEEN MULCHED, SEED, AND ADEQUATELY STABILIZED AT THE DISCRETION OF THE DESIGN ENGINEER. THE CONTRACTOR SHALL EMPLOY ALL NECESSARY MEANS TO CONTROL EROSION AND SEDIMENT AS SPECIFIED IN SECTION 31 25 00 OF THE PROJECT DOCUMENTS AT NO ADDITIONAL COST TO THE OWNER. DETAILS FOR INDIVIDUAL PRACTICES CAN BE FOUND IN THE NCDENR E & S CONTROL PLANNING & DESIGN MANUAL, AVAILABLE ON THE INTERNET AT http://www.dir.enr.state.nc.us/pages/sedimentation_new.html.
- IF EXISTING DITCHES ARE RE-GRADED DUE TO TRENCHING ACTIVITIES, ROCK CHECK DAMS SHALL BE INSTALLED.
- UPON SITE STABILIZATION AND APPROVAL FROM THE ENGINEER, TEMPORARY PRACTICES SHALL BE REMOVED.

RESTORATION NOTES

- UPON COMPLETION OF CONSTRUCTION AND INSTALLATION, CONDITIONS SHALL BE EQUAL TO OR BETTER THAN PRE-INSTALLATION CONDITIONS.
- ALL DRIVEWAYS, SIDEWALKS, PAVEMENT, ETC. SHALL BE SAW-CUT PRIOR TO REMOVAL FOR WATER LINE INSTALLATION. ALL DRIVEWAYS, SIDEWALKS, PAVEMENT, ROADS, ETC. SHALL BE REPAIRED TO EQUAL OR BETTER CONDITIONS.
- ALL DISTURBED AREAS SHALL BE PROPERLY STABILIZED WITH ADEQUATE MULCH, SEED/VEGETATION, AND SOIL AMENDMENTS.
- RESTORATION IS CONSIDERED PART OF THE WORK AND IS NOT AN ADDITIONAL PAY ITEM.

HCDPU REQUIRED UTILITY NOTES REVISED MARCH 2012

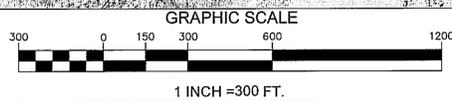
SANITARY SEWER
 A. THE PROFESSIONAL ENGINEER (PE) SHALL OBTAIN AND SUPPLY A COPY OF THE SEWER PERMIT FOR THE CONSTRUCTION AND OPERATION OF THE WASTEWATER COLLECTION SYSTEM TO THE UTILITY CONTRACTOR BEFORE THE CONSTRUCTION OF THE SANITARY SEWER LINE, SEWER LIFT STATION AND ASSOCIATED FORCE MAIN SHALL BEGIN. THE UTILITY CONTRACTOR MUST POST A COPY OF THE SEWER PERMIT ISSUED BY THE NORTH CAROLINA DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES - DIVISION OF WATER QUALITY (NCDENR-DWQ) ON SITE PRIOR TO THE START OF CONSTRUCTION. THE PERMIT MUST BE MAINTAINED ON SITE DURING THE CONSTRUCTION OF THE SEWER SYSTEM IMPROVEMENTS.
 B. THE UTILITY CONTRACTOR SHALL NOTIFY HARNETT COUNTY DEPARTMENT OF PUBLIC UTILITIES (HCDPU) AND THE PROFESSIONAL ENGINEER (PE) AT LEAST TWO DAYS PRIOR TO CONSTRUCTION COMMENCING. THE UTILITY CONTRACTOR MUST SCHEDULE A PRE-CONSTRUCTION CONFERENCE WITH MR. ALAN MOSS, HCDPU UTILITY CONSTRUCTION INSPECTOR AT LEAST TWO (2) DAYS BEFORE CONSTRUCTION WILL BEGIN AND THE UTILITY CONTRACTOR MUST COORDINATE WITH HCDPU FOR REGULAR INSPECTION VISITATIONS AND ACCEPTANCE OF THE WASTEWATER SYSTEM(S). CONSTRUCTION WORK SHALL BE PERFORMED ONLY DURING THE NORMAL WORKING HOURS OF HCDPU WHICH IS 8:00 AM - 5:00 PM MONDAY THROUGH FRIDAY. HOLIDAY AND WEEKEND WORK IS NOT PERMITTED BY HCDPU.
 C. THE PROFESSIONAL ENGINEER (PE) SHALL PROVIDE HCDPU WITH A SET OF NCDENR APPROVED PLANS MARKED "RELEASED FOR CONSTRUCTION" AT LEAST TWO DAYS PRIOR TO CONSTRUCTION COMMENCING. HCDPU WILL STAMP THE APPROVED PLANS AS "RELEASED FOR CONSTRUCTION" AND PROVIDE COPIES TO THE UTILITY CONTRACTOR. THE PROFESSIONAL LAND SURVEYOR (PLS) SHALL STAKE OUT ALL LOT CORNERS AND ESTABLISH GRADE STAKES FOR THE PROPOSED FINISH GRADE FOR EACH STREET AND SEWER LINE BEFORE THE UTILITY CONTRACTOR BEGINS CONSTRUCTION OR INSTALLATION OF THE MANHOLES, SANITARY SEWER GRAVITY LINE(S), SEWER LIFT STATIONS AND/OR SANITARY SEWER FORCE MAIN(S). THE GRADE STAKES SHOULD BE SET WITH A CONSISTENT OFFSET FROM THE STREET CENTERLINE SO AS NOT TO INTERFERE WITH THE STREET GRADING OR UTILITY CONSTRUCTION.
 D. THE UTILITY CONTRACTOR SHALL PROVIDE THE HCDPU UTILITY CONSTRUCTION INSPECTOR WITH MATERIAL SUBMITTALS AND SHOP DRAWINGS FOR ALL PROJECT MATERIALS PRIOR TO THE CONSTRUCTION OF ANY GRAVITY SEWER LINE(S), MANHOLE(S).
 SEWER LIFT STATION(S) AND ASSOCIATED FORCE MAIN(S) IN HARNETT COUNTY. THE MATERIALS TO BE USED ON THE PROJECT MUST MEET THE ESTABLISHED SPECIFICATIONS OF HCDPU AND BE APPROVED BY THE ENGINEER OF RECORD PRIOR TO CONSTRUCTION. ALL SUBSTANDARD MATERIALS OR MATERIALS NOT APPROVED FOR USE IN HARNETT COUNTY FOUND ON THE PROJECT SITE MUST BE REMOVED IMMEDIATELY WHEN NOTIFIED BY THE HCDPU UTILITY CONSTRUCTION INSPECTOR.
 E. THE SANITARY SEWER LATERAL CONNECTIONS SHOULD BE INSTALLED 90° (PERPENDICULAR) TO THE SANITARY SEWER GRAVITY LINES WITH SCHEDULE 40 PVC PIPE. HCDPU REQUIRES THE UTILITY CONTRACTOR TO PROVIDE THE PROFESSIONAL ENGINEER (PE) WITH ACCURATE MEASUREMENTS FOR LOCATING SANITARY SEWER SERVICE LATERAL AND ASSOCIATED SANITARY SEWER CLEAN-OUT. THESE MEASUREMENTS SHOULD BE TAKEN FROM THE NEAREST DOWNSTREAM MANHOLE UP ALONG THE SANITARY SEWER MAIN TO THE IN-LINE WYE FITTING (OR TAPPING SADDLE) AND THEN ANOTHER MEASUREMENT FROM THE IN-LINE WYE FITTING (OR TAPPING SADDLE) TO THE 4" X 4" LONG SWEEP COMBINATION WYE FITTING AT THE BOTTOM OF THE SEWER CLEAN-OUT STACK. THESE FIELD MEASUREMENTS MUST BE PROVIDED TO THE PROFESSIONAL ENGINEER (PE) IN THE RED LINE DRAWINGS FROM THE UTILITY CONTRACTOR FOR PROPER DOCUMENTATION IN THE AS-BUILT RECORD DRAWINGS SUBMITTED TO HCDPU.
 F. THE UTILITY CONTRACTOR SHALL BE RESPONSIBLE TO LOCATE THE NEWLY INSTALLED SANITARY SEWER GRAVITY LINE(S), SANITARY SEWER FORCE MAIN(S), SANITARY SEWER SERVICE LATERAL(S) AND ALL ASSOCIATED SEWER CLEAN-OUT(S) IN THE PROPOSED SANITARY SEWER SYSTEM FOR OTHER UTILITY COMPANIES AND THEIR CONTRACTORS UNTIL THE NEW SANITARY SEWER LINE(S) AND ASSOCIATED APPURTENANCES HAVE BEEN APPROVED BY THE NORTH CAROLINA DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES - DIVISION OF WATER QUALITY (NCDENR-DWQ) AND ACCEPTED BY HCDPU.
 ALL NEW SANITARY SEWER LINES MUST HAVE AT LEAST THREE (3 FT.) FEET OF COVER AND EXTEND UNDER ALL EXISTING WATER MAIN AND STORM WATER LINES WITH A LEAST 24" OF VERTICAL CLEARANCE BELOW THE BOTTOM OF THE EXISTING WATER MAIN AND STORM WATER LINES.
 G. THE SANITARY SEWER GRAVITY LINE(S), MANHOLE(S), SANITARY SEWER SERVICE LATERAL(S) AND ASSOCIATED CLEAN-OUT(S) SHALL BE CONSTRUCTED IN STRICT ACCORDANCE WITH THE STANDARD SPECIFICATIONS OF THE HARNETT COUNTY DEPARTMENT OF PUBLIC UTILITIES. THE SANITARY SEWER GRAVITY LINE(S) MUST PNEUMATICALLY PRESSURE TESTED WITH COMPRESSED AIR AT 5 PSI AND THE SANITARY SEWER FORCE MAIN(S) MUST HYDROSTATICALLY PRESSURE TESTED WITH WATER OR AIR AT 200 PSI AND WITNESSED BY THE HCDPU UTILITY CONSTRUCTION INSPECTOR.
 H. PRIOR TO ACCEPTANCE, ALL SEWER SERVICE LATERALS WILL BE INSPECTED TO INSURE THAT THEY ARE INSTALLED AT THE PROPER DEPTH. ALL SEWER CLEAN-OUTS MUST BE INSTALLED SO THE 4" X 4" LONG SWEEP COMBINATION WYE IS AT LEAST THREE (3') FEET BUT NO MORE THAN FOUR (4') FEET BELOW THE FINISH GRADE UNLESS OTHERWISE APPROVED IN WRITING BY HCDPU. THE SEWER CLEANOUTS SHALL HAVE A FOUR (4") SCHEDULE 40 PVC PIPE STUBBED UP FROM BOTH ENDS OF THE 4" X 4" LONG SWEEP COMBINATION WYE TO BE AT LEAST TWO (2') FEET ABOVE THE FINISH GRADE AND COVER EACH END WITH A FOUR (4") INCH TEMPORARY CAP TO KEEP OUT DIRT, SAND, ROCKS, WATER AND CONSTRUCTION DEBRIS. THE VERTICAL STACK ON EACH CLEAN-OUT MUST BE PROVIDED WITH A CONCRETE DONUT FOR PROTECTION.
 I. ONCE THE SANITARY SEWER GRAVITY LINE(S) HAVE BEEN INSTALLED, PNEUMATICALLY PRESSURE TESTED AND IN PLACE FOR AT LEAST 30 DAYS, THE UTILITY CONTRACTOR MUST CONTACT THE HCDPU UTILITY CONSTRUCTION INSPECTOR TO WITNESS THE MANDREL TEST ON EACH PVC SANITARY SEWER GRAVITY LINE. THE UTILITY CONTRACTOR WILL NOTIFY HCDPU TO SCHEDULE THE MANDREL TESTING. THE MANDREL AND PROVING RING MUST BE SUPPLIED BY THE UTILITY CONTRACTOR.
 CLOSED CIRCUIT VIDEO CAMERA INSPECTIONS (AT THE UTILITY CONTRACTOR'S EXPENSE) MAY BE REQUIRED BY THE HCDPU UTILITY CONSTRUCTION INSPECTOR IF THE MANDREL TESTING CANNOT BE COMPLETED WITH SATISFACTORY RESULTS.
 THE SANITARY SEWER LINES SHOULD BE FLUSHED CLEAN USING A SEWER BALL OF THE PROPER DIAMETER BEFORE ANY MANDREL TESTING CAN BE PERFORMED. THE UTILITY CONTRACTOR IS RESPONSIBLE TO REMOVE ALL DIRT, SAND, SILT, GRAVEL, MUD AND DEBRIS FROM THE NEWLY CONSTRUCTED SEWER LINES EXERCISING CARE TO KEEP THE HARNETT COUNTY'S EXISTING SANITARY SEWER SYSTEMS CLEAN. SANITARY SEWER FORCE MAIN(S) SHALL BE PRESSURE TESTED TO 200 PSI FOR AT LEAST 2 HOURS LIKE WATER LINES.
 J. THE UTILITY CONTRACTOR SHALL BE RESPONSIBLE TO LOCATE THE NEWLY INSTALLED SANITARY SEWER SYSTEM(S) FOR

OTHER UTILITY COMPANIES AND THEIR CONTRACTORS UNTIL THE NEW SANITARY SEWER SYSTEM(S) HAVE BEEN APPROVED BY THE NORTH CAROLINA DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES - DIVISION OF WATER QUALITY (NCDENR-DWQ) AND ACCEPTED BY HCDPU.
 K. HCDPU REQUIRES THAT THE UTILITY CONTRACTOR INSTALL TRACER WIRE IN THE TRENCH WITH ALL SANITARY SEWER FORCE MAINS. THE TRACER WIRE SHALL BE 12 GA. INSULATED, SOLID COPPER CONDUCTOR AND IT SHALL BE TERMINATED AT THE TOP OF THE VALVE BOXES OR MANHOLES. NO SPLICED WIRE CONNECTIONS SHALL BE MADE UNDERGROUND ON TRACER WIRE INSTALLED IN HARNETT COUNTY. THE TRACER WIRE MAY BE SECURED WITH DUCT TAPE TO THE TOP OF THE PIPE BEFORE BACKFILLING. THE TRACER WIRE IS NOT REQUIRED FOR THE GRAVITY SEWER LINE(S) BETWEEN MANHOLES.
 L. THE UTILITY CONTRACTOR SHALL PROVIDE THE PROFESSIONAL ENGINEER (PE) AND HCDPU UTILITY CONSTRUCTION INSPECTOR WITH A SET OF RED LINE DRAWINGS IDENTIFYING THE COMPLETE SEWER SYSTEM INSTALLED FOR EACH PROJECT. THE RED LINE DRAWINGS SHOULD IDENTIFY THE MATERIALS, PIPE SIZES AND APPROXIMATE DEPTHS OF THE SEWER LINES AS WELL AS THE INSTALLED LOCATIONS OF THE MANHOLE(S), SANITARY SEWER GRAVITY LINE(S), SANITARY SEWER SERVICE LATERALS, CLEAN-OUTS, SEWER LIFT STATION(S) AND ASSOCIATED FORCE MAIN(S). THE RED LINE DRAWINGS SHOULD CLEARLY IDENTIFY ANY DEVIATIONS FROM THE NCDENR APPROVED PLANS. ALL CHANGE ORDERS MUST BE APPROVED BY HCDPU AND THE PROFESSIONAL ENGINEER (PE) IN WRITING AND PROPERLY DOCUMENTED IN THE RED LINE FIELD DRAWINGS.
 M. PRIOR TO THE COMMENCEMENT OF ANY WORK WITHIN ESTABLISHED UTILITY EASEMENTS OR NCDOT RIGHT-OF-WAYS THE UTILITY CONTRACTOR IS REQUIRED TO NOTIFY ALL CONCERNED UTILITY COMPANIES IN ACCORDANCE WITH G.S. 87-102. THE UTILITY CONTRACTOR MUST CALL THE NC ONE CALL CENTER AT 811 OR (800) 632-4949 TO VERIFY THE LOCATION OF EXISTING UTILITIES PRIOR TO THE BEGINNING OF CONSTRUCTION. EXISTING UTILITIES SHOWN IN THESE PLANS ARE TAKEN FROM MAPS FURNISHED BY VARIOUS UTILITY COMPANIES AND HAVE NOT BEEN PHYSICALLY LOCATED BY THE P.E. (I.E. TELEPHONE, CABLE, WATER, SEWER, ELECTRICAL POWER, FIBER OPTIC, NATURAL GAS, ETC.).
 N. THE UTILITY CONTRACTOR SHALL SPOT DIG TO EXPOSE EACH EXISTING UTILITY PIPE OR LINE WHICH MAY CONFLICT WITH CONSTRUCTION OF PROPOSED SANITARY SEWER LINE EXTENSIONS WELL IN ADVANCE TO VERIFY LOCATIONS OF THE EXISTING UTILITIES. THE UTILITY CONTRACTOR SHALL PROVIDE BOTH HORIZONTAL AND VERTICAL CLEARANCES TO THE PROFESSIONAL ENGINEER (PE) TO ALLOW THE PE TO ADJUST THE SANITARY SEWER LINE DESIGN IN ORDER TO AVOID CONFLICTS WITH EXISTING UNDERGROUND UTILITIES. THE UTILITY CONTRACTOR SHALL COORDINATE WITH THE UTILITY OWNER AND BE RESPONSIBLE FOR TEMPORARY RELOCATION OF EXISTING UTILITIES AND/OR SECURING EXISTING UTILITY POLES, PIPES, WIRES, CABLES, SIGNS AND/OR UTILITIES INCLUDING SERVICES IN ACCORDANCE WITH THE UTILITY OWNER'S REQUIREMENTS DURING SANITARY SEWER LINE INSTALLATION, GRADING AND STREET CONSTRUCTION.
 O. WHEN MAKING A TAP ON AN EXISTING SEWER FORCE MAIN, THE UTILITY CONTRACTOR MUST HAVE A PERMIT FROM THE NORTH CAROLINA DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES - DIVISION OF WATER QUALITY (NCDENR-DWQ) TO BEGIN THE TAP WORK. THE UTILITY CONTRACTOR SHALL CONDUCT A PNEUMATIC PRESSURE TEST USING COMPRESSED AIR OR OTHER INERT GAS ON THE STAINLESS STEEL TAPPING SLEEVE AND GATE VALVE PRIOR TO MAKING THE TAP ON AN EXISTING SANITARY SEWER FORCE MAIN. THIS PNEUMATIC PRESSURE TEST MUST BE WITNESSED BY THE HCDPU UTILITY CONSTRUCTION INSPECTOR. THE UTILITY CONTRACTOR SHALL USE ROMAC BRAND STAINLESS STEEL TAPPING SLEEVES (S) OR APPROVED EQUAL FOR ALL TAPS MADE ON SANITARY SEWER FORCE MAINS IN HARNETT COUNTY. THE UTILITY CONTRACTOR SHALL USE ROMAC BRAND STYLE "CB" SEWER SADDLES WITH STAINLESS STEEL BANDS OR APPROVED EQUAL FOR ALL TAPS MADE ON EXISTING SANITARY SEWER GRAVITY LINES IN HARNETT COUNTY.
 P. THE UTILITY CONTRACTOR SHALL PROVIDE A GREASE TRAP FOR EACH SANITARY SEWER SERVICE LATERAL THAT WILL BE CONNECTED TO A RESTAURANT, FOOD PROCESSING FACILITY AND ANY OTHER COMMERCIAL OR INDUSTRIAL FACILITY AS REQUIRED BY THE HARNETT COUNTY FAT, OIL & GREASE ORDINANCE. THE GREASE TRAP MUST BE RATED FOR A MINIMUM CAPACITY OF AT LEAST 1,000 GALLONS UNLESS OTHERWISE APPROVED IN WRITING BY THE HCDPU PRE-TREATMENT COORDINATOR. GARBAGE DISPOSALS SHOULD NOT BE INSTALLED IN HOMES AND BUSINESSES THAT DISCHARGE WASTEWATER TO THE HARNETT COUNTY SANITARY SEWER SYSTEM AS THEY ARE NOT APPROVED BY HCDPU.
 Q. EACH SEWER LIFT STATION MUST BE PROVIDED WITH THREE PHASE POWER (AT LEAST 480 VOLTS) AND CONSTRUCTED TO MEET THE MINIMUM REQUIREMENTS OF THE LATEST VERSION OF THE NATIONAL ELECTRICAL CODE (NEC) AND HARNETT COUNTY STANDARD SPECIFICATIONS AND DETAILS. IF THREE PHASE POWER IS NOT AVAILABLE FROM THE POWER COMPANY OTHER ARRANGEMENTS MUST BE APPROVED BY HCDPU ENGINEERING PRIOR TO THE START OF CONSTRUCTION.
 R. WHERE A NEW SANITARY SEWER FORCE MAIN IS CONNECTED TO AN EXISTING MANHOLE IN THE HARNETT COUNTY SEWER COLLECTIONS SYSTEM, THE UTILITY CONTRACTOR MUST PROVIDE A PROTECTIVE COATING (COAL TAR EPOXY) FOR THE INTERIOR SURFACES OF THE MANHOLE TO PROTECT IT AGAINST CORROSION, EROSION AND DETERIORATION FROM THE RELEASE OF SEWER GASES SUCH AS METHANE AND HYDROGEN SULFIDE.
 S. THE SEWER LIFT STATION DESIGN AND ASSOCIATED EQUIPMENT MUST MEET OR EXCEED THE MINIMUM REQUIREMENTS FOR HARNETT COUNTY SEWER LIFT STATIONS 2009 EDITION. EACH SANITARY SEWER LIFT STATION MUST BE CONSTRUCTED WITH AN ALL-WEATHER ACCESS ROAD THAT IS AT LEAST 20 FEET WIDE. THE LIFT STATION SITE MUST BE COVERED WITH WEED BLOCKING MATERIAL AND AT LEAST SIX (6") INCHES OF # 57 STONE (CRUSH AND RUN).
 T. ONCE A SEWER LIFT STATION HAS BEEN INSTALLED, THE UTILITY CONTRACTOR IS RESPONSIBLE TO SCHEDULE A DRAW DOWN TEST WITH HCDPU ENGINEERING AND COLLECTIONS STAFF, THE PROFESSIONAL ENGINEER (PE), THE ELECTRICIAN, THE ORIGINAL EQUIPMENT MANUFACTURER'S (OEM) REPRESENTATIVES (FOR BOTH THE PUMPS AND THE GENERATOR). THIS DRAW DOWN TEST MUST BE COMPLETED WITH POWER SUPPLIED FROM THE ELECTRICAL UTILITY COMPANY AND WITH POWER

CONTRACTOR SHALL USE ROMAC BRAND STYLE "CB" SEWER SADDLES WITH STAINLESS STEEL BANDS OR APPROVED EQUAL FOR ALL TAPS MADE ON EXISTING SANITARY SEWER GRAVITY LINES IN HARNETT COUNTY.
 P. THE UTILITY CONTRACTOR SHALL PROVIDE A GREASE TRAP FOR EACH SANITARY SEWER SERVICE LATERAL THAT WILL BE CONNECTED TO A RESTAURANT, FOOD PROCESSING FACILITY AND ANY OTHER COMMERCIAL OR INDUSTRIAL FACILITY AS REQUIRED BY THE HARNETT COUNTY FAT, OIL & GREASE ORDINANCE. THE GREASE TRAP MUST BE RATED FOR A MINIMUM CAPACITY OF AT LEAST 1,000 GALLONS UNLESS OTHERWISE APPROVED IN WRITING BY THE HCDPU PRE-TREATMENT COORDINATOR. GARBAGE DISPOSALS SHOULD NOT BE INSTALLED IN HOMES AND BUSINESSES THAT DISCHARGE WASTEWATER TO THE HARNETT COUNTY SANITARY SEWER SYSTEM AS THEY ARE NOT APPROVED BY HCDPU.
 Q. EACH SEWER LIFT STATION MUST BE PROVIDED WITH THREE PHASE POWER (AT LEAST 480 VOLTS) AND CONSTRUCTED TO MEET THE MINIMUM REQUIREMENTS OF THE LATEST VERSION OF THE NATIONAL ELECTRICAL CODE (NEC) AND HARNETT COUNTY STANDARD SPECIFICATIONS AND DETAILS. IF THREE PHASE POWER IS NOT AVAILABLE FROM THE POWER COMPANY OTHER ARRANGEMENTS MUST BE APPROVED BY HCDPU ENGINEERING PRIOR TO THE START OF CONSTRUCTION.
 R. WHERE A NEW SANITARY SEWER FORCE MAIN IS CONNECTED TO AN EXISTING MANHOLE IN THE HARNETT COUNTY SEWER COLLECTIONS SYSTEM, THE UTILITY CONTRACTOR MUST PROVIDE A PROTECTIVE COATING (COAL TAR EPOXY) FOR THE INTERIOR SURFACES OF THE MANHOLE TO PROTECT IT AGAINST CORROSION, EROSION AND DETERIORATION FROM THE RELEASE OF SEWER GASES SUCH AS METHANE AND HYDROGEN SULFIDE.
 S. THE SEWER LIFT STATION DESIGN AND ASSOCIATED EQUIPMENT MUST MEET OR EXCEED THE MINIMUM REQUIREMENTS FOR HARNETT COUNTY SEWER LIFT STATIONS 2009 EDITION. EACH SANITARY SEWER LIFT STATION MUST BE CONSTRUCTED WITH AN ALL-WEATHER ACCESS ROAD THAT IS AT LEAST 20 FEET WIDE. THE LIFT STATION SITE MUST BE COVERED WITH WEED BLOCKING MATERIAL AND AT LEAST SIX (6") INCHES OF # 57 STONE (CRUSH AND RUN).
 T. ONCE A SEWER LIFT STATION HAS BEEN INSTALLED, THE UTILITY CONTRACTOR IS RESPONSIBLE TO SCHEDULE A DRAW DOWN TEST WITH HCDPU ENGINEERING AND COLLECTIONS STAFF, THE PROFESSIONAL ENGINEER (PE), THE ELECTRICIAN, THE ORIGINAL EQUIPMENT MANUFACTURER'S (OEM) REPRESENTATIVES (FOR BOTH THE PUMPS AND THE GENERATOR). THIS DRAW DOWN TEST MUST BE COMPLETED WITH POWER SUPPLIED FROM THE ELECTRICAL UTILITY COMPANY AND WITH POWER

CONTRACTOR SHALL USE ROMAC BRAND STYLE "CB" SEWER SADDLES WITH STAINLESS STEEL BANDS OR APPROVED EQUAL FOR ALL TAPS MADE ON EXISTING SANITARY SEWER GRAVITY LINES IN HARNETT COUNTY.
 P. THE UTILITY CONTRACTOR SHALL PROVIDE A GREASE TRAP FOR EACH SANITARY SEWER SERVICE LATERAL THAT WILL BE CONNECTED TO A RESTAURANT, FOOD PROCESSING FACILITY AND ANY OTHER COMMERCIAL OR INDUSTRIAL FACILITY AS REQUIRED BY THE HARNETT COUNTY FAT, OIL & GREASE ORDINANCE. THE GREASE TRAP MUST BE RATED FOR A MINIMUM CAPACITY OF AT LEAST 1,000 GALLONS UNLESS OTHERWISE APPROVED IN WRITING BY THE HCDPU PRE-TREATMENT COORDINATOR. GARBAGE DISPOSALS SHOULD NOT BE INSTALLED IN HOMES AND BUSINESSES THAT DISCHARGE WASTEWATER TO THE HARNETT COUNTY SANITARY SEWER SYSTEM AS THEY ARE NOT APPROVED BY HCDPU.
 Q. EACH SEWER LIFT STATION MUST BE PROVIDED WITH THREE PHASE POWER (AT LEAST 480 VOLTS) AND CONSTRUCTED TO MEET THE MINIMUM REQUIREMENTS OF THE LATEST VERSION OF THE NATIONAL ELECTRICAL CODE (NEC) AND HARNETT COUNTY STANDARD SPECIFICATIONS AND DETAILS. IF THREE PHASE POWER IS NOT AVAILABLE FROM THE POWER COMPANY OTHER ARRANGEMENTS MUST BE APPROVED BY HCDPU ENGINEERING PRIOR TO THE START OF CONSTRUCTION.
 R. WHERE A NEW SANITARY SEWER FORCE MAIN IS CONNECTED TO AN EXISTING MANHOLE IN THE HARNETT COUNTY SEWER COLLECTIONS SYSTEM, THE UTILITY CONTRACTOR MUST PROVIDE A PROTECTIVE COATING (COAL TAR EPOXY) FOR THE INTERIOR SURFACES OF THE MANHOLE TO PROTECT IT AGAINST CORROSION, EROSION AND DETERIORATION FROM THE RELEASE OF SEWER GASES SUCH AS METHANE AND HYDROGEN SULFIDE.
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 T. ONCE A SEWER LIFT STATION HAS BEEN INSTALLED, THE UTILITY CONTRACTOR IS RESPONSIBLE TO SCHEDULE A DRAW DOWN TEST WITH HCDPU ENGINEERING AND COLLECTIONS STAFF, THE PROFESSIONAL ENGINEER (PE), THE ELECTRICIAN, THE ORIGINAL EQUIPMENT MANUFACTURER'S (OEM) REPRESENTATIVES (FOR BOTH THE PUMPS AND THE GENERATOR). THIS DRAW DOWN TEST MUST BE COMPLETED WITH POWER SUPPLIED FROM THE ELECTRICAL UTILITY COMPANY AND WITH POWER

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General Notes

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No.	Revision/Issue	Date
2	ISSUED FOR BID	9/20/12
1	REVISED PROJECT NAME	8/13/12



C. Travis Clayton
Signature
9-21-2012
Date



**HARNETT COUNTY
DUNN-ERWIN LANDFILL
PROJECT 1**

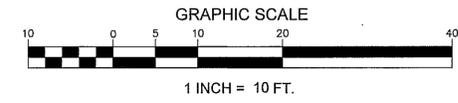
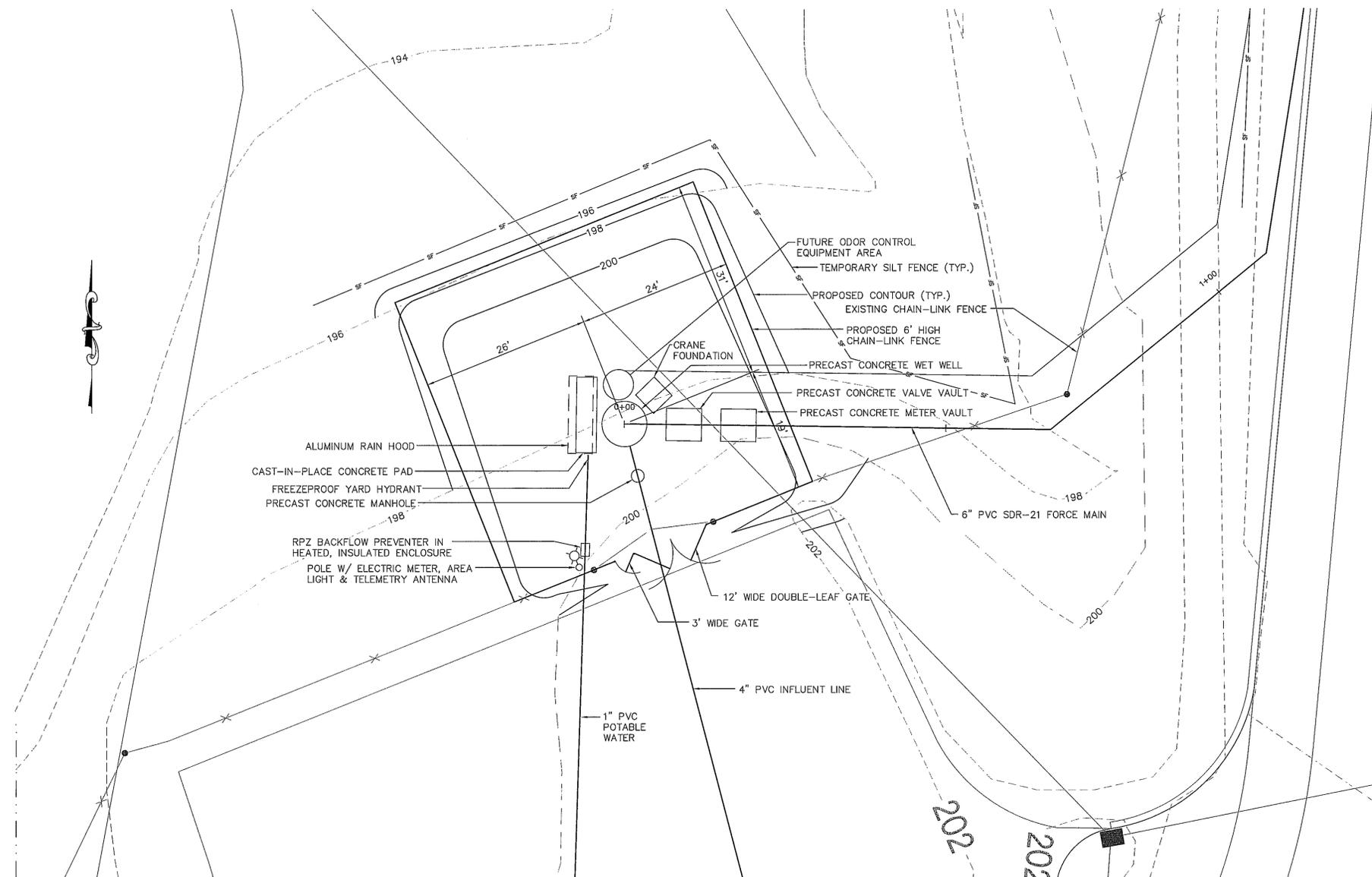
HARNETT COUNTY, NORTH CAROLINA

Project No:	03002B	File Name:	03002B Force Main.dwg
Designed By:	CTC Jr.	Drawn By:	WLF
Checked By:	CTC Jr.	Proj. Eng.:	CTC Jr.

Sheet Title	
OVERALL PLAN	
Date	1/20/11
Scale	1" = 300'
Sheet	1.1.1
OF 16	

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General Notes

1. GRADE PUMP STATION SITE TO SLOPE AWAY FROM THE WET WELL AT 1/2" PER FOOT FOR 20 FT.
2. COVER SUBGRADE WITH WEED BLOCK FABRIC AND 8" OF A.B.C. STONE COMPACTED TO 90% STANDARD PROCTOR EXTENDING 1 FOOT BEYOND FENCE.
3. FURNISH AND DELIVER TO OWNER A STENNER MODEL 85M5 PUMP AND 500 GALLON POLYETHYLENE TANK FOR FUTURE ODOR CONTROL.
4. PROVIDE SIGN ON GATE PER HARNETT COUNTY DEPT. OF PUBLIC UTILITIES SPECIFICATIONS.
5. MODIFICATIONS TO PUMP STATION LAYOUT MUST BE APPROVED BY ENGINEER PRIOR TO INSTALLATION.

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2	ISSUED FOR BID	9/20/12
1	REVISED PROJECT NAME	8/13/12
No.	Revision/Issue	Date



C. T. Clayton
Signature
Date
9-21-2012



**HARNETT COUNTY
DUNN-ERWIN LANDFILL
PROJECT 1**

HARNETT COUNTY, NORTH CAROLINA

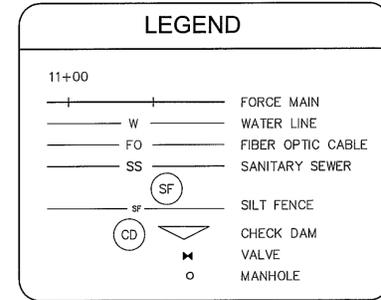
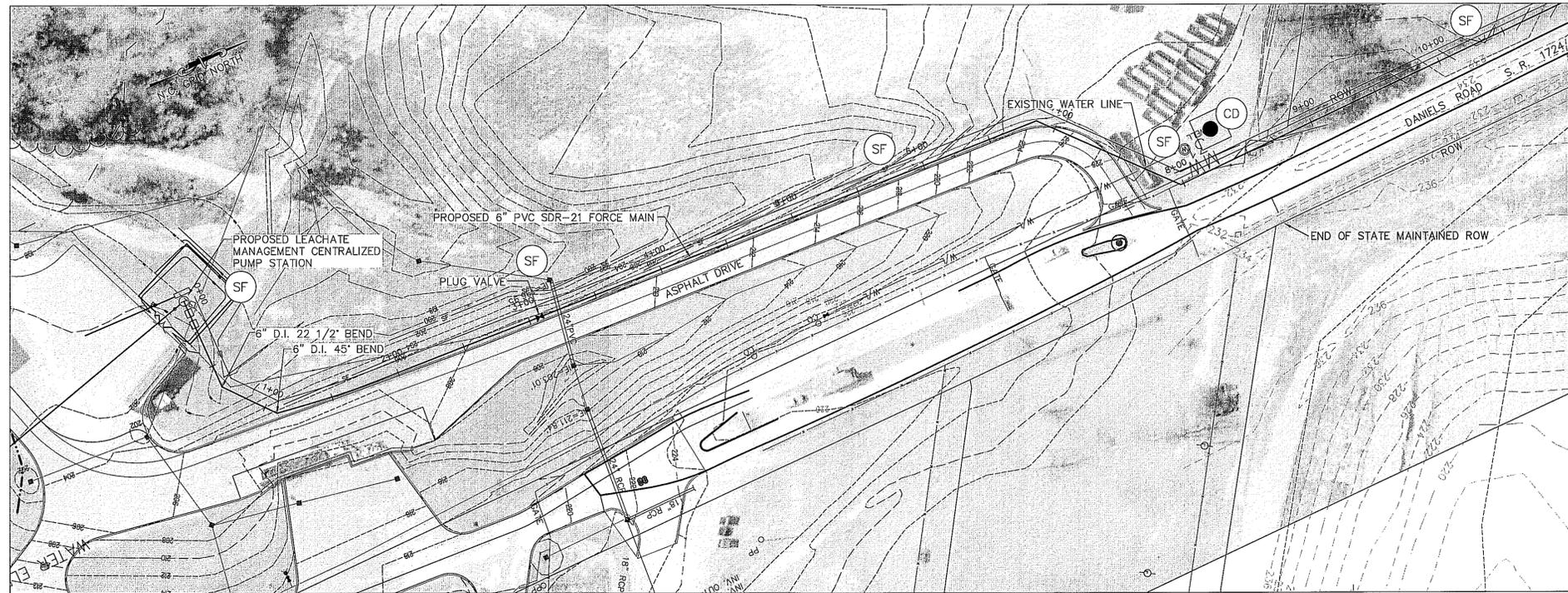
Project No:	03002B	File Name:	03002 Force Main.dwg
Designed By:	CTC Jr.	Drawn By:	WLF
Checked By:	CTC Jr.	Proj. Eng.:	CTC Jr.

Sheet No.	CENTRALIZED LEACHATE MGMT. PUMP STATION SITE PLAN	
Date	1/20/10	Sheet
Scale	1" = 10'	1.1.2 OF 16

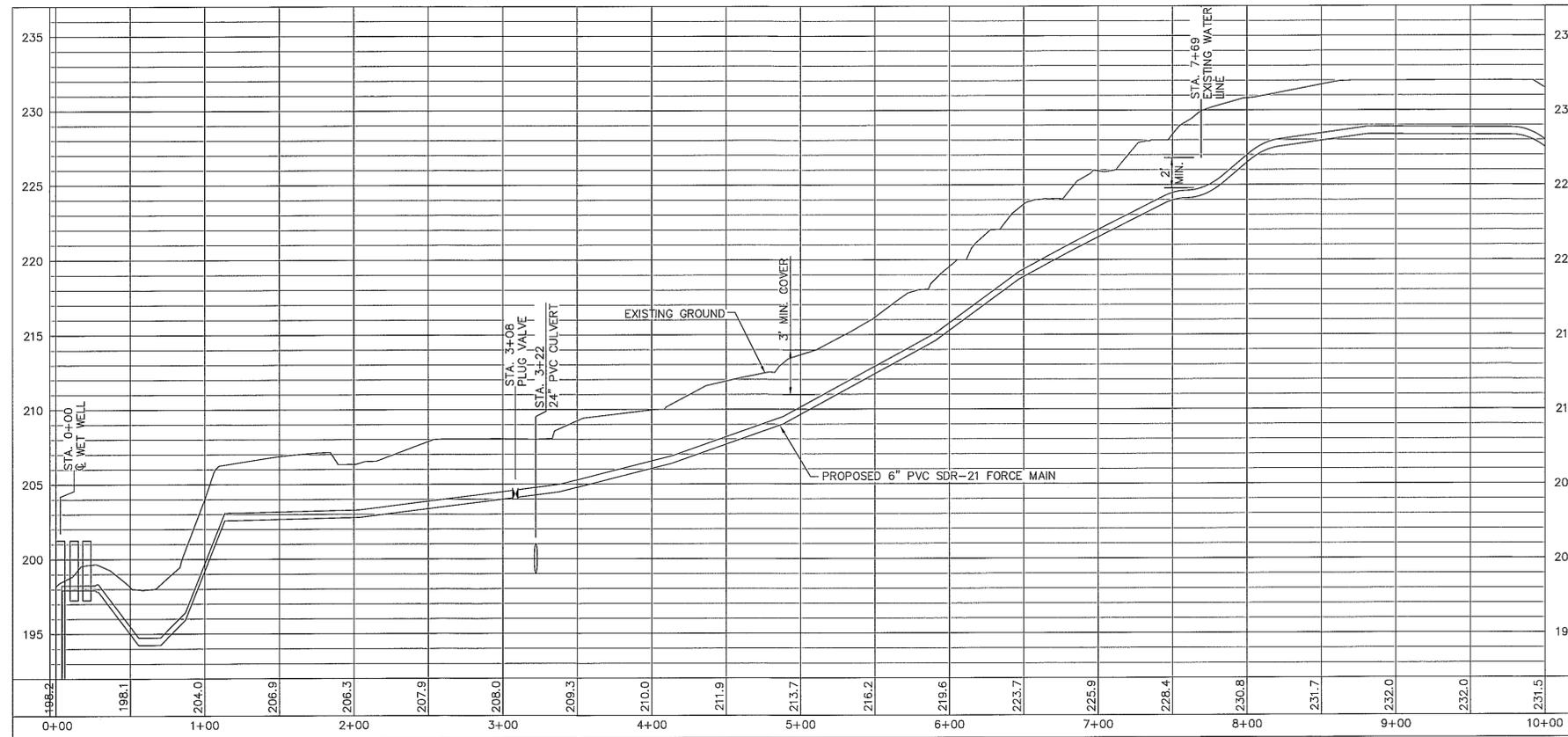
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General Notes

- FORCE MAIN TO BE LOCATED 5 FEET FROM EDGE OF ROAD RIGHT-OF-WAY.



PLAN
SCALE: 1" = 50'



PROFILE
HORIZONTAL SCALE: 1" = 50'
VERTICAL SCALE: 1" = 5'

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No.	Revision/Issue	Date
3	ISSUED FOR BID	9/20/12
2	REVISED PROJECT NAME	8/13/12
1	NCDOT COMMENTS	4/1/11



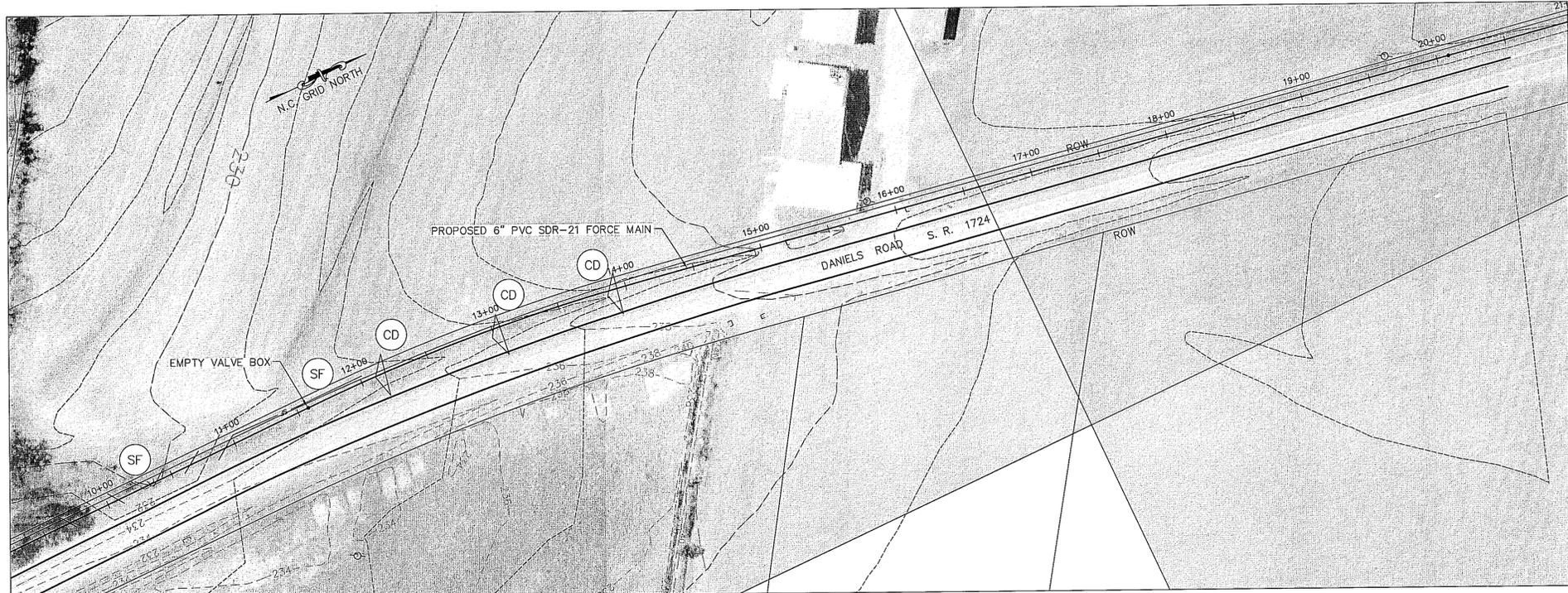
C. T. Clayton, Sr.
Signature
Date: 9-21-2012



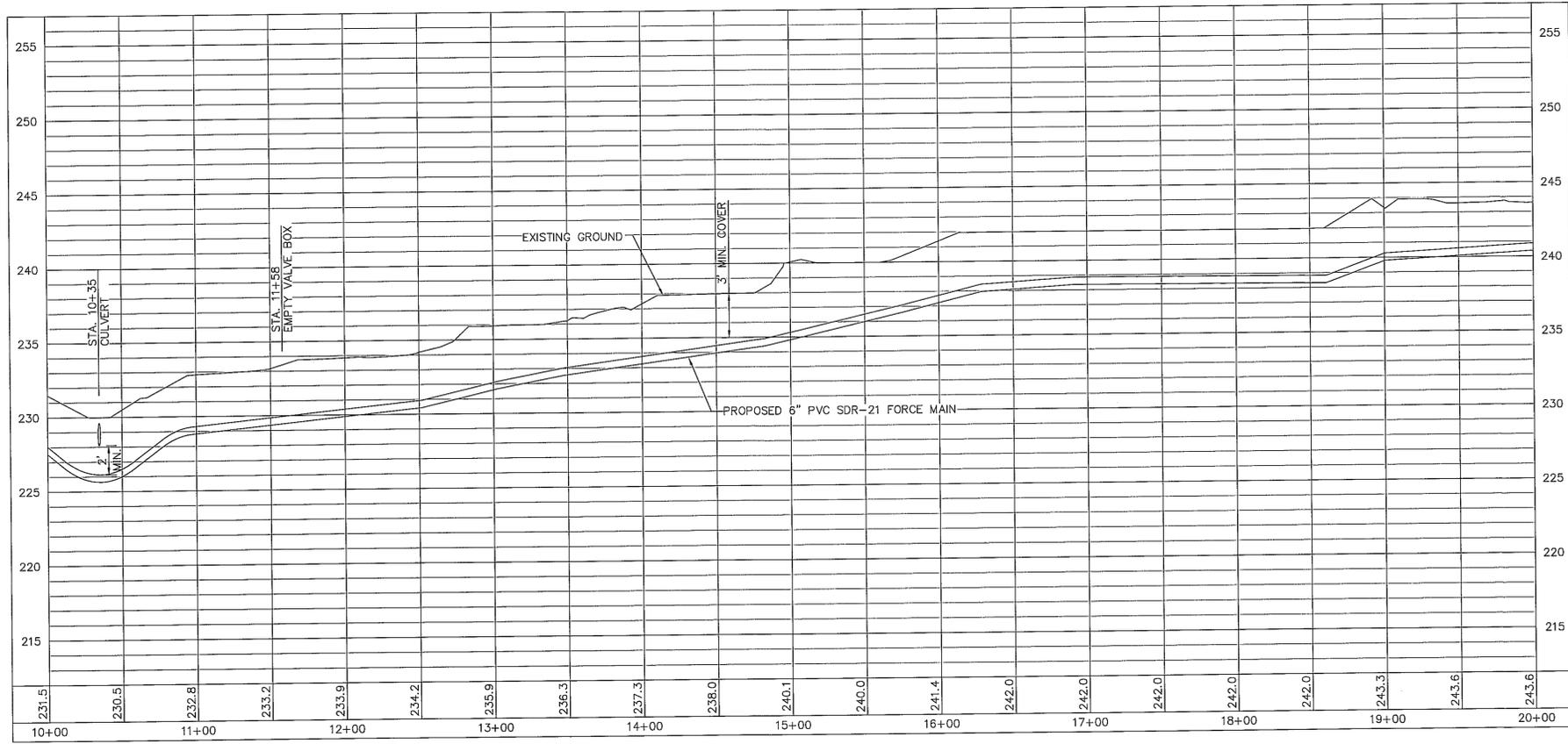
**HARNETT COUNTY
DUNN-ERWIN LANDFILL
PROJECT 1**

HARNETT COUNTY, NORTH CAROLINA	
Project No: 03002B	File Name: 03002B Force Main.dwg
Designed By: CTC Jr.	Drawn By: WLF
Checked By: CTC Jr.	Proj. Eng.: CTC Jr.

Sheet Title: FORCE MAIN PLAN & PROFILE, STA. 0+00 - STA. 10+00	
Date: 1/20/11	Sheet: 1.1.3
Scale: AS NOTED	OF 16



PLAN
SCALE: 1" = 50'
0 50 100



PROFILE
HORIZONTAL SCALE: 1" = 50'
VERTICAL SCALE: 1" = 5'

LEGEND	
11+00	FORCE MAIN
— W —	WATER LINE
— FO —	FIBER OPTIC CABLE
— SS —	SANITARY SEWER
(SF)	SILT FENCE
(CD)	CHECK DAM
▽	VALVE
○	MANHOLE

General Notes
1. FORCE MAIN TO BE LOCATED 5 FEET FROM EDGE OF ROAD RIGHT-OF-WAY.

FINAL DRAWINGS
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No.	Revision/Issue	Date
3	ISSUED FOR BID	9/20/12
2	REVISED PROJECT NAME	8/13/12
1	NCDOT COMMENTS	4/1/11

Professional Engineer Seal for Travis Clayton, License No. 028809, dated 9-21-2012.

Clayton, Sr., P.E., Inc.
CIVIL & ENVIRONMENTAL ENGINEERING
46 WEST WASHINGTON STREET
COATS, NORTH CAROLINA, 27521
PHONE: 910-897-7070 FAX: 910-897-0787
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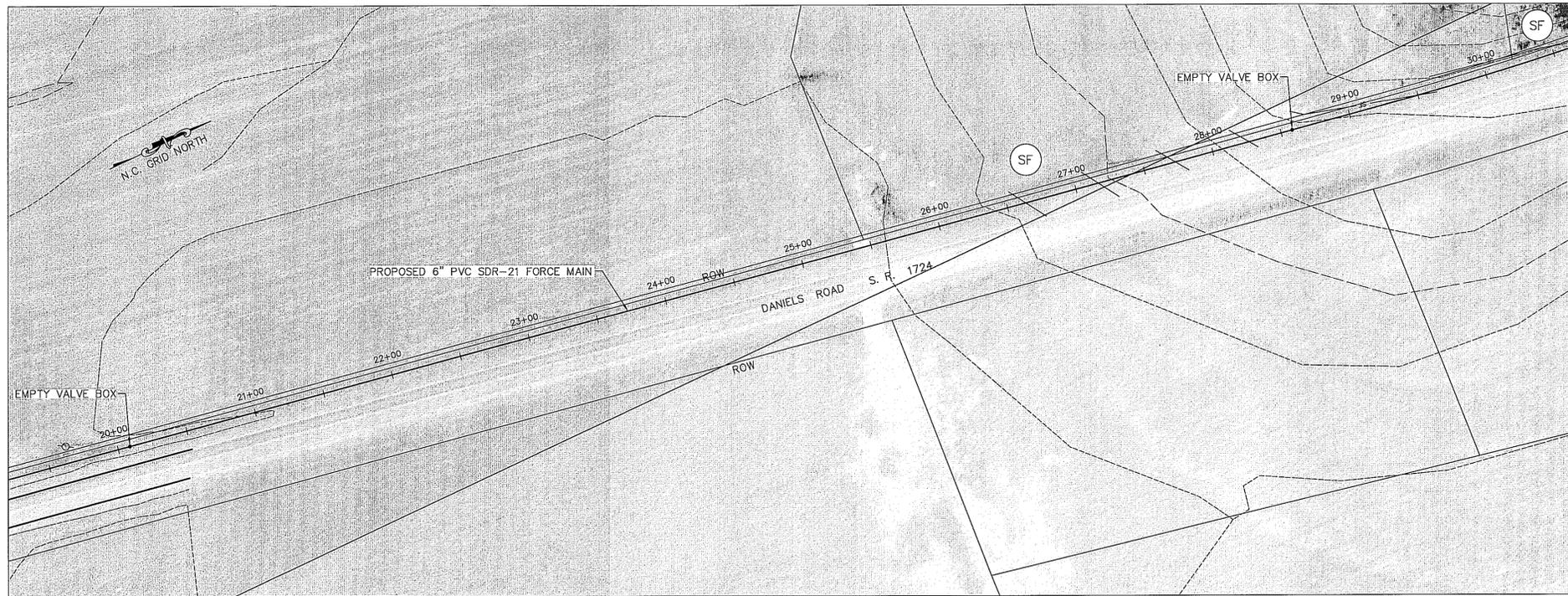
**HARNETT COUNTY
DUNN-ERWIN LANDFILL
PROJECT 1**
HARNETT COUNTY, NORTH CAROLINA

Project No:	03002B	File Name:	03002B Force Main.dwg
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Checked By:	CTC Jr.	Proj. Eng.:	CTC Jr.

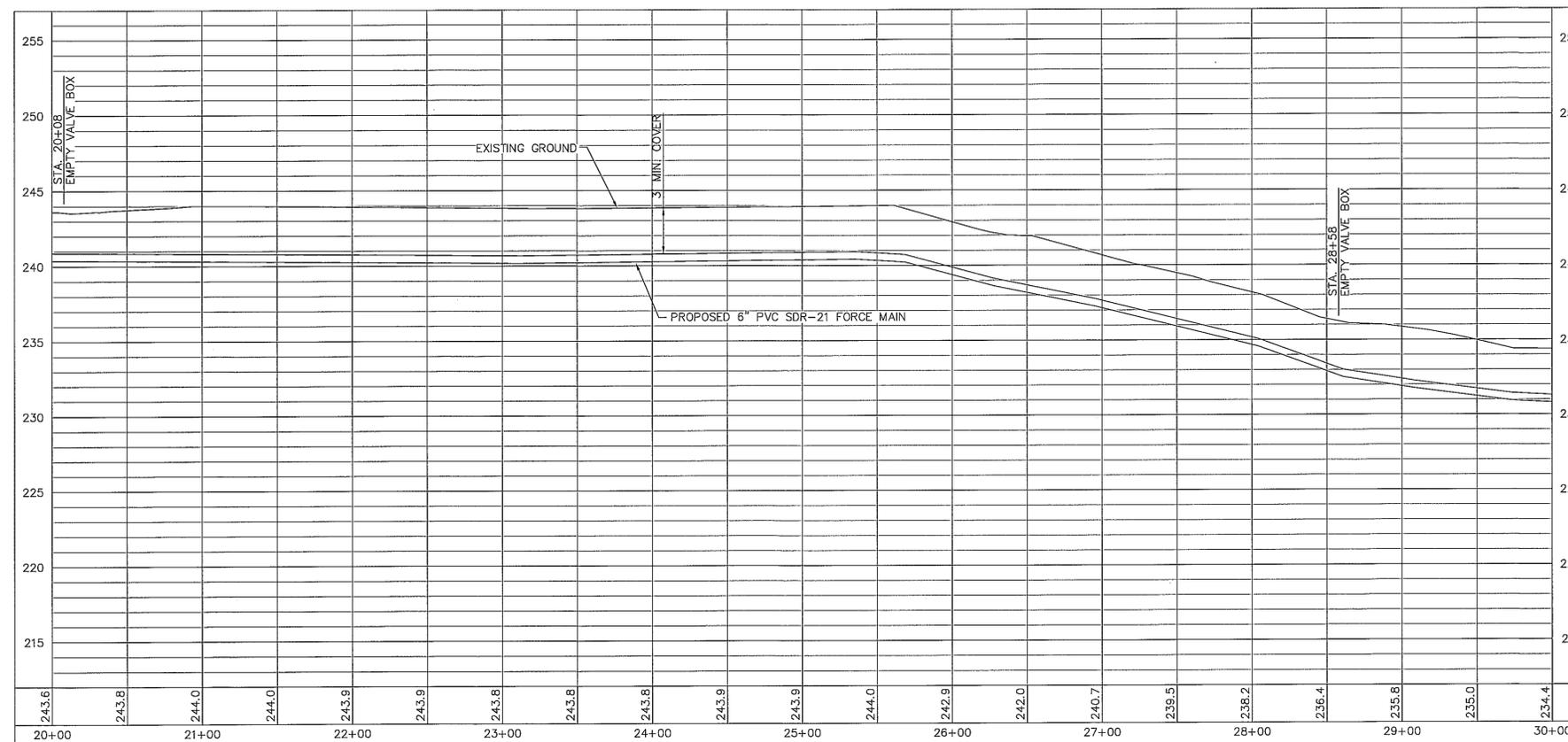
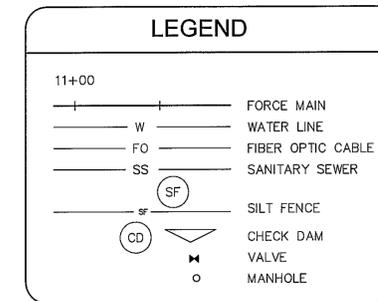
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Date	1/20/11	Sheet
Scale	AS NOTED	OF 16

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PLAN
SCALE: 1" = 50'



PROFILE
HORIZONTAL SCALE: 1" = 50'
VERTICAL SCALE: 1" = 5'

General Notes

- FORCE MAIN TO BE LOCATED 5 FEET FROM EDGE OF ROAD RIGHT-OF-WAY.

FINAL DRAWINGS
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No.	Revision/Issue	Date
3	ISSUED FOR BID	9/20/12
2	REVISED PROJECT NAME	8/13/12
1	NCDOT COMMENTS	4/1/11

Professional Engineer Seal for C. T. Clayton, Sr., P.E., No. 028909. Signature and date 9-21-2012.

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CIVIL & ENVIRONMENTAL ENGINEERING
46 WEST WASHINGTON STREET
COATS, NORTH CAROLINA 27821
PHONE: 910-897-7070 FAX: 910-897-8787
License No. C-2370 www.ctclayton.com

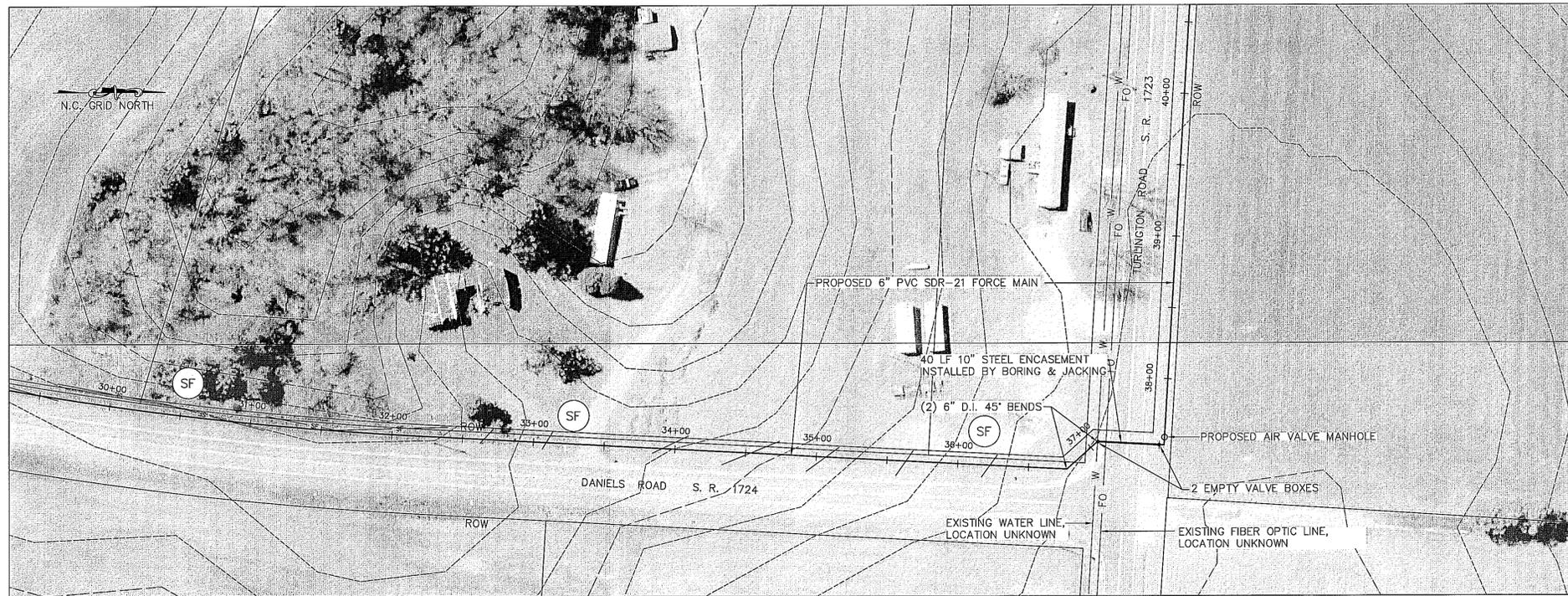
**HARNETT COUNTY
DUNN-ERWIN LANDFILL
PROJECT 1**

HARNETT COUNTY, NORTH CAROLINA

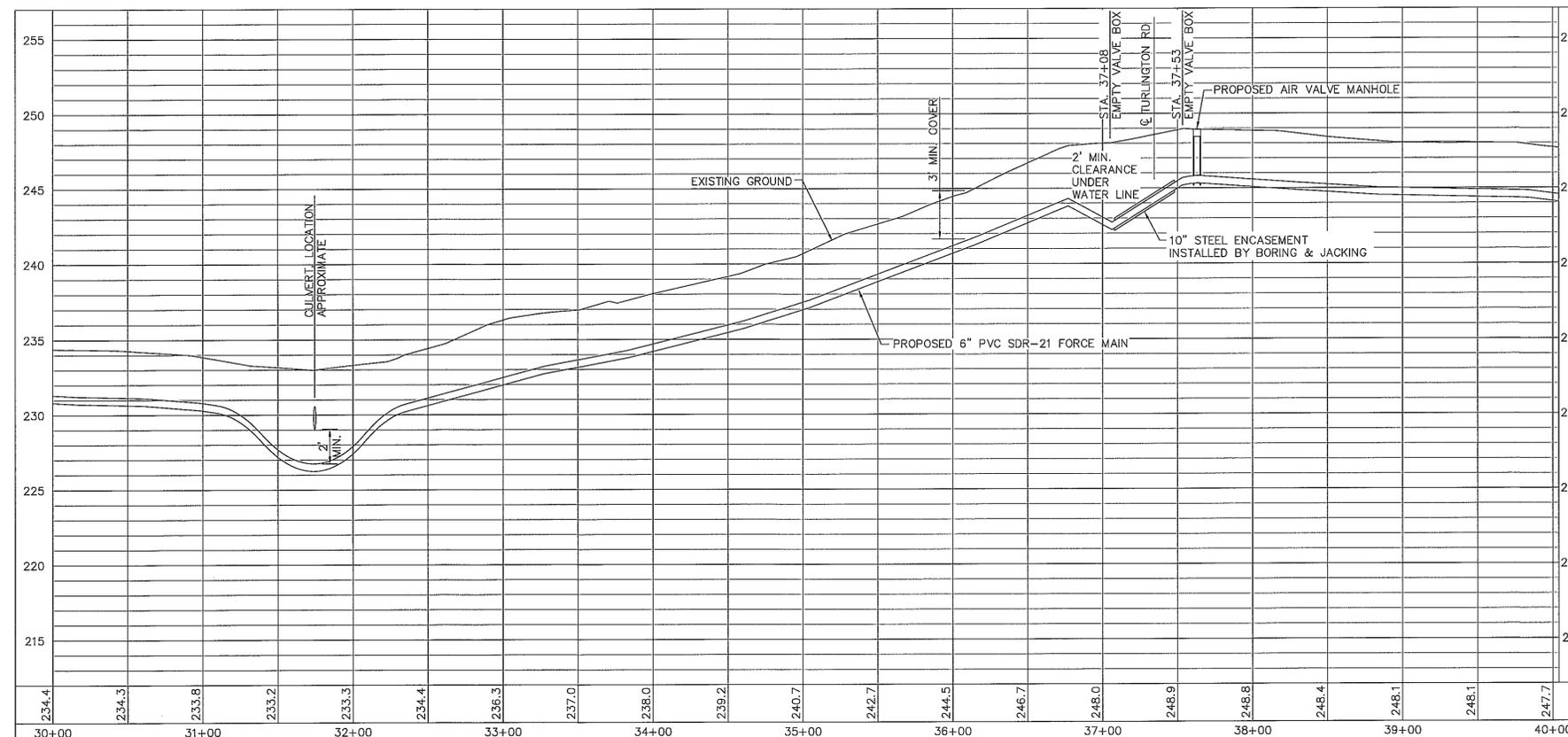
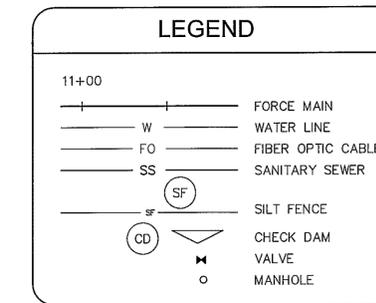
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Designed By:	CTC Jr.	Drawn By:	WLF
Checked By:	CTC Jr.	Proj Eng.:	CTC Jr.

Sheet Title: **FORCE MAIN PLAN & PROFILE, STA. 20+00 - STA. 30+00**

Date:	1/20/11	Sheet:	1.15
Scale:	AS NOTED	OF 16	



PLAN
SCALE: 1" = 50'
0 50 100



PROFILE
HORIZONTAL SCALE: 1" = 50'
VERTICAL SCALE: 1" = 5'

General Notes

- FORCE MAIN TO BE LOCATED 5 FEET FROM EDGE OF ROAD RIGHT-OF-WAY.

FINAL DRAWINGS
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No.	Revision/Issue	Date
3	ISSUED FOR BID	9/20/12
2	REVISED PROJECT NAME	8/13/12
1	NCDOT COMMENTS	4/1/11

Professional Engineer Seal for Trus Clayton, Jr., License No. 028909, dated 9-21-2012.

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48 WEST WASHINGTON STREET
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License No. C-2570 www.cclayton.com

**HARNETT COUNTY
DUNN-ERWIN LANDFILL
PROJECT 1**

HARNETT COUNTY, NORTH CAROLINA

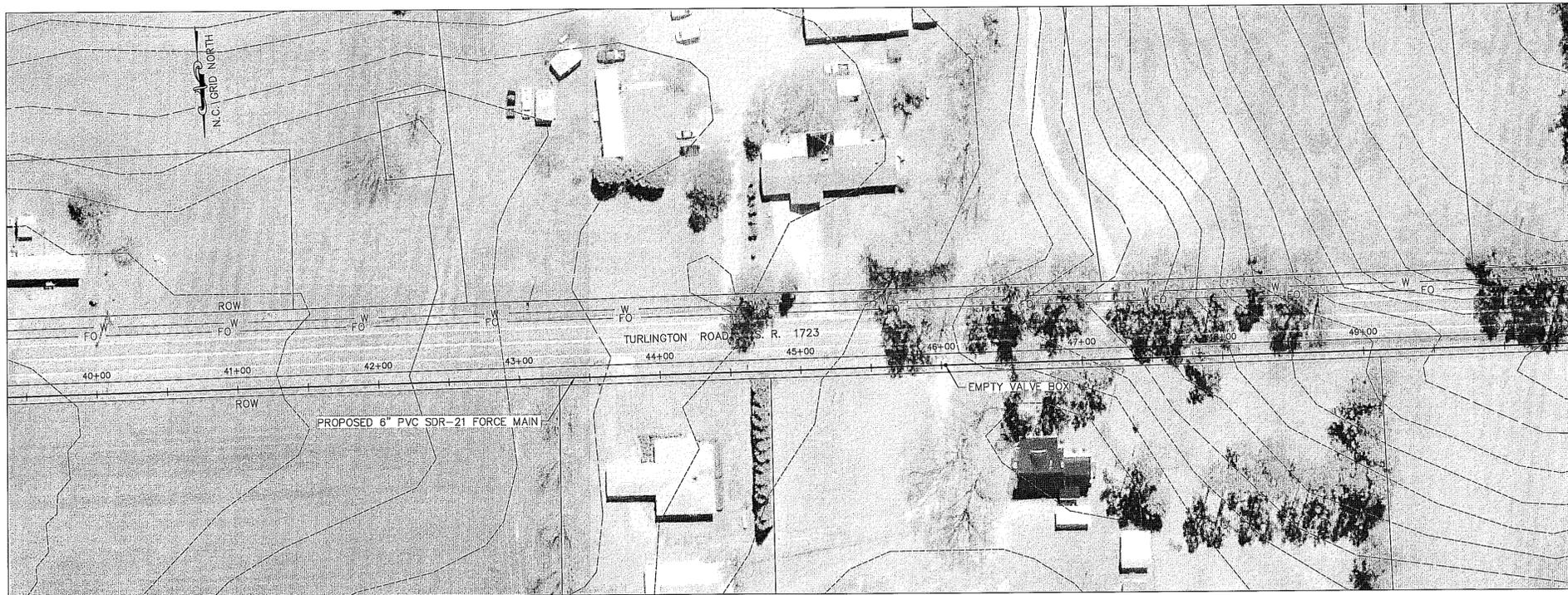
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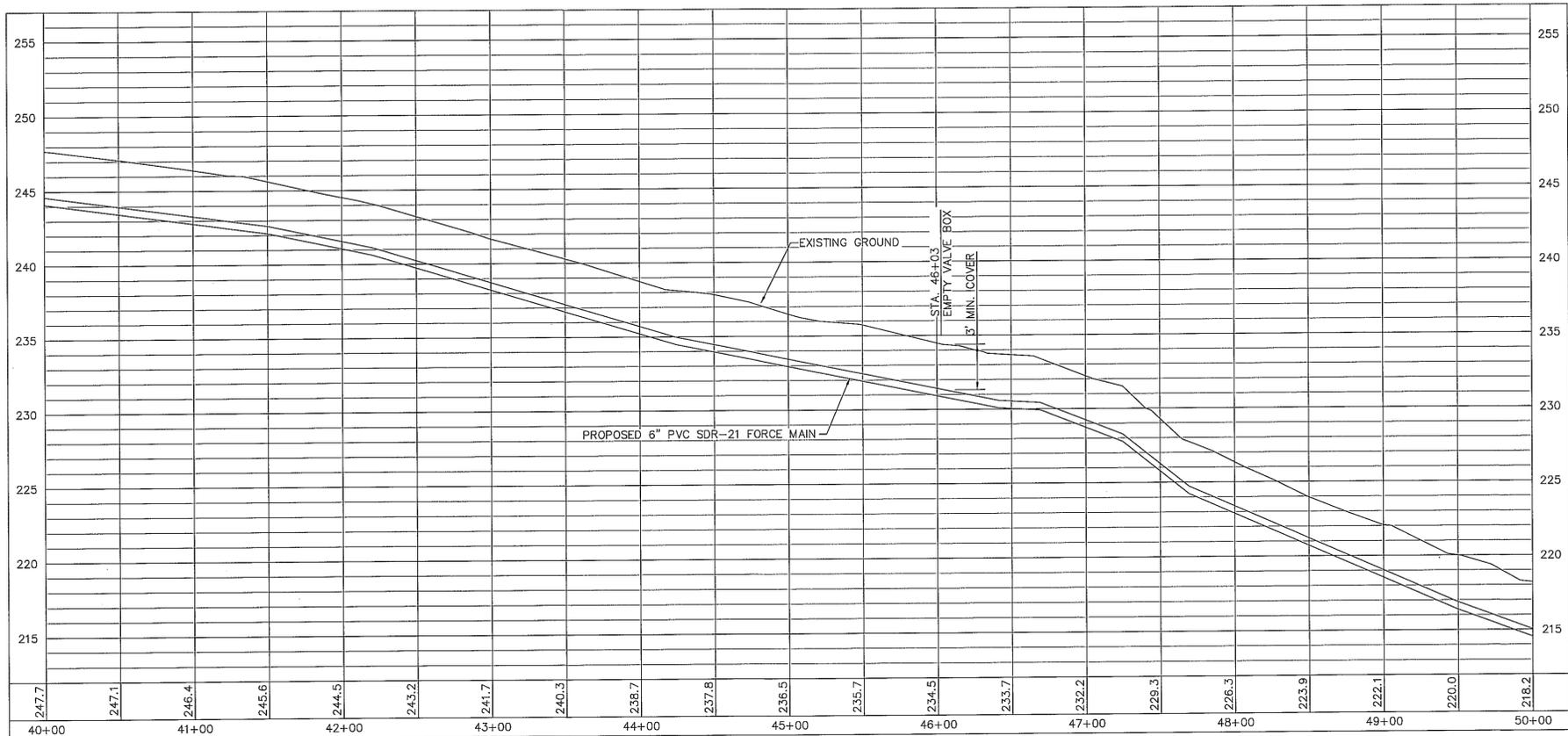
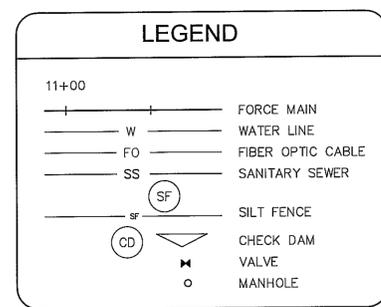
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General Notes

- FORCE MAIN TO BE LOCATED 5 FEET FROM EDGE OF ROAD RIGHT-OF-WAY.



PLAN
SCALE: 1" = 50'
0 50 100



PROFILE
HORIZONTAL SCALE: 1" = 50'
VERTICAL SCALE: 1" = 5'

FINAL DRAWINGS
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No.	Revision/Issue	Date
3	ISSUED FOR BID	9/20/12
2	REVISED PROJECT NAME	8/13/12
1	NCDOT COMMENTS	4/1/11



C. Travis Clayton
Signature
9-21-2012
Date



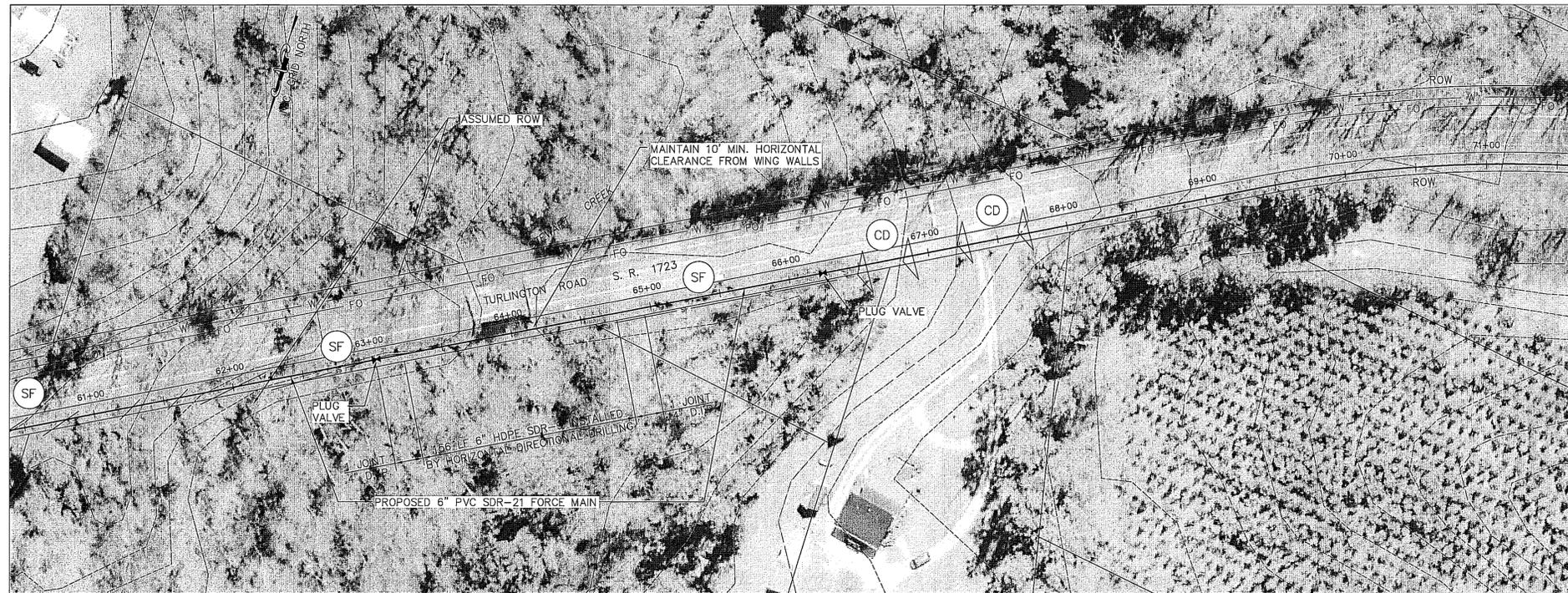
**HARNETT COUNTY
DUNN-ERWIN LANDFILL
PROJECT 1**

HARNETT COUNTY, NORTH CAROLINA

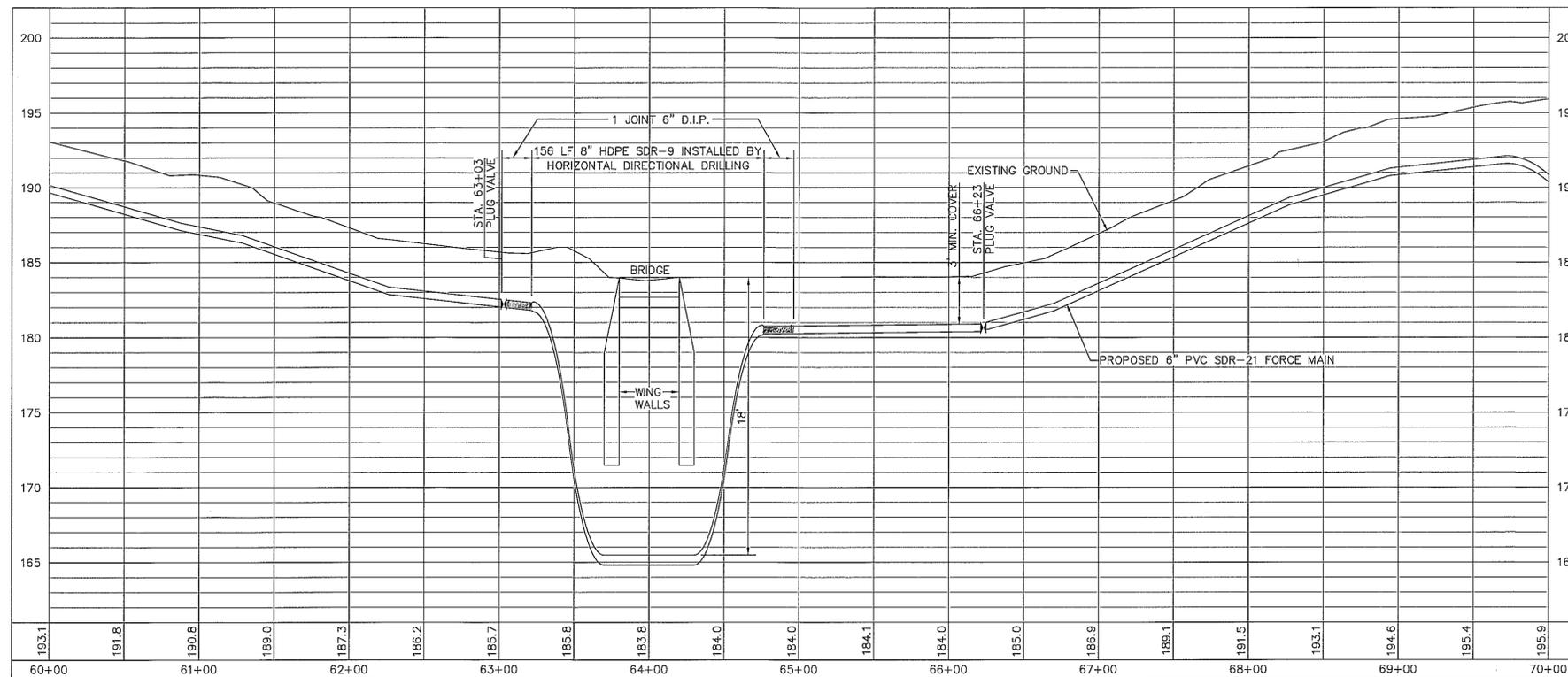
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Designed By:	CTC Jr.	Drawn By:	WLF
Checked By:	CTC Jr.	Proj. Eng.:	CTC Jr.

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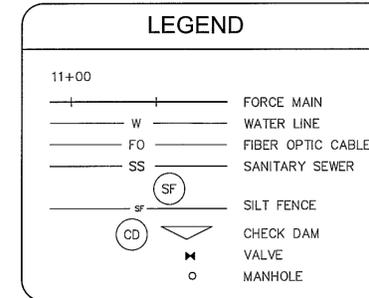
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Scale:	AS NOTED		OF 16



PLAN
SCALE: 1" = 50'
0 50 100



PROFILE
HORIZONTAL SCALE: 1" = 50'
VERTICAL SCALE: 1" = 5'



General Notes

1. FORCE MAIN TO BE LOCATED 5 FEET FROM EDGE OF ROAD RIGHT-OF-WAY.

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3	ISSUED FOR BID	9/20/12
2	REVISED PROJECT NAME	8/13/12
1	NCDOT COMMENTS	4/1/11
No.	Revision/Issue	Date



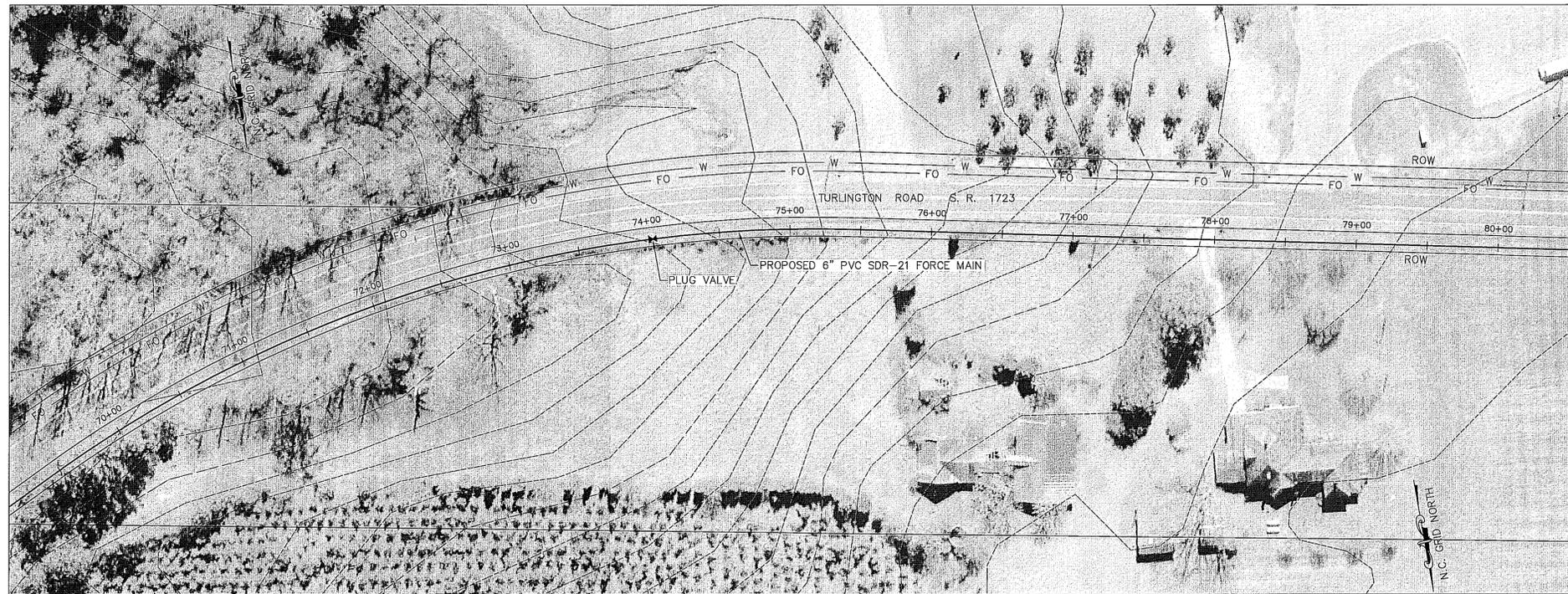
Signature: *Trus Clayton, Jr.*
Date: 9-21-2012



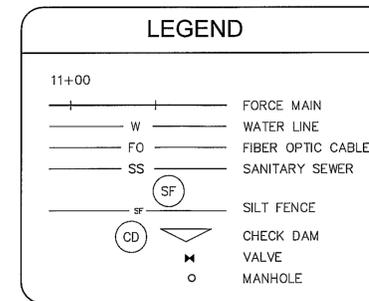
**HARNETT COUNTY
DUNN-ERWIN LANDFILL
PROJECT 1**

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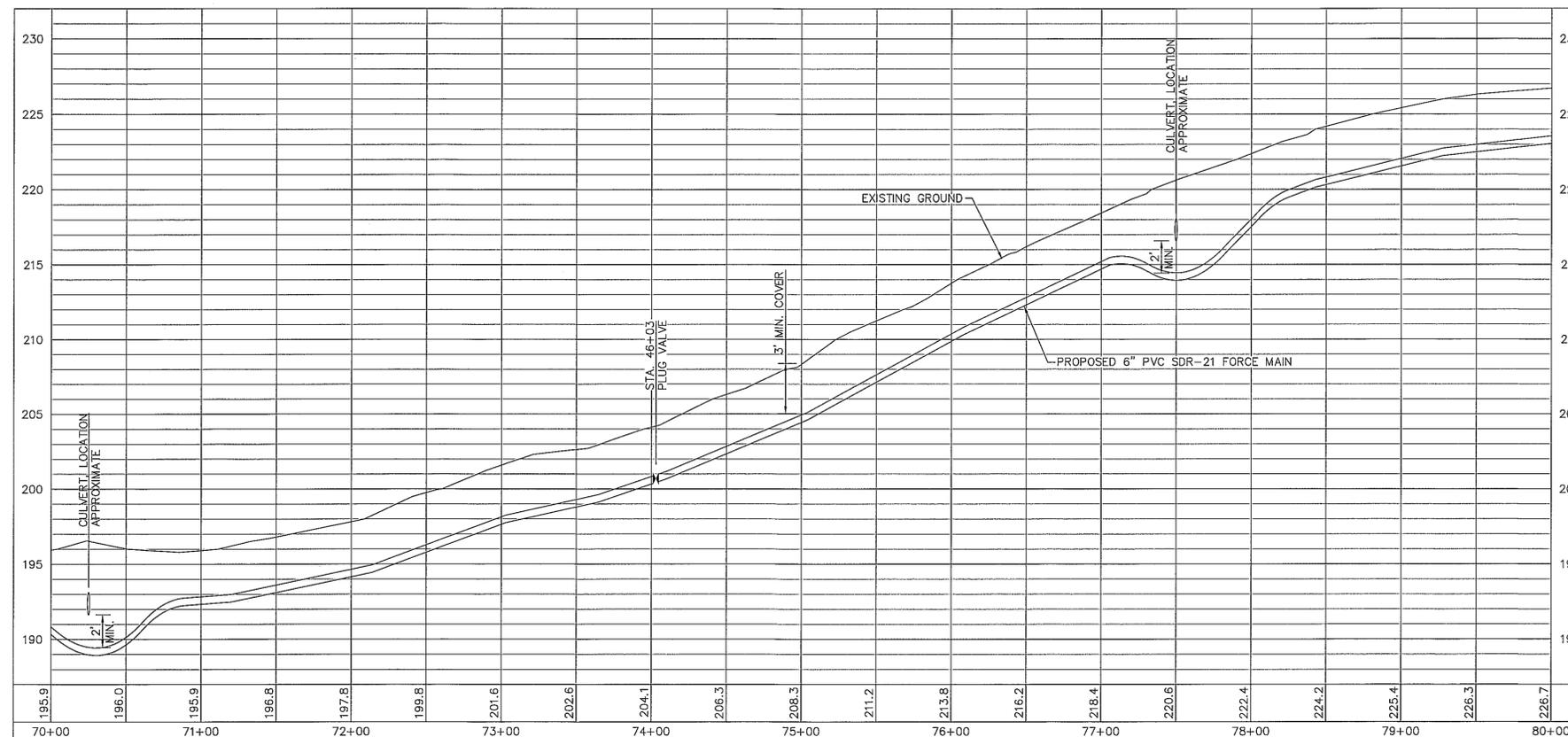
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Scale:	AS NOTED	OF 16	



PLAN
SCALE: 1" = 50'
0 50 100



- General Notes
- FORCE MAIN TO BE LOCATED 5 FEET FROM EDGE OF ROAD RIGHT-OF-WAY.



PROFILE
HORIZONTAL SCALE: 1" = 50'
VERTICAL SCALE: 1" = 5'

FINAL DRAWINGS
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3	ISSUED FOR BID	9/20/12
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1	NCDOT COMMENTS	4/1/11
No.	Revision/Issue	Date

Signature: *C. T. Clayton*
 Date: 9-21-2012

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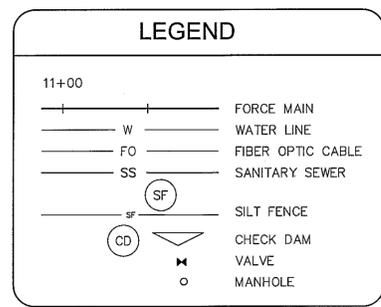
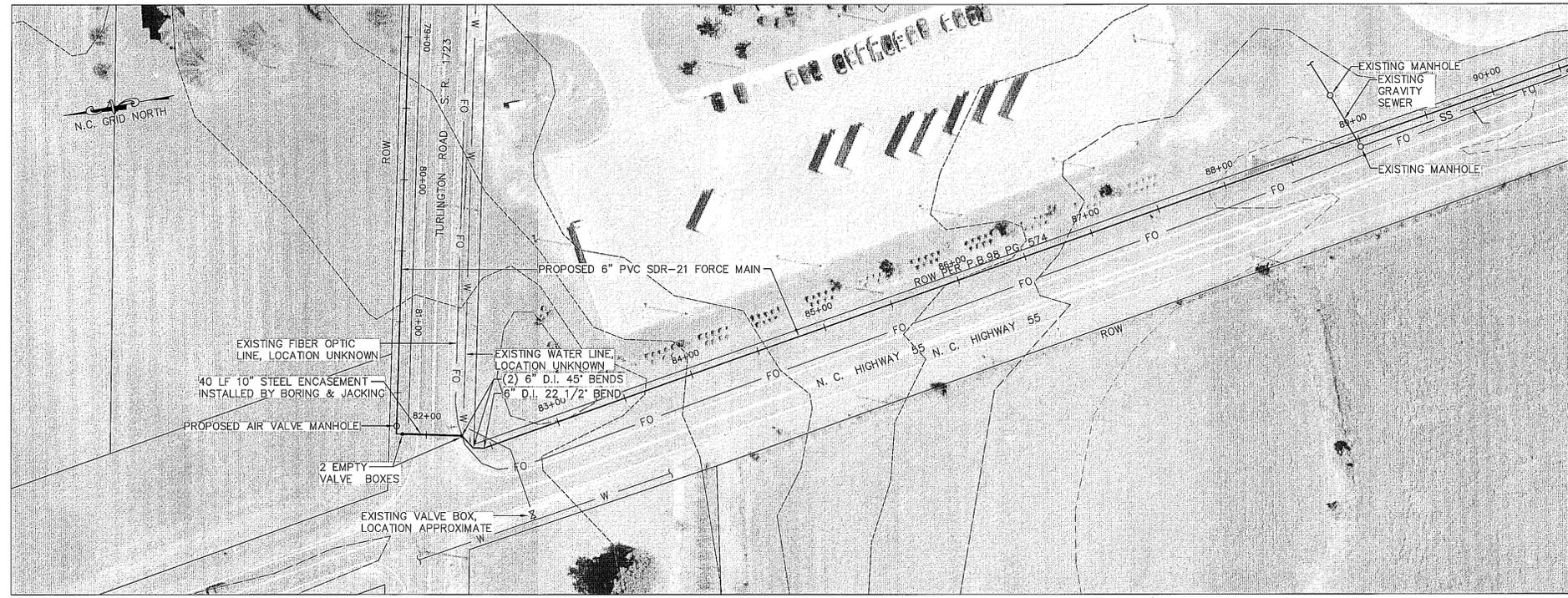
**HARNETT COUNTY
DUNN-ERWIN LANDFILL
PROJECT 1**

HARNETT COUNTY, NORTH CAROLINA

Project No:	03002B	File Name:	03002B Force Main.dwg
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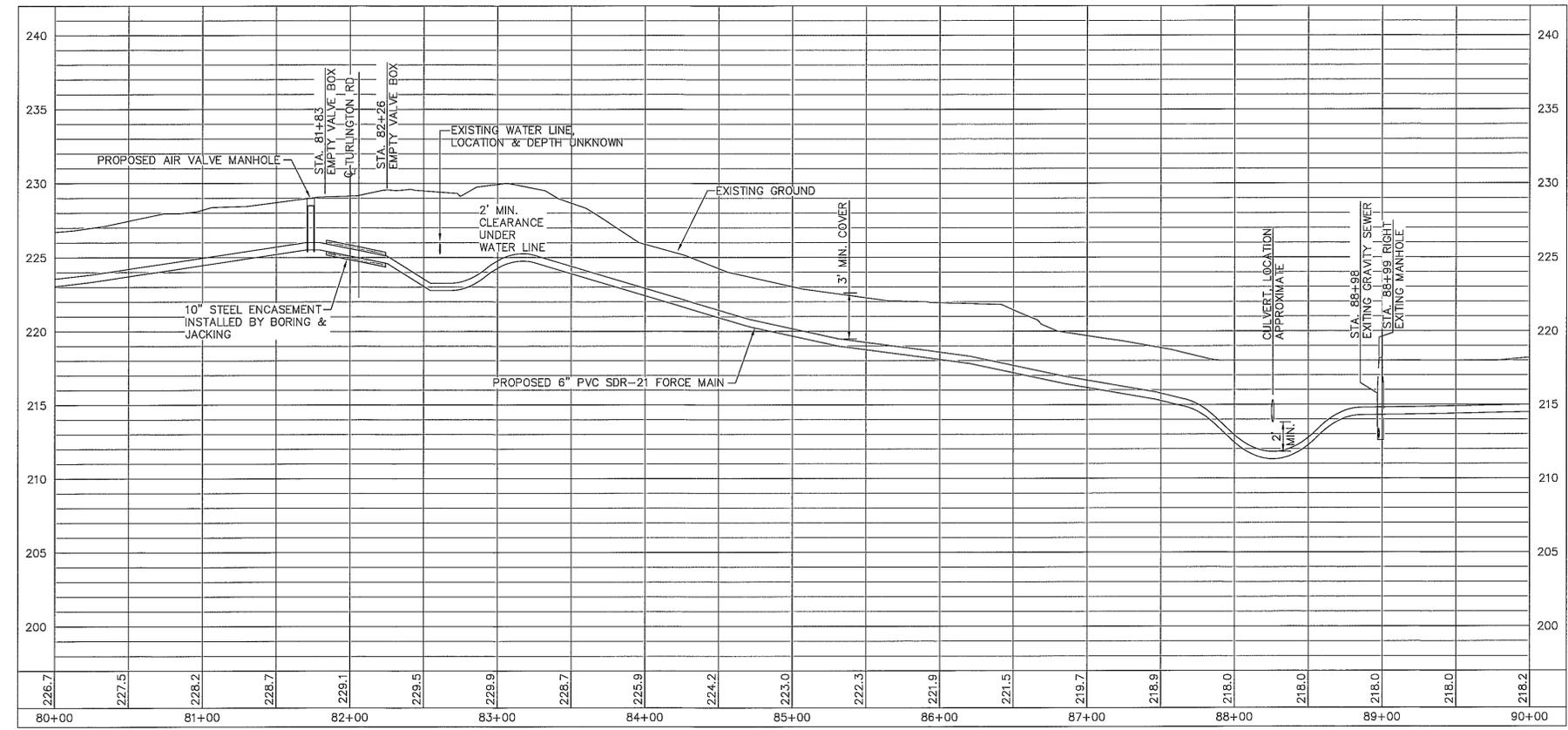
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Date:	1/20/11	Sheet:	1.1.10
Scale:	AS NOTED	OF 16	



General Notes

1. FORCE MAIN TO BE LOCATED 5 FEET FROM EDGE OF HIGHWAY RIGHT-OF-WAY.



FINAL DRAWINGS
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No.	Revision/Issue	Date
3	ISSUED FOR BID	9/20/12
2	REVISED PROJECT NAME	8/13/12
1	NCDOT COMMENTS	4/11/11

Professional Engineer Seal for C. T. Clayton, Sr., P.E., No. 028909, State of North Carolina.

Signature: *C. T. Clayton, Sr.*

Date: 9-21-2012

Clayton, Sr., P.E., Inc.
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48 WEST WASHINGTON STREET
C2416, NORTH CAROLINA 27531
PHONE: 910-887-7070 FAX: 910-887-6787
License No. C-2970 www.clayton.com

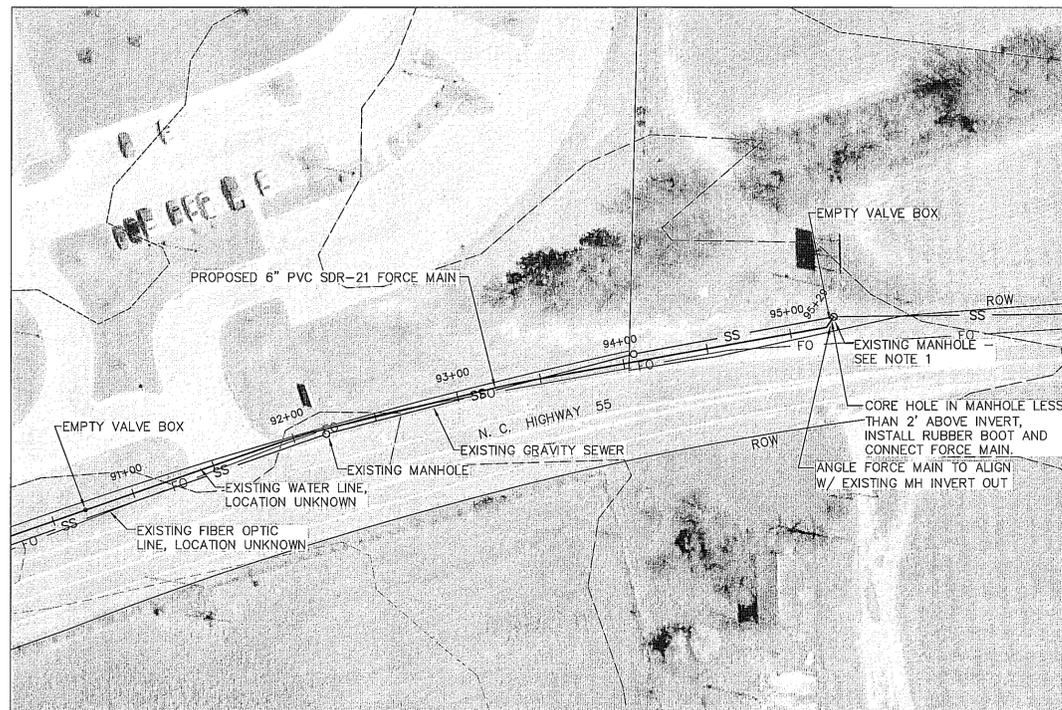
**HARNETT COUNTY
DUNN-ERWIN LANDFILL
PROJECT 1**

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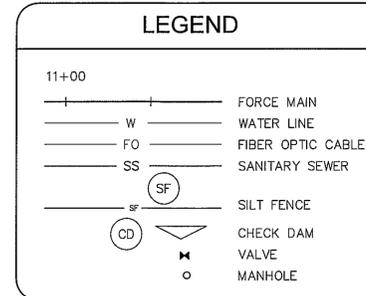
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Scale: AS NOTED	OF 16

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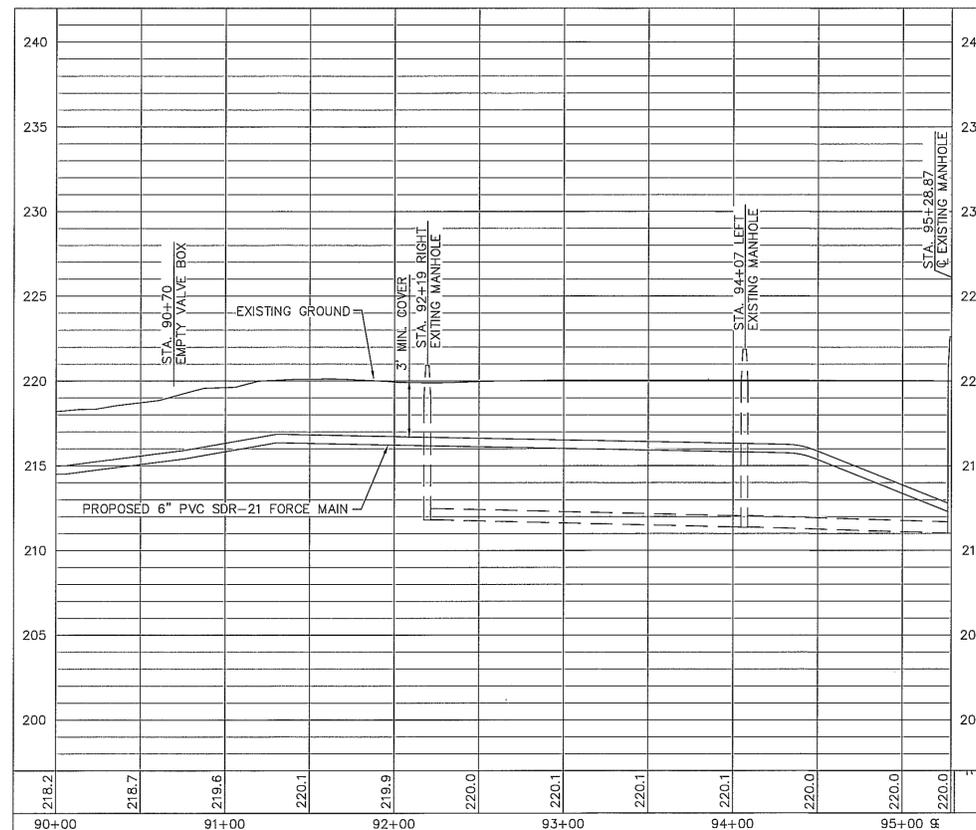
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PLAN
SCALE: 1" = 50'



- General Notes**
- COAT ALL INTERIOR SURFACES OF MANHOLE TO WHICH FORCE MAIN CONNECTS WITH COAL TAR EPOXY, FLEX-SEAL UTILITY SEALANT, SPECTRASHIELD LINER OR EQUAL COATING APPROVED BY HARNETT COUNTY PUBLIC UTILITIES DEPARTMENT.
 - FORCE MAIN TO BE LOCATED 5 FEET FROM EDGE OF HIGHWAY RIGHT-OF-WAY.



PROFILE
HORIZONTAL SCALE: 1" = 50'
VERTICAL SCALE: 1" = 5'

FINAL DRAWINGS
RELEASED FOR BID
NOT FOR CONSTRUCTION

3	ISSUED FOR BID	9/20/12
2	REVISED PROJECT NAME	8/13/12
1	NCDOT COMMENTS	4/11/11

No.	Revision/Issue	Date

North Carolina Professional Engineer Seal
SEAL 028909
TRUIS CLAYTON, JR.
Signature: [Signature]
Date: 9-21-2012

Clayton, Sr., P.E., Inc.
CIVIL & ENVIRONMENTAL ENGINEERING
48 WEST WASHINGTON STREET
OSATS, NORTH CAROLINA 27581
PHONE: 919-897-2070 FAX: 919-897-6767
License No. C-2570 www.ctclayton.com

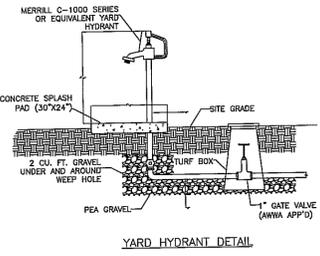
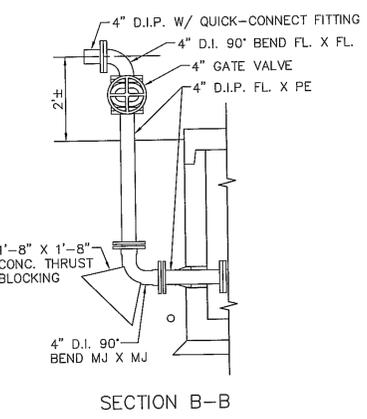
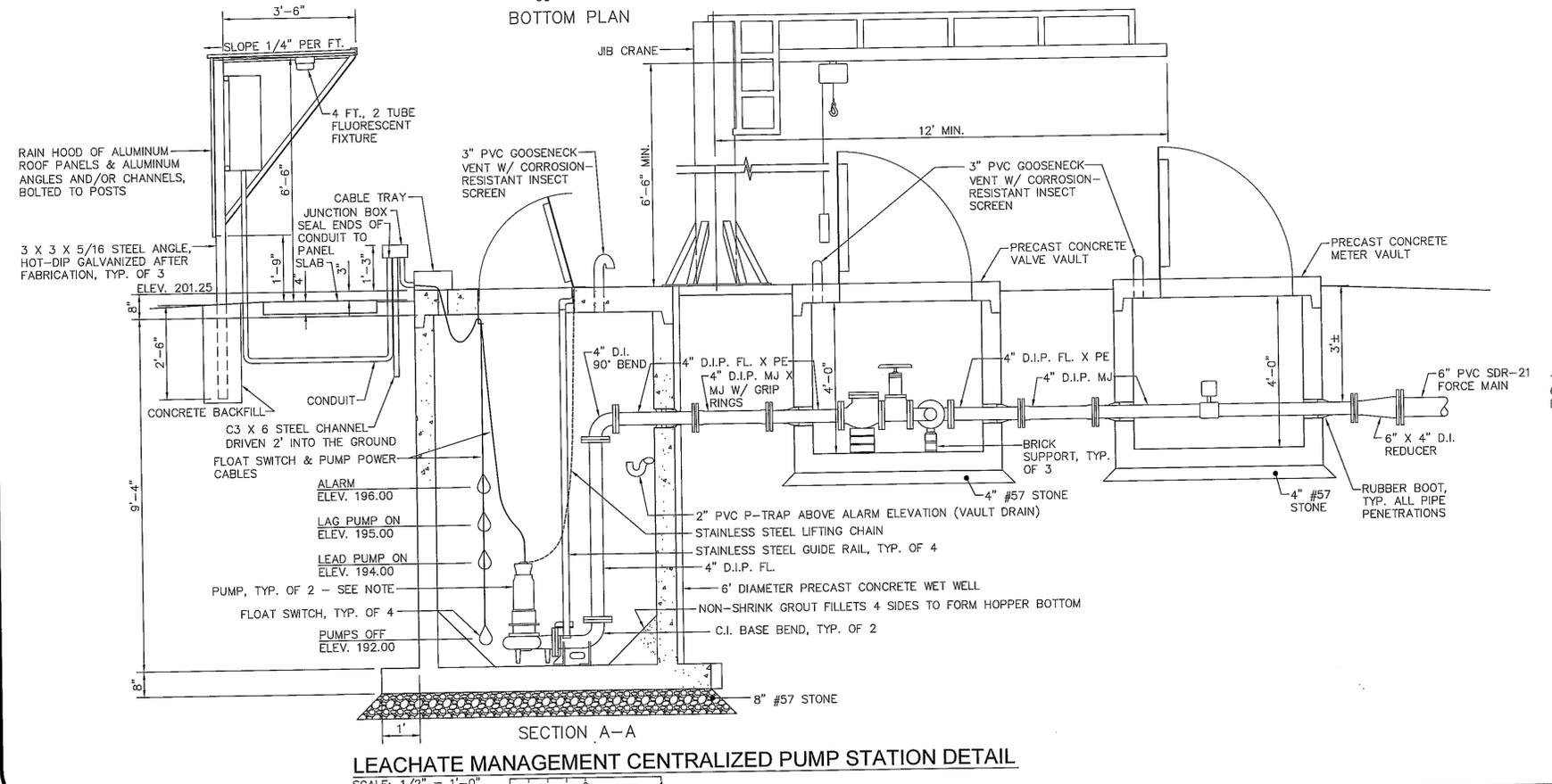
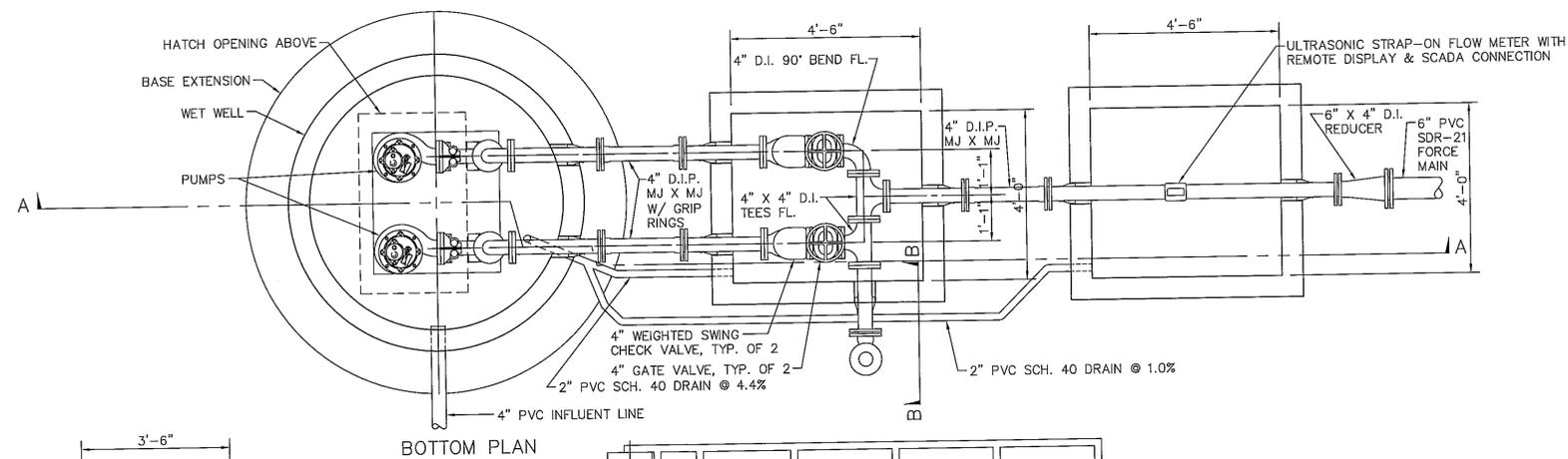
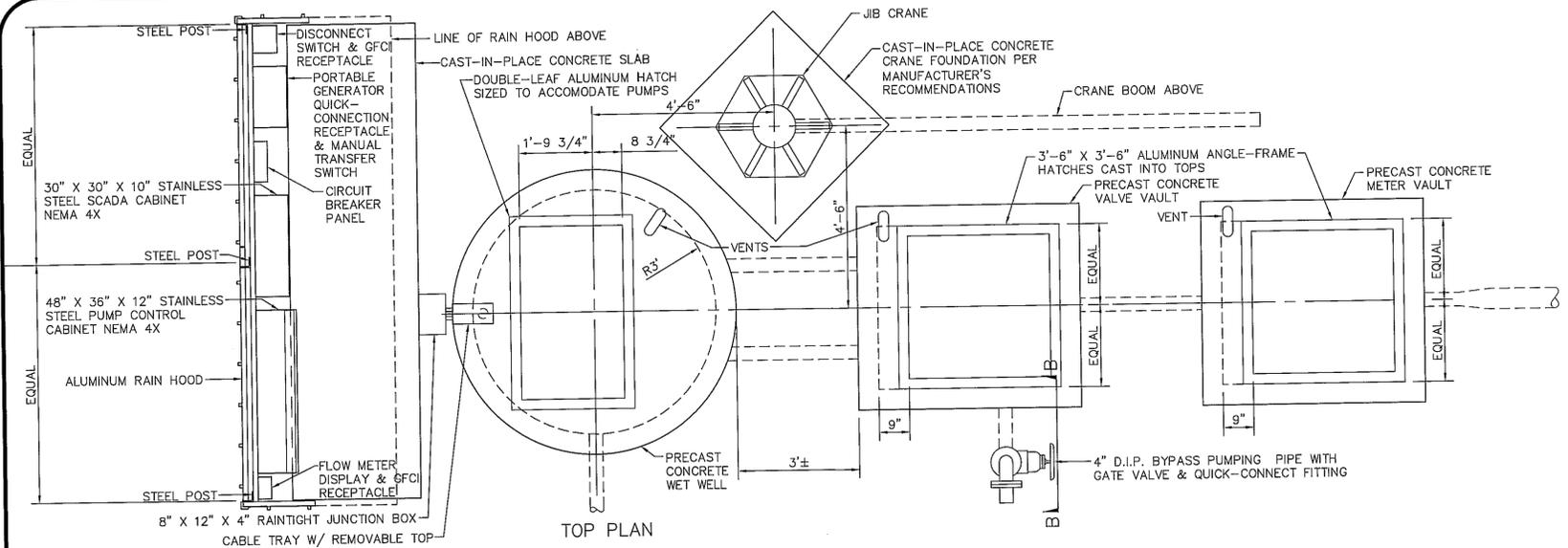
**HARNETT COUNTY
DUNN-ERWIN LANDFILL
PROJECT 1**
HARNETT COUNTY, NORTH CAROLINA

Project No:	03002B	File Name:	03002B Force Main.dwg
Designed By:	CTC Jr.	Drawn By:	WLF
Checked By:	CTC Jr.	Prof. Eng.:	CTC Jr.

Sheet Title: **FORCE MAIN PLAN & PROFILE, STA. 90+00 - STA. 95+35**
Date: 1/20/11
Scale: AS NOTED
Sheet: **1.1.12**
OF 16

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TYPICAL YARD HYDRANT INSTALLATION DETAIL S
NO SCALE 6

- General Notes
1. ALL CAST-IN-PLACE CONCRETE TO HAVE MINIMUM STRENGTH OF 3,000 PSI.
 2. PUMPS TO BE SUBMERSIBLE, ON-CLOG SEWAGE PUMPS WITH 4" DISCHARGE AND 230 VOLT, 3-PHASE MOTORS CAPABLE OF PASSING 3" SOLIDS AND PUMPING 180 GPM @ 60' TDH - FLYGT CP3127.181, MYERS 4VH OR HOMA AMX444. PUMP CONTROLS TO INCLUDE VARIABLE FREQUENCY DRIVES TO CONVERT SINGLE-PHASE POWER TO 3-PHASE. WITH A SAFETY FACTOR OF 1.15 AND BE EQUIPPED WITH AN ELECTRIC HOIST WITH A CABLE LONG ENOUGH TO REACH THE BOTTOM OF THE WET WELL. CRANE & HOIST TO BE RATED FOR 500 LB CAPACITY.

FINAL DRAWINGS
RELEASED FOR BID
NOT FOR CONSTRUCTION

2	ISSUED FOR BID	9/20/12
1	REVISED PROJECT NAME	8/13/12
No.	Revision/Issue	Date

Professional Engineer Seal for Travis Clayton, License No. 028508, dated 9-21-2012.

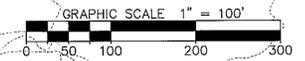
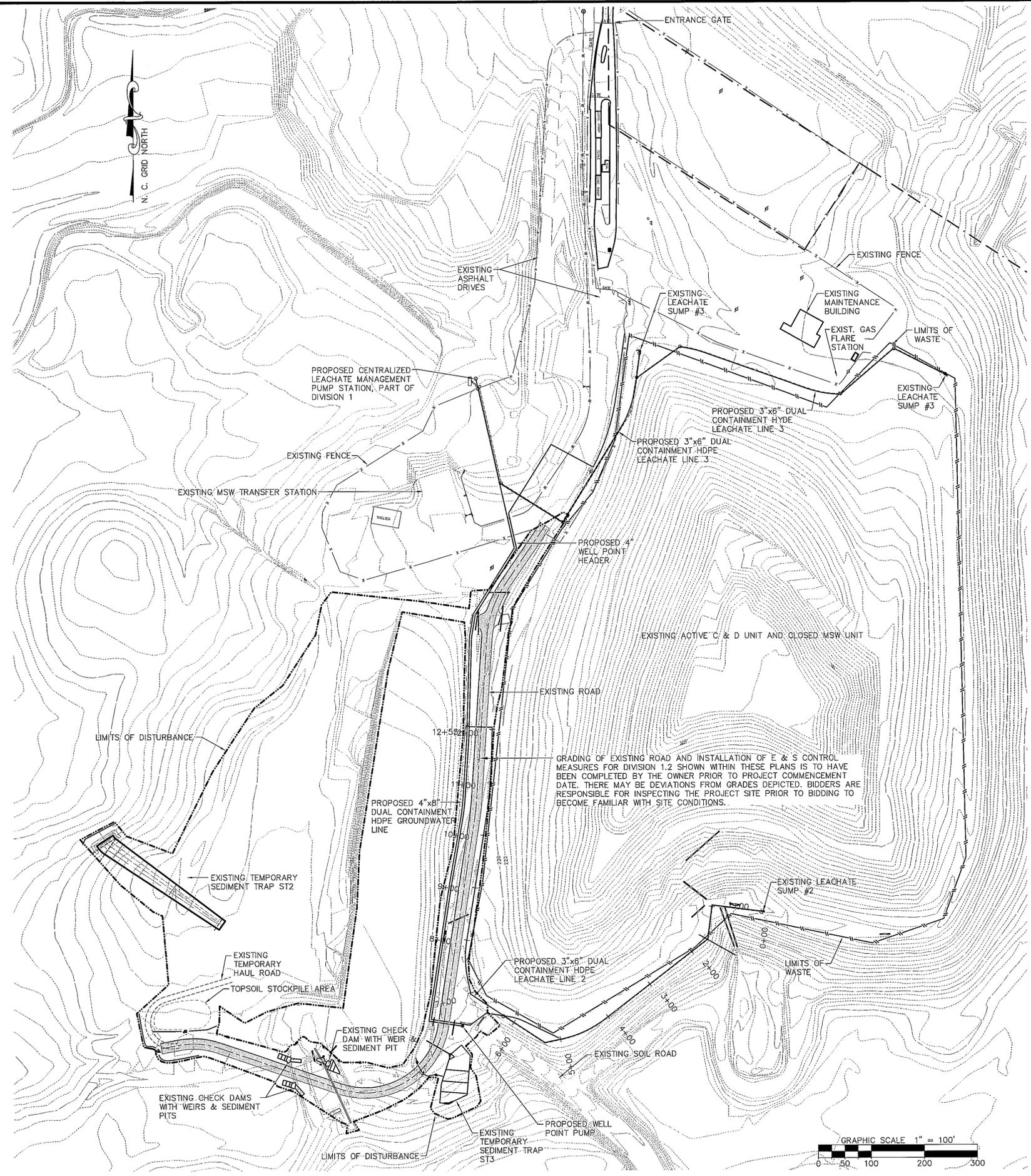
Clayton, Sr., P.E., Inc.
CIVIL & ENVIRONMENTAL ENGINEERING
46 WEST WASHINGTON STREET
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PHONE: 910-897-7070 FAX: 910-897-6787
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HARNETT COUNTY
DUNN-ERWIN LANDFILL
PROJECT 1

HARNETT COUNTY, NORTH CAROLINA	
Project No: 03002B	File Name: 03002B Force Main.dwg
Designed By: CTC Jr.	Drawn By: WLF
Checked By: CTC Jr.	Proj. Eng: CTC Jr.
Sheet Title: PUMP STATION DETAILS	
Date: 1/20/11	Sheet: 1.1.13
Scale: AS NOTED	OF 16

PA:003 Harnett County\03002B Corrective Action Plan_CAP\03002B_F66263\026\06\03\39.dwg

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GRADING OF EXISTING ROAD AND INSTALLATION OF E & S CONTROL MEASURES FOR DIVISION 1.2 SHOWN WITHIN THESE PLANS IS TO HAVE BEEN COMPLETED BY THE OWNER PRIOR TO PROJECT COMMENCEMENT DATE. THERE MAY BE DEVIATIONS FROM GRADES DEPICTED. BIDDERS ARE RESPONSIBLE FOR INSPECTING THE PROJECT SITE PRIOR TO BIDDING TO BECOME FAMILIAR WITH SITE CONDITIONS.

General Notes

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No.	Revision/Issue	Date
1	REVISED LABELS OF EXISTING WORK	9/14/11



Signature: *Travis Clayton, Jr.*
Date: **9-21-2012**



**HARNETT COUNTY
DUNN-ERWIN LANDFILL
PROJECT 1**

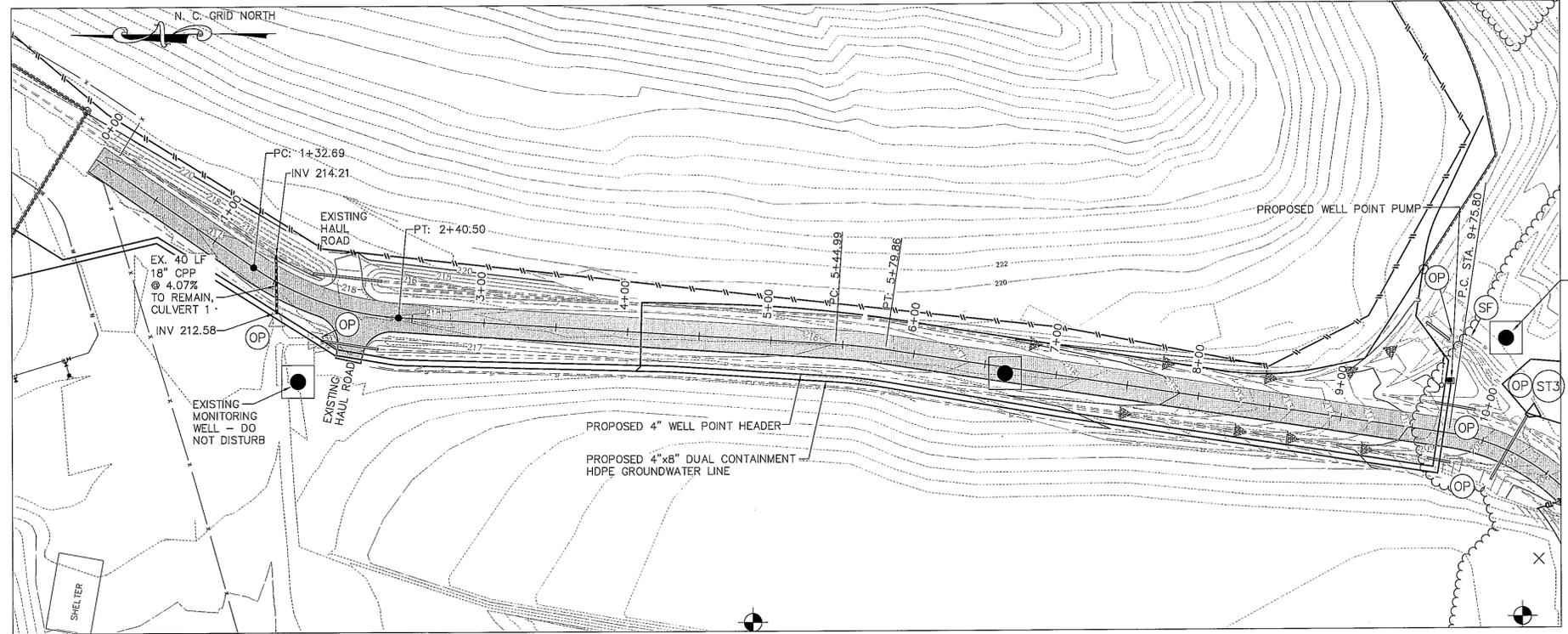
HARNETT COUNTY, NORTH CAROLINA

Project No:	03002B	File Name:	03002B Max.dwg
Designed By:	CTC Jr.	Drawn By:	WLF
Checked By:	CTC Jr.	Proj. Eng.:	CTC Jr.

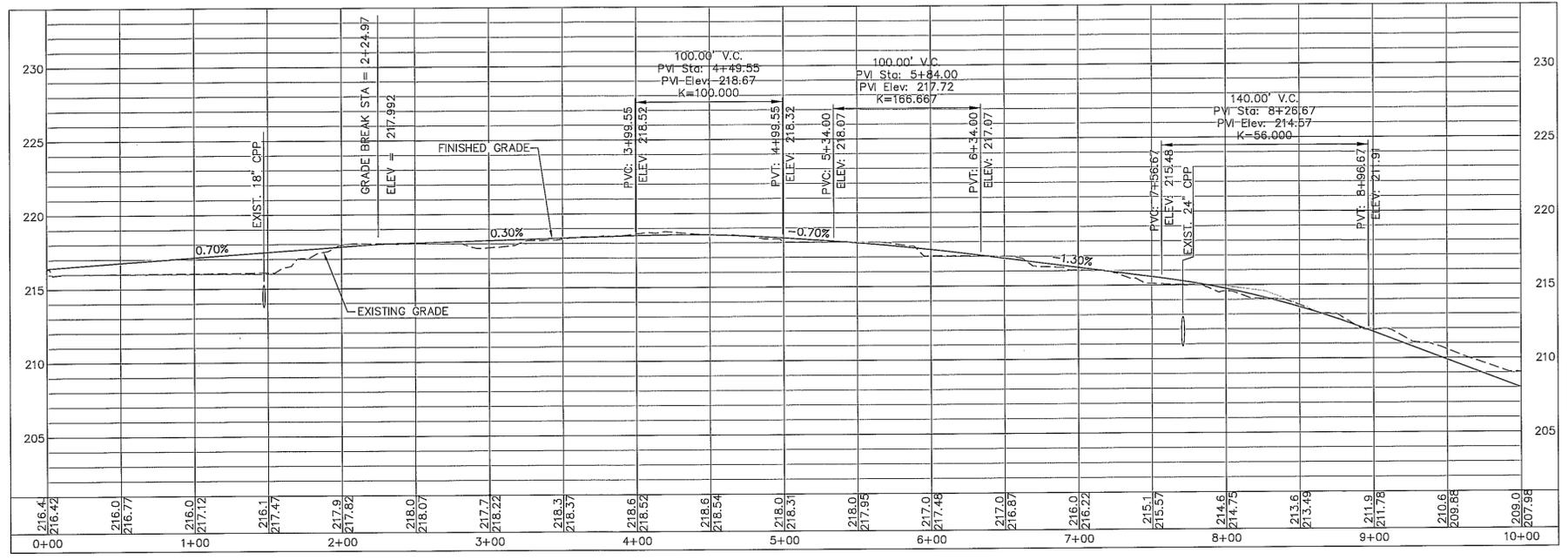
Sheet Title:	SITE PLAN
Date:	5/13/11
Scale:	1" = 100'
Sheet No.:	1.2.1
Total Sheets:	OF 16

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PLAN
SCALE: 1" = 50'



PROFILE
HORIZONTAL SCALE: 1" = 50'
VERTICAL SCALE: 1" = 5'

FINAL DRAWINGS
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No.	Revision/Issue	Date
1	REVISED LABELS OF EXISTING WORK	9/14/11



C. Clayton, Jr.
Signature
Date: 9-21-2012

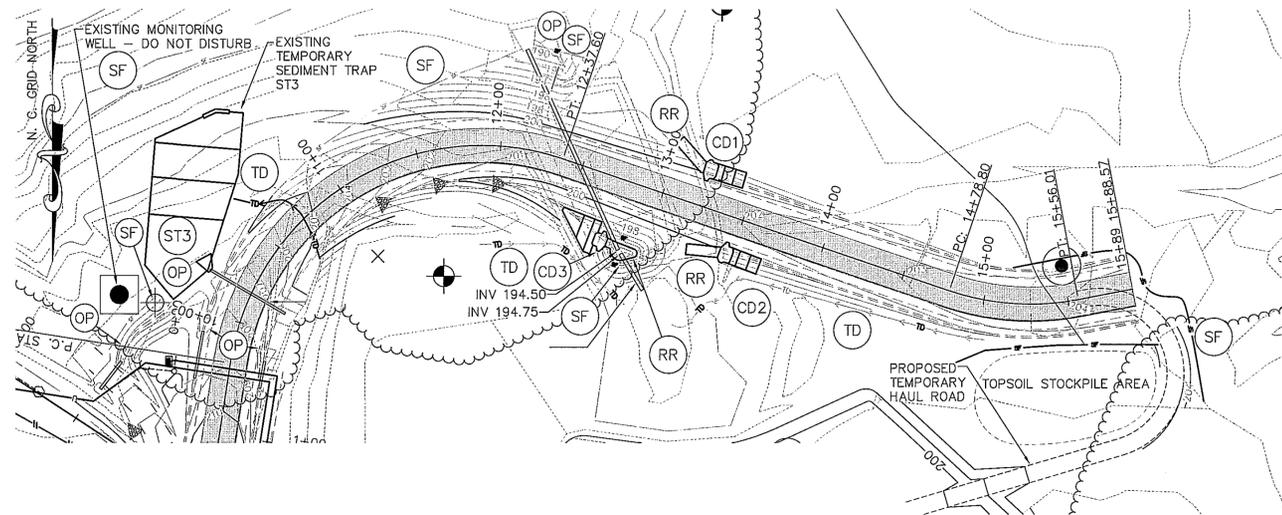


**HARNETT COUNTY
DUNN-ERWIN LANDFILL
PROJECT 1**

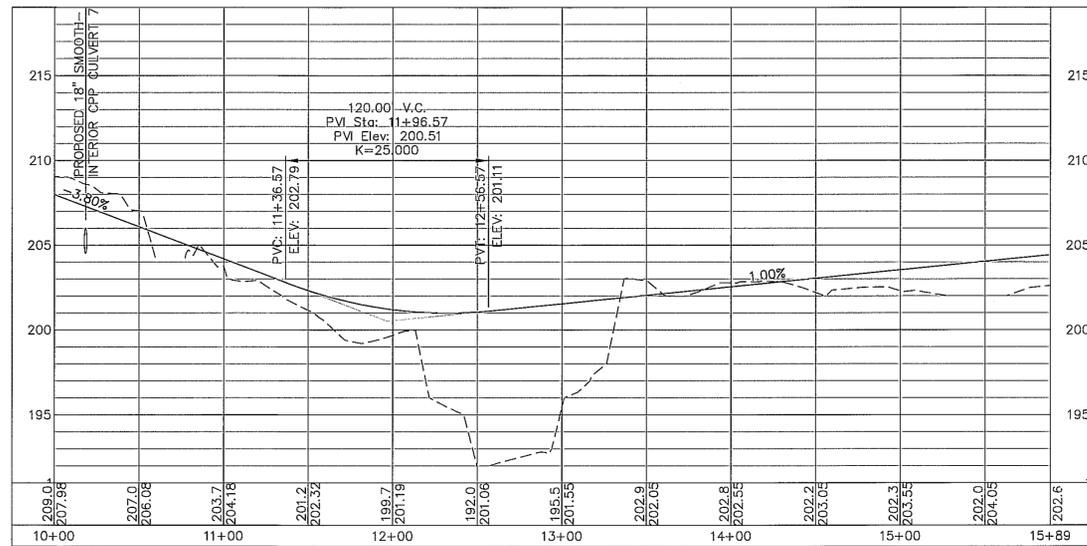
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Project No: 03002B	File Name: 03002B Mas.dwg
Designed By: CTC Jr.	Drawn By: WLF
Checked By: CTC Jr.	Proj. Eng: CTC Jr.

Sheet Title: PROPOSED ROAD PLAN & PROFILE STA. 0+00 - STA. 10+00	
Date: 5/13/11	Scale: AS NOTED
1.2.2	
OF 16	

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PLAN
SCALE: 1" = 50'
0 50 100



PROFILE
HORIZONTAL SCALE: 1" = 50'
VERTICAL SCALE: 1" = 5'

General Notes

1. GRADING OF EXISTING ROAD AND INSTALLATION OF E & S CONTROL MEASURES FOR DIVISION 1.2 SHOWN WITHIN THESE PLANS IS TO HAVE BEEN COMPLETED BY THE OWNER PRIOR TO PROJECT COMMENCEMENT DATE. THERE MAY BE DEVIATIONS FROM GRADES DEPICTED. BIDDERS ARE RESPONSIBLE FOR INSPECTING THE PROJECT SITE PRIOR TO BIDDING TO BECOME FAMILIAR WITH SITE CONDITIONS.

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No.	Revision/Issue	Date
1	REVISED LABELS OF EXISTING WORK	9/14/11



C. T. Clayton, Jr.
Signature
9-21-2012
Date



**HARNETT COUNTY
DUNN-ERWIN LANDFILL
PROJECT 1**

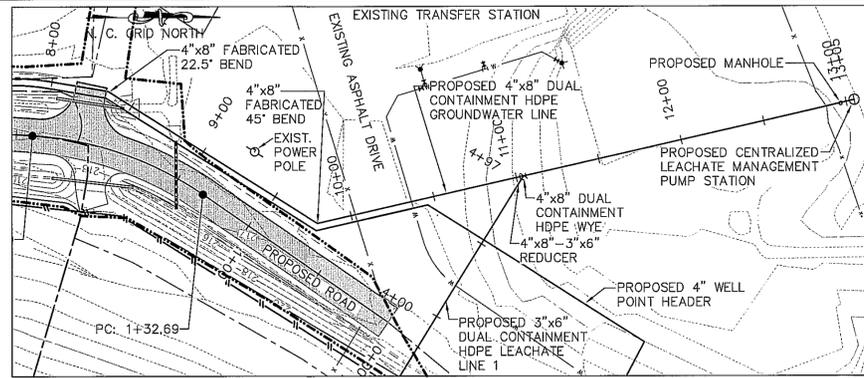
HARNETT COUNTY, NORTH CAROLINA

Project No:	03002B	File Name:	03002B Mas.dwg
Designed By:	CTC Jr.	Drawn By:	WLF
Checked By:	CTC Jr.	Proj. Eng.:	CTC Jr.

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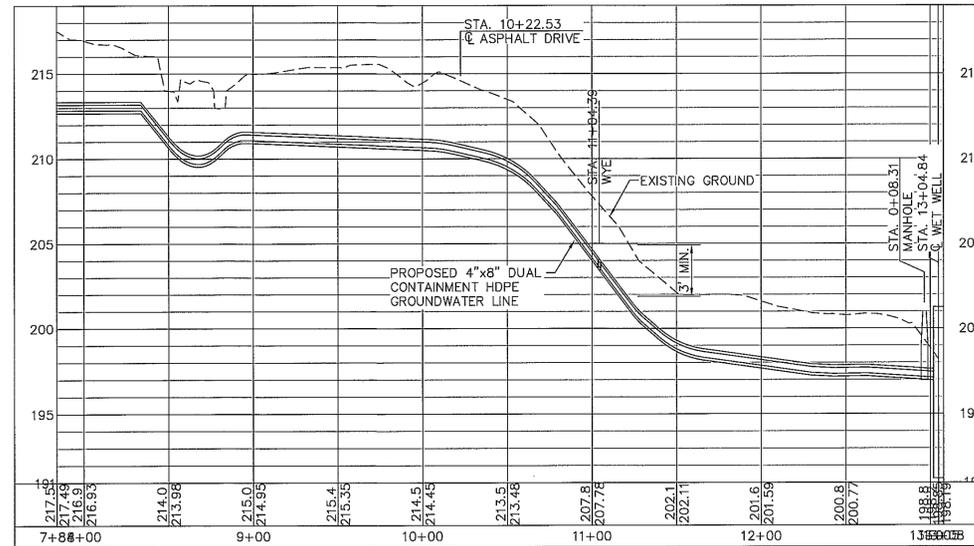
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Scale:	AS NOTED		OF 16

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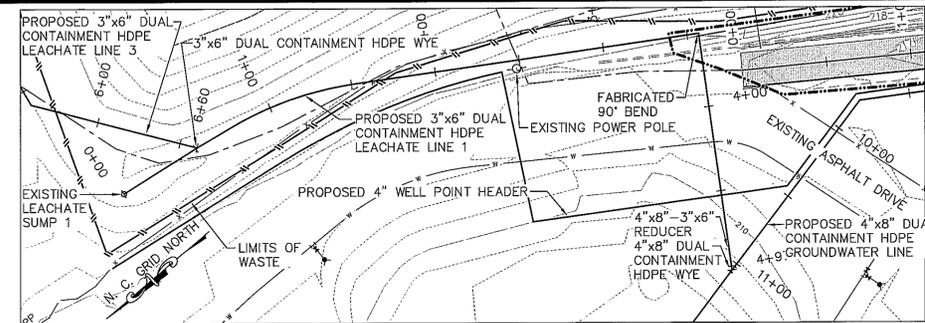
GROUNDWATER LINE PLAN

SCALE: 1" = 50'
0 50 100



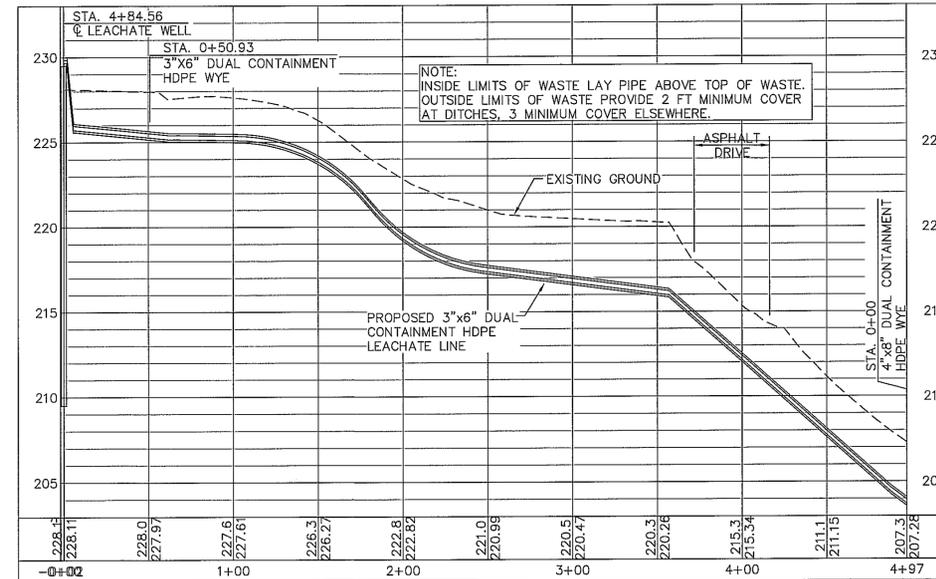
GROUNDWATER LINE PROFILE

HORIZONTAL SCALE: 1" = 50'
VERTICAL SCALE: 1" = 5'



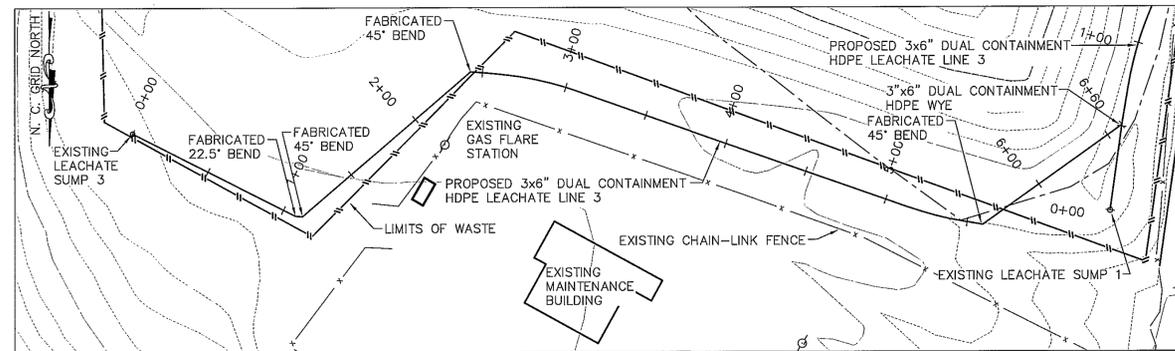
LEACHATE LINE 1 PLAN

SCALE: 1" = 50'
0 50 100



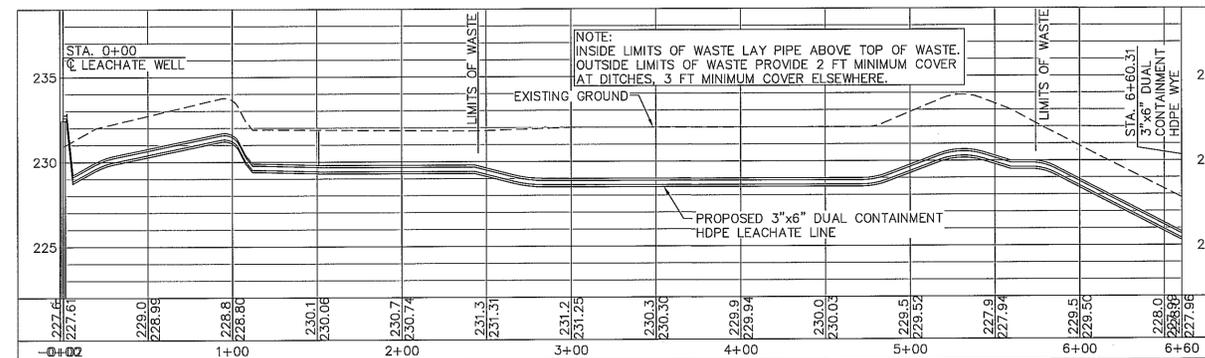
LEACHATE LINE 1 PROFILE

HORIZONTAL SCALE: 1" = 50'
VERTICAL SCALE: 1" = 5'



LEACHATE LINE 3 PLAN

SCALE: 1" = 50'
0 50 100



LEACHATE LINE 3 PROFILE

HORIZONTAL SCALE: 1" = 50'
VERTICAL SCALE: 1" = 5'

General Notes

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No.	Revision/Issue	Date
1	REVISED SHEET NUMBER	9/14/11



C. T. Clayton, Sr.
Date: 9-21-2012



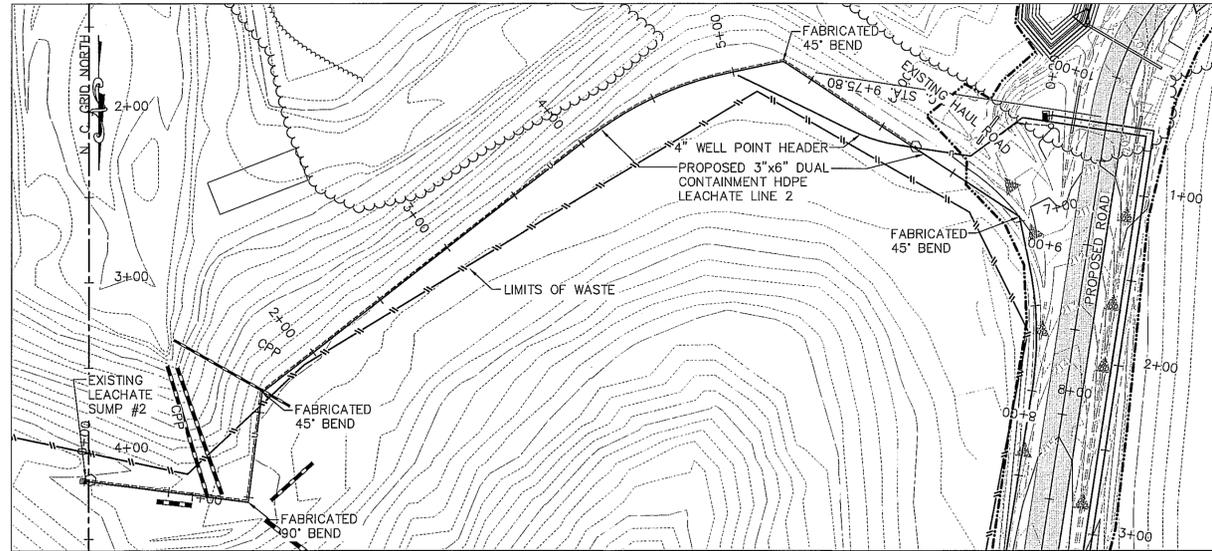
**HARNETT COUNTY
DUNN-ERWIN LANDFILL
PROJECT 1**

HARNETT COUNTY, NORTH CAROLINA
Project No: 03002B File Name: 03002B.MAS.dwg
Designed By: CTC Jr. Drawn By: WLF
Checked By: CTC Jr. Proj. Eng.: CTC Jr.

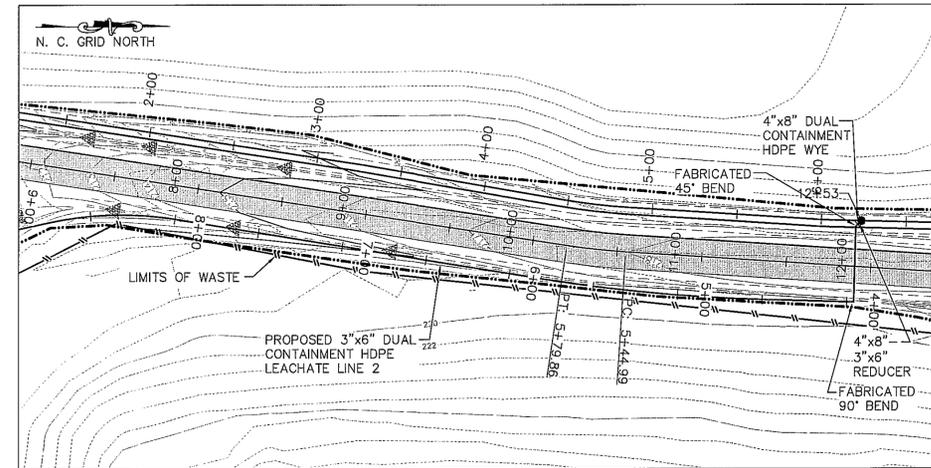
Sheet Title: **PLAN & PROFILE, GROUND WATER & LEACHATE LINES, NORTH**
Date: 5/13/11 Sheet: **1.2.4**
Scale: AS NOTED OF 16

General Notes

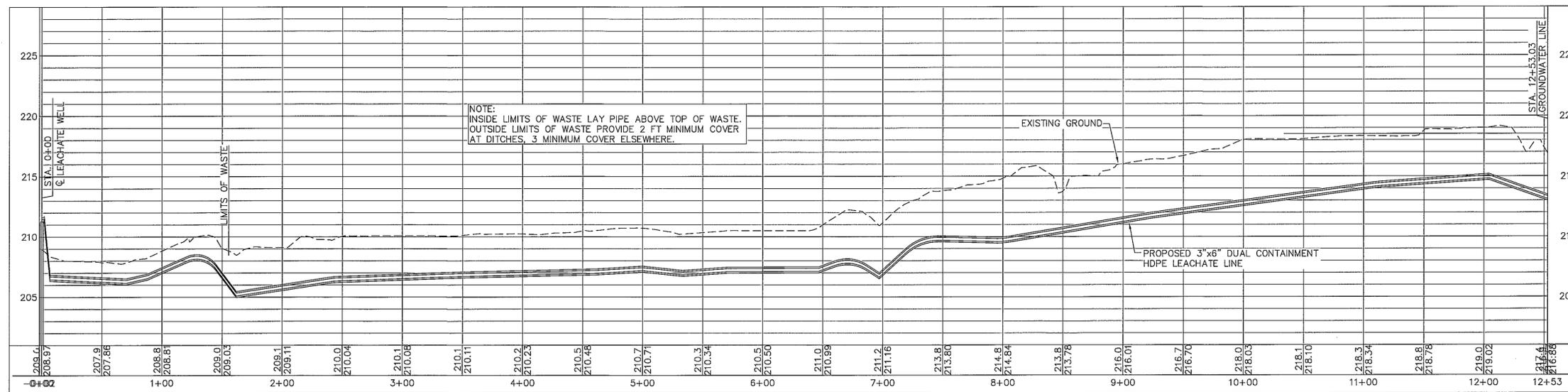
1. GRADING OF EXISTING ROAD AND INSTALLATION OF E & S CONTROL MEASURES FOR DIVISION 1.2 SHOWN WITHIN THESE PLANS IS TO HAVE BEEN COMPLETED BY THE OWNER PRIOR TO PROJECT COMMENCEMENT DATE. THERE MAY BE DEVIATIONS FROM GRADES DEPICTED. BIDDERS ARE RESPONSIBLE FOR INSPECTING THE PROJECT SITE PRIOR TO BIDDING TO BECOME FAMILIAR WITH SITE CONDITIONS.



LEACHATE LINE 2 PLAN
STA. 0+00 - STA. 8+00
 SCALE: 1" = 50'
 0 50 100



LEACHATE LINE 2 PLAN
STA. 8+00 - STA. 12+53.03
 SCALE: 1" = 50'
 0 50 100



LEACHATE LINE 2 PROFILE
 HORIZONTAL SCALE: 1" = 50'
 VERTICAL SCALE: 1" = 5'

NOTE:
 INSIDE LIMITS OF WASTE LAY PIPE ABOVE TOP OF WASTE.
 OUTSIDE LIMITS OF WASTE PROVIDE 2 FT MINIMUM COVER
 AT DITCHES, 3 MINIMUM COVER ELSEWHERE.

FINAL DRAWINGS
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No.	REVISION SHEET NUMBER	Date
1	9/14/11	



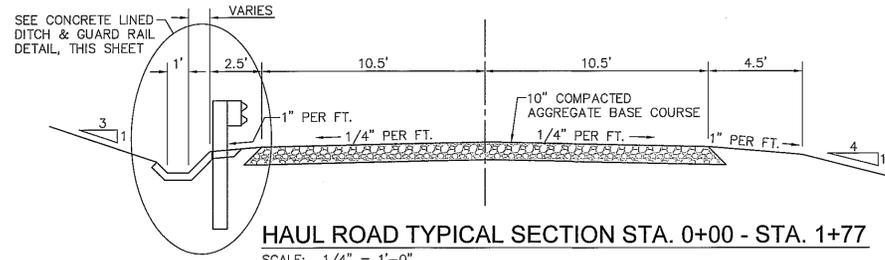
C. Travis Clayton, Jr.
 Signature
9-21-2012
 Date



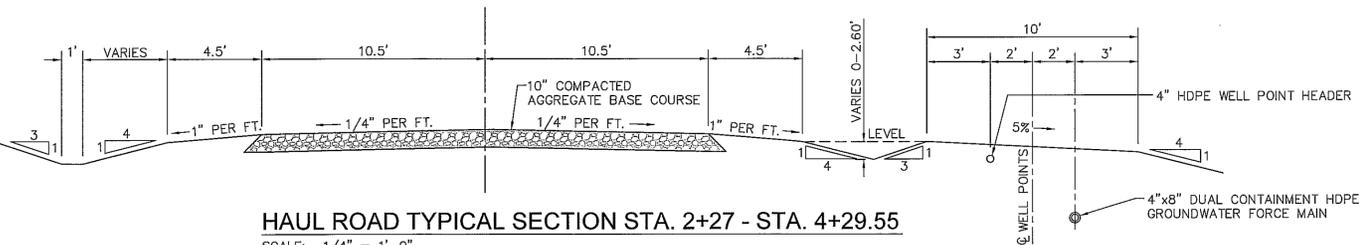
**HARNETT COUNTY
 DUNN-ERWIN LANDFILL
 PROJECT 1**

HARNETT COUNTY, NORTH CAROLINA	
Project No: 03002B	File Name: 03002B.MAS.dwg
Designed By: CTC Jr.	Drawn By: WLF
Checked By: CTC Jr.	Proj. Eng.: CTC Jr.

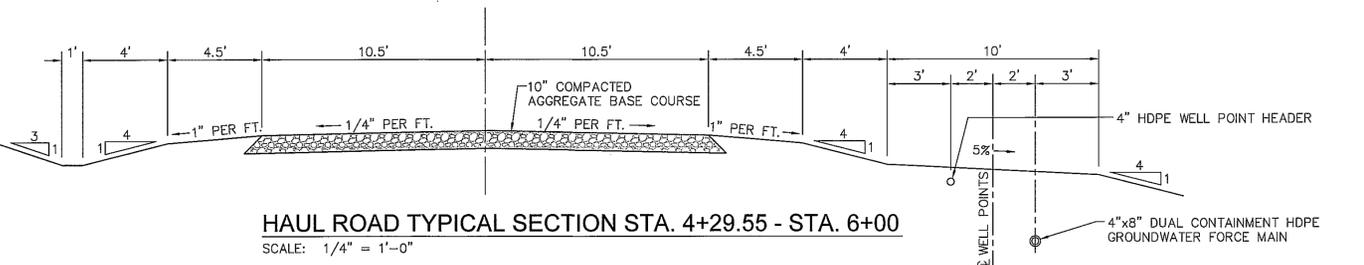
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Scale: AS NOTED	OF 16



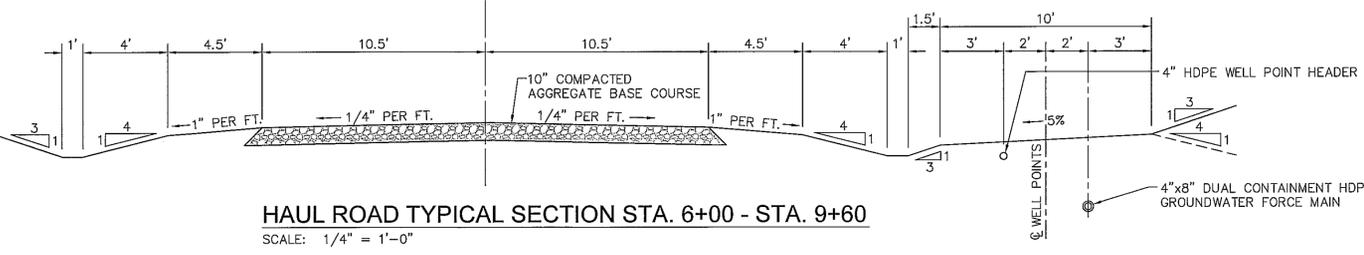
HAUL ROAD TYPICAL SECTION STA. 0+00 - STA. 1+77
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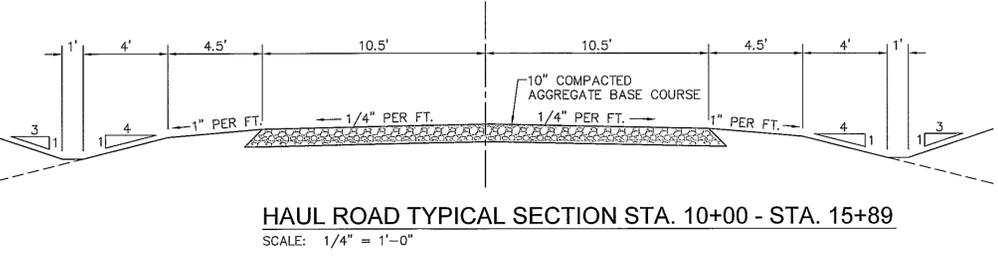
HAUL ROAD TYPICAL SECTION STA. 2+27 - STA. 4+29.55
SCALE: 1/4" = 1'-0"



HAUL ROAD TYPICAL SECTION STA. 4+29.55 - STA. 6+00
SCALE: 1/4" = 1'-0"

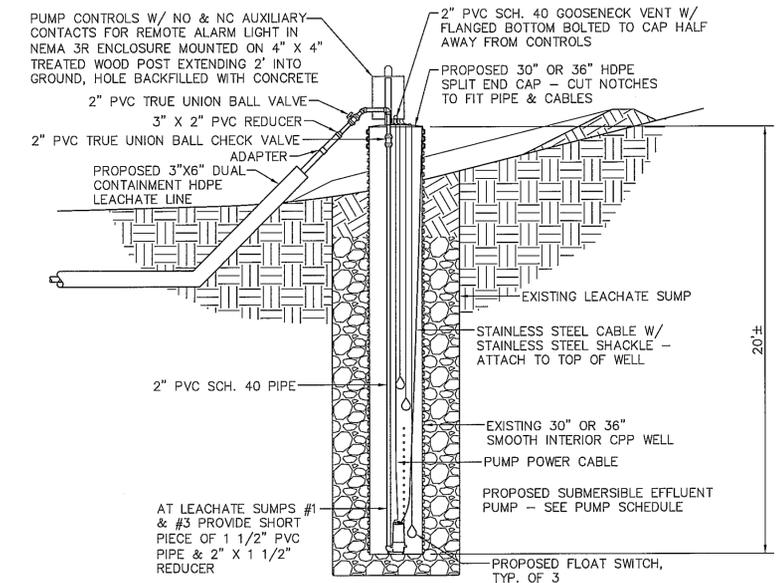


HAUL ROAD TYPICAL SECTION STA. 6+00 - STA. 9+60
SCALE: 1/4" = 1'-0"



HAUL ROAD TYPICAL SECTION STA. 10+00 - STA. 15+89
SCALE: 1/4" = 1'-0"

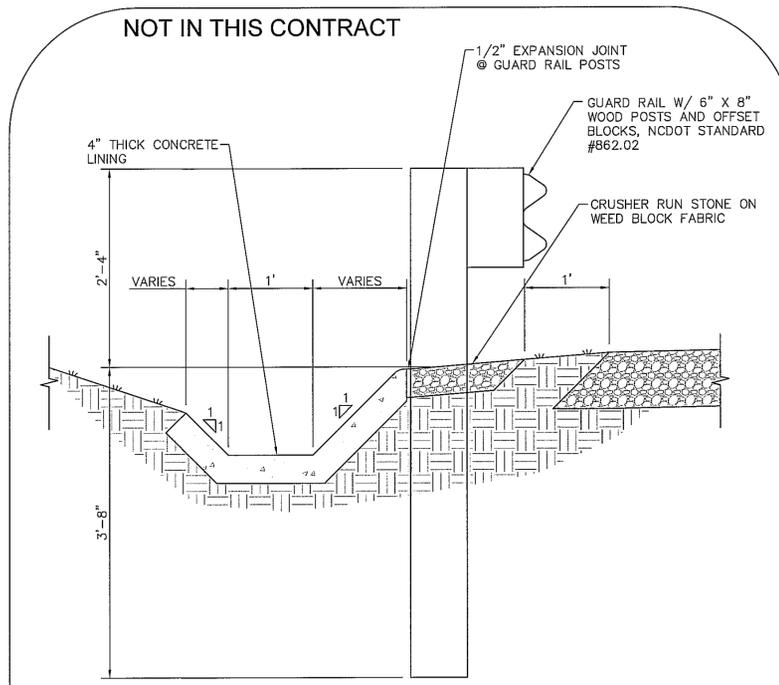
SECTIONS ABOVE ARE SHOWN FOR PIPE LAYOUT PURPOSES. GRADING AND ROAD CONSTRUCTION ARE NOT IN THIS CONTRACT. CONTRACTOR SHALL PERFORM MINOR GRADING ASSOCIATED WITH PIPE AND WELL POINT INSTALLATION AS NECESSARY.



PUMP SCHEDULE

LOCATION	WELL DIAMETER	PUMP			MOTOR		
		MANUFACTURER	MODEL	DISCHARGE	HORSEPOWER	VOLTS	PHASE
SUMP #1	36"	MYERS	ME40	1 1/2" NPT	4/10	230	1
SUMP #2	30"	MYERS	ME50	2" NPT	1/2	230	1
SUMP #3	36"	MYERS	ME40	1 1/2" NPT	4/10	230	1

TYPICAL LEACHATE EXTRACTION PUMP DETAIL
SCALE: 1/4" = 1'-0"



CONCRETE LINED DITCH & GUARD RAIL DETAIL
SCALE: 1" = 1'-0"

General Notes

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No.	REVISION SHEET NUMBER	Date
1		9/14/11



Tyrus Clayton
Date: **9-21-2012**



HARNETT COUNTY DUNN-ERWIN LANDFILL PROJECT 1

HARNETT COUNTY, NORTH CAROLINA

Project No: 03002B	File Name: 03002B Mod.dwg
Designed By: CTC Jr.	Drawn By: WLF
Checked By: CTC Jr.	Proj. Eng.: CTC Jr.

Sheet Title: TYPICAL SECTIONS & DETAILS	
Date: 5/13/11	Sheet: 1.2.6
Scale: AS NOTED	OF 8

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HARNETT COUNTY DUNN-ERWIN LANDFILL

PROJECT 2

DIVISION 2.1, CONVENIENCE CENTER IMPROVEMENTS DIVISION 2.2, TRANSFER STATION REHABILITATION SEPTEMBER 2012

GENERAL SITE AND CONSTRUCTION NOTES:

- EXISTING UTILITY SERVICES ARE NOT TO BE INTERRUPTED PRIOR TO APPROVAL BY THE PROPERTY OWNER AND ENGINEER. TEMPORARY UTILITY SERVICE SHALL BE AVAILABLE DURING INTERRUPTION. A MINIMUM NOTICE OF 72 HOURS IS REQUIRED PRIOR TO INTERRUPTION. WRITTEN PERMISSION FOR INTERRUPTION MUST BE GIVEN PRIOR TO PROCEEDING.
- ENGINEER DOES NOT GUARANTEE THE ACCURACY OF UTILITIES SHOWN OR THAT ALL UTILITIES ARE SHOWN, ABOVE OR BELOW THE SURFACE. THE CONTRACTOR IS RESPONSIBLE FOR SUBSURFACE UTILITY LOCATION PRIOR TO CONSTRUCTION TO DETERMINE THE EXISTENCE AND/OR EXACT LOCATIONS, BOTH HORIZONTAL AND VERTICAL. CALL "NC ONE CALL" (1-800-632-4949) AT LEAST 48 HOURS PRIOR TO DIGGING OR EXCAVATION, AND CONTACT INDIVIDUAL UTILITY COMPANIES FOR ASSISTANCE IN LOCATION OF UTILITIES.
- CONTRACTOR SHALL VERIFY THE LOCATIONS AND SIZES OF ALL EXISTING FEATURES PRIOR TO CONSTRUCTION. THE ENGINEER SHALL BE IMMEDIATELY NOTIFIED OF ANY DIFFERENCE(S) FROM THAT SHOWN ON THE DRAWINGS. CONTRACTOR SHALL SUBMIT SCALED DRAWING(S) OF THE DIFFERENCE(S) OR FORMERLY UNKNOWN FEATURE(S) TO THE ENGINEER ALONG WITH A WRITTEN REQUEST FOR FURTHER INSTRUCTION AND DIRECTION.
- CONTRACTOR SHALL LOCATE ALL EXISTING UTILITIES PRIOR TO CONSTRUCTION.
- CONTRACTOR SHALL REPAIR ANY DAMAGES TO EXISTING UTILITIES RESULTING FROM CONSTRUCTION ACTIVITIES.
- ANY CONCRETE, ASPHALT, CURB & GUTTER OR OTHER TYPE OF PAVEMENT SHALL BE SAW-CUT AT EXTENT OF REMOVAL PRIOR TO THE REMOVAL. CONCRETE ITEMS SHALL BE SAW-CUT AT THE NEAREST CONTROL JOINT TO THE REMOVAL AREA.
- CONTRACTOR SHALL COORDINATE ANY REQUIRED WORK, RELOCATION, INSTALLATION, OR REMOVAL OF EXISTING UTILITIES WITH THE APPROPRIATE UTILITY COMPANY PRIOR TO THE BEGINNING OF CONSTRUCTION.
- TIE-INS TO EXISTING PAVEMENT SHALL BE FLUSH AND EVEN. WHEN INSTALLING NEW ASPHALT TO EXISTING SURFACES, EXISTING SURFACES SHALL BE COATED WITH ASPHALT SPRAY TACK.
- FINE-GRADE AREAS TO DRAIN TO INTENDED DRAINAGE STRUCTURES IN ORDER TO PREVENT ANY STANDING WATER. IF THERE IS ANY QUESTION ON THE COMPLETION OF THE FINAL GRADING, THE CONTRACTOR SHALL CONTACT THE ENGINEER PRIOR TO CONSTRUCTION.

DIVISION 2.1 SHEET INDEX	
SITE PLAN	2.1.1
DETAILS	2.1.2
DETAILS	2.1.3
DETAILS	2.1.4

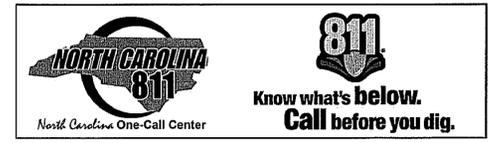
DIVISION 2.2 SHEET INDEX	
EXISTING CONDITIONS AND DEMOLITION PLAN	2.2.1
FLOOR PLAN	2.2.2
UTILITY PLAN	2.2.3
ELECTRICAL PLAN	2.2.4
ELEVATIONS	2.2.5
DETAILS	2.2.6

DESIGNED: CTC Jr./RS	DATE: JANUARY 2012
DRAWN: AEP	CTC PROJ. No. 03002B
CHECKED: CTC Jr.	DWG FILE: 03002B_Shingles Dump.dwg
PROJ. ENG: CTC Jr.	

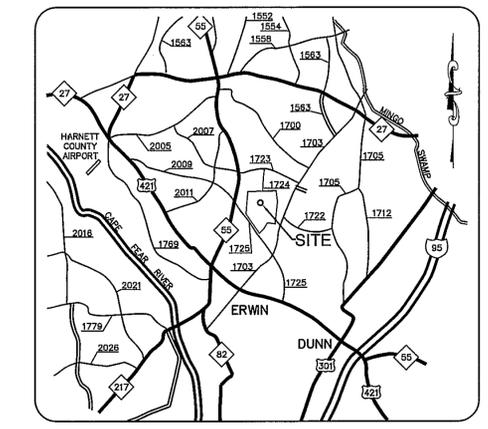
SEAL
028809
ENGINEER
TYRUS CLAYTON, JR.

CTC Jr. P.E.
9/21/2012 DATE

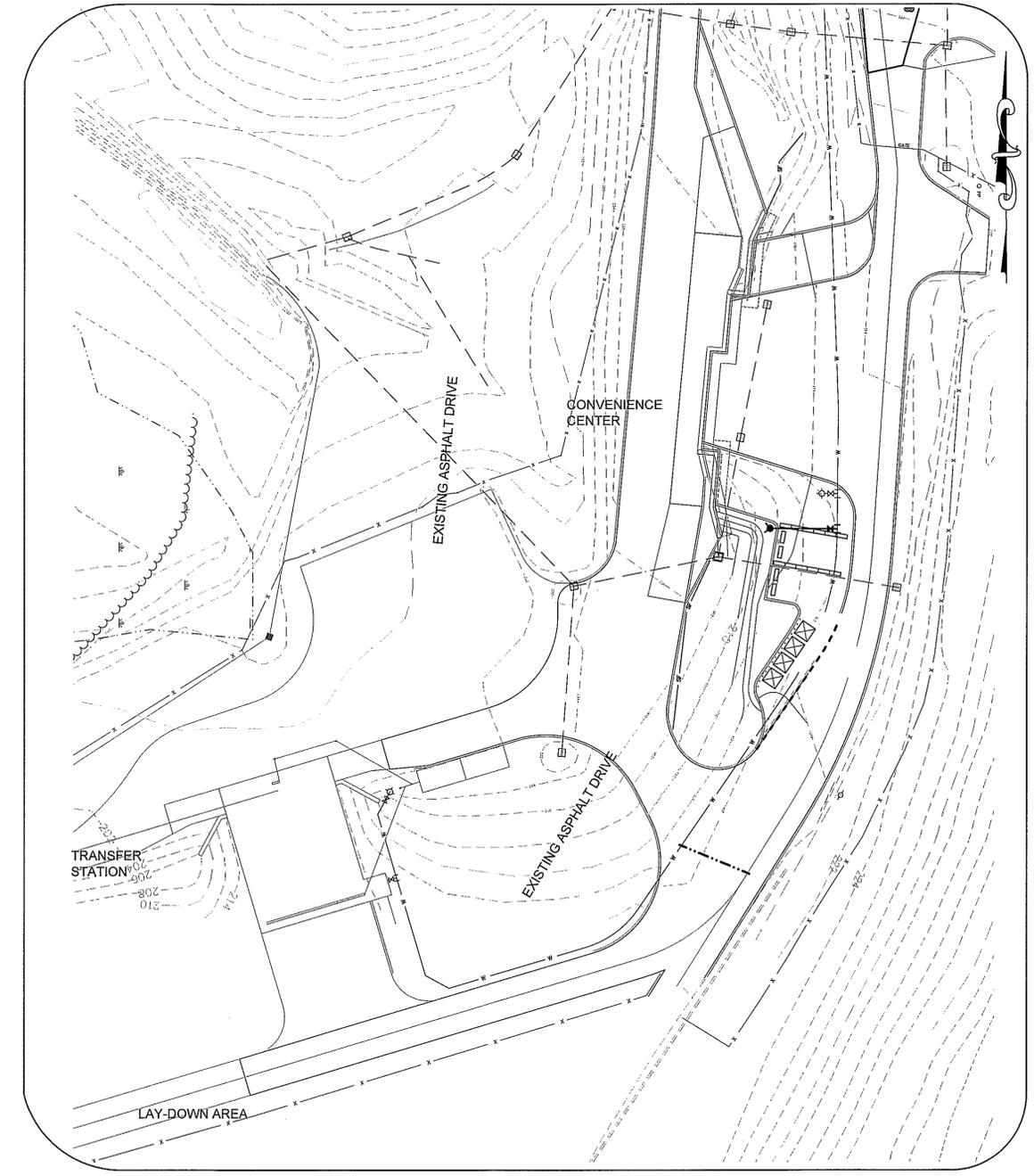
FINAL DRAWINGS
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CALL NORTH CAROLINA ONE CALL CENTER, 811 OR 800-632-4949, AT LEAST 48 HOURS BEFORE DIGGING OR EXCAVATION TO LOCATE ALL EXISTING UTILITIES.



VICINITY MAP
NOT TO SCALE



OVERALL PROJECT SITE MAP
SCALE: 1" = 40'

Clayton, Sr., P.E., Inc.
CIVIL & ENVIRONMENTAL ENGINEERING
46 WEST WASHINGTON STREET
COATS, NORTH CAROLINA 27521
PHONE: 910-897-7070 FAX: 910-897-6767
License No. C-2570 www.ctclayton.com

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TEMPORARY & PERMANENT SEEDING

TS PS

TEMPORARY SEEDING SCHEDULE FOR LATE WINTER AND EARLY SPRING

DATES	SPECIES	RATE (LB/ACRE)
JAN 1 - MAY 1	RYE (GRAIN)	120
	KOBE LESPEDEZA	50

SOIL AMENDMENTS
FOLLOW RECOMMENDATIONS OF SOIL TESTS OR APPLY 2,000 LB/ACRE GROUND AGRICULTURAL LIMESTONE AND 750 LB/ACRE 10-10-10 FERTILIZER.

MULCH
APPLY 4000 LB/ACRE SMALL GRAIN STRAW AND TACK WITH ASPHALT.

MAINTENANCE
REFERTILIZE IF GROWTH IS NOT FULLY ADEQUATE. RESEED, REFERTILIZE AND MULCH IMMEDIATELY FOLLOWING EROSION OR OTHER DAMAGE.

TEMPORARY SEEDING SCHEDULE FOR SUMMER

DATES	SPECIES	RATE (LB/ACRE)
MAY 1 - APR 15	GERMAN MILLET	40

SOIL AMENDMENTS
FOLLOW RECOMMENDATIONS OF SOIL TESTS OR APPLY 2,000 LB/ACRE GROUND AGRICULTURAL LIMESTONE AND 750 LB/ACRE 10-10-10 FERTILIZER.

MULCH
APPLY 4000 LB/ACRE SMALL GRAIN STRAW AND TACK WITH ASPHALT.

MAINTENANCE
REFERTILIZE IF GROWTH IS NOT FULLY ADEQUATE. RESEED, REFERTILIZE AND MULCH IMMEDIATELY FOLLOWING EROSION OR OTHER DAMAGE.

TEMPORARY SEEDING SCHEDULE FOR FALL

DATES	SPECIES	RATE (LB/ACRE)
AUG 15 - DEC 30	RYE (GRAIN)	120

SOIL AMENDMENTS
FOLLOW RECOMMENDATIONS OF SOIL TESTS OR APPLY 2,000 LB/ACRE GROUND AGRICULTURAL LIMESTONE AND 1000 LB/ACRE 10-10-10 FERTILIZER.

MULCH
APPLY 4000 LB/ACRE SMALL GRAIN STRAW AND TACK WITH ASPHALT.

MAINTENANCE
REPAIR AND REFERTILIZE AND RESEED DAMAGED AREAS IMMEDIATELY. TOPDRESS WITH 50 LB/ACRE OF NITROGEN IN MARCH. IF IT IS NECESSARY TO EXTEND TEMPORARY COVER BEYOND JUNE 15, OVERSEED WITH 50 LB/ACRE KOBE LESPEDEZA IN LATE FEBRUARY OR EARLY MARCH.

PERMANENT SEEDING SCHEDULE FOR GRASS-LINED CHANNELS

DATES	SPECIES	RATE (LB/ACRE)
BEST		
AUG 15 - OCT 31	TALL FESCUE	200
POSSIBLE		
FEB 1 - APR 15		

NURSE PLANTS
PRIOR TO MAY 1 OR AFTER AUG 15, ADD 40 LB/ACRE RYE (GRAIN).

SOIL AMENDMENTS
FOLLOW RECOMMENDATIONS OF SOIL TESTS OR APPLY 4,000 LB/ACRE GROUND AGRICULTURAL LIMESTONE AND 1000 LB/ACRE 10-10-10 FERTILIZER. OPERATE TILLAGE EQUIPMENT ACROSS THE WATERWAY.

MULCH
USE A ROLLED EROSION CONTROL PRODUCT TO COVER THE BOTTOM OF CHANNELS AND DITCHES AND STAPLE SECURELY. THE LINING SHOULD EXTEND ABOVE THE HIGHEST CALCULATED DEPTH OF FLOW.

MAINTENANCE
INSPECT AND REPAIR MULCH FREQUENTLY. REFERTILIZE IN LATE WINTER OF THE FOLLOWING YEAR. FOLLOW RECOMMENDATIONS OF SOIL TESTS OR USE 150 LB/ACRE OF 10-10-10. MOW REGULARLY TO A HEIGHT OF 2-4 INCHES.

PERMANENT SEEDING SCHEDULE FOR AREAS OTHER THAN CHANNELS

SPECIES	RATE (LB/ACRE)	
	3:1 AND STEEPER SLOPES	SLOPES FLATTER THAN 3:1
TALL FESCUE	100	80
SERICA LESPEDEZA	30	20
KOBE LESPEDEZA	10	10
PENSACOLA BAHIA GRASS	25	NONE

AFTER AUGUST 15 USE UNSCARIFIED SERICEA SEED.

NURSE PLANTS
PRIOR TO MAY 1 OR AFTER AUG 15, ADD 40 LB/ACRE RYE (GRAIN).

SEEDING DATES	BEST		POSSIBLE	
	FALL:	AUG 25 - SEP 15	AUG 20 - OCT 25	
LATE WINTER:	FEB 15 - MAR 21	FEB 1 - APR 15		

FALL IS BEST FOR TALL FESCUE AND LATE WINTER FOR LESPEDEZAS. OVERSEEDING OF KOBE LESPEDEZA OVER FALL-SEEDED TALL FESCUE IS VERY EFFECTIVE.

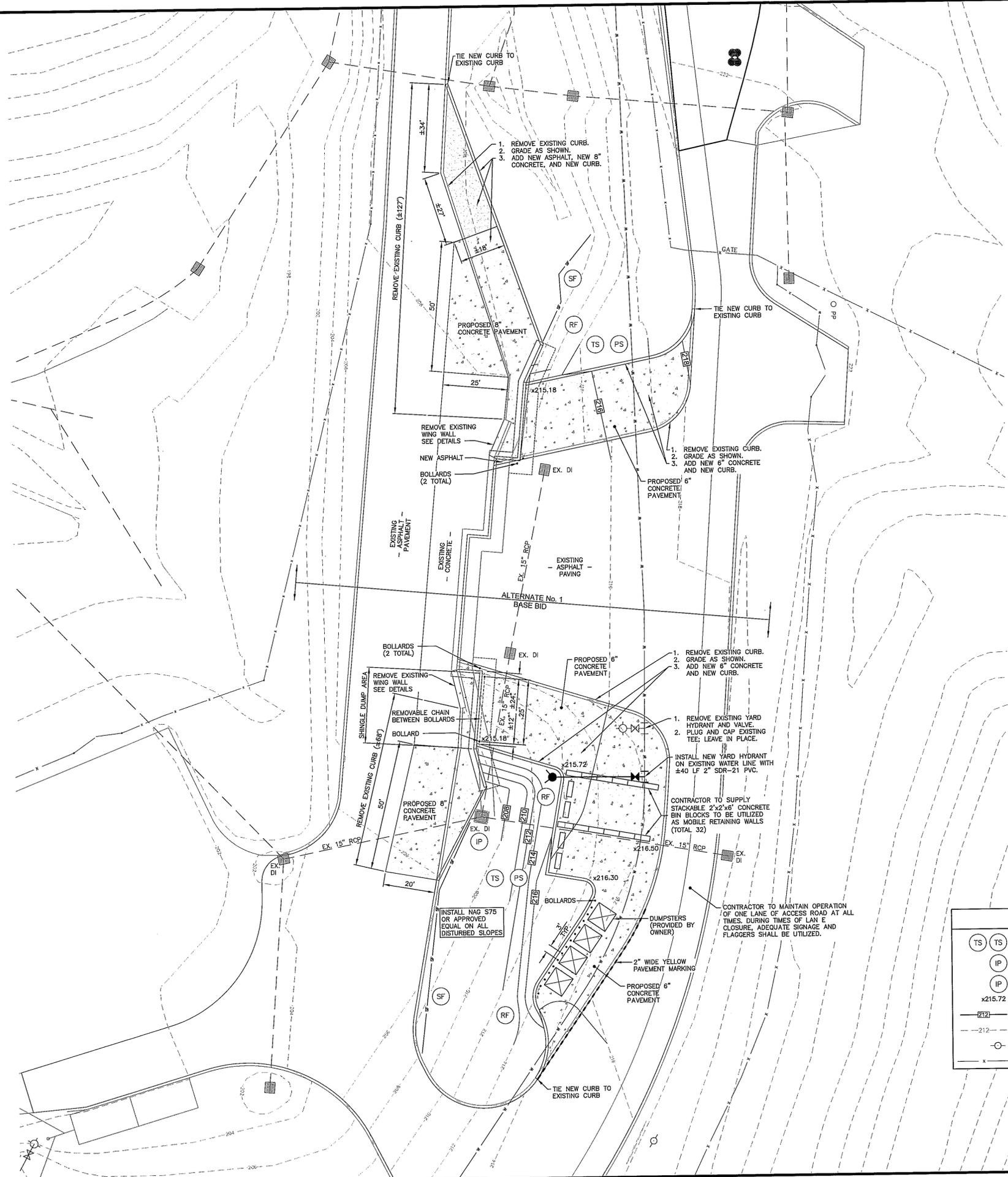
SOIL AMENDMENTS
FOLLOW RECOMMENDATIONS OF SOIL TESTS OR APPLY 4,000 LB/ACRE GROUND AGRICULTURAL LIMESTONE AND 1000 LB/ACRE 10-10-10 FERTILIZER.

MULCH
APPLY 4,000-5,000 LB/ACRE GRAIN STRAW. ANCHOR BY TACKING WITH ASPHALT. ON SLOPE 3:1 OR STEEPER ANCHOR STRAW WITH NETTING.

MAINTENANCE
REFERTILIZE IN THE SECOND YEAR UNLESS GROWTH IS FULLY ADEQUATE. MAY BE MOWED ONCE OR TWICE A YEAR, BUT MOWING IS NOT NECESSARY. REFERTILIZE, RESEED AND MULCH DAMAGED AREAS IMMEDIATELY.

SPECIFICATIONS

1. PLOW COMPACTED AREAS 6 INCHES DEEP.
2. APPLY TOPSOIL IF AVAILABLE.
3. APPLY LIME AND FERTILIZER UNIFORMLY AND INCORPORATE INTO THE TOP 4-6 INCHES OF SOIL. IF A HYDRAULIC SEEDER IS USED, DO NOT MIX SEED AND FERTILIZER MORE THAN 30 MINUTES BEFORE APPLICATION.
4. UNLESS HYDROSEEDING IS USED, BREAK UP LARGE CLOUDS. IF SURFACE IS SEALED, LOOSEN IT IMMEDIATELY BEFORE SEEDING BY RAKING, DISKING, HARROWING OR OTHER SUITABLE METHODS. GROOVE OR FURROW SLOPES STEEPER THAN 3:1 ON THE CONTOUR BEFORE SEEDING.
5. EVENLY APPLY SEED USING A CYCLONE SEEDER (BROADCAST), DRILL, CULTIPACKER SEEDER OR HYDROSEEDER. SMALL GRAINS SHOULD BE PLANTED NO MORE THAN ONE INCH DEEP. GRASSES AND LEGUMES NO MORE THAN 1/2 INCH. BROADCAST SEED MUST BE COVERED BY RAKING OR CHAIN DRAGGING AND THEN LIGHTLY FIRMED WITH A ROLLER OR CULTIPACKER. HYDROSEEDED MIXTURES SHOULD INCLUDE A WOOD FIBER (CELLULOSE) MULCH.
6. IN AREAS NOT HYDROSEEDED, MULCH WITH GRAIN STRAW. SEE SEEDING SCHEDULES.



General Notes

1. CONTRACTOR SHALL VISIT SITE AND BECOME FAMILIAR WITH EXISTING CONDITIONS PRIOR TO BIDDING.
2. CONTRACTOR SHALL BE RESPONSIBLE FOR ADEQUATE EROSION AND SEDIMENT CONTROL AT ALL TIMES.
3. SUITABLE STRUCTURAL FILL IS AVAILABLE ON SITE.
4. WORK SHALL BE COMPLETED ON PHASE A PRIOR TO COMMENCING ON PHASE B. CONTRACTOR SHALL SUBMIT WRITTEN WORK AND TRAFFIC CONTROL PLAN TO OWNER AND ENGINEER PRIOR TO COMMENCING WORK.
5. EXISTING CONVENIENCE CENTER BAYS SHALL REMAIN OPERATIONAL DURING CONSTRUCTION.
6. MINOR ADJUSTMENTS MAY BE NECESSARY IN ORDER TO MATCH FIELD CONDITIONS FOR LAYOUT AND GRADE. ALL NEW WORK SHALL DRAIN TO EXISTING INLETS. "BIRDBATHS" WILL BE CAUSE FOR REJECTION OF WORK.

FINAL DRAWINGS
RELEASED FOR BID
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No.	Revision/Issue	Date
1	REVISED LABELS OF EXISTING WORK	9/14/11

Professional Engineer Seal for Travis Clayton, State of North Carolina, License No. 22959. Date: 9/21/2012.

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HARNETT COUNTY DUNN-ERWIN LANDFILL PROJECT 2

Project No: 03002B	File Name: 03002b Shingles Dump
Designed By: CTC Jr.	Drawn By: AEB
Checked By: CTC Jr.	Proj. Eng.: CTC Jr.

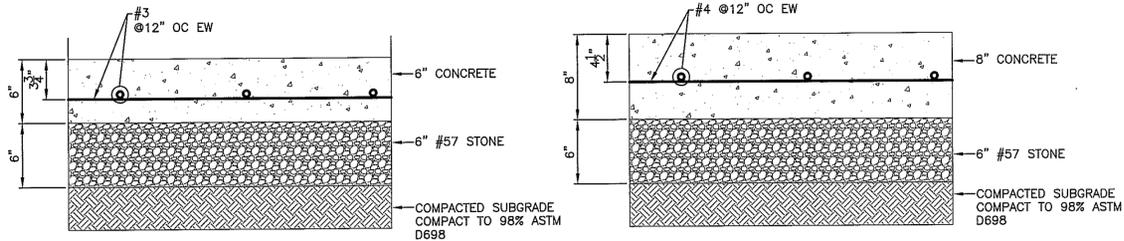
SITE PLAN	
Date: JANUARY 2012	Sheet: 2.1.1
Scale: AS NOTED	

LEGEND

- TS PS TEMPORARY AND PERMANENT SEEDING
- IP INLET PROTECTION
- IP SILT FENCE
- x215.72 PROPOSED ELEVATION TOP OF PAVEMENT
- 212- PROPOSED CONTOUR
- 212- EXISTING CONTOUR
- EXISTING POWER POLE
- x EXISTING CHAIN LINK FENCE

PA:003 Harnett County\03002B Corrective Action Plan_CAF\03002B Shingles Dump.dwg

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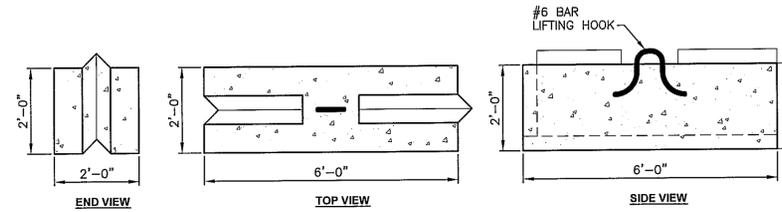


6" CONCRETE PAVEMENT

SCALE: 1-1/2" = 1'-0"

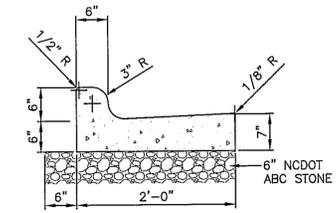
8" CONCRETE PAVEMENT

SCALE: 1-1/2" = 1'-0"



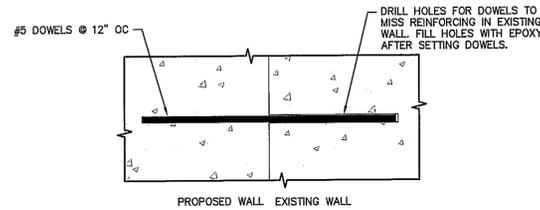
TYPICAL CONCRETE BIN BLOCK

SCALE: 1/2" = 1'-0"



STANDARD CURB AND GUTTER

NO SCALE

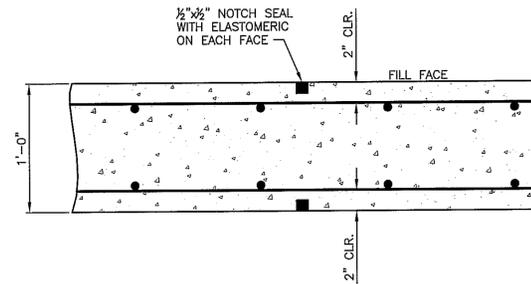


CONSTRUCTION JOINT DETAIL

SCALE: 1-1/2" = 1'-0"

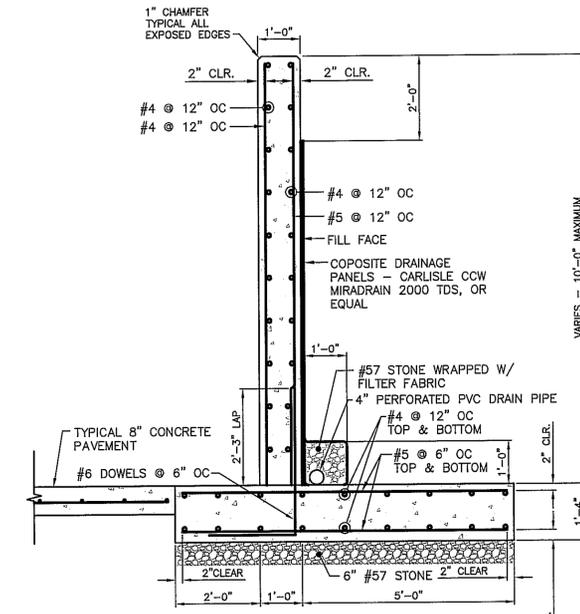
PLAN - RETAINING WALL EXPANSION JOINT

SCALE: 1-1/2" = 1'-0"



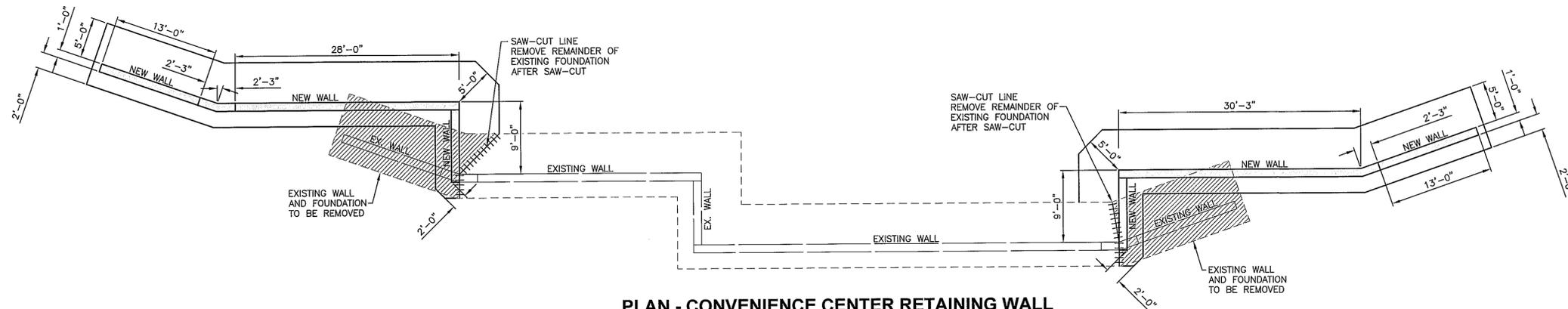
PLAN - RETAINING WALL CONTRACTION JOINT

SCALE: 1-1/2" = 1'-0"



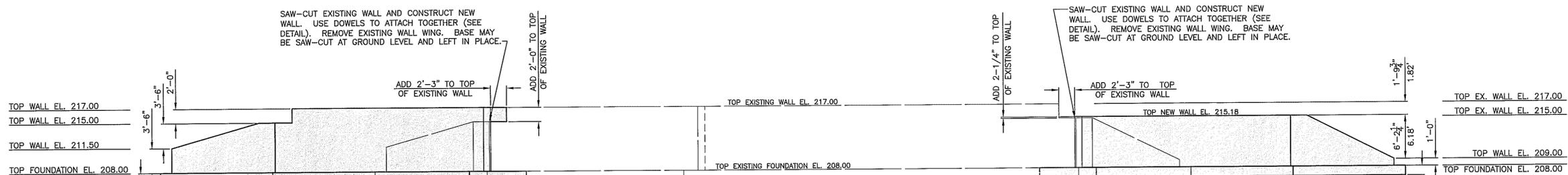
TYPICAL RETAINING WALL SECTION

SCALE: 1/2" = 1'-0"



PLAN - CONVENIENCE CENTER RETAINING WALL

SCALE: 1/8" = 1'-0"



ELEVATION - CONVENIENCE CENTER RETAINING WALL

SCALE: 1/8" = 1'-0"

FINAL DRAWINGS
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No.	Revision/Issue	Date

Signature: *Cyril Clayton*
Date: 9/21/2012

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**HARNETT COUNTY
DUNN-ERWIN LANDFILL
PROJECT 2**

HARNETT COUNTY, NORTH CAROLINA

Project No: 03002B File Name: 03002B Shingles Dump

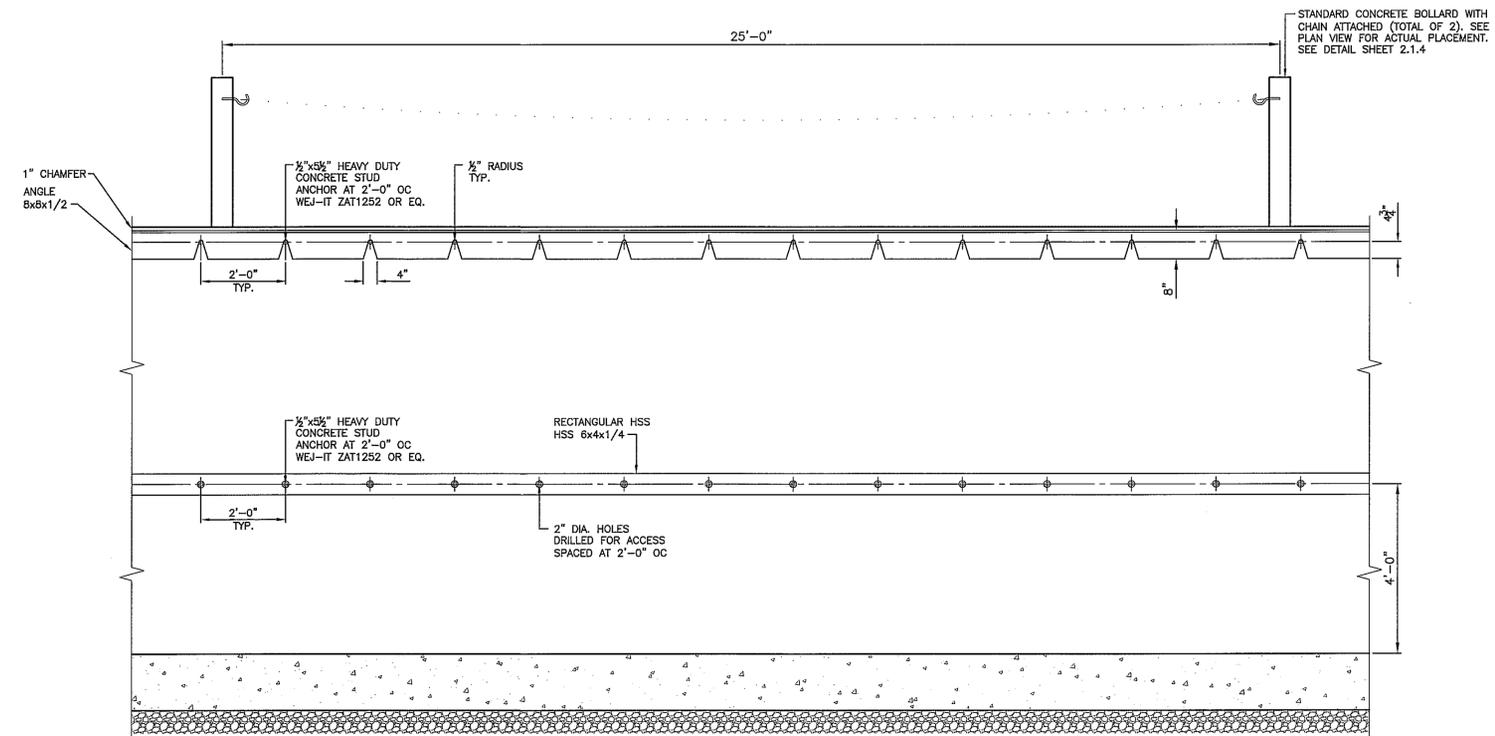
Designed By: CTC Jr. Drawn By: AEB

Checked By: CTC Jr. Proj. Eng.: CTC Jr.

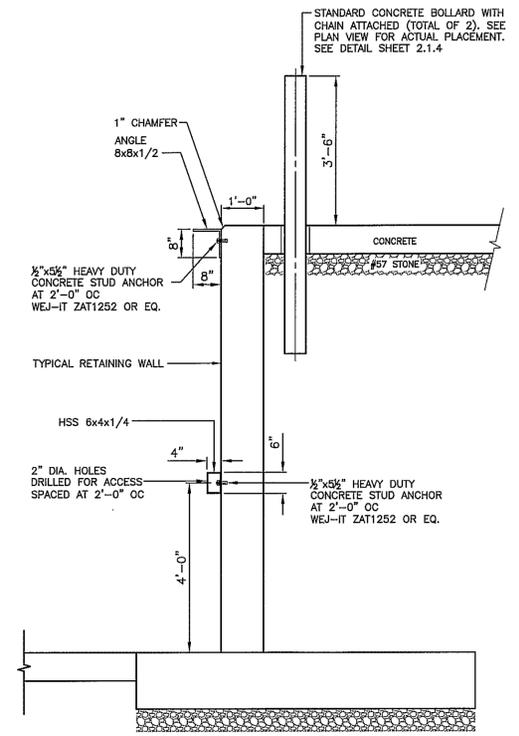
Sheet Title: **DETAILS**

Date: JANUARY 2012 Sheet

Scale: AS NOTED **2.1.2**



TYPICAL WALL ELEVATION AT SHINGLES DUMP AREA
SCALE: 1/2" = 1'-0"



TYPICAL WALL SECTION AT SHINGLES DUMP AREA
SCALE: 1/2" = 1'-0"

FINAL DRAWINGS
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No.	Revision/Issue	Date



Clayton, Sr.
Signature
9/21/2012
Date



HARNETT COUNTY DUNN-ERWIN LANDFILL PROJECT 2

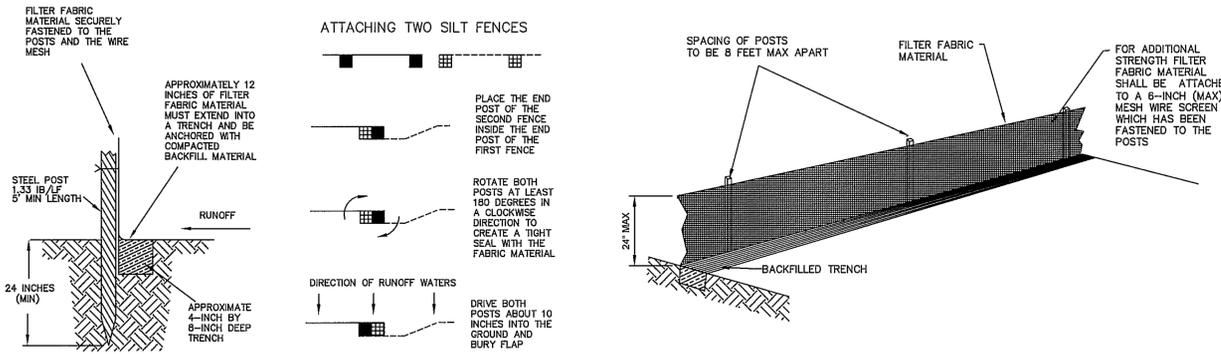
HARNETT COUNTY, NORTH CAROLINA

Project No: 03002B	File Name: 03002B Shingles Dump
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Sheet Title	
DETAILS	
Date: JANUARY 2012	Sheet
Scale: AS NOTED	2.1.3

CONSTRUCTION SEQUENCE

- OBTAIN PLAN APPROVAL AND OTHER APPLICABLE PERMITS.
- HOLD PRECONSTRUCTION MEETING AT LEAST ONE WEEK PRIOR TO STARTING CONSTRUCTION.
- INSTALL SEDIMENT FENCE AND CONSTRUCT TEMPORARY DIVERSIONS.
- CLEAR VEGETATION FROM THE ENTIRE WORK AREA.
- REMOVE TOPSOIL FROM AREA OF CONSTRUCTION AND BORROW AREA AND STOCKPILE IN AN AREA DESIGNATED BY THE ENGINEER.
- COMPLETE GRADING AND INSTALL CULVERTS IF APPLICABLE.
- DISTRIBUTE TOPSOIL AND PERMANENTLY VEGETATE AND MULCH.
- AFTER THE SITE IS STABILIZED AND WHEN DIRECTED BY THE ENGINEER AND NCDENR, REMOVE ALL TEMPORARY MEASURES AND INSTALL PERMANENT VEGETATION.



CONSTRUCTION OF A SILT FENCE

MATERIALS

- USE A SYNTHETIC FILTER FABRIC OF AT LEAST 95% BY WEIGHT OF POLYOLEFINS OR POLYESTER, WHICH IS CERTIFIED BY THE MANUFACTURER OR SUPPLIER TO CONFORM TO THE REQUIREMENTS IN ASTM D 6461, WHICH IS SHOWN IN PART IN TABLE 6.62B. SYNTHETIC FILTER FABRIC SHOULD CONTAIN ULTRAVIOLET RAY INHIBITORS AND STABILIZERS TO PROVIDE A MINIMUM OF 6 MONTHS OF EXPECTED USABLE CONSTRUCTION LIFE AT A TEMPERATURE RANGE OF 0 TO 120°F.
- ENSURE THAT POSTS FOR SEDIMENT FENCES ARE 1.33 LB/LINEAR FT STEEL WITH A MINIMUM LENGTH OF 5 FEET. MAKE SURE THAT STEEL POSTS HAVE PROJECTIONS TO FACILITATE FASTENING THE FABRIC.
- FOR REINFORCEMENT OF STANDARD STRENGTH FILTER FABRIC, USE WIRE FENCE WITH A MINIMUM 14 GAUGE AND A MAXIMUM MESH SPACING OF 6 INCHES.

CONSTRUCTION

- CONSTRUCT THE SEDIMENT BARRIER OF STANDARD STRENGTH OR EXTRA STRENGTH SYNTHETIC FILTER FABRICS.
- ENSURE THAT THE HEIGHT OF THE SEDIMENT FENCE DOES NOT EXCEED 24 INCHES ABOVE THE GROUND SURFACE. (HIGHER FENCES MAY IMPOUND VOLUMES OF WATER SUFFICIENT TO CAUSE FAILURE OF THE STRUCTURE.)
- CONSTRUCT THE FILTER FABRIC FROM A CONTINUOUS ROLL CUT TO THE LENGTH OF THE BARRIER TO AVOID JOINTS. WHEN JOINTS ARE NECESSARY, SECURELY FASTEN THE FILTER CLOTH ONLY AT A SUPPORT POST WITH 4 FEET MINIMUM OVERLAP TO THE NEXT POST.
- SUPPORT STANDARD STRENGTH FILTER FABRIC BY WIRE MESH FASTENED SECURELY TO THE UPSLOPE SIDE OF THE POSTS. EXTEND THE WIRE MESH SUPPORT TO THE BOTTOM OF THE TRENCH. FASTEN THE WIRE REINFORCEMENT, THEN FABRIC ON THE UPSLOPE SIDE OF THE FENCE POST. WIRE OR PLASTIC ZIP TIES SHOULD HAVE MINIMUM 50 POUND TENSILE STRENGTH.
- WHEN A WIRE MESH SUPPORT FENCE IS USED, SPACE POSTS A MAXIMUM OF 8 FEET APART. SUPPORT POSTS SHOULD BE DRIVEN SECURELY INTO THE GROUND A MINIMUM OF 24 INCHES.
- EXTRA STRENGTH FILTER FABRIC WITH 6 FEET POST SPACING DOES NOT REQUIRE WIRE MESH SUPPORT FENCE. SECURELY FASTEN THE FILTER FABRIC DIRECTLY TO POSTS. WIRE OR PLASTIC ZIP TIES SHOULD HAVE MINIMUM 50 POUND TENSILE STRENGTH.
- EXCAVATE A TRENCH APPROXIMATELY 4 INCHES WIDE AND 8 INCHES DEEP ALONG THE PROPOSED LINE OF POSTS AND UPSLOPE FROM THE BARRIER (FIGURE 6.62A).
- PLACE 12 INCHES OF THE FABRIC ALONG THE BOTTOM AND SIDE OF THE TRENCH.
- BACKFILL THE TRENCH WITH COMPACTED SOIL PLACED OVER THE FILTER FABRIC. THOROUGH COMPACTION OF THE BACKFILL IS CRITICAL TO SILT FENCE PERFORMANCE.
- DO NOT ATTACH FILTER FABRIC TO EXISTING TREES.

SEDIMENT FENCE INSTALLATION USING THE SLICING METHOD

INSTEAD OF EXCAVATING A TRENCH, PLACING FABRIC AND THEN BACKFILLING TRENCH, SEDIMENT FENCE MAY BE INSTALLED USING SPECIALLY DESIGNED EQUIPMENT THAT INSERTS THE FABRIC INTO A CUT SLICED IN THE GROUND WITH A DISC.

INSTALLATION SPECIFICATIONS

- THE BASE OF BOTH END POSTS SHOULD BE AT LEAST ONE FOOT HIGHER THAN THE MIDDLE OF THE FENCE. CHECK WITH A LEVEL IF NECESSARY.
- INSTALL POSTS 4 FEET APART IN CRITICAL AREAS AND 6 FEET APART ON STANDARD APPLICATIONS.
- INSTALL POSTS 2 FEET DEEP ON THE DOWNSTREAM SIDE OF THE SILT FENCE, AND AS CLOSE AS POSSIBLE TO THE FABRIC, ENABLING POSTS TO SUPPORT THE FABRIC FROM UPSTREAM WATER PRESSURE.
- INSTALL POSTS WITH THE NIPPLES FACING AWAY FROM THE SILT FABRIC.
- ATTACH THE FABRIC TO EACH POST WITH THREE TIES, ALL SPACED WITHIN THE TOP 8 INCHES OF THE FABRIC. ATTACH EACH TIE DIAGONALLY 45 DEGREES THROUGH THE FABRIC, WITH EACH PUNCTURE AT LEAST 1 INCH VERTICALLY APART. ALSO, EACH TIE SHOULD BE POSITIONED TO HANG ON A POST NIPPLE WHEN TIGHTENED TO PREVENT SAGGING.
- WRAP APPROXIMATELY 6 INCHES OF FABRIC AROUND THE END POSTS AND SECURE WITH 3 TIES.
- NO MORE THAN 24 INCHES OF A 36 INCH FABRIC IS ALLOWED ABOVE GROUND LEVEL.
- THE INSTALLATION SHOULD BE CHECKED AND CORRECTED FOR ANY DEVIATIONS BEFORE COMPACTION.
- COMPACTION IS VITALLY IMPORTANT FOR EFFECTIVE RESULTS. COMPACT THE SOIL IMMEDIATELY NEXT TO THE SILT FENCE FABRIC WITH THE FRONT WHEEL OF THE TRACTOR, SKID STEER, OR ROLLER EXERTING AT LEAST 60 POUNDS PER SQUARE INCH. COMPACT THE UPSTREAM SIDE FIRST, AND THEN EACH SIDE TWICE FOR A TOTAL OF 4 TRIPS.

MAINTENANCE

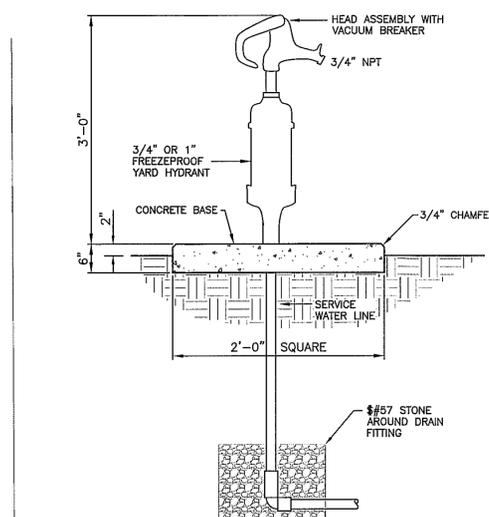
- INSPECT SEDIMENT FENCES AT LEAST ONCE A WEEK AND AFTER EACH RAINFALL. MAKE ANY REQUIRED REPAIRS IMMEDIATELY.
- SHOULD THE FABRIC OF A SEDIMENT FENCE COLLAPSE, TEAR, DECOMPOSE OR BECOME INEFFECTIVE, REPLACE IT PROMPTLY.
- REMOVE SEDIMENT DEPOSITS AS NECESSARY TO PROVIDE ADEQUATE STORAGE VOLUME FOR THE NEXT RAIN AND TO REDUCE PRESSURE ON THE FENCE. TAKE CARE TO AVOID UNDERMINING THE FENCE DURING CLEANOUT.
- REMOVE ALL FENCING MATERIALS AND UNSTABLE SEDIMENT DEPOSITS AND BRING THE AREA TO GRADE AND STABILIZE IT AFTER THE CONTRIBUTING DRAINAGE AREA HAS BEEN PROPERLY STABILIZED.

EROSION & SEDIMENT CONTROL NOTES

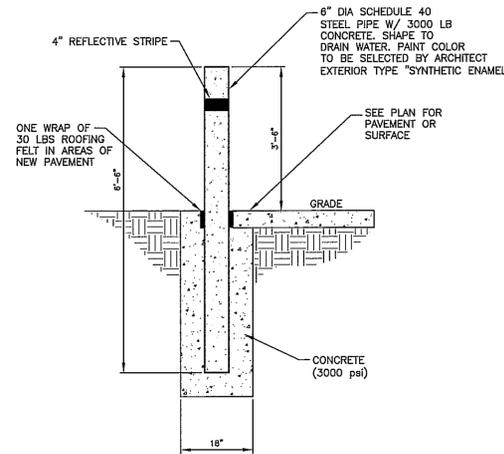
- GENERAL CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING ALL EROSION AND SEDIMENT CONTROL STRUCTURES DURING CONSTRUCTION.
- UNLESS OTHERWISE INDICATED, ALL VEGETATIVE AND STRUCTURAL EROSION AND SEDIMENT CONTROL MEASURES SHALL BE CONSTRUCTED AND MAINTAINED IN ACCORDANCE WITH THE MINIMUM STANDARDS AND SPECIFICATIONS OF THE NORTH CAROLINA EROSION AND SEDIMENT CONTROL PLANNING AND DESIGN MANUAL.
- EROSION CONTROL MEASURES SHOWN ON APPROVED PLANS ARE SITE SPECIFIC AND ARE DESIGNED TO PREVENT SOIL EROSION AND TO PREVENT SEDIMENT FROM LEAVING THE SITE. HOWEVER, EROSION CONTROL DESIGN IS PERFORMANCE BASED. THE CONTRACTOR IS RESPONSIBLE FOR INSTALLATION OF ANY ADDITIONAL EROSION CONTROL MEASURES NECESSARY TO PREVENT EROSION AND SEDIMENTATION AS DETERMINED BY EITHER NCDENR OR THE ENGINEER.
- ALL DISTURBED AREAS ARE TO DRAIN TO APPROVED SEDIMENT CONTROL MEASURES AT ALL TIMES DURING LAND DISTURBING ACTIVITIES AND DURING SITE DEVELOPMENT UNTIL FINAL STABILIZATION IS ACHIEVED.
- CONTRACTOR STAGING AREA(S) SHALL BE RETURNED TO ORIGINAL CONDITION AT THE COMPLETION OF ALL WORK.
- DURING DEWATERING OPERATIONS, WATER SHALL BE PUMPED INTO AN APPROVED FILTERING DEVICE PRIOR TO DISCHARGE TO RECEIVING OUTLET.
- ALL TEMPORARY EROSION CONTROL MEASURES SHALL BE REMOVED BY CONTRACTOR ONCE STABILIZATION OR A SUFFICIENT GROUND COVER HAS BEEN ESTABLISHED OR AS DIRECTED BY THE ENGINEER. NCDENR'S FINAL APPROVAL IS REQUIRED.
- ALL EXCESS EARTHWORK, CLASSIFIED AS SUITABLE FILL MATERIAL OR TOPSOIL, SHALL REMAIN AND BE STORED ON-SITE AT A LOCATION DESIGNATED BY THE ENGINEER OR OWNER, UNLESS DIRECTED OTHERWISE BY THE ENGINEER OR OWNER. THIS EXCESS SOIL SHALL BE STOCKPILED WITHIN THE APPROVED DISTURBANCE AREA AND ADEQUATELY PROTECTED FOR EROSION AND SEDIMENT CONTROL.

EROSION & SEDIMENT CONTROL MAINTENANCE REQUIREMENTS

- ALL EROSION AND SEDIMENT CONTROL PRACTICES SHALL BE CHECKED FOR DAMAGE, STABILITY AND OPERATION FOLLOWING EVERY RAINFALL EVENT PRODUCING 1/2 INCH OR MORE OF RUNOFF AND AT LEAST ONCE EVERY WEEK. ANY NEEDED REPAIRS SHALL BE MADE IMMEDIATELY TO MAINTAIN ALL PRACTICES AS DESIGNED. MAINTENANCE SPECIFIED IN STRUCTURE CONSTRUCTION SPECIFICATIONS SHALL BE PERFORMED. RECORDS OF THESE INSPECTIONS ARE TO BE MAINTAINED AND MADE AVAILABLE FOR INSPECTION BY NCDENR, THE OWNER, AND ENGINEER ON-SITE AT ALL TIMES.
- DISTURBED AREAS LEFT INACTIVE BETWEEN PERIODS OF GRADING ACTIVITY SHALL BE TEMPORARILY SEEDED WITHIN 15 WORKING DAYS OR 30 CALENDAR DAYS, WHICHEVER IS SHORTER.
- PERMANENT GROUND COVER VEGETATION SHALL BE APPLIED TO ALL AREAS WITH TEMPORARY VEGETATION AND ALL UNCOVERED DISTURBED AREAS WITHIN 15 WORKING DAYS OR 90 CALENDAR DAYS, WHICHEVER IS SHORTER, AFTER COMPLETION OF GRADING.
- ALL SEEDED AREAS WHERE VEGETATION IS DAMAGED OR COVER IS NOT ADEQUATE SHALL BE PREPARED AND RESEEDED AS NECESSARY TO PRODUCE A VIGOROUS, DENSE VEGETATIVE COVER.



YARD HYDRANT (3/4" AND 1")
NOT TO SCALE



STANDARD CONCRETE BOLLARD
NOT TO SCALE

ROLLED EROSION CONTROL PRODUCTS

A. ROLLED EROSION CONTROL PRODUCTS (RECP)

- GRADE THE SURFACE OF INSTALLATION AREAS SO THAT THE GROUND IS SMOOTH AND LOOSE. WHEN SEEDING PRIOR TO INSTALLATION, FOLLOW THE STEPS FOR SEED BED PREPARATION, SOIL AMENDMENTS AND SEEDING IN "SEEDING" ABOVE. ALL GULLIES, RILLS AND OTHER DISTURBED AREAS MUST BE FINE GRADED PRIOR TO INSTALLATION. SPREAD SEED BEFORE RECP INSTALLATION. IMPORTANT; REMOVE ALL LARGE ROCKS, DIRT CLODS, STUMPS, ROOTS, GRASS CLUMPS AND OTHER OBSTRUCTIONS FROM THE SOIL SURFACE TO ALLOW FOR DIRECT CONTACT BETWEEN THE SOIL SURFACE AND THE RECP.
- TERMINAL ANCHOR TRENCHES ARE REQUIRED AT RECP ENDS AND INTERMITTENT TRENCHES MUST BE CONSTRUCTED ACROSS CHANNELS AT 25-FOOT INTERVALS. TERMINAL ANCHOR TRENCHES SHOULD BE A MINIMUM OF 12 INCHES IN DEPTH AND 6 INCHES IN WIDTH, WHILE INTERMITTENT TRENCHES NEED BE ONLY 6 INCHES DEEP AND 6 INCHES WIDE.

INSTALLATION IN CHANNELS

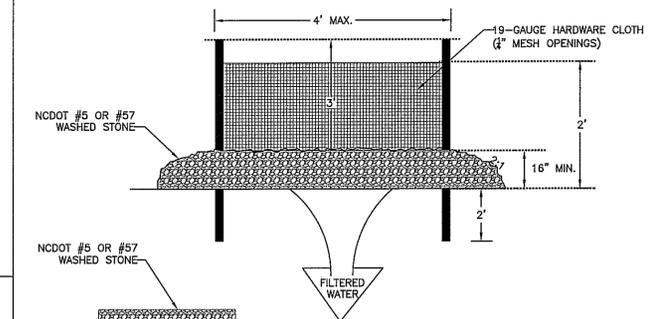
- EXCAVATE TERMINAL TRENCHES ACROSS THE CHANNEL AT THE UPPER AND LOWER ENDS OF THE LINED CHANNEL SECTIONS. AT 25-FOOT INTERVALS ALONG THE CHANNEL, ANCHOR THE RECP ACROSS THE CHANNEL EITHER IN 6 INCH BY 6 INCH TRENCHES OR BY INSTALLING TWO CLOSELY SPACED ROWS OF ANCHORS. EXCAVATE LONGITUDINAL TRENCHES 6 INCHES DEEP AND WIDE ALONG CHANNEL EDGES (ABOVE WATER LINE) IN WHICH TO BURY THE OUTSIDE RECP EDGES. PLACE THE FIRST RECP AT THE DOWNSTREAM END OF THE CHANNEL. PLACE THE END OF THE FIRST RECP IN THE TERMINAL TRENCH AND PIN IT AT 1 FOOT INTERVALS ALONG THE BOTTOM OF THE TRENCH. NOTE: THE RECP SHOULD BE PLACED UPSIDE DOWN IN THE TRENCH WITH THE ROLL ON THE DOWNSTREAM SIDE OF THE TRENCH. ONCE PINNED AND BACKFILLED, THE RECP IS DEPLOYED BY WRAPPING OVER THE TOP OF THE TRENCH AND UNROLLING UPSTREAM. IF THE CHANNEL IS WIDER THAN THE PROVIDED ROLLS, PLACE ENDS OF ADJACENT ROLLS IN THE TERMINAL TRENCH, OVERLAPPING THE ADJACENT ROLLS A MINIMUM OF 3 INCHES. PIN AT 1 FOOT INTERVALS. BACKFILL AND COMPACT. UNROLL THE RECP IN THE UPSTREAM DIRECTION UNTIL REACHING THE FIRST INTERMITTENT TRENCH. FOLD THE RECP BACK OVER ITSELF, POSITIONING THE ROLL ON THE DOWNSTREAM SIDE OF THE TRENCH, AND ALLOW THE MAT TO CONFORM TO THE TRENCH. THEN PIN THE RECP (TWO LAYERS) TO THE BOTTOM OF THE TRENCH, BACKFILL AND COMPACT. CONTINUE UP THE CHANNEL (WRAPPING OVER THE TOP OF THE INTERMITTENT TRENCH) REPEATING THIS STEP AT OTHER INTERMITTENT TRENCHES, UNTIL REACHING THE UPPER TERMINAL TRENCH. AT THE UPPER TERMINAL TRENCH, ALLOW THE RECP TO CONFORM TO THE TRENCH, SECURE WITH PINS OR STAPLES, BACKFILL, COMPACT AND THEN BRING THE MAT BACK OVER THE TOP OF THE TRENCH AND ONTO THE EXISTING MAT (2 TO 3 FEET OVERLAP IN THE DOWNSTREAM DIRECTION), AND PIN AT 1 FOOT INTERVALS ACROSS THE RECP. WHEN STARTING INSTALLATION OF A NEW ROLL, BEGIN IN A TRENCH OR SINGLE-LAP ENDS OF ROLLS A MINIMUM OF 1 FOOT WITH UPSTREAM RECP ON TOP TO PREVENT UPLIFTING. PLACE THE OUTSIDE EDGES OF THE RECP(S) IN LONGITUDINAL TRENCHES, PIN, BACKFILL, AND COMPACT.

ANCHORING DEVICES

- 1 1/2 GAUGE, AT LEAST 6 INCHES LENGTH BY 1 INCH WIDTH STAPLES OR 12 INCH MINIMUM LENGTH WOODEN STAKES ARE RECOMMENDED FOR ANCHORING THE RECP TO THE GROUND. DRIVE STAPLES OR PINS SO THAT THE TOP OF THE STAPLE OR PIN IS FLUSH WITH THE GROUND SURFACE. ANCHOR EACH RECP EVERY 3 FEET ALONG ITS CENTER. LONGITUDINAL OVERLAPS MUST BE SUFFICIENT TO ACCOMMODATE A ROW OF ANCHORS AND UNIFORM ALONG THE ENTIRE LENGTH OF OVERLAP AND ANCHORED EVERY 3 FEET ALONG THE OVERLAP LENGTH. ROLL ENDS MAY BE SPLICED BY OVERLAPPING 1 FOOT (IN THE DIRECTION OF WATER FLOW), WITH THE UPSTREAM/SLOPE MAT PLACED ON TOP OF THE DOWNSTREAM/ DOWNSLOPE RECP. THIS OVERLAP SHOULD BE ANCHORED AT 1 FOOT SPACING ACROSS THE RECP. WHEN INSTALLING MULTIPLE WIDTH MATS HEAT SEALED IN THE FACTORY, ALL FACTORY SEAM AND FIELD OVERLAPS SHOULD BE SIMILARLY ANCHORED.

MAINTENANCE

- INSPECT ROLLED EROSION CONTROL PRODUCTS AT LEAST WEEKLY AND AFTER EACH SIGNIFICANT (1/2 INCH OR GREATER) RAINFALL EVENT. REPAIR IMMEDIATELY.
- GOOD CONTACT WITH THE GROUND MUST BE MAINTAINED, AND EROSION MUST NOT OCCUR BENEATH THE RECP. ANY AREAS OF THE RECP THAT ARE DAMAGED OR NOT IN CLOSE CONTACT WITH THE GROUND SHALL BE REPAIRED AND STAPLED.
- IF EROSION OCCURS DUE TO POORLY CONTROLLED DRAINAGE, THE PROBLEM SHALL BE FIXED AND THE ERODED AREA PROTECTED.
- MONITOR AND REPAIR THE RECP AS NECESSARY UNTIL GROUND COVER IS ESTABLISHED.



CONSTRUCTION SPECIFICATIONS

- UNIFORMLY GRADE A SHALLOW DEPRESSION APPROACHING THE INLET.
- DRIVE 5-FOOT STEEL POSTS 2 FEET INTO THE GROUND SURROUNDING THE INLET. SPACE POSTS EVENLY AROUND THE PERIMETER OF THE INLET, A MAXIMUM OF 4 FEET APART.
- SURROUND THE POSTS WITH WIRE MESH HARDWARE CLOTH. SECURE THE WIRE MESH TO THE STEEL POSTS AT THE TOP, MIDDLE, AND BOTTOM, PLACING A 2-FOOT FLAP OF THE WIRE MESH UNDER THE GRAVEL FOR ANCHORING IS RECOMMENDED.
- PLACE CLEAN GRAVEL (NO DOT #5 OR #57 STONE) ON A 2:1 SLOPE WITH A HEIGHT OF 16 INCHES AROUND THE WIRE, AND SMOOTH TO AN EVEN GRADE.
- ONCE THE CONTRIBUTING DRAINAGE AREA HAS BEEN STABILIZED, REMOVE ACCUMULATED SEDIMENT, AND ESTABLISH FINAL GRADING ELEVATIONS.
- COMPACT THE AREA PROPERLY AND STABILIZE IT WITH GROUND COVER.

MAINTENANCE

INSPECT INLETS AT LEAST WEEKLY AND AFTER EACH SIGNIFICANT (1/2" OR GREATER) RAINFALL EVENT. CLEAR THE MESH WIRE OF ANY DEBRIS OR OTHER OBJECTS TO PROVIDE ADEQUATE FLOW FOR SUBSEQUENT RAINS. TAKE CARE NOT TO DAMAGE OR UNDERCUT THE WIRE MESH DURING THE SEDIMENT REMOVAL. REPLACE STONE AS NEEDED.

HARDWARE CLOTH AND GRAVEL INLET PROTECTION

NOT TO SCALE

General Notes

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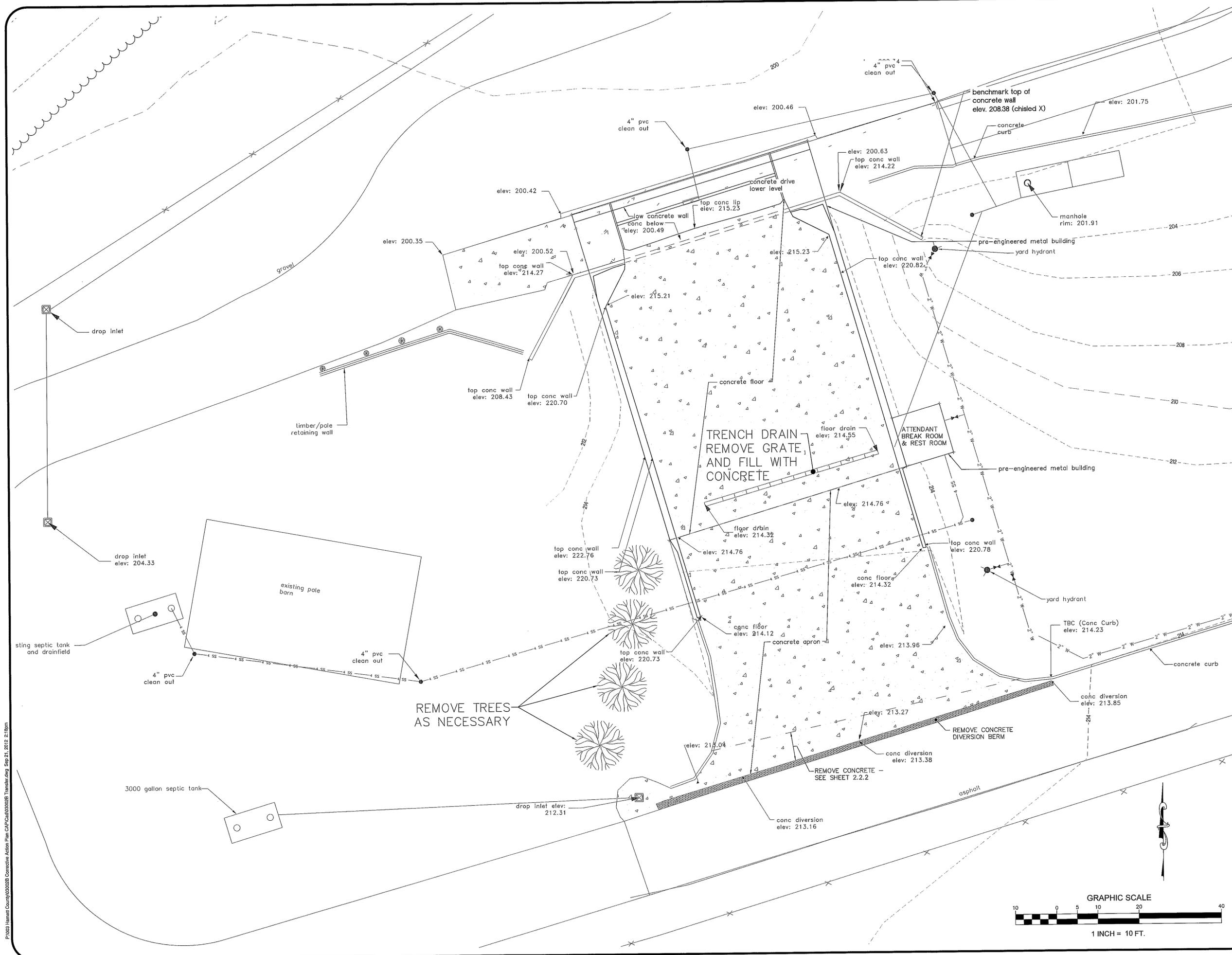
HARNETT COUNTY
DUNN-ERWIN LANDFILL
PROJECT 2

HARNETT COUNTY, NORTH CAROLINA

Project No: 03002B	File Name: 03002B Shingles Dump
Designed By: CTC Jr.	Drawn By: AEB
Checked By: CTC Jr.	Proj. Eng.: CTC Jr.

DETAILS

Date: JANUARY 2012	Sheet: 2.1.4
Scale: NO SCALE	



- General Notes
- EXISTING CONDITIONS BASED UPON SURVEY BY STREAMLINE SURVEYING ON JULY 2011.
 - UNDERGROUND UTILITY INFORMATION IS FROM VISIBLE STRUCTURES AND OTHER DESIGN DRAWINGS. CONTRACTOR SHALL CONFIRM ALL LOCATIONS.

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Professional Engineer Seal for C. T. Clayton, Sr., P.E., No. 028908, State of North Carolina. Signature: C. T. Clayton, Sr. Date: 9/21/2012.

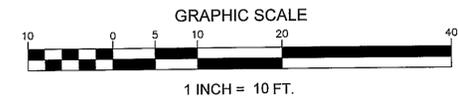
Clayton, Sr., P.E., Inc.
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HARNETT COUNTY DUNN-ERWIN LANDFILL PROJECT 2
HARNETT COUNTY, NORTH CAROLINA

Project No: 03002B	File Name: 03002B Transfer.dwg
Designed By: CTC Jr.	Drawn By: SBK
Checked By: CTC Jr.	Proj. Eng.: CTC Jr.

Sheet Title: **EXISTING CONDITIONS AND DEMOLITION PLAN**

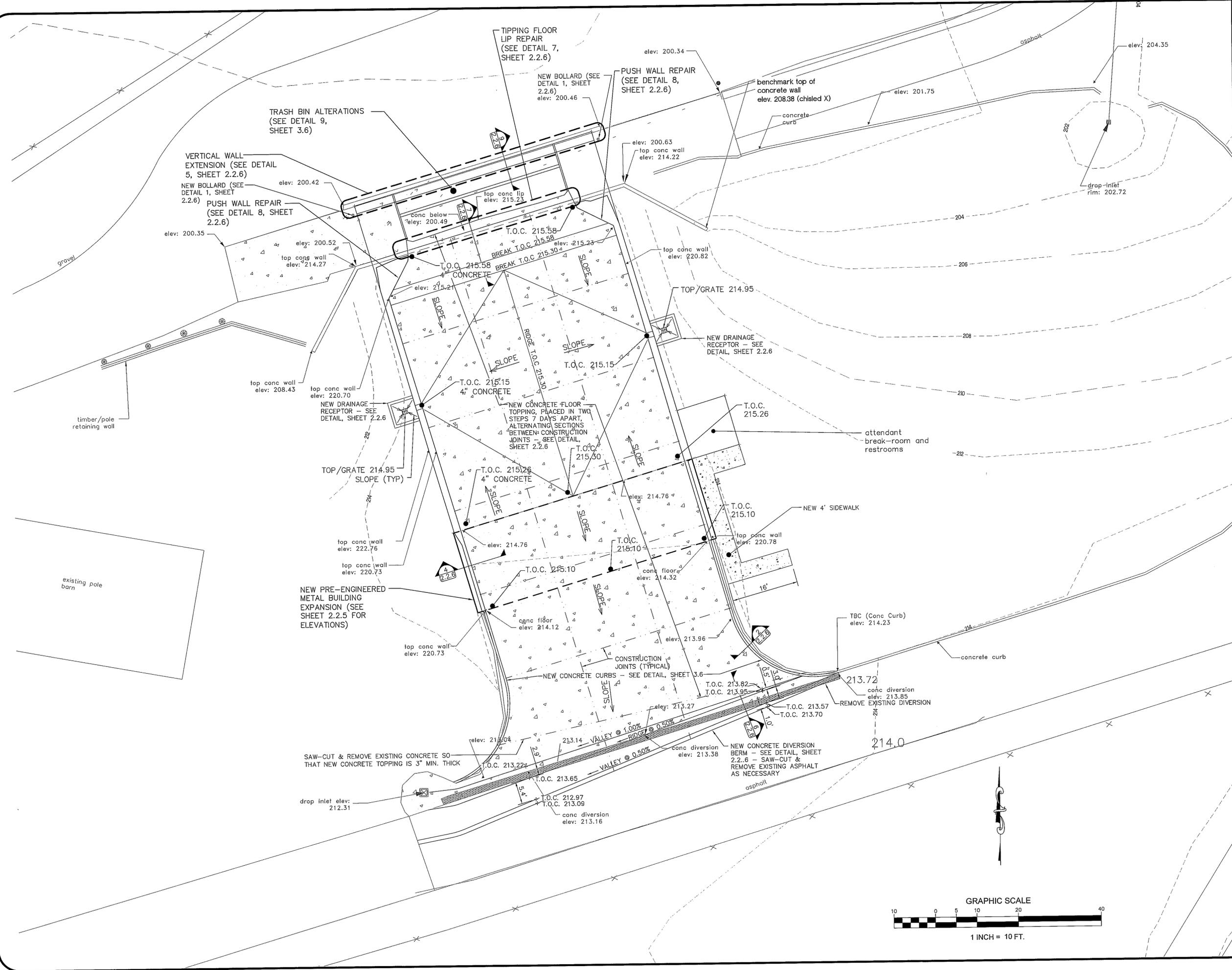
Date: 9/21/12 Sheet: **2.2.1**
Scale: 1" = 10' OF 6



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General Notes
LEGEND
 elev: EXISTING ELEVATION
 T.O.C. PROPOSED ELEVATION

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Professional Engineer Seal for Travis Clayton, Jr., No. 028809, State of North Carolina. Signature and date: 9-21-2012.

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**HARNETT COUNTY
 DUNN-ERWIN LANDFILL
 PROJECT 2**

HARNETT COUNTY, NORTH CAROLINA

Project No: 03002B	File Name: 03002B Transfer.dwg
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Checked By: CTC Jr.	Proj. Eng.: CTC Jr.

Sheet Title	NEW FLOOR GRADING
Date	
Scale	1" = 10'
Sheet	2.2.2 OF 6



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UTILITY NOTES:

1. PRIOR TO BIDDING ON WORK AT THE SITE, THE CONTRACTOR SHALL VISIT THE SITE TO FIELD VERIFY THE EXISTING CONDITIONS.
2. NO WORK SHALL TAKE PLACE ON THE SITE UNTIL THE CONTRACTOR HAS CONTACTED NORTH CAROLINA ONE-CALL CENTER TO LOCATE ALL EXISTING UNDERGROUND UTILITIES.
3. ANY SIGNIFICANT CHANGES IN THE ACTUAL SITE CONDITIONS FROM THOSE SHOWN ON THE PLANS SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER.
4. ALL EXISTING WALKS, PAVEMENT, CURB, ETC. WHICH ARE DAMAGED BY CONSTRUCTION ACTIVITIES SHALL BE REPAIRED TO MATCH EXISTING CONDITIONS.
5. ALL EXISTING FENCING, PAVEMENT, UTILITIES, ETC. THAT ARE REMOVED BY THE CONTRACTOR SHALL BE DISPOSED OF PROPERLY.
6. ALL WATER AND SANITARY SEWER WORK SHALL CONFORM TO THE HARNETT COUNTY STANDARDS.
7. ADJUST ALL EXISTING AND NEW UTILITIES TO BE FLUSH WITH FINISHED GRADE PER APPLICABLE DETAILS SHOWN UNLESS OTHERWISE SPECIFIED.
8. ALL EXTERNAL VALVES ARE TO BE SUPPLIED WITH A STEM OPERATING NUT, ONE GATE VALVE OPERATING WRENCH OF SUFFICIENT LENGTH TO OPERATE ALL INSTALLED VALVES SHALL BE SUPPLIED TO THE OWNER PRIOR TO FINAL COMPLETION.
9. ALL EXTERNAL VALVES ARE TO BE INSTALLED IN A VALVE BOX.
10. ALL SANITARY SEWER AND STORM SEWER CLEANOUTS ARE TO BE CONSTRUCTED PER THE DETAIL. THE TOP COVER OF THE CAST IRON VALVE BOX SHALL BE PAINTED WITH 2 COATS, GLOSS, AS FOLLOWS:
 - I. SANITARY SEWER: GREEN
 - II. STORM SEWER: BLACK OR NATURAL

General Notes

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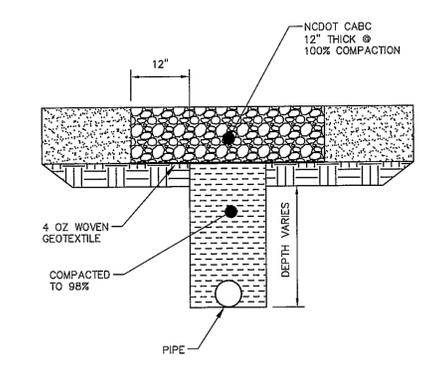
Signature: *CTC*
Date: 9-21-2012

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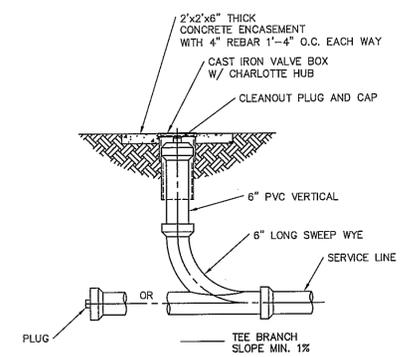
HARNETT COUNTY
DUNN-ERWIN LANDFILL
PROJECT 2

Project No:	03002B	File Name:	03002B Transfer.dwg
Designed By:	CTC Jr.	Drawn By:	SBK
Checked By:	CTC Jr.	Proj. Eng.:	CTC Jr.

Sheet Title	
UTILITY PLAN	
Date	Sheet
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1" = 20'	OF 6

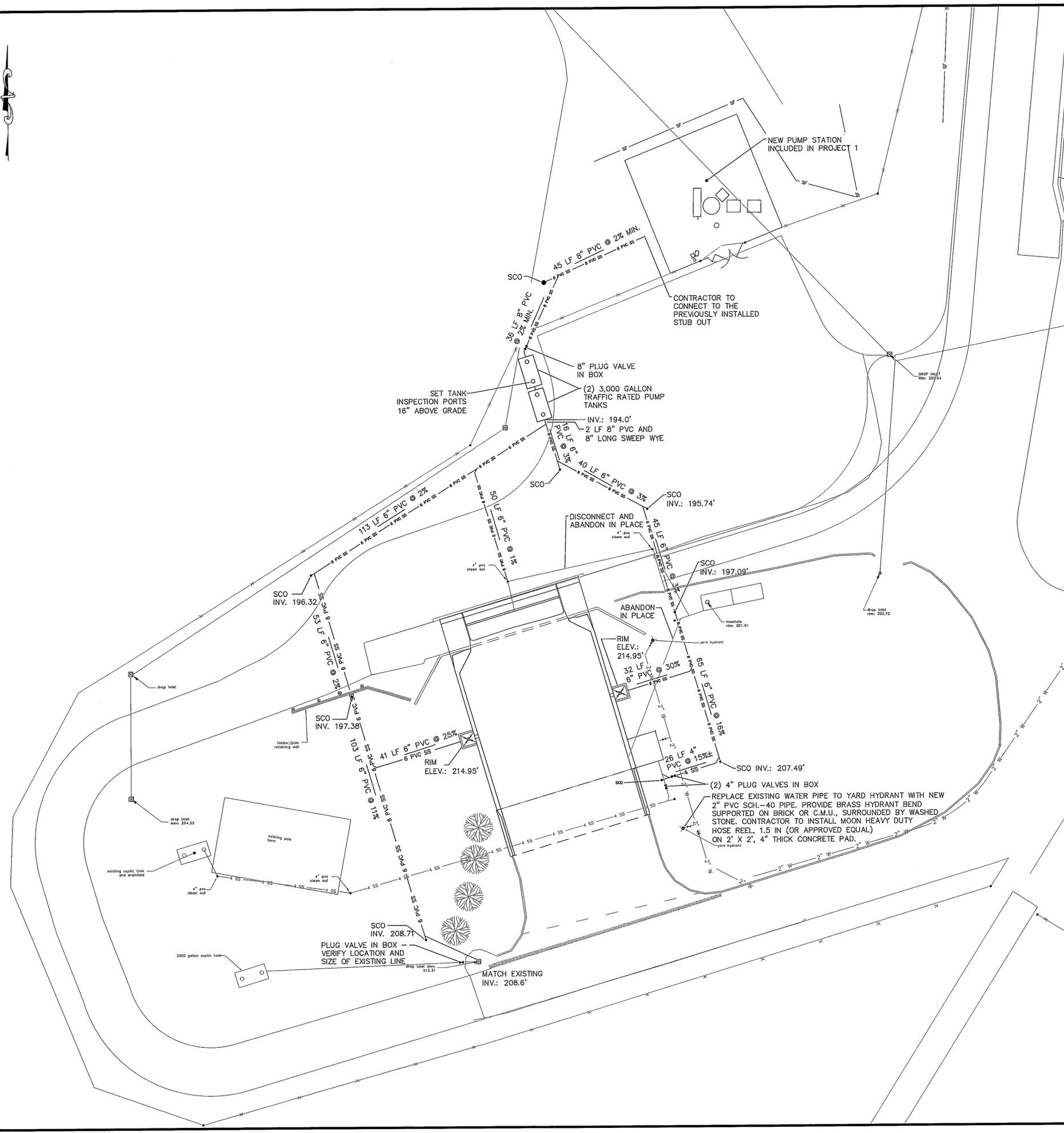
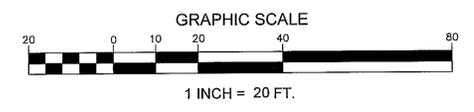


GRAVEL PAVEMENT REPAIR DETAIL



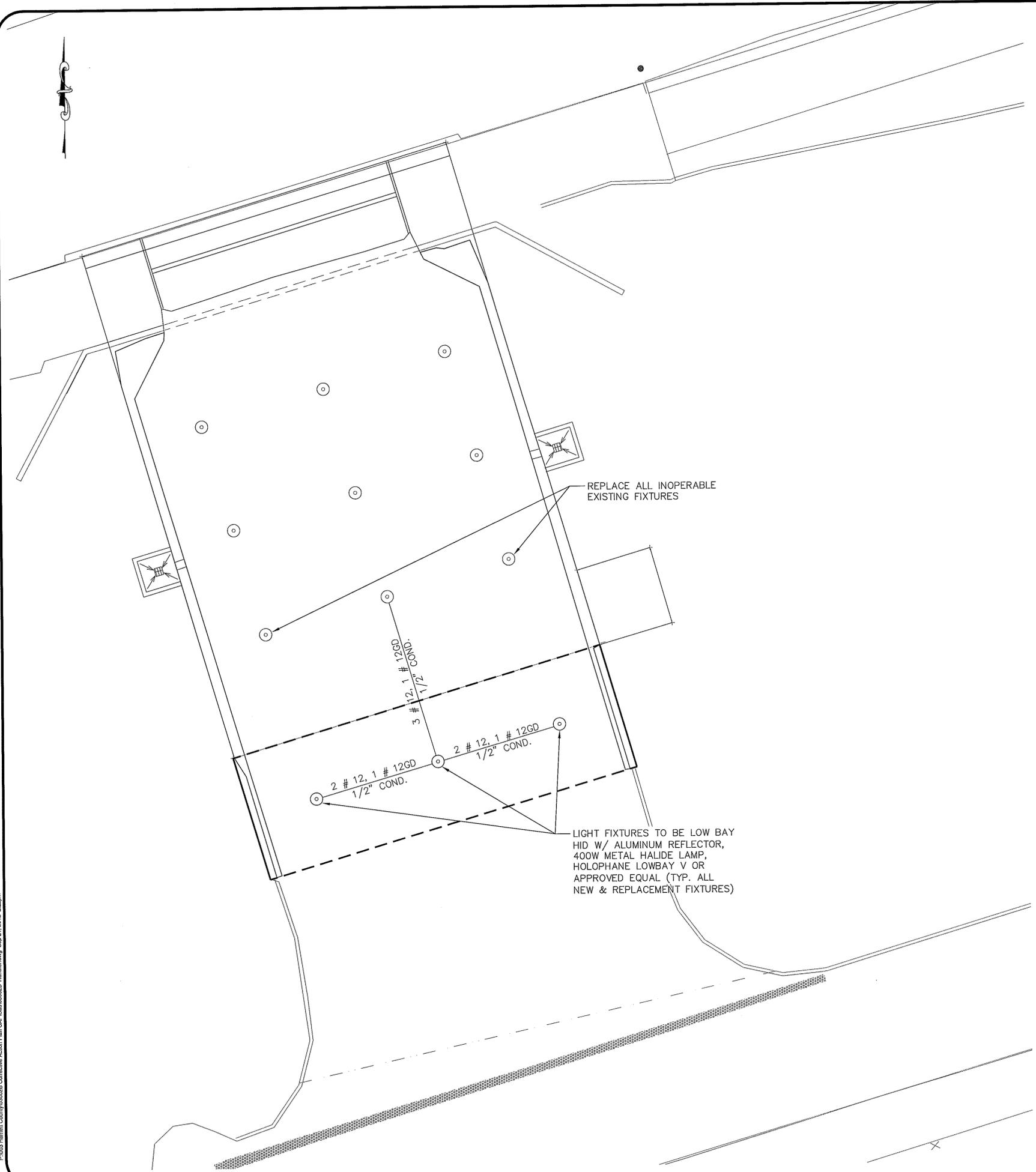
NOTE: THE TOP COVER OF THE CAST IRON VALVE BOX SHALL BE PAINTED WITH 2 COATS, GLOSS, AS FOLLOWS:
 SANITARY SEWER: GREEN
 STORM SEWER: BLACK OR NATURAL

SEWER SERVICE CLEANOUT



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- ELECTRICAL NOTES (GENERAL)**
1. THE ELECTRICAL INSTALLATION, EQUIPMENT, MATERIALS, AND WORKMANSHIP SHALL, AS A MINIMUM, BE IN ACCORDANCE WITH THE REQUIREMENTS OF THE NATIONAL ELECTRICAL CODE (NEC), OCCUPATIONAL SAFETY AND HEALTH ACT (OSHA), ALL FEDERAL, STATE, COUNTY, AND LOCAL CODES, LAWS, AND ORDINANCES, AND RULINGS OF THE INSPECTION AUTHORITIES HAVING JURISDICTION. ALL FEES, PERMITS, ETC., ASSOCIATED WITH THE ELECTRICAL WORK SHALL BE THE RESPONSIBILITY OF THE ELECTRICAL CONTRACTOR.
 2. THE DRAWINGS GENERALLY INDICATE THE WORK TO BE INSTALLED, BUT DO NOT SHOW ALL BENDS, BOXES, FITTINGS, AND SPECIALTIES WHICH MAY BE REQUIRED FOR A COMPLETE INSTALLATION. ALL SUCH ITEMS REQUIRED TO COMPLETE THE INSTALLATION ACCORDING TO INDUSTRY ACCEPTED PRACTICES SHALL BE INCLUDED IN THE BID.
 3. ALL EQUIPMENT AND MATERIALS SHALL BE NEW AND LISTED AND LABELED BY UNDERWRITER LABORATORIES, INC.
 4. THE CONTRACTOR SHALL VERIFY WIRE AND FUSE/CIRCUIT BREAKER SIZING FOR ALL MECHANICAL EQUIPMENT PRIOR TO PURCHASING MATERIALS AND INSTALLING BRANCH CIRCUITS.
 5. THE ELECTRICAL CONTRACTOR SHALL COORDINATE ALL WORK WITH OTHER TRADES TO AVOID INTERFERENCES AND CONFLICTS. APPARENT INTERFERENCES OR CONFLICTS SHALL BE REPORTED TO THE PRIME CONTRACTOR AND ENGINEER, AND RESOLVED PRIOR TO PROCEEDING WITH THE WORK IN QUESTION.
 6. THE ELECTRICAL CONTRACTOR SHALL CONNECT BRANCH CIRCUITS TO THE MAIN LINE TERMINALS OF EQUIPMENT FURNISHED BY OTHER CONTRACTORS. THE ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING AND INSTALLING ANY NECESSARY SWITCHES, DISCONNECTS, OR OVERCURRENT PROTECTION AHEAD OF SUCH EQUIPMENT.
 7. RACEWAYS ARE SHOWN SCHEMATICALLY AND MAY BE REROUTED IN THE FIELD. THEY SHALL BE INSTALLED AT RIGHT ANGLES TO OR PARALLEL WITH BUILDING LINES. THEY SHALL BE RUN CONCEALED WITHIN WALLS OR BUILDING STRUCTURES WHEREVER POSSIBLE.
 8. THE MINIMUM ALLOWABLE SIZE FOR ANY CONDUIT, IMC, OR EMT SHALL BE 1/2" AND MAY BE USED FOR 2 #12 WIRE SWITCHLEGS ONLY. A SWITCHLEG SHALL BE DEFINED AS THE RUN OF CONDUIT FROM THE SWITCH OUTLET BOX TO THE FIRST OUTLET BEING SWITCHED.
 9. FULL WEIGHT GALVANIZED RIGID STEEL CONDUIT SHALL BE USED IN THE FOLLOWING AREAS:
 - A. ON THE EXTERIOR OF THE BUILDING OR ROOF.
 - B. VERTICAL DROPS WHERE THE CONDUIT CANNOT BE ANCHORED TO WALLS OR OTHER SUPPORT
 - C. WHERE SUBJECT TO MECHANICAL DAMAGE
 - D. ANY AREA EXPOSED TO AMBIENT MOISTURE CONDITIONS (I.E. SHELTERS, PORCHES, ETC.)
 10. ALL WIRE AND CABLE SHALL BE COPPER AND HAVE 600 VOLT THHN-THWN INSULATION. ALUMINUM WIRING SHALL NOT BE PERMITTED.
 11. THE MINIMUM WIRE SIZE SHALL BE #12 AWG EXCEPT FOR CONTROL WIRING, WHICH MAY BE #14 AWG. CONTROL WIRING SHALL USE STRANDED CONDUCTORS UNLESS OTHERWISE NOTED.
 12. ALL METAL RACEWAY SYSTEMS SHALL BE MADE ELECTRICALLY CONTINUOUS. THE RACEWAY SYSTEM SHALL NOT BE THE SOLE GROUNDING METHOD. AN INSULATED COPPER CONDUCTOR SHALL BE INSTALLED FOR ALL FEEDERS AND BRANCH CIRCUITS. AT RECEPTACLES, A GREEN GROUND CONDUCTOR SHALL BE CONNECTED TO THE GROUND TERMINAL OF THE RECEPTACLE.
 13. 3/4" CONDUIT IS MINIMUM ALLOWABLE SIZE EXCEPT AS INDICATED IN NOTE #10 ABOVE. CONDUIT FILL NOT TO EXCEED 40% AS PERMITTED BY THE NEC.
 14. ALL CONDUCTORS TO BE INSTALLED IN CONDUIT. EMT FITTINGS TO BE COMPRESSION TYPE, INSULATED THROAT.
 15. #10 AWG CONDUCTORS SHALL BE USED FOR 20 AMP BRANCH CIRCUIT HOME RUNS EXCEEDING 50 FT. TO THE JUNCTION POINT. 20 AMP BRANCH CIRCUIT WIRING SHALL BE #10 AWG THROUGHOUT IF THE CIRCUIT IS LONGER THAN 100 FEET TOTAL LENGTH.
 16. CONDUCTORS SHALL BE CONTINUOUS FROM OUTLET TO OUTLET (OR FIXTURE TO FIXTURE). SPLICES WILL NOT BE MADE EXCEPT WITHIN ACCESSIBLE OUTLET OR JUNCTION BOXES, TROUGHS, OR GUTTERS.
 17. MAKE CONDUCTOR LENGTHS FOR PARALLEL CIRCUITS EQUAL.
 18. ALL CONDUIT WITHOUT CONDUCTORS SHALL HAVE NYLON PULL CORDS INSTALLED.
 19. THE CONTRACTOR SHALL MAKE COMPLETE REVIEW OF THE PLANS, SCHEDULES, AND DETAILS, PRIOR TO INSTALLATION, AND REVIEW ANY CONFLICTS THAT ARE NOTED WITH THE ENGINEER.
 20. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL FEES FOR PERMITS INSPECTIONS. THE CONTRACTOR WILL ALSO BE RESPONSIBLE FOR ELECTRIC UTILITY CONNECTION FEES AND LINE EXTENSION FEES.
 21. ALL WIRE TERMINATIONS AND EQUIPMENT TO BE RATED FOR 75° C MINIMUM.
 22. ALL ITEMS ARE TO BE SURFACE MOUNTED WITH EXPOSED CONDUITS.

General Notes

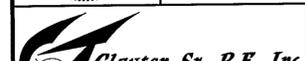
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 Signature: *Clayton, Sr.*

 Date: 9-21-2012



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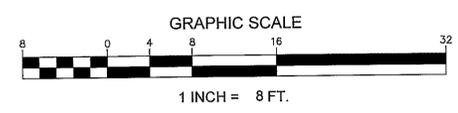
HARNETT COUNTY DUNN-ERWIN LANDFILL PROJECT 2

HARNETT COUNTY, NORTH CAROLINA

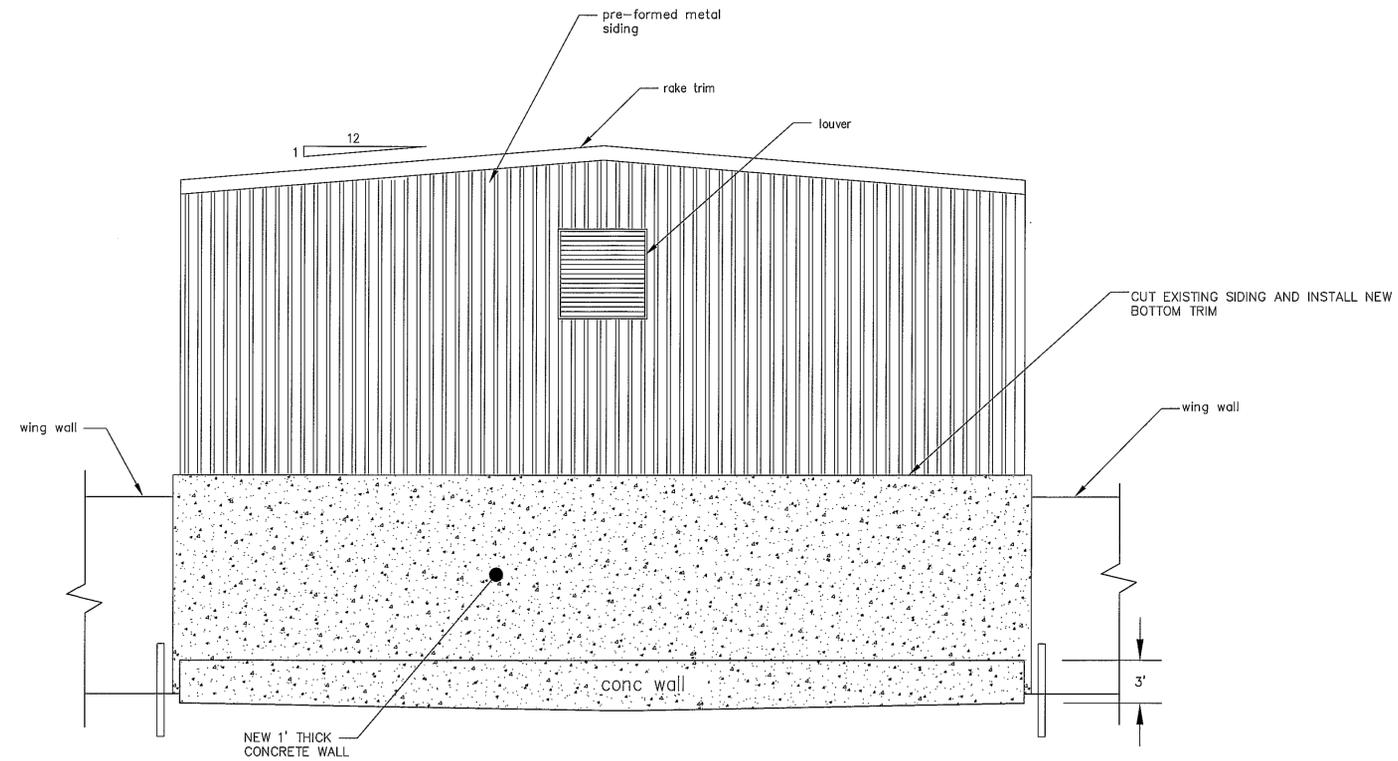
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Checked By:	CTC Jr.	Proj. Eng.:	CTC Jr.

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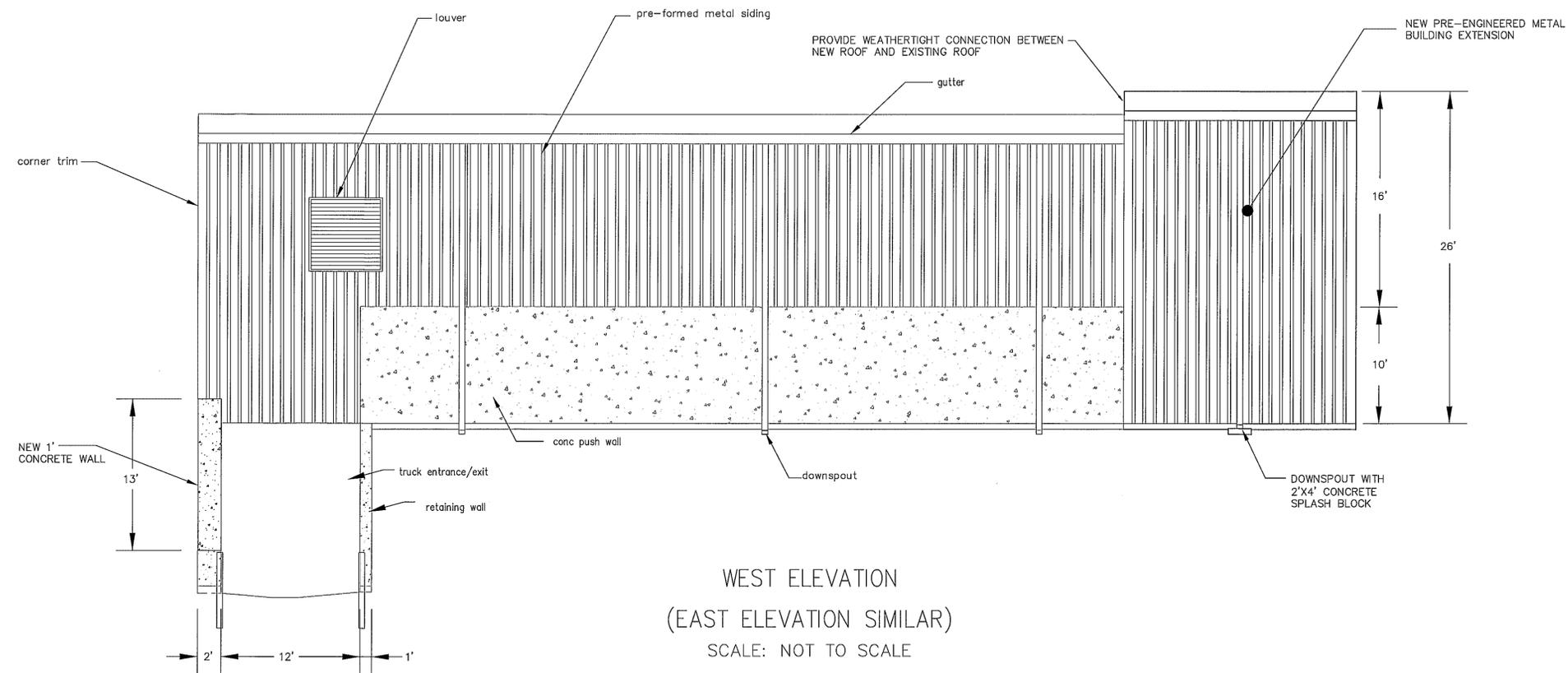
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NORTH ELEVATION
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WEST ELEVATION
(EAST ELEVATION SIMILAR)
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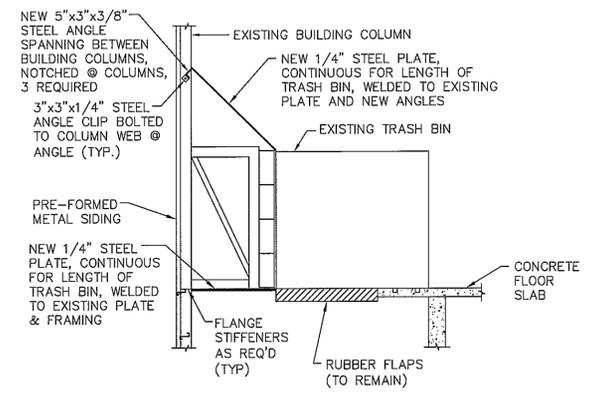
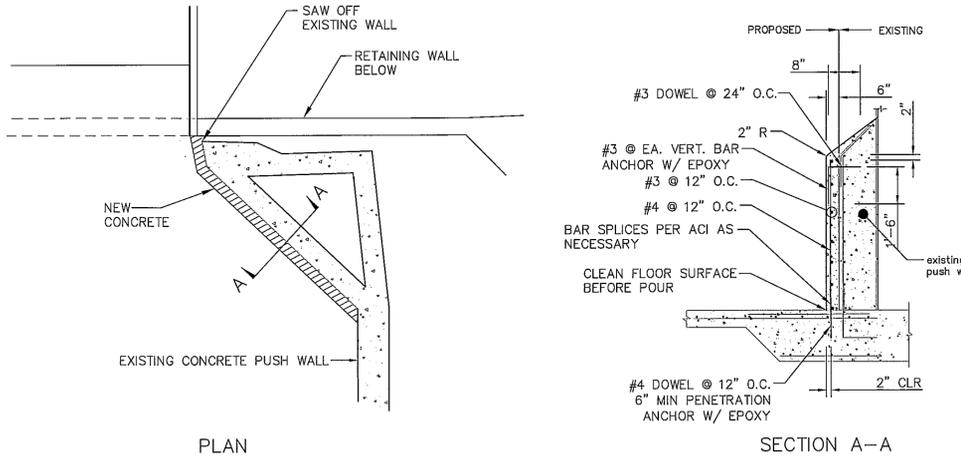
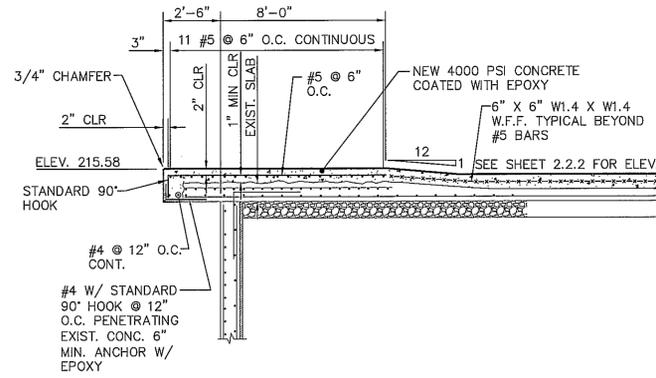
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DUNN-ERWIN LANDFILL
PROJECT 2

HARNETT COUNTY, NORTH CAROLINA

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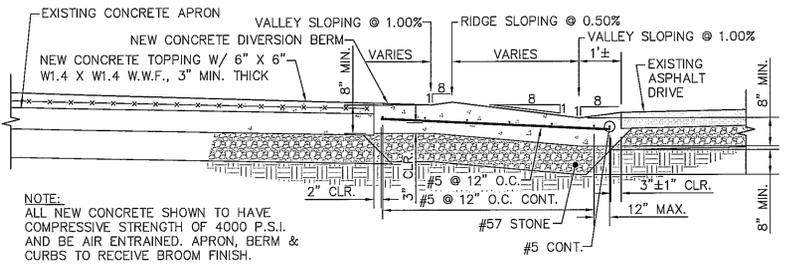
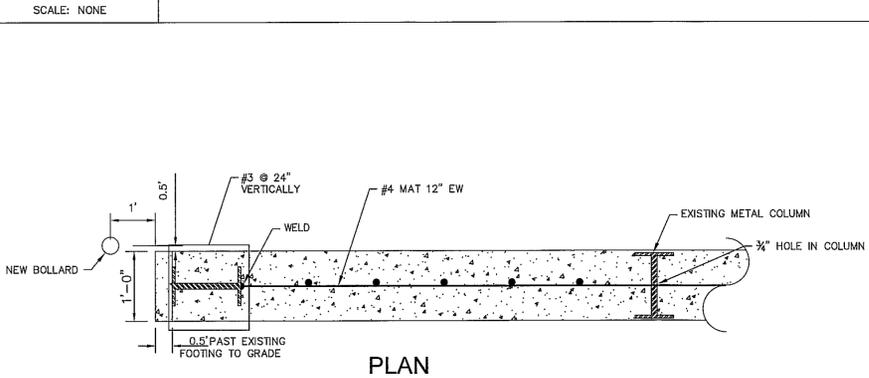
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7 TIPPING FLOOR REPAIR DETAIL

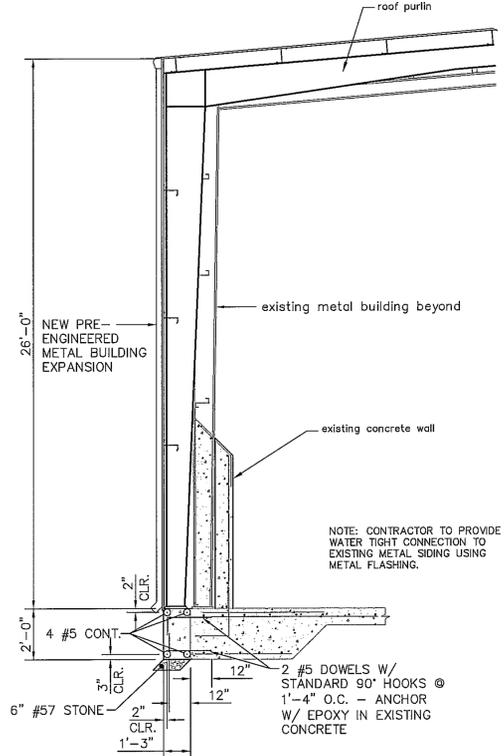
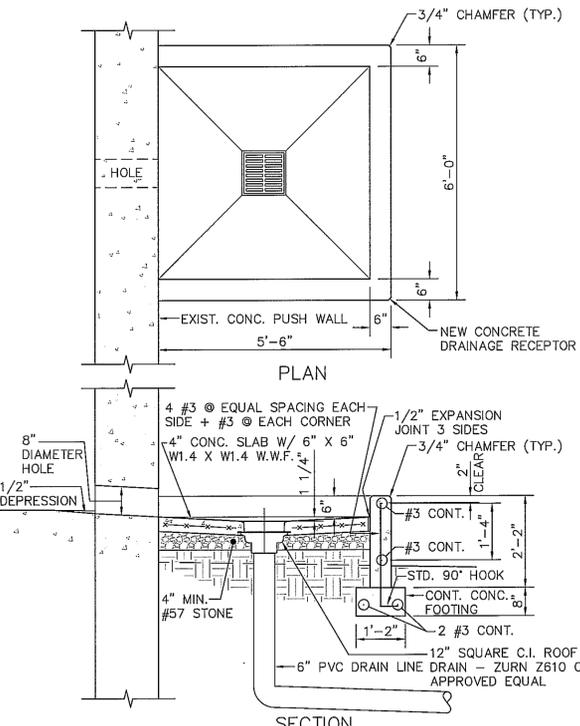
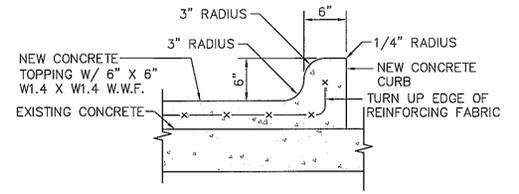
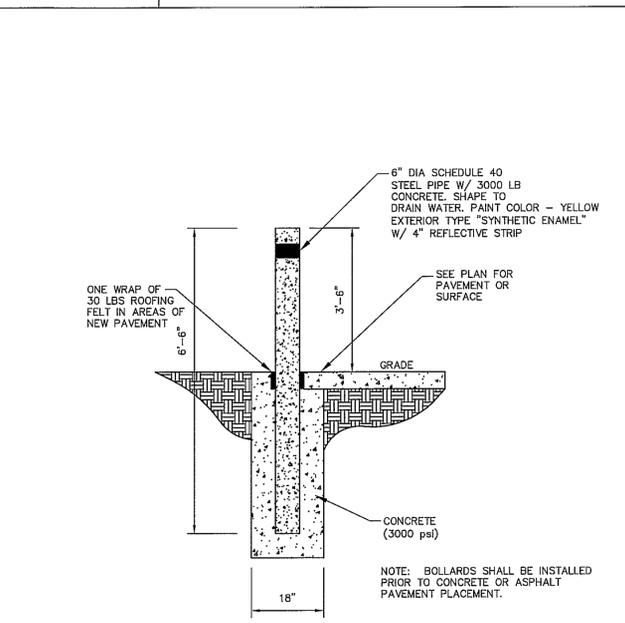
8 TYPICAL PUSH WALL REPAIR DETAIL

9 TRASH BIN ALTERATIONS DETAIL



5 CONCRETE WALL AT LOWER LEVEL DETAIL

6 CONCRETE DIVERSION BERM DETAIL



1 TYPICAL BOLLARD DETAIL

2 CURB DETAIL

3 DRAINAGE RECEPTOR DETAIL

4 WALL SECTION

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HARNETT COUNTY
DUNN-ERWIN LANDFILL
PROJECT 2

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