Town of Zebulon
Parks and Recreation

1003 N Arendell Ave.
Zebulon, NC 27597
(919) 823-1839

Little River Park – Phase 1
Benesch
November 20, 2025

Notice to Bidders

Formal Contracts

Sealed proposals will be received by the Town of Zebulon for providing labor, material and equipment entering into a Single Prime Contract for Little River Park – Phase 1.

Sealed bids will be received until 2:00 P.M. on 12/18/2025 at the Executive Conference Room upstairs at the Zebulon Municipal Complex (1003 N. Arendell Ave., Zebulon, NC 27595).

All bids will be publicly opened and read starting at 2:00 P.M.

Complete electronic plans and specifications can be obtained from Benesch, (984) 231-6226 jcpung@benesch.com, beginning November 20, 2025, during normal office hours.

A mandatory pre-bid conference on 12/4/2025 at 11:00 A.M. at the Little River Park's gravel parking lot off Water Plant Road and on the east side of Little River (1800 W. Gannon Avenue, Zebulon, NC 27597).

The Town of Zebulon provides minorities and women equal opportunity to participate in all aspects of its construction program consistent with North Carolina Law.

The Town of Zebulon reserves the right to reject any and all bids and to waive informalities and irregularities.

Town of Zebulon
Parks and Recreation

Nick Rummage
Parks & Grounds Superintendent

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INSTRUCTIONS TO BIDDERS
FORMAL CONSTRUCTION CONTRACTS

For a Proposal to be considered, it must be in accordance with the following instructions:

1. PROPOSALS

Proposals must be made on the Bid Proposal Forms provided herein, and all blank spaces for Bids, Alternates and Unit Prices, applicable to bidder's work, shall be properly filled in. When requested Alternates are not Bid, the Proposal may be considered non responsive. The Bidders agree that Bids submitted on the specified Bid Proposal Forms, which are detached from specifications, will be considered and will have the same force and effect as if attached thereto. Numbers shall be stated both in writing and in figures for the Base Bids and Alternates.

Any modification to the Form of Proposal (including Alternates and/or Unit Prices) may disqualify the Bid and may cause the Bid to be rejected.

The Contractor shall fill in the Form of Proposal as follows:

A. If the documents are executed by a sole Owner, that fact shall be evidenced by the word "Owner" appearing after the name of the person.

B. If the documents are executed by a Partnership, that fact shall be evidenced by the word "Co-Partner" appearing after the name of the partner executing them.

C. If the documents are executed on the part of a Corporation, they shall be executed by either the President or the Vice-President and attested by the Secretary or Assistant Secretary in either case and the title of the office of such person shall appear after their signatures. The seal of the Corporation shall be impressed on each signature page of the documents.

D. If the Proposal is made by a Joint Venture, it shall be executed by each member of the Joint Venture in the above form for sole Owner, Partnership, or Corporation, whichever form is applicable.

E. All signatures shall be properly witnessed.

F. Proposal shall be addressed as indicated in the Advertisement for Bids and shall be delivered enclosed in an opaque sealed envelope, marked "Proposal" and bearing the name of Project, name and address of the Bidder, the Bidder's license number and, if applicable, the designated portion of the Work for which Bid is submitted.

G. It shall be the specific responsibility of the Bidder to deliver this Bid to the proper official at the appointed place and prior to the announced time for the opening of Bids. Later delivery of a Bid for any reason, including delivery by the United States Mail, shall disqualify the Bid.

H. Modifications of previously deposited Bids or requests for withdrawal will be acceptable only if delivered in writing to the place of the Bid opening prior to the time for opening Bids.

I. Unit Prices quoted in the Proposal shall include overhead and profit and shall be the full compensation for the Contractor's cost involved in the work.

2. REQUIREMENTS FOR DOCUMENTING MINORITY BUSINESS PARTICIPATION

A. Documentation to be submitted with each bid proposal

1. All Bidders must provide, with the bid, Town of Zebulon Form MBE-1 (2002), Identity of Minority Business Participation, which identifies the minority business that will be used on the project, with the total dollar value of the work that will be performed by the listed minority businesses. Town of Zebulon Form MBE-1 (2002), Identity of Minority Business Participation, is a part of the bid form.

2. All Bidders must provide, with the bid, one of the following:

a. Town of Zebulon Form MBE-2 (2002) – a listing of the good faith efforts made to solicit minority participation in the bid effort. A bidder must earn a minimum of 50 points from the good faith efforts listed for their bid to be considered responsive or;

b. Town of Zebulon Form MBE-3 (2002) – This form is to be submitted only by bidders certifying that all work on the project will be performed 100% by their own workforce.

All bidders must submit with their bid the applicable forms; failure to submit the required forms may be grounds for rejection of the bid.

B. Documentation to be submitted by the apparent low bidder after notification by the Owner

After the bid opening, the Owner will consider all bid proposals and then determine and contact the apparent lowest responsible, responsive bidder. Within 72 hours of receipt of notification of being the apparent lowest responsible, responsive bidder, the Bidder shall submit the following:

1. If the Bidder's minority business participation meets or exceeds the established goal of 10%, the Bidder must submit Town of Zebulon Form MBE-4 (2002). This form is to include a description of the portion of work to be executed by minority business, expressed as a percentage of the total contract price.

2. If the Bidder's minority business participation is less than the established goal of 10%, the Bidder must submit Town of Zebulon Form MBE-5 (2002). This form is to document the Bidder's good faith efforts to meet the established goal. Documentation to be provided on this form shall be evidence of all good faith efforts made, including any advertisements, solicitations and other specific actions demonstrating recruitment and selection of minority business for participation in the contract.

C. Other documentation to be provided after contract award

1. Within 30 days after a contract is awarded, or sooner if required by the Contract Documents, the successful Bidder must provide, to the Owner, a list of all subcontractors to be used on the project. The list must identify the minority category of each minority subcontractor.

2. With the final request for payment, the successful Bidder shall provide a complete listing of all minority businesses used on the project, along with the total dollar value of work performed by each minority business. This information must be provided on Town of Zebulon Form MBE-6 (2002).

3. EXAMINATION OF CONDITIONS

It is understood and mutually agreed that by submitting a Bid the Contractor acknowledges his careful examination of the Bidding Documents pertaining to the work, the location, accessibility and general character of the site of the work and all existing buildings and structures within and adjacent to the site; and has satisfied himself as to the nature of the work, the condition of existing buildings and structures, the conformation of the ground, the character, quality and quantity of the materials to be encountered; the

character of the equipment, machinery, plant and any other facilities needed preliminary to and during prosecution of the work; the general and local conditions; the construction hazards; and all other matters, including but not limited to, the labor situation which can in any way affect the work under the Contract; and including all safety measures required by the latest edition of the Occupational Safety Health Act and all rules and regulations issued pursuant thereto. It is further mutually agreed that by submitting a Proposal, the Contractor acknowledges that he has satisfied himself as to the feasibility and meaning of the plans, drawings, specifications, and other Contract Documents for the construction of the work and that he accepts all the terms, conditions and stipulations contained therein; and that he is prepared to work in cooperation with the Owner and all other Contractors performing work on the site.

Reference is made to the Contract Documents for the identification of those surveys and investigative reports of subsurface or latent physical conditions at the site or otherwise affecting performance of the work which have been relied upon by the Licensed Professional who prepared the documents. Copies of all such surveys and reports are available to the Bidders, upon request. All Bidders are responsible for reviewing these documents prior to submission of their Bid Proposal. Each Bidder may, at his own expense, make such additional surveys and investigations, as he may deem necessary to determine his Bid price for the performance of the work. Any on-site investigation shall be done at the convenience of the Owner. The Owner will honor any reasonable request for access to the site.

4. SUBSTITUTIONS

Material substitutions will be considered during the bidding phase until seven (7) days prior to the receipt of bids. No substitutions will be considered after seven (7) days prior to the receipt of Bids.

For proposed material substitutions submit the following information to the Licensed Professional who prepared the bidding documents:

- Name of manufacturer
- Address of manufacturer
- Phone number of manufacturer
- Trade name
- Model or catalogue designation
- Manufacturer's data including:
- Performance and test data
- Reference standards
- Detailed comparison with specified product including:
    - Performance
    - Test results
    - Warranties
    - Gauge, thickness or strength or material finish
    - Other pertinent data

- Other information requested by the Licensed Professional who prepared the bidding documents.

Submittals relating to substitutions, which are not fully complete by seven (7) days prior to the receipt of bids, will not be reviewed.

If the Licensed Professional who prepared the bidding documents accepts a material substitution, Contractors will be notified by Addendum.

5. ADDENDA

Any Addenda to bidding documents issued during the time of bidding will be sent to each Bidder, and are to be considered covered in the Bid Proposal. It is the Contractor's responsibility to ascertain prior to Bid time, which Addenda have been issued and confirm that his Bid Proposal includes any changes covered by the Addenda.

Should the Bidder find discrepancies in, or omissions from, the drawings or documents or should he be in doubt as to their meaning, he shall at once notify the Licensed Professional who prepared said drawings or documents. Neither the Owner nor the Licensed Professional who prepared the bidding documents will be responsible for any oral instructions.

The Bidder on his Bid Proposal shall acknowledge all Addenda. Failure to do so may disqualify the Bid and may cause the Bid to be rejected.

6. BID SECURITY

Each Proposal shall be accompanied by a cash deposit, or a certified check drawn on some bank or trust company insured by the Federal Deposit Insurance Corporation, or a Bid Bond in an amount equal to not less than five percent (5%) of the Proposal. Said deposit to be retained by the Owner (referred to as Obligee on the Bond Form) as liquidated damages in event of failure of the successful Bidder to execute the Contract within ten (10) days after the award or to give satisfactory Surety as required by law. The Bid Bond shall be conditioned that the surety will, upon demand, forthwith make payment to the Owner (referred to as Obligee on the Bond Form) upon the said bond if the Bidder fails to execute the contract.

7. RECEIPT OF BIDS

Bids and Bid Security shall be received in strict accordance with requirements of the North Carolina General Statutes. Prior to opening of any Bids on the Project, the Bidder will be permitted to change or withdraw his Bid as allowed by Item 1-H of these Instructions.

All copies of the Bid, the Bid security, if any, and any other documents required to be submitted with the Bid shall be enclosed in a sealed opaque envelope. The envelope

shall be addressed to the party receiving the Bids and should be identified with the Project name, time and date of Bid Opening, the Bidder's name and address, Bidder's license number and, if applicable, the designated portion of the Work for which the Bid is submitted. If the Bid is sent by mail, the sealed envelope shall be enclosed in a separate mailing envelope with the notation "SEALED BID ENCLOSED" on the face thereof.

8. OPENING OF BIDS

Upon opening, all Bids shall be read aloud. Once any Bid is opened, no Bids may be returned by the Owner to any Bidder.

A Bidder may withdraw its formal Bid after the Bids are opened without forfeiting its Bid deposit in certain limited circumstances. Withdrawal after opening is permitted only if all of the following conditions specified in North Carolina General Statutes §143-129.1 are met:

A. The Bid was submitted in good faith.

B. The price Bid "was based upon a mistake, which constituted a substantial error".

C. Credible evidence is submitted showing that the error (1) was clerical nature as opposed to a judgment error, and (2) was actually due to an unintentional and substantial arithmetic error or an unintentional omission of a substantial quantity of work, labor, material or services made directly in the compilation of the Bid.

D. The error can be clearly shown by objective evidence drawn from inspection of the original work papers, documents or materials used in the preparation of the Bid.

E. The request to withdraw (1) is made in writing to the public agency that invited the Proposals, and (2) is made prior to the award of the Contract, but not later than seventy-two (72) hours after the opening of Bids.

9. REJECTION OF BIDS

The Owner reserves the unqualified right to reject any and all Bids. Reasons for rejection may include, but shall not be limited to, the following:

A. If the Form of Proposal furnished to the Bidder is not used or is altered.

B. If the Bidder fails to insert a price for all Bid items, Alternates and Unit Prices requested.

C. If the Bidder adds any provisions reserving the right to accept or reject any award.

D. If there are unauthorized additions or conditional Bids, or irregularities of any kind which tend to make the Proposal incomplete, indefinite, or ambiguous as to its meaning.

E. If the Bidder fails to complete the Proposal forms where information is requested so the Bid may be properly evaluated by the Owner.

F. If the Unit Prices contained in the Bid Schedule are unacceptable to the Owner.

G. If the Bidder fails to comply with other instructions stated herein.

10. BID EVALUATION

The award of the Contract will be made to the lowest responsible Bidder as soon as practical. Should the successful Bidder default and fail to execute a Contract, the Contract may be awarded to the next lowest and responsible Bidder.

Before awarding a Contract, the Owner may require the apparent low Bidder to qualify himself to be a responsible Bidder by furnishing any or all of the following data:

A. The latest financial statement showing assets and liabilities of the company or other information satisfactory to the Owner.

B. A listing of similar completed projects of similar size, with contact persons and telephone numbers.

C. Permanent name and address of place of business.

D. The number of regular employees of the organization and length of time the organization has been in business under present name and percentage of work typically performed by the contractor's firm.

(1) Qualifications of key employees assigned to this Project.

(2) References for key employees assigned to this Project.

E. The name and home office address of the Surety proposed and the name and address of the responsible local claim agent.

F. The names of members of the firm who hold appropriate trade licenses, together with license numbers.

G. Complete list of all subcontractors and suppliers proposed.

H. Any pending arbitration or mediation cases or lawsuits. This may include all arbitration, mediation and lawsuits settled or resolved within last ten (10) years.

Failure or refusal to furnish any of the above information if requested shall constitute a basis for disqualification of any Bidder.

In determining the lowest responsible Bidder, the Owner may consider the past performance of the Bidder on construction contracts for the County of Wake, Town of Zebulon, the State of North Carolina or other governmental agencies. Particular concern will be given to completion times, quality of work, cooperation with other Contractors, and cooperation with the Designer and Owner.

Should the Owner adjudge that the apparent low Bidder is not the lowest "responsible" Bidder by virtue of the above information, said apparent low Bidder will be so notified and his Bid Security shall be returned to him.

The Owner shall have the right to accept Alternates in any order or combination and to determine the low Bidder on the basis of the sum of the Base Bid and the Alternates accepted.

In the event of a discrepancy between Unit Prices and extensions, unit prices will prevail.

The Owner reserves the right to reject any and all Bids, to waive all technicalities and irregularities, and to make the award as considered to be in the best interest of the Owner.

11. PERFORMANCE BOND

The successful Bidder, upon award of Contract, shall furnish a Performance Bond in an amount equal to one hundred percent (100%) of the Contract price.

12. PAYMENT BOND

The successful Bidder, upon award of Contract, shall furnish a Payment Bond in an amount equal to one hundred percent (100%) of the Contract price.

13. PRE-BID CONFERENCE

Bidders are required to attend a mandatory Pre-Bid Conference at the time and place stipulated in the Bidding Documents.

14. PROPOSALS TO BE BID

Single Prime Work

15. INFORMATION TO BIDDER

All questions concerning the plans and specifications should be directed to the Licensed Professional who prepared said documents.

16. IRAN DIVESTMENT ACT CERTIFICATION

By submittal of a bid, all contractors, including any subcontractors employed by the contractor(s), attest and affirm they are not listed on the Final Divestment List created by the State Treasurer pursuant to N.C.G.S. 143-6A-4, Iran Divestment Act.

BID BOND

KNOW ALL MEN BY THESE PRESENTS, that we,

_____,

(Bidder's Name)

_____, of _____

(Street Address) (City, State, Zip)

hereinafter called the Principal, and

_____ of

(Surety's Name)

_____, a Corporation duly organized, and existing under the laws of the State of _____ and authorized to transact business in the State of North Carolina, as Surety, hereinafter called the Surety, are held and firmly bound unto the Town of Zebulon as Owner, hereinafter called the Obligee, in the Penal sum of five percent (5%)of the amount bid, good and lawful money of the United States of America, for the payment for which the Principal and the Surety, bind ourselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents. This bid bond is submitted in lieu of submitting cash, a cashier's check, or a certified check pursuant to G.S. 143- 129.

WHEREAS, the Principal has submitted a Bid for the construction of _____

(Project Name)

_____

NOW THEREFORE, if the Obligee shall accept the Bid of the Principal and the Principal shall enter into a Contract with the Obligee in accordance with the terms of said Bid, and give such bond or bonds as may be specified in the Bidding and Contract Documents with good and sufficient surety for the faithful performance of such Contract and for the prompt payment of labor and materials furnished in the prosecution thereof, or in the event of the failure of the Principal to enter into such Contract and give such bond or bonds the Surety shall, upon demand forthwith pay to the Obligee the amount set forth above. The Principal shall pay the Obligee the difference not to exceed the penalty hereof between the amount specified in said Bid and such larger amount for which the Obligee may in good faith contract with another party to perform the work covered by said Bid, then this obligation shall be null and void, otherwise to remain in full force and effect.

SIGNED AND SEALED this ____ day of _____, 20___ in the presence of:

Witness _____ Witness _____

_____(SEAL) _____(SEAL)
Principal Surety

_____ _____
Title Title

Town of Zebulon
Little River Park – Phase 1
Bid Proposal Form

SINGLE PRIME GENERAL CONSTRUCTION WORK

The undersigned, as Bidder, hereby declares that the only person or persons interested in this Proposal as principal or principals is or are named herein and that no other person than herein mentioned has any interest in this Proposal or in the Contract to be entered into; that this Proposal is made without connection with any other person, company or parties making a Bid or Proposal; 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 specifications for the work and the Contract Documents relative thereto, including addenda, if any, and has read all special provisions furnished prior to the opening of bids; that he has satisfied himself relative to the work to be performed.

The Bidder proposes and agrees if this Proposal is accepted to contract with the Town of Zebulon with a definite understanding that no money will be allowed for extra work except as set forth in the General Conditions and Contract Documents, for the sum of:

Base Bid: _____
Dollars _____ ($_____).

General Contingency (5% of Base Bid Only): _____
Dollars _____ ($_____).

Construction Testing Allowance: Three thousand dollars_____
Dollars _____
($3,000.00).

Restroom/Shelter Allowance: Two hundred fifty-six thousand dollars_____
Dollars _____ ($256,000.00).

Total Bid: _____
Dollars _____ ($_____).

Total Bid is all work in accordance with the aforementioned contract document including the Base Bid plus General Contingency plus Playground Allowance.

TOWN OF ZEBULON
Little River Park – Phase 1

Should any of the alternates as described in the specifications be accepted, the amount written below shall be the amount to "add to" or "deduct from" the Base Bid. If to be "deducted from" Base Bid, put minus sign (-) in parentheses at head of alternate and plus sign (+) in parentheses if to be added. Refer to Section 01230 for description of alternates.

Alternate No.1 Add_____ Dollars ($_____).

For separate prime bids to a single prime contractor pursuant to G.S. 143-128, the separate prime contractor shall not submit a higher bid to any singe prime contractor than the separate prime bid submitted to the Owner for the same scope of work, including the cost of bonds. Therefore, if the separate prime contractor is NOT including the bonds in its bid to a single prime contractor, the deduction for bonds shall be clearly shown in the bid to the single prime contractor

SUBCONTRACTOR LISTING:

(OTHER CONTRACTOR)

Name:_____Lic.No._____
$_____

(OTHER CONTRACTOR)

Name:_____Lic.No._____
$_____

(OTHER CONTRACTOR)

Name:_____Lic.No _____
$_____

(OTHER CONTRACTOR)

Name:_____ Lic. No._____
$_____

BID PROPOSAL FORM

The Bidder further proposes and agrees hereby to commence work under his Contract on a date to be specified in a written order of the Town of Zebulon and shall fully complete all work there under within the number of consecutive calendars days stipulated in the Supplementary General Conditions. Applicable liquidated damages shall be as stated in Supplementary General Conditions. The undersigned acknowledges receipt of the following addenda issued during the time of bidding and includes the changes therein in this Proposal:

Addendum Number _____, Dated _____

Addendum Number _____, Dated _____

Addendum Number _____, Dated _____

Addendum Number _____, Dated _____

Addendum Number _____, Dated _____

UNIT PRICES

Unit prices are complete for labor, equipment, material, overhead and profit. Base bid includes the stipulated quantity of each item. Unused amount will be credited to the Owner by change order at the end of the project.

(Increase number of lines as needed for project)

Item No.	Description	Unit Measure	Quantity	Unit Price	Total Cost
1	Rock removal and disposal on-site	CY	100		
2	Rock removal and disposal off-site	CY	100		
3	Unsuitable soil removal and disposal on-site	CY	100		
4	Unsuitable soil removal and disposal off-site	CY	100		
5	Imported structural fill	CY	100		
6	CABC stone, purchased transported, installed, and compacted	Tons	100		
7	Concrete sidewalk purchased, transported, installed	SY	100		
8	Grass seeding, purchased, transported, installation, fertilizer, lime, mulch	SF	1,000		
9	Asphalt, S9.5B, purchase, transported, installed	TONS	100		

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The undersigned agrees that this Proposal will not be withdrawn for a period of sixty (60) days.

The undersigned further agrees that in the case of failure on his part to execute the said Contract and the Bond within ten (10) consecutive calendar days after written notice being given of the award of the Contract, the check, cash or Bid Bond accompanying this Bid shall be paid into the funds of Owner's Account set aside for this Project, as liquidated damages for such failure; otherwise the check, cash or Bid Bond accompanying this Proposal shall be returned to the undersigned.

Respectfully submitted this _____
day of _____, 20_____.

_____
(Name of Firm or Corporation making Bid)

By: _____

WITNESS:

_____
(Proprietorship or Partnership)

Title: _____
(Owner, Partner, or Corporation
President or Vice President only)

Address: _____

_____

License No.: _____

ATTEST:

By: _____

Title: _____
(Corporation Secretary or Assistant Secretary only)

BID PROPOSAL FORM

RESOLUTION 2009-04
MINORITY BUSINESS ENTERPRISE POLICY

WHEREAS, NCGS 143-128.2 requires each municipality to adopt an appropriate verifiable percentage goal for the participation by minority businesses (as defined in that statute) in the awarding of construction contracts under NCGS 143-128.1, 143-128.2, 143-129, and 143-131; and

WHEREAS, NCGS 143-128.2 requires an authority awarding a building contract that exceeds the limits established by the state to adopt written guidelines specifying the action that a contractor must take to ensure a good faith effort in the recruitment and selection of minority businesses for building contracts; and requires that action taken by contractors and the awarding authority must be documented in writing; and

WHEREAS, the Town of Zebulon desires to establish and maintain minority business enterprise programs consistent with NCGS;

NOW, THEREFORE BE IT RESOLVED by the Town of Zebulon Board of Commissioners, that the following policy related to Minority Business Enterprise Program be established:

Verifiable Goal

The Town of Zebulon shall have a verifiable goal of ten percent (10%) participation by minority businesses in the award of building contracts that exceed $300,000, or building contracts that exceed $100,000 where the Town has received a State appropriation or State grant funds to be utilized as part of the project.

Good Faith Efforts by the Town to Utilize Minority Businesses

1. The Town shall utilize the list of minority businesses maintained by the NC Office of Historically Underutilized Businesses.
2. For each building contract put out for bids under the separate specification or single prime contract systems, notice of the contract and available-related documents shall be transmitted to minority businesses maintained on the above list with an interest in the type of work being bid or to local minority businesses identified by the Town, and documents related to the contract shall be available for inspection at a convenient and accessible location.
3. For each building contract put out for bids under the separate specification or single prime contract systems, the Town shall hold a pre-bid conference to orient contractors and subcontractors to the Minority Business Enterprise Policy as well as bid procedures and regulations. Minority businesses on the above list with an interest in the type of work being bid or local minority businesses identified by the Town shall be notified at least 10 days in advance of the pre-bid conference. The notification shall include:
    a. A description of the work for which the bid is being solicited.
    b. The date, time and location where bids are to be submitted.

c. The name of the individual with the Town who will be available to answer questions about the project.
d. Where bid documents may be reviewed.
e. Any special requirements that may exist.

4. The Town shall utilize media, as appropriate, likely to inform potential minority businesses of the bid being sought.
5. The Town shall maintain records that include:
   a. Contractors or subcontractors notified of the project, and the number of those contractors and subcontractors defined by NCGS that are included on the above list.
   b. Contractors or subcontractors that bid or otherwise respond to notice of the project, and the number of those contractors and subcontractors defined by NCGS that are included on the above list.
   c. Contractors or subcontractors awarded contracts as part of the project, and the number and identity of those contractors and subcontractors defined by NCGS that are included on the above list.
   d. The percentage of work on the project that is being performed by minority businesses appearing on the above list.

Good Faith Efforts by Contractors to Utilize Minority Businesses

1. Each bidder shall identify and submit with its bid:
   a. A list of minority businesses that it will use on the project, to include a description of the work to be performed by the minority businesses, the total minority business contracting amount, and the percentage of the amount toward the total project cost.
   b. In addition to (a), an affidavit documenting its good-faith effort to meet the goal. Such an affidavit shall include the list the good faith efforts it has made pursuant to NCGS 143-128.2(f). This list of good faith efforts shall include a point value for each type of effort made. Bidders must earn a minimum of 50 points in order to be considered a responsive bidder.
   c. In lieu of (a) and (b), a bidder that performs all of the work under a contract with its own workforce may submit an affidavit to that effect. and an affidavit listing the good faith efforts it has made pursuant to NCGS 143-128.2(f) and the total value of the bid that will be performed by minority businesses.
2. Within 3 days after award of contract, the lowest responsible, responsive bidder shall provide to the Town a list of all identified subcontractors that will be used on the project, the total minority business contracting amount, and the percentage of the amount toward the total project cost.

Informal Construction Projects

Informal construction projects are those projects that are greater than $30,000 but less than the amounts prescribed above.

1. Good faith efforts for informal construction project by the Town shall include:

a. Advertising the project in a media likely to inform potential minority businesses or directly contact minority businesses. If direct contact method is used, at least 30% of the businesses contacted must be minority businesses.
b. Maintaining a record of all contractors contacted, all contractors provided with bid documents, and all contractors submitting bids, identifying those contractors that are defined as minority businesses.

2. Good faith efforts for informal construction project by the Bidder shall include:
   a. Providing the Town a list of minority businesses used on the project, to include a description of the work to be performed by the minority businesses, the total minority business contracting amount, and the percentage of the amount toward the total project cost.

Reporting Requirements

All data, including the type of project, total dollar value of the project, dollar value of minority business participation on each project, and documentation of efforts to recruit minority participation shall be reported to the NC Office for Historically Underutilized Business, upon the completion of the project.

Nothing in this resolution shall be construed to require contractors or the Town to award contracts or subcontracts to or make purchases of materials or equipment from minority-business contractors or sub-contractors who do not submit the lowest responsible, responsive bid.

This resolution supersedes all previous Minority Business Entity policies including, but not limited to Resolutions 2002-02 and 2004-03.

Adopted 7th day of July, 2008

Effective 7th day of July, 2008

TOWN OF ZEBULON
SEAL
1907
NORTH CAROLINA

Robert S. Matheny—Mayor

Lisa M. Markland, CMC—Town Clark

Town of Zebulon
Little River Park – Phase 1

MINORITY BUSINESS ENTERPRISE FORMS
Formal Bid Process

Provide with the bid - Under GS 143-128.2(c) the bidder shall identify and include with the bid, Town of Zebulon Form MBE-1 Identity of Minority Business Participation, the minority businesses that it will use on the project with the total dollar value of the bids that will be performed by the minority businesses.
All bidders must submit, with the bid, Town of Zebulon Form MBE-1 Identity of Minority Business Participation Form even if there is zero MBE participation.

Also include with the bid a list of the good faith efforts made to solicit minority participation in the bid effort, Town of Zebulon Form MBE-2 Listing of the Good Faith Effort.

NOTE: A contractor that performs all of the work with its own workforce may submit Town of Zebulon Form MBE-3-Intent to Perform Contract with Own Workforce, to that effect in lieu of Town of Zebulon Form MBE-2-Listing of the Good Faith Effort.

After the bid opening - The Owner will consider all bids and alternates and determine the lowest responsible, responsive bidder. Upon notification of being the apparent lowest responsible, responsive bidder, the bidder must then file within 72 hours of the notification Town of Zebulon Form MBE-4. It includes that portion of the Work to be performed by Minority Business. Also included is 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 and Town of Zebulon Form MBE-5 is not necessary,
OR
If less than the 10% goal, Town of Zebulon Form MBE-5 documenting all good faith efforts to meet the goal shall be provided. 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 project.

Note: Bidders must always submit with their bid the Identification of Minority Business Participation Form listing all MBE contractors, vendors, and suppliers that will be used. If there is no MBE participation, then enter none or zero on the form. Town of Zebulon Form MBE-2 or Town of Zebulon Form MBE-3 as applicable must also be submitted with the bid. Failure to submit a required affidavit or form with the bid or within the time required may be grounds for rejection of the bid. Attach to Bid

Town of Zebulon

Little River Park – Phase 1

Attach To Bid

Town of Zebulon Form MBE-1 (8-2003)

Identification of Minority Business Participation

I, _____

(Bidder)

Do hereby certify that on this project we will use the following minority business enterprises as construction subcontractors, vendors, suppliers or providers of professional services.

Firm Name, Address and Phone #	Work Type	Minority Category

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

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

Town of Zebulon

Little River Park – Phase 1

Attach to Bid

Town of Zebulon– Form MBE-2 (8-2003)
Listing of the Good Faith Effort

Affidavit of _____

(Name of Bidder)

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 pre-bid 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 GS 143-128.2(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: _____

SEAL

State of North Carolina, County of _____

Subscribed and sworn to before me this_____ day of _____ 20_____

Notary Public_____

My commission expires_____

Town of Zebulon
Little River Park – Phase 1

Attach to Bid Only if Bidder Performs All Work With Own Workforces

Town of Zebulon Form MBE-3 (8-2003)

Intent to Perform Contract with Own Workforce

Affidavit of _____
(Name of Bidder)

I hereby certify that it is our intent to perform 100% of the work required for the project

_____
(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: _____
SEAL Title: _____

State of North Carolina, County of _____
Subscribed and sworn to before me this_____ day of _____ 20_____
Notary Public_____

My commission expires_____

Town of Zebulon
Little River Park – Phase 1

Town of Zebulon Form MBE-4 (8-2003)
Portion of the Work to be Performed by Minority Firms
****(NOTE: THIS FORM IS NOT TO BE SUBMITTED WITH THE BID PROPOSAL)****

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, to the Owner, by the apparent lowest responsible, responsive bidder within 72 hours after notification of being the apparent low bidder.

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

_____
(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**)

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: _____
Seal
State of North Carolina, County of _____
Subscribed and sworn to before me this_____ day of _____ 20__
Notary Public_____
My commission expires_____

Town of Zebulon

Little River Park – Phase 1

Town of Zebulon Form MBE-5 (8-2003) - Good Faith Efforts

****(NOTE: THIS FORM IS NOT TO BE SUBMITTED WITH THE BID PROPOSAL)****

If the goal of 10% participation by minority business **is not** achieved, this affidavit shall be provided, to the Owner, by the apparent lowest responsible, responsive bidder within 72 hours after notification of being the apparent low bidder.

Affidavit of:

_____

(Bidder)

I do certify the attached documentation as true and accurate representation of my good faith efforts.

(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**)

Documentation of the Bidder's good faith efforts to meet the goals set forth in these provisions. Examples of documentation include, but are not limited to, the following evidence:

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 c 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.

Date: _____ Name of Authorized Officer: _____

Signature: _____

Seal Title: _____

State of North Carolina, County of _____

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

Notary Public_____

My commission expires_____

Town of Zebulon
Little River Park – Phase 1

Town of Zebulon FORM MBE-6 (8-2003)

CERTIFICATION of Actual Work Performed by Minority Businesses

NOTE: THIS FORM IS TO BE SUBMITTED PRIOR TO FINAL PAYMENT BEING DUE THE CONTRACTOR

Affidavit of _____
(Contractor Name)

_____
(Project Name)

Project ID# _____Final Contract Amount $ _____

I do hereby certify that _____% of the total dollar amount of the contract was performed with minority business. Such work was subcontracted to the 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**)

The undersigned hereby certifies that above information is correct to the best of his/her knowledge, information and belief.

Date: _____ Name of Authorized Officer: _____
Signature: _____
Title: _____
Seal State of North Carolina, County of _____
Subscribed and sworn to before me this_____ day of _____ 20___
Notary Public_____
My commission expires_____

CONSTRUCTION AGREEMENT

FOR

Little River Park – Phase 1

THIS AGREEMENT, made as of the ____ day of _____, 20__, by and between _____, a corporation, hereinafter called the Contractor, and Town of Zebulon, a body corporate and politic and a political subdivision of the State of North Carolina, hereinafter called the Owner.

W I T N E S S E T H:

That the Contractor and the Owner, for the consideration herein named, agree as follows:

1. SCOPE OF WORK - The Contractor shall furnish and deliver all of the materials, and perform all of the work required by this Agreement and the following enumerated documents, which are attached hereto and made a part hereof as if fully contained herein: General Conditions, Supplemental Conditions, Contract Construction Schedule, Specifications, Drawings entitled "Little River Park – Phase 1" which Drawings are listed in the Specifications, Performance Bond, Labor and Material Payment Bond, Insurance Certificates and the following addenda:

Addendum No. _____ Dated _____.

Addendum No. _____ Dated _____

Addendum No. _____ Dated _____

All of the documents listed, referenced or described in this paragraph, together with Modifications made or issued in accordance herewith are the Contract Documents, and the work, labor, materials and completed construction required by the Contract Documents and all parts thereof is the Work. The Contractor shall perform the Work in the time, manner and form required by the Contract Documents. The Contract Documents constitute the entire agreement between Owner and Contractor.

2. The Contractor agrees to commence work not later than three (3) days after the commencement date specified in the Notice to Proceed. The Contractor agrees to complete fully all Work hereunder on the dates specified in the Contract Documents, as may be adjusted in accordance with the terms thereof. Time is of the essence with respect to all dates specified in the Contract Documents as Completion Dates. Liquidated damages for failure(s) to complete in accordance with the provisions

of this paragraph shall be computed and assessed against the Contractor in accordance with the Contract Documents.

3. The Owner hereby agrees to pay to the Contractor for the faithful performance of this Agreement, and the Contractor hereby agrees to perform all of the Work, for the sum of insert written dollar amount Dollars ($XXXXX) in the lawful money of the United States, subject to adjustments as provided for in the Contract Documents. The Contract Sum is derived as follows:

Base Bid:	$
Alternates:	$
Contract Sum:	$

Payment of the Contract Price shall be in accordance with Articles 18 and 19 of the General Conditions.

4. It is further mutually agreed between the parties hereto that if at any time after the execution of this Agreement and the Performance Bond and Labor and Material Payment Bond hereto attached for its faithful performance, the Owner shall deem the surety or sureties upon such Bonds to be unsatisfactory, or if, for any reason, such Bonds or either of them cease to be adequate to cover the performance of and payment for the Work, the Contractor shall, at its expense, within five (5) days after notice from the Owner so to do, furnish an additional bond or bonds in such form and amount and with such surety or sureties as shall be satisfactory to the Owner. In such event no further payment to the Contractor shall be deemed to be due under this Agreement until such new or additional security for the faithful performance of or payment for the Work shall be furnished in a manner and form satisfactory to the Owner.

5. Terms used in this Agreement, which are defined in the Contract Documents, shall have the meanings designated in those Contract Documents.

6. The laws of the State of North Carolina shall apply to the interpretation and enforcement of this Agreement. Any and all suits or actions to enforce, interpret or seek damages with respect to any provision of, or the performance or nonperformance of, this Agreement shall be brought in the General Court of Justice of North Carolina sitting in Wake County, North Carolina, or the United States District Court sitting in Wake County, North Carolina, and it is agreed by the parties that no other court shall have jurisdiction or venue with respect to such suits or actions. Prior to initiating any such action, any party to this Construction Agreement may initiate the mediation process as provided in Appendix A to the General Conditions of the Contract for Construction.

IN WITNESS WHEREOF, the Parties hereto have executed this Agreement as of the day and date first above written in a number of counterparts, each of which shall, without proof or accounting for other counterparts, be deemed an original contract.

_____
Contractor: (Trade or Corporate Name)

By: _____

Title: _____
(President)

ATTEST: (CORPORATION)

By: _____

Title: _____
(Corporate Secretary)

(CORPORATE SEAL)

WITNESS:

_____
(Proprietorship or Partnership)

Town of Zebulon
450 East Horton Street
Zebulon, NC 27597

By: _____ ATTEST: _____
Joseph M. Moore, II, P.E.
Town of Zebulon Manager

This instrument has been pre-audited in the manner required by the local Government Budget and Fiscal Control Act.

_____
Robert T. Fitts
Finance Director Town of Zebulon

This instrument is approved as to Form.

_____
Eric A. Vernon
Town of Zebulon Attorney

The person responsible for monitoring the contract performance requirements is Chris D. Ray, Director of Public Works, Town of Zebulon. _____Department Head Initials

PAYMENT BOND

Date of Contract:	_____
Date of Execution:	_____
Name of Principal: (Contractor)	_____ _____ _____
Name of Surety:	_____
Name of Obligee:	Town of Zebulon 450 East Horton Zebulon, NC 27597
Amount of Bond:	_____ Dollars ($_____)
Project:	Little River Park – Phase 1

KNOW ALL MEN BY THESE PRESENTS, that we, the Principal and Surety above named, are held and firmly bound unto the above named Obligee, hereinafter called Owner, in the penal sum of the amount stated above, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, and successors, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, that whereas the Principal entered into a certain Contract with the Owner identified as shown above and hereto attached:

NOW THEREFORE, if the Principal shall promptly make payment to all persons supplying labor and material in the prosecution of the Work provided for in said Contract, and any and all duly authorized modifications of said Contract that may hereafter be made, notice of which modification to the Surety being hereby waived, then this obligation to be void; otherwise to remain in full force and virtue.

IN WITNESS WHEREOF, the above-bounden parties have executed this instrument under their several seals on the date indicated above, the name and corporate seal of each corporate party being hereto affixed and these presents duly signed by its undersigned representatives, pursuant to authority of its governing body.

PAYMENT BOND

Executed in Four (4) Counterparts.

PRINCIPAL (Contractor):

By: _____

Title: _____
(Corporation President or
Vice President Only)

ATTEST: (Corporation)

_____
(Corporation Secretary or Assistant
Secretary Only)

(AFFIX CORPORATE SEAL)

SURETY:

WITNESS: By: _____

_____ Title: _____
(Attorney in Fact)

(AFFIX SURETY CORPORATE SEAL)

COUNTERSIGNED:

_____

_____
(N.C. Licensed Resident Agent)

_____

_____
Name and Address-Surety Agency

_____

_____
Surety Company Name and N.C.
Regional or Branch Office Address

PERFORMANCE BOND

Date of Contract:	_____
Date of Execution:	_____
Name of Principal: (Contractor)	_____ _____ _____
Name of Surety:	_____
Name of Obligee:	Town of Zebulon 450 East Horton Street Zebulon, NC 27597
Amount of Bond:	_____ Dollars ($_____)
Project:	Little River Park – Phase 1

KNOW ALL MEN BY THESE PRESENTS, that we, the Principal and Surety above named, are held and firmly bound unto the named Obligee, hereinafter called the Owner, in the penal sum of the amount stated above for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators and successors, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, that whereas the Principal entered into a certain Contract with the Owner, identified as shown above and hereto attached:

NOW THEREFORE, if the Principal shall well and truly perform and fulfill all the undertakings, covenants, terms, conditions, and agreements of said Contract during the original term of said Contract and any extensions thereof that may be granted by the Owner, with or without notice to the Surety, and during the life of any guaranty required under the Contract, and shall also well and truly perform and fulfill all the undertakings, covenants, terms, conditions, and agreements of any and all duly authorized modifications of said Contract that may hereafter be made, notice of which modifications to the Surety being hereby waived, then, this obligation to be void; otherwise to remain in full force and virtue.

IN WITNESS WHEREOF, the above-bounden parties have executed this instrument under their several seals on the date indicated above, the name and corporate seal of each corporate party being hereto affixed and these presents duly signed by its countersigned representative, pursuant to authority of its governing body.

PERFORMANCE BOND

Executed in Four (4) Counterparts.

PRINCIPAL (Contractor):

By: _____

Title: _____
(Corporation President or
Vice President Only)

ATTEST: (Corporation)

_____
(Corporation Secretary or Assistant
Secretary Only)

(AFFIX CORPORATE SEAL)

SURETY:

WITNESS: By: _____

_____ Title: _____
(Attorney in Fact)

(AFFIX SURETY CORPORATE SEAL)

COUNTERSIGNED

_____

_____
(N.C. Licensed Resident Agent)

_____

_____
Name and Address-Surety Agency

_____

_____
Surety Company Name and N.C.
Regional or Branch Office Address

NON-DISCRIMINATION ASSURANCES

It is specifically agreed as part of the consideration of the signing of this Contract that the parties hereto, their agents, officials, employees, or servants will not discriminate in any manner on the basis of age, handicap, sex, race, color, creed, sexual orientation, or national origin with reference to the subject matter of this Contract, no matter how remote.

This provision shall be binding on the successors and assigns of the parties hereto with reference to the subject matter of this contract.

This CONTRACT is entered into this, the _____ day of _____, 20___.

(PLEASE THOROUGHLY EXECUTE THIS INSTRUMENT)

THE CONTRACTOR	THE OWNER THE TOWN OF ZEBULON
_____	BY: _____
(NAME)	Public Works Director
BY: _____	
_____	
(TITLE) (Subscribe & indicate capacity)	
ATTEST:	ATTEST:
BY: _____	BY: _____
(ASST) CORPORATE SECRETARY	
(AFFIX CORPORATE SEAL)	Title_____

CONTRACTOR'S CERTIFICATE

The undersigned, being the _____ (Insert title and Company Name), (the "Company"), does hereby certify that, to the best of his knowledge, information, and belief:

1. The Company is a corporation duly formed and validly existing corporation under the laws of the State of North Carolina.

2. The _____President of the Company has all requisite corporate power and authority to execute and perform the Company's obligations under the Documents.

3. The representations made by or on behalf of the Company in the following documents (collectively, "the Documents") are true, correct and complete:

a) Construction Contract dated (Insert Date)

b) Performance and Payment Bond from (Insert Date and Insurance Co. Name)

4. The foregoing Documents constitute valid and legally binding obligations upon the Company.

5. As of the date hereof, no judicial proceeding has been instituted by the State of North Carolina alleging that the Company has abused, misused, or failed to use its powers and franchises in a manner which, in the public interest, would make proper the forfeiture of the articles incorporation of the Company or the dissolution of the Company; no Articles of Dissolution have been filed with the Secretary of State of North Carolina; and no petition has been filed in any court of competent jurisdiction to dissolve the Company.

6. No proceedings by or against the Company have been commenced in bankruptcy or for reorganization, liquidation, or the readjustment of debts under the Bankruptcy Code or any other law, whether state or federal, nor has the Company made an assignment for the benefit of creditors, admitted in writing inability to pay debts generally as they become due, or filed or have filed against it any action seeking an order appointing a trustee or receiver of all or a substantial part of the property of the Company.

[Remainder of page is intentionally left blank. Next page is signature page.]

IN WITNESS WHEREOF, the undersigned has executed this Contractor's Certificate as of _____ , 20____.

Insert company name
a North Carolina corporation

By: _____

Name: _____

Title: _____

CERTIFICATE OF OWNER'S ATTORNEY

I, Eric Vernon, the duly authorized and acting legal representative of the Town of Zebulon, do hereby certify as follows:

I have examined the attached contract(s) and the manner of execution thereof, and I am of the opinion that each of the aforesaid agreements is adequate and has been duly executed by the proper parties thereto acting through their duly authorized representatives;

And that the foregoing agreements constitute valid and legally binding obligations upon the parties executing the same in accordance with terms, conditions, and provisions thereof.

_____ _____

Eric Vernon, Attorney at Law *Date*

GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION

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ARTICLE 1. DEFINITIONS

1.1 Agreement - The Construction Agreement, these General Conditions, and any Supplementary Conditions.

1.2 AIA - The American Institute of Architects.

1.3 ASTM - The American Society for Testing and Materials.

1.4 Beneficial Occupancy – The point at which the Project can be occupied by the Owner for its intended purpose, upon achievement of Substantial Completion, as defined in 1.40.

1.5 Change Order - A written order to the Contractor signed by the Owner and the Designer authorizing an addition, deletion, or revision in the Work and/or an adjustment in the Contract Price and/or the Contract Time issued after execution of the Construction Agreement. See paragraph 14.1.

1.6 Completion Date - Those dates identified as Completion Dates in the Contract Construction Schedule or elsewhere in the Contract Documents.

1.7 Construction Agreement – The document executed by the Contractor and the Owner to formally memorialize their consent to the terms of the Agreement.

1.8 Construction Change Directive – A written order to the Contractor signed by the Owner and the Designer directing an addition, deletion, or revision in the Work after execution of the Construction Agreement, in circumstances when the parties have been unable to agree on an adjustment to the Contract Price or the Contract Time, but the Owner requests that the Contractor proceed with said Work subject to adjustment of the Contract Price and/or Contract Time under the procedures described herein.

1.9 Construction Manager(s) - The person or firm designated as the Construction Manager in the Contract Documents, or their authorized representatives. The Construction Manager(s), as referred to herein, will be referred to hereinafter as if each were of the singular number, masculine gender.

1.10 Contract Construction Schedule - That schedule described in Article 13 hereof and identified as the Contract Construction Schedule.

1.11 Contract Documents - All of the documents that make up the Agreement, plus the Drawings and Specifications that describe the scope of the Work, plus allowable Modifications to the Contract Documents.

1.12 Contract Price - The total monies payable to the Contractor under the Contract Documents pursuant to paragraph 15.1 of the Agreement.

1.13 Contract Time - The number of calendar days stated in, or computed from, the Contract Documents for the completion of the Work, or any portion thereof. See, particularly, Article 13 hereof and the Contract Construction Schedule. Time of completion as specified therein is of the essence. The time used and referred to on the Project will be that time which is

observed in Raleigh, North Carolina, being Eastern Daylight Savings Time (EDT), Eastern Standard Time (EST), or other as designated by the Designer.

1.14 Contractor - The Contractor shall be that party identified as such in the Agreement.

1.15 Days - Unless otherwise indicated, the term "days" shall mean consecutive calendar days.

1.16 Daylight Hours - The hours or portions of hours between sunrise and sunset local time.

1.17 Designer(s) – The person or firm designated as the Designer in the Contract Documents, or their authorized representatives. The Designer(s), as referred to herein, shall mean architect, landscape architect, and/or engineer. They will be referred to hereinafter as if each were of the singular number, masculine gender.

1.18 Drawings - The Drawings are the graphic and pictorial portions of the Contract Documents, wherever located and whenever issued, showing the design, location, and dimensions of the Work, and generally including plans, elevations, sections, details, schedules and diagrams. A list of the Drawings is contained in the Supplemental General Conditions.

1.19 Field Order - A written order issued by the Designer which clarifies or interprets the Contract Documents or orders minor changes in the Work in accordance with the Contract Documents. See paragraph 14.2.

1.20 Final Completion - The point at which the Contractor has, as determined by the Designer, completed the Work, with the exception of guaranty and warranty obligations, and becomes entitled, upon the recommendation of the Designer and determination by the Owner, to final payment.

1.21 The words "furnish," "furnish and install," "install," and "provide" or words with similar meanings shall be interpreted, unless otherwise stated, to mean furnish and install complete, in place and ready for service.

1.22 Liquidated Damages – See paragraph 13.18 of these General Conditions.

1.23 Modification - (A) a written amendment to the Contract Documents signed by the Owner and the Contractor and identified therein as such, (B) a Change Order, (C) Construction Change Directive, or (D) a Field Order. A Modification may only be issued after execution of the Agreement.

1.24 Notice of Award - The written notice by the Owner to the Contractor that the Contractor is the successful Bidder and that upon compliance with the conditions precedent to be fulfilled by the Contractor within the time specified, the Owner will execute and deliver the Agreement to him.

1.25 Notice to Proceed - See paragraph 13.3.

1.26 Owner - The Owner is the person designated as such in the Agreement.

1.27 Owner's Authorized Representative - A person, or persons, employed by the Owner and designated from time to time by written notice to the Contractor to administer the Contract Documents, and to observe and monitor the Work on behalf of the Owner with authority and responsibility as herein specified.

1.28 Notice - The term "notice" or "written notice" as used herein shall mean and include all written notices, demands, instructions, and claims approvals and disapprovals furnished by the Owner or the Designer to obtain compliance with the requirements of the Contract Documents, as well as all written notices, demands, instructions and claims furnished by the Contractor as required by the Contract Documents. Where notice is required under the terms of the Contract Documents written notice shall always be required, and oral or "constructive" notice shall be insufficient and ineffective as notice. Email or other electronic delivery shall be insufficient and ineffective as notice unless specifically allowed by the Supplementary Conditions or a Modification to the Agreement. Written notice shall be deemed to have been duly served on the date that it is delivered in person to the individual or to a member of the firm, to an officer of the corporation for whom it is intended, to an authorized representative of such individual, firm, or corporation, or on the date that it is mailed by registered or certified mail, return receipt requested, addressed to the last business address of such individual, firm, or corporation known to the person giving the notice. Written notice may also be given by facsimile transmission, provided that proof of delivery is obtained. In the case of delivery in person, such delivery shall not be effective unless and until a written and signed receipt showing the date and time of delivery is obtained.

1.29 Project - The total construction of which the Work performed under the Contract Documents may be the whole or a part.

1.30 Project Expediter – As used herein, is an entity stated in the Contract Documents, designated to effectively facilitate scheduling and coordination of Work activities. For the purpose of a single prime contract, the single prime contractor is designated as the Project Expediter. For the purpose of a project involving separate prime contracts, the Contractor for general work shall be designated as the Project Expediter unless otherwise indicated in the Supplementary General Conditions. See paragraph 7.27.

1.31 Project Manager - That person designated by the Contractor in accordance with paragraph 7.2 who shall be in general charge of the Work and its performance and who shall have the authority set forth in the last sentence of paragraph 7.2.

1.32 Request for Information - A written communication from the Contractor to the Designer for any interpretation of, or information needed, required, or desired under the Contract Documents. The Owner reserves the right to determine the reasonable format and contents required for a Request for Information. In any Request for Information, the Contractor shall state a reasonable date by which a response is necessary in order to avoid delay in progress on the Work and shall make such request sufficiently in advance of such date as to avoid any such delay. The Designer shall respond in writing to the Request for Information by the date stated by the Contractor unless he cannot reasonably do so, in which case he shall prior to that date notify the Contractor of the date by which he can reasonably respond. The Contractor shall not be entitled to any additional time for the completion of the Work or any portion thereof by reason of the Designer's failure to respond

if he has not submitted his Request for Information sufficiently in advance to allow the Designer a reasonable time within which to respond.

1.33 Request for Payment - The form, in the form of AIA Document G702 (latest ed.) or other published document approved by Owner, which is to be used by the Contractor in requesting progress payments and which is to include a Schedule of Values as required by the Contract Documents and an affidavit of the Contractor that progress payments theretofore received from the Owner on account of the Work have been applied by the Contractor to discharge in full all the Contractor's obligations incurred in connection with Work covered by all prior applications for payment. See paragraph 20.2.

1.34 Resident Superintendent - That person designated by the Contractor in accordance with paragraph 7.2 who has day-to-day responsibility for the prosecution of the Work and the obtaining of proper materials and equipment, and adequate labor and who shall have the authority set forth in the last sentence of paragraph 7.2.

1.35 Schedule of Values - Any breakdown of the Contract Price which may be required by the Contract Documents, and designated as such. See paragraph 20.1.

1.36 Specifications - That portion of the Contract Documents consisting generally of the written requirements for materials, equipment, construction systems, standards, and workmanship for the Work and performance of related services.

1.37 Subcontractor - A person, firm, or corporation who has entered into a direct contract with the Contractor to perform any of the Work at the Project.

1.38 Submittal - Shop drawings, product data, samples, and other documents required by the Contract Documents to be submitted by the Contractor to the Designer.

1.39 Submittal Register - See paragraph 13.2 of these General Conditions.

1.40 Substantial Completion - The point at which the Work, and Work by other Contractors on or in connection with the Project, as determined by the Designer, is sufficiently complete in accordance with the Contract Documents that it can be beneficially occupied by the Owner, and the Work can be utilized by the Owner for its intended use, and all necessary permits and permissions for Beneficial Occupancy and utilization having been obtained by the Contractor. All operations and maintenance manuals, Owner training, and as-built drawings must be submitted prior to Substantial Completion being achieved.

1.41 Sub-subcontractor - A person or entity that has a direct or indirect contract with a Subcontractor to perform any of the Work at the Project.

1.42 Work - The construction and services required by the Contract Documents, including all labor, materials, equipment, and services provided or to be provided by the Contractor to fulfill the Contractor's obligations.

1.43 All references in the Contract Documents to the masculine shall be interpreted as including the feminine or neuter and all references in the Contract Documents to the singular or the

plural shall be interpreted as including the other, as may be appropriate in the reasonable interpretation of the Contract Documents.

ARTICLE 2. CORRELATION, INTERPRETATION AND INTENT OF CONTRACT DOCUMENTS

2.1 It is the intent of the Specifications and Drawings and other Contract Documents to describe a complete Project in accordance with the Contract Documents.

2.2 The Contract Documents are complementary; what is called for by one is as binding as if called for by all. If the Contractor finds a conflict, error or discrepancy in the Contract Documents, the Contractor shall notify the Designer in writing before proceeding with the Work affected thereby. In resolving such conflicts, errors and discrepancies, the Contract Documents shall be given preference in the following order: Construction Agreement, Modifications, Addenda, Supplemental Conditions, General Conditions, Specifications, and Drawings. Figure dimensions on Drawings shall govern over scale dimensions, and detailed Drawings shall govern over general Drawings. Any Work that may reasonably be inferred from the Contract Documents as being required to produce the intended result shall be supplied whether or not it is specifically called for. Work, materials or equipment described in words which, so applied, have a well known technical trade meaning shall be deemed to refer to such meaning and to incorporate any recognized standards which are a part of such meaning.

2.3 Miscellaneous items, accessories and work which are not specifically mentioned, but which are essential to produce a complete and properly operating installation, or useable structure or plant providing the indicated function shall be furnished and installed without change in the Contract Price. Such miscellaneous items and accessories shall be of the same quality standards, including material, style, finish, strength, class, weight and other applicable characteristics, as specified for the major component of which the miscellaneous item or accessory is an essential part, and shall be approved by the Designer before installation. This requirement is not intended to include major components not covered by or inferable from the Contract Documents.

2.4 The Work of all trades under the Contract Documents shall be coordinated by the Contractor in such a manner as to obtain the best workmanship possible for the entire Project and all components of the Work shall be installed or erected in accordance with the best practices of the particular trade.

2.5 The Contractor shall fully complete the Work and shall be responsible for all of the Work under the Contract Documents to which the Construction Agreement applies. If the Contractor is prevented from doing so by any limitation of the Contract Documents, the Contractor shall immediately give notice thereof to the Designer and the Owner in writing before proceeding with the construction in the area where the problem or limitation exists.

2.6 Standard specifications or manufacturers' literature, when referenced, shall be of the latest revision or printing unless otherwise stated and is intended to establish the minimum requirements acceptable.

2.7 For those materials specified without the use of brand names, the Contractor shall submit within thirty (30) days after his receiving the Construction Agreement for signatures, any product that meets the express requirements of the Specifications.

Such Submittal shall include manufacturer's data, test reports, performance data and certifications, samples, erection details, and other applicable information as required to permit determination by the Designer whether such proposed products are suitable. The Designer shall be the sole judge as to the suitability of any proposed product. The burden of proof of quality rests with the Contractor.

2.8 The Contractor is required to examine and read the complete set of Contract Documents for information concerning the Work, because some of the Work for which the Contractor will be responsible may be indicated on or in documentation applying primarily to the Work of one or more other separate prime contractors. No allowance will be made for the Contractor's failure to become familiar with the complete set of project documents.

2.9 Contractor's requests for clarification or information shall clearly define the cause(s) of Contractor's request and, as appropriate, shall include Contractor's interpretation and Contractor's proposed solution.

ARTICLE 3. FAMILIARITY WITH WORK, CONDITIONS AND LAWS

3.1 The Contractor has investigated prior to bidding and is satisfied with all conditions affecting the Work, including but not restricted to those bearing upon transportation, disposal, handling and storage of materials, availability of labor, water, electrical power, roads and uncertainties of weather, or similar physical conditions at the Project site, and the character of equipment and facilities needed prior to and during prosecution of the Work. The Contractor is satisfied as to the character, quality and quantity of surface and subsurface materials or obstacles to be encountered insofar as this information is reasonably ascertainable from inspection of the Project site, including all exploratory work done by the Owner, as well as from information presented by the Contract Documents, or any other information made available to the Contractor prior to receipt of bids. Any failure by the Contractor to become acquainted with the available information shall not relieve the Contractor from the responsibility for estimating properly the difficulty or cost of successfully performing the Work.

3.2 The Contractor shall be entitled to rely upon all information furnished to the Contractor in writing by the Owner with respect to the Project site and to make all inferences from it that would reasonably be made by a contractor having knowledge and experience with similar work; however, the Contractor shall not be entitled to infer from Owner-supplied information any fact or condition which would not be inferred by a contractor having knowledge and experience with similar work and, if the Owner-supplied information is inadequate or insufficient in any respect, the Contractor shall be required to obtain independently such other information as a knowledgeable and experienced contractor would prudently obtain in order to evaluate any such condition.

3.3 The Contractor specifically acknowledges familiarity with all Federal, State, and local laws, ordinances, rules, and regulations which may in any manner affect those engaged or

employed in the Work, or the materials or equipment in or about the Work, or in any way affect the conduct of the Work and agrees that the Contractor and the Contractor's employees, subcontractors, and suppliers will, at all times, comply with same. If the Contractor shall discover any provisions in the Contract Documents which are contrary to or inconsistent with any such law, ordinance, rule, or regulation, the Contractor shall immediately give notice thereof to the Designer and the Owner in writing, identifying any items of Work affected, and the Contractor shall not proceed until the Contractor has received written direction from the Designer with respect to these items. If the Contractor performs contrary to or inconsistently with any such law, ordinance, rule, or regulation without giving such notice, the Contractor shall bear all costs which are a consequence of such performance.

To ensure compliance with the E-Verify requirements of the General Statutes of North Carolina, all contractors, including any subcontractors employed by the contractor(s), by submitting a bid, proposal or any other response, or by providing any material, equipment, supplies, services, etc., attest and affirm they are aware and in full compliance with Article 2 of Chapter 64 (NCGS64-26(a)) relating to the E-Verify requirements.

By submittal of a bid or execution of a contract, all contractors, including any subcontractors employed by the contractor(s), attest and affirm they are not listed on the Final Divestment List created by the State Treasurer pursuant to N.C.G.S. 143-6A-4, Iran Divestment Act.

3.4 At times selected by the Designer after execution by the Contractor of the Construction Agreement, a pre-construction conference shall be scheduled and conducted for the benefit of the Project.

ARTICLE 4. BONDS

4.1 A performance bond in the full amount of the Contract Price shall be required of the Contractor to guarantee the faithful performance of the Work in compliance with the Contract Documents, in such form as may be required by law and approved by the Owner. The bond shall be dated the same date as the Construction Agreement and must be accompanied by a current copy of the power of attorney for the attorney-in-fact executing such bond on behalf of a surety company licensed to do business in the state of North Carolina.

4.2 A payment bond in the full amount of the Contract Price shall be required of the Contractor to guarantee the payment of all labor and material costs or claims in connection with compliance with the Contract. The payment bond shall be in such form as may be required by law and approved by the Owner. Said bond shall be dated and executed in the same manner as the performance bond in paragraph 4.1.

ARTICLE 5. INSURANCE AND INDEMNITY

5.1 CONTRACTOR PROVIDED INSURANCE

The Contractor shall, without limiting its obligations or liabilities, procure, pay for and maintain such insurance as is required by law and as is required by this Agreement to protect the Contractor and the Owner from claims for damages for bodily injury, including death, and from claims for property damage which may arise from the Contractor's or its representatives', consultants', Subcontractors', agents', or employees' operations under this

Agreement. Such insurance shall be of the kinds and have limits of liability and coverages not less than the minimum limits hereinafter specified or required by law, whichever is greater. The Owner makes no representation as to the adequacy or sufficiency of such coverages. The following requirements shall in no way be construed to limit or eliminate the liability of the Contractor, which arises from performance of Work under the Agreement. The Contractor is strictly responsible for any losses, claims, and costs of any kind which exceed the Contractor's limits of liability, or which may be outside the coverage scope of the policies.

The insurance specified shall be provided by an insurer approved by the Owner, authorized to do such business in the State of North Carolina, and on terms approved by the Owner. Insurance companies utilized shall have a minimum rating of A- and Class VII as evaluated by the most current A.M. Best Rating Guide. If the insurer has a Best Rating less than A- and Class VII, the Contractor must receive specific written approval from the Owner prior to proceeding with any Work under the Agreement. All agents and brokers shall hold valid licenses from the State of North Carolina. Before commencing mobilization to the Project site and not later than 7 days after the receipt of the Construction Agreement by the Contractor for signatures, the Contractor shall furnish to the Owner a certificate or certificates of insurance in a form satisfactory to the Owner. Upon request of the Owner, the Contractor shall provide the Owner with certified copies of the insurance policies required by this Article, including without limitation declaration pages, conditions, exclusions and endorsements, and confirmation that each policy premium has been paid for the required term of this Agreement. A copy of the umbrella policy shall be provided to Town of Zebulon. Certificates shall be signed by a person authorized by that insurer to bind coverage on its behalf. All insurance policies shall provide as evidenced by Certificates of Insurance, that the insurance shall not be canceled, reduced, restricted, or changed in any way without at least 30 days prior written notice to the Owner. With regard to expiration, cancellation, reduction, restriction, or any other change, certificates shall state “Should any of the following described policies be canceled before expiration date or be due to expire within 30 days, the insurer shall mail 30 days prior written notice to named certificate holder.” In the event of any such cancellation, non- renewal, reduction, restriction, or change in any insurance, the Contractor is obligated to replace such insurance within 7 days without a gap in coverage and file accordingly such notice with the Owner, and other interested parties. Failing immediate receipt of evidence of such replacement of insurance the Owner reserves the right to procure such insurance as the Owner considers desirable and the Contractor shall pay or reimburse the cost of the premium in respect thereof. It is expressly provided, however, that any action or inaction on the part of the Owner in this respect shall in no way change or reduce the Contractor's responsibilities and liabilities under this Agreement. Self-funded, policy fronting, or other non-risk transfer insurance mechanisms are not acceptable without prior written approval of the Owner. Full disclosure of such a program must be made prior to commencing mobilization to the Project site. Failure to make a full disclosure constitutes a material breach of the Agreement, justifying termination for default.

The Contractor shall name the Owner, the Designer, the Designer’s consultants, and the Construction Manager as additional insureds under all its insurance contracts (except workers' compensation) with respect to and including without limitation liability arising out of activities performed by or on behalf of the Contractor, products and completed operations of the Contractor, and automobiles owned, hired, leased, or borrowed by the Contractor. The coverage shall contain no special limitations on the scope of protection afforded to

additional insureds.

For any claims related to this Project, the Contractor's insurance or self insurance shall be primary and noncontributory with respect to the Owner's insurance. Any insurance or self- insurance maintained by the Owner shall be excess and noncontributory with respect to the Contractor's insurance.

All policies of insurance shall contain a clause waiving rights of subrogation against the Owner, unless the Owner approves otherwise in writing.

Limits of coverage are not to be amended by deductible clauses of any nature without the express written consent of the Owner. The Contractor shall be solely responsible for any deductible assumptions that may exist in any insurance policies required under this Agreement. In addition, the Contractor shall be responsible and shall not be reimbursed for any losses arising from any risk or exposure not insured as required herein, or not covered as a result of a normal policy exclusion or that falls within the self insured retention, if Contractor self insured.

The Contractor's insurance shall apply separately to each insured against whom claim is made or suit is brought, except with respect to the limits of the insurer's liability.

The claim provisions in the Contractor's insurance policies must specifically state the insurance company or Contractor's Third Party Administrator, if self insured, has both the right and duty to adjust a claim and provide defense.

The policies shall not contain any provision or definition which would serve to exclude or eliminate from coverage third party claims, including exclusions of claims for bodily or other injury to shareholders, partners, officers, directors, or employees of the insured, the premises owner, real estate manager, or the insured's Subcontractor, or any family relative of such persons.

If the policies contain any warranty stating that coverage is null and void (or words to that effect) if the Contractor does not comply with the most stringent regulations governing the Work, it shall be modified so that coverage shall be afforded in all cases except for the Contractor's willful or intentional noncompliance with applicable government regulations.

Any failure by any person to comply with reporting or other provisions of the policy including breach of warranties, shall not affect coverage provided to the Owner and its representatives, officials, and employees.

The insolvency or bankruptcy of the Insured or of the Insured's estate shall not relieve the insurance companies of their obligations under these policies. Any clauses to the contrary are unacceptable and must be stricken.

Failure to comply with these requirements shall be a material breach of this Agreement justifying termination for default.

5.1.1 Worker's Compensation and Employers' Liability Insurance

The Contractor and its Subcontractors shall procure and maintain Workers' Compensation Insurance in the amount and type required by the State of North Carolina and federal law

for all employees employed under the Agreement who may come within the protection of Workers' Compensation Laws and covering all operations under the Agreement whether

performed by the Contractor or by his Subcontractors. In jurisdictions not providing complete Workers' Compensation protection, the Contractor and his Subcontractors shall maintain employers' liability insurance in an amount, form, company, and agency satisfactory to the State of North Carolina and the Owner for the benefit of all employees not protected by Workers' Compensation Laws and covering all operations under the Agreement whether performed by the Contractor or by his Subcontractors.

The Contractor shall pay such assessments as will protect the Contractor and the Owner from claims under the Workers' Compensation Laws, workers' or workmen's compensation disability benefits, and other similar employee benefit acts. The current Experience Modification Factor shall be indicated on the Certificate of Insurance.

Coverage under this section shall be as required by federal and state Workers' Compensation and Occupational Disease Statutes, and shall have minimum limits as follows:

Coverage A:	Statutory, State of North Carolina	
Employers' Liability:	Each Accident	$1,000,000
	Disease - Policy Limit	$1,000,000
	Disease - Each Employee	$1,000,000

Such insurance shall include Voluntary Compensation coverage, a Waiver of Subrogation in favor of the Owner as well as other endorsements that may be required by applicable jurisdictions, i.e. United States Longshoremen and Harbor Workers Act and maritime coverage (Jones Act).

5.1.2 Automobile Liability Insurance

The Contractor shall procure and maintain automobile insurance against liability for bodily injury and property damage as described below, that may arise with respect to the Work being performed under the Agreement, and as will provide protection from claims which may arise out of or result from the Contractor's performance of the Work and the Contractor's other obligations under the Agreement, whether such performance of the Work is by the Contractor, by any representative or Subcontractor, by anyone, both officially and personally, directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable.

This policy of insurance shall carry the following minimum Limit of Liability:

Combined Single Limit	$1,000,000

The policy of insurance shall contain or be endorsed to include the following:

a) owned, hired, and non-owned automobile liability.

b) If the policy contains a warranty stating that coverage is null and void (or words to that effect) if the transporter does not comply with the most stringent regulations governing the Work, it shall be modified so that coverage shall be afforded in all

cases except for the transporter's willful or intentional noncompliance with applicable government regulations.

Any failure by any party to comply with reporting or other provisions of the policy including breach of warranties, shall not affect coverage provided to the Owner and its representatives, officials, and employees.

No subcontracting of waste hauling shall be permitted without prior, written approval of the Owner.

5.1.3 General Liability

This policy must be written on an Occurrence basis, with the following minimum Limits of Liability:

General Aggregate per project	$2,000,000.00
Products/Completed Operations Aggregate	$2,000,000.00
Bodily Injury and Property Damage csl/each occurrence	$1,000,000.00
Personal Injury and Advertising Injury	$2,000,000.00

The policy of insurance shall contain or be endorsed to include the following:

a) Blanket Contractual Liability covering Contractor's indemnification obligations under this Agreement, in accordance with ISO policy form CG 00 01. Modifications to the standard provision will not be acceptable if they serve to reduce coverage.

b) Premises/Operations Liability.

c) Explosion, collapse, and underground fault.

d) Independent Contractors and Independent Subcontractors coverage. e)

Broad Form Property Damage.

f) Personal Injury

g) Cross Liability/Severability of Interest clause.

h) Employer's Stop-Gap Liability endorsement, if applicable.

i) Amendment of the Pollution Exclusion Endorsement to allow coverage for bodily injury or property damage caused by heat, smoke, or fumes from a hostile fire.

j) Designated General Aggregate Limit Endorsement if required by the Supplemental General Conditions.

Coverage shall remain continuously in effect and without interruption for at least 6 years from the date of the Notice of Award and shall include coverage for exposures arising from operations that have been completed. The Contractor shall furnish the Owner and each other additional insured listed in the Agreement to whom the Certificates have been issued,

evidence satisfactory to the Owner of continuation of such insurance at the date of Preliminary Acceptance and each year thereafter.

5.1.4 Pollution Legal Liability (PLL)

Pollution Legal Liability coverage will be provided if required by the Supplementary General Conditions.

5.1.5 Umbrella Liability

The Contractor shall maintain an occurrence basis (as distinguished from a "claims made" basis) Umbrella Liability policy (true follow form) over the underlying General Liability, Automobile Liability, and Employer's Liability, with the following limits of liability:

Each Occurrence	$3,000,000
Aggregate	$3,000,000

On a fully insured basis such coverage will be subject to a deductible no greater than $10,000 per occurrence where coverage is not provided by the underlying insurance, but is provided by the Umbrella Liability policy.

The Contractor may use any combination of primary and umbrella insurance policies to comply with the insurance requirements, provided the resulting insurance is equivalent to the insurance stated herein.

All Occupational Disease exclusions must be deleted. Any Pollution Exclusion must be amended to allow coverage for bodily injury or property damage caused by spill, upset, overturn, heat, smoke, or fumes from a hostile fire.

5.1.6 Property Insurance

The Contractor shall purchase All Risk Property Insurance on a Completed Value Form in the names of the Owner, Contractor, Subcontractors, and sub-subcontractors as their interests may appear with limits as follows:

a) Full insurance value of the Work, or

b) Amount equal to the Contract Price for the Work, whichever is higher.

The Contractor is responsible for all physical damage to owned or rented machinery, tools, equipment, forms, and other items owned, rented or used by the Contractor and/or Subcontractor(s) in the performance of the Work. The insurance coverage evidencing such shall include a waiver of subrogation in favor of the Owner.

5.1.7 Valuable Papers And Records

The Contractor shall provide valuable papers and records insurance with coverage in an amount commensurate with project scope and set forth in the Supplementary General Conditions.

5.1.8 Claims

The Contractor shall notify the Owner within 24 hours of any claims or alleged claims received by the Contractor covered by any of the policies of insurance required in this

Agreement. The Contractor shall provide a written copy of the claim or alleged claim to the Owner within 3 days of the Contractor's receipt of the claim or alleged claim. If a claim is

settled to the satisfaction of the claimant, the Contractor shall submit a copy of the claimant's release to the Owner.

If a claim or alleged claim is rejected by the Contractor and/or its insurance company, the Contractor shall immediately report this fact to the Owner.

Should 30 days elapse after the claim or alleged claim has been received by the Contractor, and the Contractor is not able to report a settlement or rejection of the claim, it shall report to the Owner the steps being taken with respect to the claim.

Without limiting the foregoing, he Contractor shall notify in writing the county risk manager of any paid or incurred claims which may impair annual aggregate or general liability.

5.1.9 Deductibles and Self-insured Retentions

Any deductibles or self-insured retentions must be declared to and approved by the Owner. At the option of the Owner, either: the insurer shall reduce to a maximum of $250,000 or eliminate such deductibles or self-insured retentions with respect to the Owner, or the Contractor shall provide evidence of collateral provided to insurers or procure a bond guaranteeing payment of losses and related investigations, claim administration, and defense expenses within the deductible or self-insured retention amount. Any self-insured retention or deductible amount on the policy shall not reduce the amount of collectible limits or liability.

5.1.10 Subcontractors

The Contractor shall include all Subcontractors as Insureds under its policies, or shall furnish separate certificates, policies, and endorsements for each Subcontractor the Contractor intends to use. If a Subcontractor does not take out insurance in his own name and the Contractor wishes to provide insurance protection for such Subcontractor and such Subcontractor's employees, the Contractor shall either (a) procure appropriate policies in the name of the Subcontractor, or (b) cause a rider or riders to be attached to the Contractor's policies which shall identify the Subcontractor thereby covered; provided, however, in the case of the latter option, such a rider need not be attached to the Contractor's workers' compensation policy if such policy by its terms is sufficiently broad to cover the employees of all Subcontractors performing Work under the Contract Documents. Except as otherwise approved by the Owner in writing, Limits of Liability and coverage scope must be at a minimum as stringent as required of the Contractor by the Contract Documents. All Work performed for the Contractor by any Subcontractor shall be pursuant to an appropriate agreement between the Contractor and the Subcontractor which shall contain provisions that waive all rights the contracting parties may have against one another for damages caused by fire or other perils covered by insurance as provided herein. Insurance monies received from any loss shall be divided as the respective interest

of the parties affected shall appear.

5.2 OWNER CONTROLLED PROJECT SPECIFIC INSURANCE

In the event the Owner elects to purchase project-specific insurance affording coverage to the Contractor and Subcontractors, the terms and conditions of such coverage shall be set forth in the Supplementary Conditions.

5.3 CONTRACTOR AS JOINT VENTURE

If the Contractor is completing this Project on a joint venture basis, both joint venture partners retain all liabilities assumed by this Agreement, individually and collectively. This may include, but is not limited to, all premiums due, deductibles/self-insured retentions, coinsurance provisions, claim provisions, insurance policy conditions, and indemnification provisions hereunder.

Evidence of a Blanket Joint Venture Endorsement must be obtained from the General Liability and Contractor's Pollution Legal Liability carriers of each joint venture partner for a period of 6 years after completion of the Project, substantially as follows:

With respect to "your work", and the "products-completed operations hazard", you are an insured for your liability arising out of the conduct of any partnership or joint venture of which you were a partner or member, even though this partnership or joint venture is not shown as a Named Insured in the Declarations. This coverage is excess over any available liability purchased specifically to insure the partnership or joint venture. This coverage will not inure to the benefit of any other party except you."

5.4 INDEMNIFICATION

The Contractor, to the fullest extent not expressly prohibited by law, shall defend, indemnify, and save harmless the Owner, the Designer, the Construction Manager and their respective officials, officers, employees, and agents from and against any and all liabilities (foreseeable or unforeseeable), penalties, fines, forfeitures, demands, claims, causes of actions, suits, judgments, and costs and expenses incidental thereto, (including, without limitation, amounts paid pursuant to investigations, defense or settlements, and reasonable attorneys' fees), which any or all of them may hereafter suffer, incur, be responsible for, or pay out as a result of but not limited to:

a) bodily injury (including sickness, disease, or death) to any person including but not limited to, the Contractor's employees or its representatives while on the site of the Project; or

b) actual or alleged damage (including loss of use) to any property (public or private, including the Project or other property on the Project site); or

c) contamination of or adverse effects on the environment arising directly or indirectly out of or in connection with the performance of the Work, including but not limited to any hazardous or toxic waste, substance, or constituent of any substance subject to regulation under CERCLA, RCRA, TSCA, and other Federal and state authorities that is spilled, released, threatening to release, or disposed of or destroyed by the Contractor or its Subcontractors on or off the site of the Project or while in transport to

or from the site; or

d) any violation or alleged violation of laws and regulations, arising out of or in any way connected with the Work, caused in whole or in part by the Contractor, any Subcontractor or supplier or any representatives of the Contractor. The Contractor shall not be required to indemnify the Owner against losses resulting from a breach of this Agreement by the Owner or its other agents and contractors, or resulting from negligence, misconduct or violation of laws on the part of the Owner or its other agents and contractors.

The Contractor further agrees to obtain, maintain, and pay for such liability insurance coverages and endorsements as will insure the provisions of this paragraph. Furthermore, the Contractor agrees to be liable for and to indemnify and reimburse the Owner for all legal fees and disbursements paid or incurred to enforce the provisions of this paragraph. The indemnification obligations under this paragraph shall not be limited in any way by the amount or type of damages, compensation or benefits payable under worker's compensation acts, disability benefit acts, other employment benefit acts, or the amount of insurance carried or recovered.

The Owner acknowledges that hazardous or toxic waste, material, chemicals, compounds or substances, or other environmental hazards, contamination or pollution, (referred to hereinafter as "environmental hazards") may be present at the Project site that were not created, generated, or released at the Project site by the Contractor or its Subcontractors, agents or employees, acting alone or in concert with others. Unless the remediation, abatement or handling of such environmental hazards is part of the scope of the Work under this Agreement, then upon the discovery of such environmental hazards, the Contractor shall immediately, and in no event more than three days later, give notice to the Owner of the environmental hazards before they are disturbed. The Owner and the Designer shall thereupon promptly investigate the environmental hazards, and make such changes in the Drawings and/or Specifications as they may find necessary to abate, remediate, isolate or handle the environmental hazards. Any increase or decrease in the Contract Price or the Contract Time resulting from such changes shall be adjusted in the manner provided herein for adjustments as to extra and/or additional Work and changes. It is agreed that the Contractor shall have no liability under this Agreement for any environmental hazards existing prior to the date that Work commences under this Agreement unless the Contractor or its Subcontractors, agents or employees, acting alone or in concert with others, by their own negligence or misconduct, release or expose the Owner or third parties to the environmental hazards.

The provisions of this paragraph shall survive the termination or cancellation or completion of this Agreement.

ARTICLE 6. OTHER RECORD DOCUMENTS AND SUBMITTALS

6.1 The Designer shall furnish to the Contractor the number of copies of Drawings and Specifications stated in the Supplementary General Conditions. Additional copies of Drawings and Specifications may be obtained at the cost of reproduction and handling.

6.2 The Contractor shall submit to the Designer all Submittals required by the Contract Documents. The Contractor shall submit three (3) reproducible prints of all shop drawings plus the number of copies sufficient for his requirements. The Contractor shall submit samples in quantities required by the Contract Documents. The Contractor shall submit product data in five (5) copies, plus the number of copies sufficient for the Contractor's requirements. All shop drawings shall be reviewed by the Contractor and shall bear the Contractor's stamp of approval before being forwarded to the Designer. Submittals shall be submitted in such time as to cause no delay to the Work or any part thereof and in accordance with the Contract Construction Schedule and Submittal Register. The Designer shall review the submittal with reasonable promptness, noting desired corrections, if any. The Designer shall retain two (2) copies of the submittal and shall return the balance of the reviewed submittal to the Contractor for action. The Contractor shall furnish any corrected submittal to the Designer. The Designer shall retain two (2) copies of the corrected submittal and will return the balance of the reviewed submittal to the Contractor.

No substitutions will be accepted after the bids have been received. All substitutions prior to the receipt of bids shall be in accordance with the Contract Documents. Refer to Instructions to Bidders, Paragraph 3, Substitutions.

The Contractor acknowledges that the processing of shop drawings and other submittals is directly impacted by the clarity, completeness, and accuracy of said documents and that it is the Contractor's responsibility to (i) review and coordinate each submittal with all other related or affected Work and (ii) approve each submittal before submitting same to the Designer for approval.

6.3 No substitutions and no deviations from any requirement of the Contract Documents shall be deemed allowed unless the Contractor has specifically informed the Designer and the Owner in writing of such deviations at the time of submittal and the Designer and the Owner have given written and specific approval to the substitutions or deviations. In proposing a deviation or substitution the Contractor warrants to the Owner, notwithstanding any review, allowance or approval by the Designer or the Owner that the deviation or substitution is at least equal to or better in quality and for the purpose intended, and that Contractor shall not by reason of any such review, allowance or approval be relieved from any obligation or responsibility contained in the Contract Documents.

6.4 Review of submittal by the Designer shall not be construed as relieving the Contractor from responsibility for compliance with terms or designs of the Contract Documents nor from responsibility for errors of any sort in the submittal.

6.5 The Contractor shall keep one record copy marked "As-Built" of all Specifications, Drawings, Addenda, Modifications, and Submittals at the Project in good order and annotated at least monthly to show all changes made during the construction process. Such monthly annotations and their approval by the Designer shall be a condition precedent to approval by the Designer of each monthly Request for Payment. Said record copy shall be stored at the Project and fully protected from damage by fire or other hazard. This record copy shall be available to the Designer and Owner for inspection at all times and shall be delivered to the Designer for the Owner's purposes prior to the Designer's certifying Substantial Completion of the Work.

6.6 At completion of the Project and before Final Payment, the Contractor shall assemble and deliver to the Owner one complete set of all as-built drawings and one complete set of all approved submittals, product data, and samples which were reviewed by the Designer. These drawings and submittals shall be on paper, or in electronic or other media if required by the Supplementary Conditions. These drawings and submittals shall be categorized and packaged as directed by the Designer.

ARTICLE 7. CONTRACTOR

7.1 The Contractor shall supervise and direct the Work efficiently and with the Contractor's best skill and attention. Except as may be set forth specifically in the Contract Documents, the Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction, and for safety precautions and programs in connection with the Work. The Contractor shall be responsible to see that the finished Work complies accurately with the Contract Documents.

7.2 The Contractor shall appoint a Project Manager and shall keep on the Project at all times during its progress a competent Resident Superintendent and necessary assistants who shall not be replaced without prior written approval by the Owner except under extraordinary circumstances, in which event immediate written notice shall be given to the Designer and the Owner. The Project Manager and the Resident Superintendent may be the same person or different persons. At any time, the Owner, in its sole and absolute discretion, may require the Contractor to replace the Project Manager or Resident Superintendent with an experienced and competent person or persons upon seven (7) days written notice from the Owner to the Contractor. Such replacement shall be at the Contractor's expense and at no cost to the Owner.

Both the Project Manager and the Resident Superintendent shall have authority to act on behalf of the Contractor, and instructions, directions or notices given to either of them shall be as binding as if given to the Contractor.

7.3 The Contractor shall provide sufficient competent and suitably qualified personnel, equipment, and supplies to lay out the Work and perform construction as required by the Contract Documents. The Contractor will at all times maintain good discipline and order at the site, and will comply with all applicable OSHA standards.

Any person employed by the Contractor, any Subcontractor, or any sub-subcontractor who, in the opinion of the Designer or the Owner, does not perform his Work in a proper and skillful manner or is intemperate or disorderly shall, at the written request of the Owner or Designer, be removed forthwith by the Contractor, Subcontractor, or sub-subcontractor employing such person without cost to the Owner, and shall not be employed again in any portion of the Work without the written approval of the Owner or Designer.

Should the Contractor fail to remove such person or persons or fail to furnish suitable and sufficient personnel for the proper prosecution of the Work within three (3) days after written order, the Owner may withhold further payment by written notice until compliance with such order.

7.4 If, in the opinion of the Designer or the Owner, any Subcontractor on the Project is incompetent or otherwise unsatisfactory, he shall be replaced by the Contractor with no increase in the Contract Price if and when directed by the Designer or the Owner in writing.

7.5 The Contractor shall furnish all materials, equipment, labor, transportation, construction equipment and machinery, tools appliances, fuel, light, heat, and all other facilities and incidentals necessary for the execution, maintenance, initial operation, and completion of the Work, other than those specifically excluded by the Contract Documents and to be furnished by the Owner or others. When use or storage of hazardous materials or equipment or methods of more than ordinary risk are necessary in accomplishing the Work, the Contractor shall give the Owner and Designer reasonable advance notice.

If any materials are to be furnished or installed by the Owner or others under the terms of the Contract Documents, said materials shall be made available to the Contractor at the location(s) specified in the Contract Documents. All costs of handling, transportation from the specified location to the Project, storage, and installing of Owner-furnished materials shall be included in the Contract Price. The Contractor shall be responsible for any demurrage, damage, loss, or other deficiencies which may occur during the Contractor's handling, storage, or use of such Owner-furnished material. The Owner shall deduct from any monies due or to become due the Contractor any cost incurred by the Owner in making good any such damage, loss, or deficiency.

All equipment which is proposed to be used in the Work shall be of sufficient size and in such mechanical condition as to meet the requirements of the Work and produce a satisfactory quality of work. Equipment used on any portion of the Work shall be such that no injury to previously completed Work, adjacent property, or existing facilities shall result from its use.

When the methods and equipment to be used by the Contractor accomplishing the Work are not prescribed in the Contract Documents, the Contractor shall be free to use any methods or equipment that will accomplish the Work in conformity with the requirements of the Contract Documents.

When the Contract Documents specify the use of certain methods and equipment, such methods and equipment shall be used unless others are authorized by the Designer. If the Contractor desires to use a method or type of equipment other than specified in the Contract Documents, the Contractor may request authority from the Designer to do so. The request shall be in writing and shall include a full description of the methods and equipment proposed and of the reasons for desiring to make the change. If approval is given, it shall be on the condition that the Contractor shall be fully responsible for producing Work in conformity with the requirements of the Contract Documents. If, after trial use of the substituted methods or equipment, the Designer determines that the Work produced does not meet the requirements of the Contract Documents, the Contractor shall discontinue the use of the substitute method or equipment and shall complete the remaining Work with the specified methods and equipment at no additional cost to the Owner. The Contractor shall remove any deficient Work and replace it with Work of specified quality, or take such other corrective action as the Designer may direct. No change in the Contract Price or in Contract Time shall be made as a result of authorizing a change in methods or equipment under this paragraph.

7.6 All materials and equipment shall be new, except as otherwise provided in the Contract Documents. When special makes or grades of material which are normally packaged by the supplier or manufacturer are specified or approved, such materials shall be delivered to the Project site in their original packages or containers with seals unbroken and labels intact.

Materials shall be so stored as to assure the preservation of their quantity, quality and fitness for the Work. Stored materials, even though approved before storage, may again be inspected by the Designer or Owner prior to their use in the Work and shall meet the requirements of the Contract Documents at the time they are incorporated into the Work. Stored materials shall be located so as to facilitate their prompt inspection. The Contractor shall coordinate the storage of all materials with the Designer and the Owner. Materials to be stored at the Project or on the Owner's property shall not create an obstruction to the Owner's or other contractor's reasonable activities. Private property shall not be used for storage purposes without written permission of the owner or lessee of such property. The Contractor shall make all arrangements and bear all expenses for the storage of materials on private property. Upon request, the Contractor shall furnish the Owner a copy of the property owner's permission. All storage sites on private or the Owner's property shall be restored to their original condition by the Contractor at his entire expense, except as otherwise agreed to (in writing) by the owner or lessee of the property.

7.7 All materials and equipment shall be applied, installed, connected, erected, used, cleaned and conditioned in accordance with the instructions of the applicable manufacturer, fabricator, or processor, except as otherwise provided in the Contract Documents.

7.8 The Contractor will be fully responsible for all acts and omissions of his Subcontractors and of persons directly or indirectly employed by them and of persons for whose acts any of them may be liable to the same extent that the Contractor is responsible for the acts and omissions of the Contractor's own employees. Nothing in the Contract Documents shall create any contractual relationship between any Subcontractor or supplier and the Owner or the Designer, or any obligation on the part of the Owner or the Designer to pay or see to the payment of any money due any such Subcontractor or material furnisher except as may otherwise be required by law. The Owner or the Designer may furnish to any Subcontractor or supplier, to the extent practicable, evidence of amounts paid to the Contractor on account of specific Work done.

7.9 The divisions and sections of the Specifications and the identifications of any Drawings shall not control the Contractor in dividing the Work among Subcontractors.

7.10 The Contractor agrees to bind specifically every Subcontractor to the terms and conditions of the Contract Documents for the benefit of the Owner and to furnish written evidence thereof to the Designer and the Owner within seven (7) days after written request by the Owner.

7.11 The Contractor shall attend job progress conferences and all other meetings or conferences as directed by the Designer. The Contractor shall be represented at these job progress conferences by a representative having the authority of the Project Manager and by such other representatives as the Designer may direct. Job progress conferences shall

be open to Subcontractors, suppliers and any others who may contribute beneficially toward maintaining required job progress, and such personnel shall be encouraged by the Contractor to attend. It shall be the principal purpose of job progress conferences to effect coordination, cooperation and assistance in every practical way toward the end of maintaining progress of the Project on schedule and to complete the Work and the Project by the specified Completion Dates. The Contractor shall be prepared to assess progress of the Work as required in the Contract Documents and to recommend remedial measures for correction of progress as may be appropriate. The Designer shall preside as chairman and arrange for minutes to be taken and circulated.

In the event that the prosecution of the Work is discontinued for any reason, the Contractor shall notify the Designer and the Owner at least forty-eight (48) hours in advance of resuming operations.

Should the terms of the Contract Documents require completion of one or more portions of the Work for the Beneficial Occupancy of the Owner prior to completion of the entire Work, the Contractor shall complete such portion(s) of the Work on or before the date specified. Such completion shall include the obtaining of all government or other permits, permission, and/or approvals necessary to occupancy. The Contractor shall independently estimate the difficulties involved in arranging the Work to permit such Beneficial Occupancy and shall not claim any additional compensation or time extension by reason of any delay or increased cost due to completing such portion(s) of the Work. The Owner's possession and use of such portion(s) of the Work shall not be deemed an acceptance of any Work not completed in accordance with the Contract Documents. The Owner shall be responsible for the security, maintenance, utilities, and insurance of all portions of the Work completed and beneficially occupied by the Owner.

7.12 The Contractor shall pay all license fees and royalties, and assume all costs incident to the use of any invention, design process, or device which is the subject of patent rights or copyrights held by others, except for inventions, design processes, or devices specified by the Designer in the Contract Documents. The Contractor shall indemnify and hold harmless the Owner, the Designer, and anyone directly employed by either of them, from and against all claims, damages, losses and expenses, including attorney's fees and costs of defense, arising out of any infringement or alleged infringement of such rights during or after completion of the Work, and shall defend all such claims in connection with any actual or alleged infringement of such rights.

7.13 The Contractor shall secure and pay for all permits, including without limitation construction permits and licenses, and will pay all governmental charges and inspection fees necessary for the prosecution of the Work.

7.14 The Contractor shall give all notices and comply with all laws, ordinances, rules, and regulations applicable to the Work and shall protect and indemnify the Owner and the Owner's officers, agents, or servants against any claim or liability arising from or based on the violation of any such law, ordinance, regulation, order, or decree, whether by the Contractor or by the Contractor's employees, Subcontractors, sub-subcontractors, or their employees.

7.15 The Contractor shall be responsible for the entire site of the Project and for its reasonable and necessary protection and security, as required by laws or ordinances governing such conditions, or by custom or sound construction practices, and shall share such

responsibilities as may be agreed upon among them, or in the absence of such agreement, as may be directed by the Contract Documents, Owner, or Designer. The Contractor shall be responsible for any damage to the Owner's property, or that of others, by the Contractor or the Contractor's employees, Subcontractors, sub-subcontractors, or their employees or agents, and shall make good such damages. The Contractor shall be responsible for and pay for any such claims against the Owner.

7.16 The Contractor shall protect all landscaping designated to remain in the vicinity of the operations and barricade all walks, roads, and areas as necessary to keep the public away from the construction.

7.17 The Contractor shall provide cover and/or protect all portions of the Work and provide all materials necessary to protect the Work whether performed by the Contractor or any of the Subcontractors or sub-subcontractors. Any Work damaged through the lack of proper protection, or from any other cause, shall be repaired or replaced without extra cost to the Owner or extension to the Contract Time.

The Contractor shall maintain the Work during construction and until the Work is accepted. This maintenance shall constitute continuous and effective effort prosecuted day by day, with adequate equipment and forces so that the Work is maintained in satisfactory condition at all times. All costs of maintenance shall be included in the Contract Price and the Contractor will not be paid an additional amount for such effort. Should the Owner or Designer observe that the Contractor at any time has failed to maintain the Work as provided herein, the Designer may immediately notify the Contractor of such non- compliance. Such notification shall specify a reasonable time within which the Contractor shall be required to remedy such unsatisfactory maintenance condition. Should the Contractor fail to properly respond to the Designer's notification, the Owner may, at the Contractor's expense, take such action as it may deem appropriate to remedy the defective maintenance, including suspension of the Contractor's Work or any part thereof. Any such expense incurred by the Owner shall be deducted from monies due or to become due the Contractor.

Parking lots, streets, and walks connecting to the Project area shall be protected by the Contractor from deposits of mud, sand, stone, litter, or debris in any form.

Pedestrian traffic areas around the construction limits must be maintained in a clean and safe condition at all times with required barricades and covered walkways. When excavation or other operations outside the Project limits is required, the Contractor shall, immediately following that work, return the area to its original condition.

All catch basins and storm drain lines in the vicinity of the Project site shall be protected at all times from entry of dirt, rubble and other debris. The residue from the cleaning of trucks, wheelbarrows, concrete buggies, etc. must be prevented from entering the drainage system, and if cleaning is done, the residue must be contained and removed from the Project site with other refuse.

7.18 No burning of refuse or debris shall be allowed inside or around the Project during the course of construction without written authority from authorities having jurisdiction and the Owner.

7.19 The Contractor shall provide for and maintain necessary safety measures and safety

programs for the protection of all persons involved with the Work. Such measures and programs shall include the requirements of the most current edition of the CAGC Safety and Health Manual [or the AGC Accident Prevention Manual in Construction], or equivalent requirements, and shall fully comply with all Federal, State, and local laws, rules, regulations, and building code requirements relating to the prevention of accidents or injuries to persons on or about the location of the Work.

All trenches, excavations, or other hazards in the vicinity of the Work shall be well barricaded, and properly lighted at night. When Work requires closing of an area normally used by the Owner or the public, the Contractor shall furnish, erect, and maintain temporary barricades, and properly light the area. The Contractor shall comply with any directions and public authorities in this respect.

7.20 The Contractor shall designate a responsible officer or employee as safety inspector, whose duties shall include accident prevention on the Project as well as implementation of the Contractor's safety measures and safety programs on the Project. The name of the safety inspector shall be made known to the Designer and the Owner at the pre- construction conference.

7.21 In emergencies affecting the safety of persons, the Work, or property at the Project site or adjacent thereto, the Contractor is obligated to act in the Contractor's discretion to prevent threatened damage, injury, or loss. As soon as practicable, the Contractor shall notify the Designer and Owner of such emergency. The Contractor shall give the Designer and the Owner prompt written notice of any significant changes in the Work or deviations from the Contract Documents caused by such emergency. If the Contractor believes that additional work done in an emergency entitles the Contractor to an increase in the Contract Price or an extension of the Contract Time, the Contractor may make a claim therefore as provided in Articles 14 and/or 15.

7.22 The Contractor shall at all times keep the premises free from accumulation of waste materials or rubbish caused by the Work. At least weekly and at the completion of the Work, the Contractor shall remove all waste materials and rubbish from and about the Project. At the completion of the Work, the Contractor shall remove all tools, construction equipment, machinery, and surplus materials. The Contractor shall leave the Work in condition for occupancy by the Owner such that no cleaning or other operations are required. Material cleared from the Project and deposited on adjacent property shall not be considered as having been disposed of satisfactorily. If the Contractor fails to keep the Project clean of waste materials or rubbish, fails to satisfactorily clean-up weekly or at the completion of the Work, the Owner may do so and the costs thereof may be deducted from any amounts due the Contractor.

7.23 Utilities, temporary facilities, and signs shall be provided as described in the Contract Documents. Absent a contrary direction in the Supplementary Conditions, the Contractor shall pay all bills for water, electricity, or other public utility service to the Project site.

7.24 The Contractor shall indemnify and hold the Owner, the Designer, the Designer's consultants, and their officers, agents, and employees harmless against all costs, damages, and expenses, including attorney's fees and costs of defense, arising out of claims by any separate contractor or by any Subcontractor, sub-subcontractor, or supplier engaged by or employed by the Contractor or employed by any of the Subcontractors claiming through him, including without limitation damages, losses, and expenses arising

out of or relating to any inconvenience, delay, interference, or other action or non-action of the Contractor or the Contractor's Subcontractors on the Project.

The Contractor acknowledges that should the Contractor or any of the Contractor's Subcontractors be damaged by any breach of contract by any other separate prime contractor on the Project, the Contractor may invoke applicable dispute resolution procedures with said other separate prime contractor or bring a direct civil action against said other separate prime contractor. The Contractor hereby expressly agrees that neither the Owner nor its officers, agents, or employees shall have any liability of any kind or nature whatsoever to the Contractor, its Subcontractors, sub-subcontractors, or suppliers arising out of or relating to any breach, inconvenience, delay, interference, or other action or non-action by any other separate prime contractor. The Contractor covenants not to sue the Owner for any loss or damage caused by any breach, inconvenience, delay, interference, or other action or non-action by any other separate prime contractor, notwithstanding whatever rights at law the Contractor might have to bring a civil action against the Owner for any breach, inconvenience, delay, interference, or other action or non-action of any other separate prime contractor. The Contractor agrees to look exclusively to the other prime contractor for relief or remedy.

Nothing contained herein or appearing anywhere in the Contract Documents shall obligate or require the Owner to exercise any right or privilege, or to take any action or to refrain from taking any action under any contract it may have with any other prime contractor or party to the Project for the benefit of the Contractor or any Subcontractor, sub- Subcontractor, or supplier claiming through the Contractor.

7.25 Prior to completion of the Work and Final Payment of the Contract Price, excepting only those portions of the Work deemed accepted in accordance with the Contract Documents, the Contractor shall have charge and care of the Work, and shall take every precaution against injury or damage to any part due to the action of the elements or from any other cause, whether arising from the execution or from the non-execution of the Work. The Contractor shall as required by the Owner replace, rebuild, repair, restore, and make good all injury or damage to any portion of the Work occasioned by any of the above causes before Final Completion and shall bear the expenses thereof.

7.26 In the event that the Work, or any portion thereof, is suspended at any time pursuant to an order of the Owner, the Contractor shall obey all instructions of the Owner regarding storage of materials, drainage, protection of the Work, and erection of temporary structures during the suspension period.

7.27 The Project Expediter for the Project shall be responsible for the coordination of the Work of itself and any other separate contractors, both as to space and time. The Project Expediter shall coordinate the implementation of the Contract Construction Schedule, all construction activities and close-out of the Project, including but not limited to all testing, inspection, certifications, and approvals required by public agencies.

The Contractor and the Project Expediter shall each be required to notify the Designer and the Owner promptly of any event or condition which could affect the conduct or progress of the Work and shall cooperate fully with all other contractors on the Project site.

7.28 The Owner hereby delegates to the Project Expediter all of its duties to coordinate and to expedite the Work not expressly reserved to the Owner by other provisions of the Contract

Documents.

7.29 All Work performed pursuant to the Contract Documents shall conform in all respects to the North Carolina State Building Code and all other state, local, and national codes in effect at the time of and applicable to this Work.

7.30 The Contractor shall provide for and maintain necessary safety measures and safety programs for the protection of all persons at the Project site, and shall comply at all times with the requirements of the most current edition of the CAGC Safety and Health Manual [or the AGC Accident Prevention Manual in Construction], or the equivalent requirements of the Contractor's safety program, and shall fully comply with all Federal, State, and local laws, rules, regulations, and building code requirements so as to prevent accidents or injuries to persons on or about the Project site. The Contractor shall clearly mark or post signs warning of existing hazards, and shall barricade excavations, elevator shafts, stairways, and similar hazards. The Contractor shall protect against damage or injury resulting from falling materials, and shall maintain all protective devices and signs throughout the progress of the Work.

7.31 The Contractor shall adhere to the rules, regulations, and interpretations of the North Carolina Department of Labor's Occupational Safety and Health Standards for the Construction Industry (29 CFR Part 1926 as adopted in 13 NCAC 07F.0201, including 29
CFR Part 1910 General Industry Safety and Health Standards applicable to construction) and N.C. Gen. Stat. §95-126 through 155 (Occupational Safety and Health) as well as all revisions and amendments to such standards or statutes as may occur throughout the performance of the Work.

7.32 Any land disturbing activity performed by the Contractor in connection with the Project shall comply with all erosion control measures set forth in the Contract Documents and any additional measures which may be required in order to ensure that the Project is in full compliance with the Sedimentation Pollution Control Act of 1973, as implemented by Title
15 North Carolina Administrative Code, Chapter 4, Sedimentation Control, Subchapters 4A,
4B and 4C, as amended (15 NCAC 4A, 4B, and 4C), and as may be revised or amended in the future. Upon receipt of notice that a land-disturbing activity is in violation of said Act, the Contractor shall be responsible for ensuring that all steps or actions necessary to bring the Project in compliance with said Act are promptly taken. The Contractor shall be responsible for all penalties assessed pursuant to N.C. Gen. Stat. 113A-64 with respect to its Work, and shall indemnify and hold harmless the Owner from all costs and expenses, including attorney's fees and costs of defense arising out of or related to the enforcement of the Act against any party or person described in this Article.

7.33 Any mechanical or electrical work such as sleeves, inserts, chases, etc. located in the Work of the Contractor for general work shall be built in by that Contractor. On multiple prime projects, the mechanical and electrical contractors shall set all sleeves, inserts, and other devices built into the structure in cooperation and under the supervision of the Contractor for general work. The responsibility for exact location of such items shall be that of the mechanical, plumbing, or electrical prime contractor.

7.34 The Contractor shall be responsible for permanently fixed service facilities and systems in use during progress of the Work and shall strictly adhere to the following procedures:

a) Prior to acceptance of the Work by the Owner, the Contractor shall remove and

replace any part of the permanent building systems damaged through use during construction.

b) Temporary filters shall be installed in each of the heating and air conditioning units, return air grilles, and other locations to prevent intrusion of dust, dirt, and debris during construction. Temporary filters shall be removed and replaced with new filters immediately prior to Substantial Completion.

c) Extra effort shall be maintained to keep the building clean and under no circumstances shall air systems be operated if finishing operations are creating dust in excess of what would be considered normal if the building were occupied.

d) When the permanent lighting system is used during construction, lamps shall be replaced and shall be new on the date of Substantial Completion.

ARTICLE 8. OWNER

8.1 The Owner shall issue communications and notices to the Contractor through the Designer to the extent contemplated by the Contract Documents.

8.2 In case of termination of the employment of the Designer, the Owner shall appoint as Designer a qualified person who shall have and assume all rights and duties held by the original Designer.

8.3 The Owner shall have the right to take possession of and use any portion of the Work notwithstanding the fact that the time for completion of such portion of the Work may not have expired, but such taking possession and use shall not be deemed an acceptance of any Work not completed in accordance with the Contract Documents.

8.4 A waiver on the part of the Owner of any breach of any part of the Contractor shall not be held to be a waiver of any other or subsequent breach.

8.5 The Owner shall pay all permanent acreage fees, governmental impact fees, and meter deposits for permanent utilities.

ARTICLE 9. CONSTRUCTION MANAGER

9.1 The Owner may employ one or more Construction Managers for the purpose of assisting the Owner, Designer, and Contractor in developing and administering budgets and cost controls, in evaluating constructability and value engineering proposals, in establishing and maintaining a critical path method (CPM) schedule, in coordinating and/or expediting the Work with other projects being constructed by the Owner or others adjacent or near the Work, or for such other purposes as the Owner may deem appropriate. From time to time the Owner may identify such Construction Managers(s) to the Contractor in writing identifying any tasks assigned to such Construction Managers(s).

ARTICLE 10. DESIGNER

10.1 The Designer is charged with the responsibility of interpretation of the Contract Documents. The Designer's decisions relating to aesthetic matters shall be final.

10.2 All Work completed under the Contract Documents shall be subject to review by the Designer. No Work is to be covered without the Designer's review or prior authorization. Any Work so covered without the Designer's review or prior authorization shall be uncovered at the Contractor's expense. The Contractor shall notify the Designer in writing at least twenty-four (24) hours in advance of covering any Work.

10.3 The Designer shall not be responsible for the construction means, methods, techniques, sequences, procedures, or the safety precautions and programs incident thereto, and shall not be responsible for the Contractor's failure to perform the Work in accordance with the Contract Documents, but shall be entitled to enforce any requirements in the Contract Documents specifying particular means, methods, techniques, sequences, or procedures.

10.4 The Designer shall be an Owner's representative during the construction period. The duties, responsibilities and authority of the Designer as the Owner's representative during construction are as set forth in the Contract Documents.

ARTICLE 11. TESTING AND SURVEYING

11.1 Laboratory and field tests to determine compliance of construction with the Contract Documents shall be made by the Owner or testing consultants employed by the Owner except those required elsewhere in the Contract Documents to be paid for by the Contractor. The costs and expenses of providing samples for and assistance in any testing shall be borne by the Contractor and are included in the Contract Price. Any Work in which untested materials are used without approval or written permission of the Designer shall be removed and replaced at the Contractor's expense. Work found to be unacceptable or unauthorized will not be paid for and, if directed by the Designer shall be removed and replaced at the Contractor's expense. Unless otherwise designated, tests in accordance with the cited standard methods of ASTM or other generally recognized or specifically authorized methods which are current on the date of advertisement for bids shall be made at the expense of the Owner; provided, however, in the event that after such testing any Work is found to be defective or does not meet the requirements of the Contract Documents, the costs of retesting such Work and the costs of inspection services shall be paid by the Contractor. Samples shall be taken by a testing laboratory employed by the Owner. All materials being used are subject to inspection, tests, or rejection at any time prior to or during incorporation into the Work. Copies of all Owner test reports will be furnished to the Contractor at his written request. Copies of Contractor test reports shall be furnished to the Designer upon written request.

11.2 The Owner shall have the right to deduct the costs of additional testing as described in paragraph 11.1 from any money due the Contractor; or if no money is due the Contractor, the Owner shall have the right to recover these costs from the Contractor, from its sureties, or from both.

11.3 All layouts and surveying shall be accomplished by properly qualified personnel duly licensed in the State of North Carolina.

ARTICLE 12. SEPARATE CONTRACTS

12.1 It is expressly understood that the Owner may deploy the Owner’s own employees or engage other separate prime contractors to perform Work as a part of the Project whose work will be performed simultaneously and sequentially with the performance of the Work

by the Contractor. It shall be necessary for the Contractor to coordinate construction activities with such other contractors, particularly with respect to access to work areas, storage of materials, and use of elevators and other common facilities. The Contractor shall diligently and in good faith cooperate with the Owner, the Designer, and all other contractors with respect to such matters and shall regularly and faithfully attend any and all meetings called by the Owner or the Designer with respect to such matters. Any disputes between the Contractor and any other separate prime contractor with respect to such matters shall be resolved in accordance with the claim and dispute resolution procedures in the Agreement.

ARTICLE 13. CONTRACT TIME

13.1 Within fourteen (14) days after receipt of the Construction Agreement by the Contractor for signatures, the Project Expediter shall prepare and submit to the Designer and Owner for review and approval a preliminary progress schedule for the Work pursuant to the requirements stated in the Contract Documents.

13.2 Within fourteen (14) days after initial receipt of the Construction Agreement for signatures the Contractor shall submit to the Designer a Submittal Register listing all Submittals the Contractor is required to make or proposes to make under the Contract Documents, the dates on which the Contractor proposes to make such Submittals and the dates by which the Contractor reasonably requires a response from the Designer with respect to each Submittal. The dates submitted shall be incorporated into the Contract Construction Schedule as Completion Dates when they have been approved or modified by the Owner. The Designer shall not be required to review any Submittal from the Contractor until a Submittal Register acceptable to and approved by the Owner has been submitted by the Contractor.

13.3 Not later than thirty (30) days following execution and delivery of the Construction Agreement by Owner to Contractor, the Owner shall deliver to the Contractor a Notice to Proceed. The Notice to Proceed shall state a commencement date on which it is expected that the Contractor will begin the Work to be performed under the Agreement. The Contract Time shall be measured from said specified commencement date. The commencement date stated in the Notice to Proceed shall not be earlier than three (3) days after the Notice to Proceed is served on the Contractor.

If, other than by mutual agreement, said specified commencement date is more than thirty (30) days after the date of execution and delivery of the Agreement from Owner to Contractor and the Contractor believes said delay justifies an increase in Contract Price and/or an extension of Contract Time, the Contractor may make a claim therefore as provided in Article 14 and/or Article 15.

No Work shall be done prior to the date specified in the Notice to Proceed.

A final Contract Construction Schedule shall be submitted for approval by the Contractor, Designer, and Owner no later than fourteen (14) days after Notice to Proceed. No payments shall be due the Contractor until this schedule is approved by all parties.

13.4 The Contract Construction Schedule is a Contract Document. The Contractor represents that the Contract Construction Schedule has been reviewed in detail, that the Contractor participated in its preparation, that all of the activities which impact, limit, or otherwise affect

the time of completion of the Work are shown in the Contract Construction Schedule and that all of the activities of others which impact, limit, or otherwise affect the start, duration, or completion of the Contractor's activities are also shown. The Contractor further represents that the Contractor can and will complete each activity within the time shown for that activity. Time is of the essence with respect to each such activity and Completion Date.

13.5 If the Contractor submits a construction schedule, progress report, or any other document that indicates or otherwise expresses an intention to achieve completion of the Work prior to any Completion Date required by the Contract Documents or prior to expiration of the Contract Time, no liability of the Owner to the Contractor for any failure of the Contractor to so complete the Work shall be created or implied.

13.6 If the Contractor, for reasons beyond the Contractor's control, is delayed in beginning any activity, the Contractor shall, nevertheless, have the same number of days as is shown in the Contract Construction Schedule for the activity, and the affected activity and any succeeding activity that is dependent upon that activity shall be adjusted accordingly; provided that at any time the Owner, by means of a Change Order, may require the Contractor to work overtime, to increase labor forces or to take any necessary or appropriate action to decrease the time required for any activity, and the Contractor shall be entitled to an adjustment in the Contract Price computed in accordance with Article 15 of these General Conditions.

13.7 At any time, the Owner may order the Contractor, on seven (7) days written notice, to begin any activity earlier than the starting date shown on the Contract Construction Schedule.

13.8 Should the Contractor fail to start any activity on the start date shown in the Contract Construction Schedule or as it may have been adjusted in accordance with paragraphs 13.5 or 13.6 above, or become delayed, the Contractor shall, without being entitled to any increase in the Contract Price or other compensation, work overtime, increase labor forces or take such other action as may be necessary or appropriate to complete the activity by the Completion Date shown on the Contract Construction Schedule, or as such Completion Date may have been adjusted.

13.9 The Designer and Owner or his Construction Consultant shall monitor progress of the Work at all times and the Contractor shall cooperate with such monitoring and provide any and all information with respect to the progress of the Work and scheduling as the Owner may reasonably require.

13.10 On a monthly basis, the Contractor shall revise the Contract Construction Schedule, showing any adjustments made in accordance with paragraphs 13.5 or 13.6, above, by any Change Order, the progress of the Work, and any days gained or days lost with respect to any activity, and shall furnish copies thereof to the Owner and Designer.

13.11 Should any monthly revision of any Contract Construction Schedule show that the Contractor is behind on any activity, the late completion of which could delay Substantial Completion of the Work, the Owner shall be entitled to withhold from the next Progress Payment due the Contractor an amount not exceeding the amount the Owner would be entitled to in Liquidated Damages, should Substantial Completion be delayed by the same number of days that the Contractor is currently behind schedule. If, subsequently, the

Contractor's progress, as shown by any succeeding monthly revision to the Contract

Construction Schedule, is such that the anticipated delay no longer exists, the Owner shall pay with the Progress Payment next due to the Contractor such amounts as have been withheld in accordance with this paragraph.

13.12 The Owner shall have the right to perform Work, hire and employ labor and craftsmen, rent equipment, subcontract with other parties, or do anything that the Owner deems necessary or appropriate to remedy or cure any delay by the Contractor in the progress of the Work. Such action by the Owner shall not, in any way, affect, void or limit any warranty, guaranty or other responsibility of the Contractor under the Contract Documents. Such action may be taken by the Owner only after three (3) days written notice to the Contractor. All costs incurred by the Owner in taking any such action shall be charged to the Contractor and deducted from any amounts remaining due under the Agreement.

13.13 The Contractor may be entitled to an extension of the Contract Time (but no increase in the Contract Sum) for delays arising from unforeseen causes beyond the control and without the fault or negligence of the Owner, the Contractor or the Contractor's Subcontractors as follows:

a) Labor disputes and strikes that directly impact the critical path activities of the Contract Construction Schedule;

b) Acts of God, tornado, fire, hurricane, blizzard, earthquake, typhoon, or flood that damage completed Work or stored materials.

c) Acts of the public enemy; acts of the State, Federal, or local government in their sovereign capacities.

d) Abnormal inclement weather as defined in Article 13.14.

13.14 On any day that the Contractor considers that the Project is delayed by adverse weather conditions, the Contractor shall identify in writing to the Designer and the Owner the adverse weather conditions affecting each activity, the specific nature of the activity affected, the number of hours lost, and the number of and identity (by responsibility or trade) of workers affected and shall obtain from the Designer written recognition of the delay. The time for performance of this Contract includes an allowance for a number of calendar days which may not be suitable for construction Work by reason of adverse weather. The Contract Time will be extended only if the number of calendar days of adverse weather recognized by the Designer exceeds the number of inclement weather days set forth below, and the Contractor demonstrates how this adverse weather impacts activities on the critical path of the Contract Construction Schedule.

Month	Number of Inclement Weather Days
January	10
February	10
March	10
April	9
May	10
June	9
July	11
August	10
September	8

October	7
November	8
December	9

13.15 If the Contractor believes that the progress of the Work has been adversely affected by adverse weather recognized by the Designer during a particular month, the Contractor shall submit a written request for extension of time to the Designer. Such a request for time extension of the Contract Time shall be submitted by the tenth (10th) day of the month following that month in which the adverse weather is encountered. The request shall include, but is not limited to, the following information:

a) Detailed description of weather's effect on scheduled activities and its net effect on the critical path of the Project, and

b) Weather records from the official weather station nearest the Project site and records of actual observation as contained in daily reports, correspondence, or other documentation.

13.16 The Contractor specifically recognizes that a delay by the Contractor in achieving any Completion Date can have the effect of delaying the Substantial Completion of the Project, that such delay in Substantial Completion of the Project will necessarily cause damages, losses, and expenses to the Owner, including, but not limited to and by way of illustration only, increased capitalized costs and interests for the Project, increased and extended Project overhead, Designer's and Consultant's fees, increased costs of construction, increased and extended operation costs of other facilities, and inefficiency and loss of productivity, and that such damages, losses, and expenses may not be readily identifiable or ascertainable at the time they are incurred or at any time. Therefore, and in recognition
of these factors and the likelihood that actual damages from his delay will not be readily ascertainable, the Contractor agrees to pay to the Owner, as Liquidated Damages and not as a penalty, the sum identified in the Supplemental Conditions hereto as the Liquidated Damages per Day, for each day by which the failure to meet any Completion Date shown in the Contract Construction Schedule, adjusted in accordance with this Article, delays the Substantial Completion of the Project.

13.17 The Contractor shall not be entitled to any adjustment in the Contract Price or other compensation from the Owner for any delay in the completion of or progress on the Work that is caused by a force majeure condition or is otherwise not caused by the sole and direct act or omission of the Owner and the Owner's employees or agents.

13.18 The sum for Liquidated Damages is the amount stipulated in the Supplementary General Conditions per day per Prime Contractor as Liquidated Damages reasonably estimated in advance to cover the losses to be incurred by the Owner by reason of failure of said Contractor(s) to complete the Work within the time specified, such time being in the essence of this contract and a material consideration thereof.

ARTICLE 14. CHANGES IN THE WORK

14.1 Without invalidating the Contract Documents, the Owner may, at any time, or from time to time order additions, deletions, or revisions in the Work. Said additions, deletions, or revisions shall be authorized only by written Change Orders, Construction Change Directives or Field Orders. Upon receipt of a Change Order, Construction Change Directive

or Field Order, the Contractor shall proceed with the Work involved. All such Work shall be executed under the applicable conditions of the Contract Documents. If any change causes an increase or decrease in the Contract Price and/or an extension or shortening of the Contract Time, adjustments shall be made as provided in Article 14 and/or Article 15.

In order to expedite the Work and avoid or minimize delay in the Work that might affect the Contract Price or Contract Time, the Designer may issue a Change Order in the form of a Construction Change Directive which when signed by the Owner and Designer, directs the Contractor to proceed promptly with the Work involved. Any claim for an adjustment in Contract Price or Time, if not defined in the Construction Change Directive, shall be promptly made in writing in accordance with the procedures defined in Article 15.2.

14.2 The Designer may authorize minor changes or alterations in the Work not involving change in the Contract Price or in the Contract Time and not inconsistent with the overall intent of the Contract Documents. These may be accomplished by a Field Order. Such alterations shall not invalidate the Contract Documents nor release the surety. If the Contractor believes that any minor change or alteration authorized by the Designer entitles him to an increase in the Contract Price and/or an extension of Contract Time, he may make a claim therefore as provided in Article 14 and/or Article 15.

14.3 Except in an emergency endangering life or property, no change shall be made by the Contractor except upon prior written Change Order, Directive or Field Order authorizing such Change.

14.4 Increases in the Contract Price and/or extensions of the Contract Time for additional Work performed by the Contractor shall only be in accordance with a written Change Order signed by the Owner and Designer. The Contractor shall not be entitled to additional time or to additional compensation for any Work performed or material supplied which is claimed to have been authorized or settled by an "oral" change, or by a "constructive" or "implied" change, or by a course of conduct, or by any action or non-action by the Owner, Designer, or any other persons, or by any means whatsoever other than by a written Change Order for such Work or material signed by the Owner and the Designer.

14.5 Changes in the Work resulting from emergency shall not invalidate the Contract Documents nor release the surety.

14.6 Neither the Owner nor the Designer shall be responsible for verbal instructions which have not been confirmed in writing, and in no case shall such instructions be interpreted as permitting a departure from the Contract Documents unless such instruction is confirmed in writing and supported by a proper Change Order, Construction Change Directive or Field Order, whether or not the cost is affected.

14.7 The Owner, in its sole discretion, may require that the Contractor notify the Contractor's sureties of any changes affecting the general scope of the Work or change in the Contract Price, and that the amount of applicable bonds shall be adjusted accordingly. If this requirement is exercised, the Contractor shall furnish proof of such adjustment to the Designer and the Owner.

If this requirement is exercised, the Change Orders shall require written consent of the Contractor's surety. At the time of signing a Change Order, the Contractor shall be required to certify as follows:

"I certify that all sureties have been notified that my contract has been altered by the amount of this Change Order, and that a copy of the approved Change Order will be mailed to all sureties upon its receipt by me."

If this requirement is exercised, no payment to the Contractor on account of any Change Order shall become due or payable until written evidence of the surety's consent to the Change Order has been furnished to the Designer and to the Owner, and the furnishing of such written consent is a condition precedent to such payment.

14.8 The Contractor shall support all requests for Change Orders with a detailed cost breakdown showing cost of materials, labor, equipment, transportation, other items, Contractor's overhead and profit, and total cost, in accordance with methods defined in this Article, and, if the request seeks an extension of the Contract Time, with a time-related diagram which demonstrates specifically why an increase in construction time is needed.

14.9 When a request for a Change Order involves a Subcontractor, the Contractor shall provide quotation from same on Subcontractor's letterhead. The Subcontractor's quote shall list materials, equipment, and labor separately, and show overhead and profit in the manner provided in paragraph 14.8.

ARTICLE 15. CHANGE OF THE CONTRACT PRICE

15.1 The Contract Price constitutes the total compensation payable to the Contractor for performing all Work under the Contract Documents. All duties, responsibilities, and obligations assigned to or undertaken by the Contractor shall be at his expense without change in the Contract Price. The Contract Price may only be changed by a Change Order.

15.2 Any claim for an adjustment in the Contract Price shall be in writing and written notice of any event, action, or non-action which may become the basis of a claim shall be delivered to the Owner and the Designer within three (3) days of the occurrence, or the beginning of the occurrence, of any such event, action or non-action giving rise to the claim. Such written notice is a condition precedent to the making of a claim, and such notice shall describe the basis of the potential claim with reasonable detail and clarity.

A claim shall be made in writing and shall be delivered to the Designer and the Owner no later than fourteen (14) days after such notice. The claim shall describe in detail the basis for the claim, with specific reference to any provisions of the Contract Documents, by paragraph, drawing number, or other specific identification, and shall state the amount claimed and how it is calculated. If the Contractor, at the time the claim is made, is unable to state the amount claimed with accuracy, the Contractor shall so state and provide the estimated amount and the basis on which the amount is to be calculated. At the earliest date practicable, but in no event more than thirty (30) days after Contractor's notice of claim, the Contractor shall supplement the claim with an accurate statement of the amount claimed and how it has been calculated. The Contractor shall provide, in writing, in support of the claim all such explanations, arguments, data, receipts, expert opinions, or other documents or information as the Contractor deems appropriate to be considered in support of the claim. A claim may properly be rejected by the Owner by reason of the Contractor's failure to submit adequate or accurate documentation or information, except that within seven (7) days after being given notice that the claim has been rejected on this basis, the Contractor may submit additional documentation or information. No claim for a change of the Contract Price shall be considered or granted (except solely at the discretion of the

Owner) unless a claim is so made, nor shall the Contractor be entitled to any increase in the Contract Price unless the Contractor has given notice and made such a written claim within the times required. The Owner shall decide, after obtaining the advice of the Designer, whether an increase in Contract Price is warranted, and the amount of such increase shall be determined as provided in paragraph 15.4 through 15.5, below. Any change in the Contract Price resulting from any such claim shall be incorporated in a Change Order.

The Owner shall advise the Contractor of its decision with respect to the claim within fourteen (14) days of its receipt, or of the receipt of additional documentation or information if the absence of such has previously been the basis of rejection of the claim; provided, however, that if, in its sole discretion, the Owner deems that review or consideration of any part of the claim or any matter related thereto by its governing Board is necessary or appropriate, it shall so advise the Contractor and shall provide its decision to the Contractor within seven (7) days after such Board consideration, review or action. Any claim on which the Owner has not provided its decision to the Contractor within the applicable time period shall be deemed denied.

If the Contractor is not satisfied with the decision of the Owner, the Contractor may within seven (7) days of receipt of the Owner's decision initiate the mediation process as described in Appendix A to the General Conditions of the Contract for Construction.

15.3 In determining the amount of a Contract Price adjustment, the parties shall apply the following methods, as appropriate:

(A) Change in Work: The Owner and Contractor shall negotiate in good faith and attempt to agree upon the value of any change (extra or decrease) in Work prior to the issuance of a Change Order covering said Work. Such Change Order shall set forth the corresponding adjustment to the Contract Price. In the event the Owner and the Contractor are unable to agree, the Owner shall grant an equitable adjustment in the Contract Price.

(B) Emergency Work: In the event of emergency endangering life or property, the Contractor may be directed by the Designer to proceed on a time and material basis, whereupon the Contractor shall so proceed and keep accurately, in such form as may be required by the Designer, a correct account of costs together with all proper invoices, payrolls, and supporting data therefore.

15.4 Where the Contract Price is to be adjusted, the following limitations shall apply in determining the amount of adjustment:

(A) In the case of extra or emergency work, the Contract Price shall not be increased by more than the reasonable, actual, and documented net cost of the extra or emergency work plus ten percent (10%) of such net cost on Work performed by the Contractor and five percent (5%) thereof on any subcontracted Work for overhead and profit combined.

(B) In the case of a decrease in Work, the Contract Price shall not be decreased by less than the net cost of the deleted Work plus five percent (5%) of such direct net cost for profit and overhead.

The term 'net cost' as used herein shall include, as applicable, and shall be limited to, all direct labor, direct material, direct equipment, labor burden, sales taxes, shipping and

handling charges, permits and fees, and insurance and bond premium adjustments, if any, attributable to the change. All other items of cost shall be considered as overhead and covered by the percentages allowed in sections A and B of this paragraph.

The Contractor shall provide worksheets or tabulations describing the method by which the direct net cost was calculated, and shall provide all data needed to support the calculation of the direct net cost, all in a form acceptable to the Owner.

15.5 Where the Contract Price is to be adjusted by negotiation, the Owner may authorize and designate the Designer to negotiate with the Contractor on behalf of the Owner; provided, however, any agreement reached between the Contractor and Designer shall be subject to approval by the Owner.

ARTICLE 16. UNFORESEEN CONDITIONS

16.1 Should the Contractor encounter unforeseen conditions at the Project site materially differing from those shown on the Drawings or indicated in the Specifications or differing materially from those ordinarily encountered and generally recognized as inherent in work of the character provided for in this Agreement, the Contractor shall immediately, and in no event more than three days later, give notice to the Owner of such conditions before they are disturbed. The Owner and the Designer shall thereupon promptly investigate the conditions and if they find that they materially differ from those shown on the Drawings or indicated in the Specifications, they shall at once make such changes in the Drawings and/or Specifications as they may find necessary. Any increase or decrease in the Contract Price resulting from such changes shall be adjusted in the manner provided herein for adjustments as to extra and/or additional Work and changes. However, neither the Owner nor the Designer shall be liable or responsible for additional work, costs, or changes to the Work that could have been reasonably determined from any reports, surveys, and analyses made available for the Contractor's review or that could have been discovered by the Contractor through the performance of its obligations pursuant to the Contract Documents.

ARTICLE 17. CORRECTION OF WORK BEFORE FINAL PAYMENT

17.1 The Owner has the authority to stop or suspend work, and the Designer has the authority to order Work removed or to order corrections of defective Work or Work not in compliance with the Contract Documents where such action may be necessary to ensure successful completion of the Work.

Any work, materials, fabricated items, or other parts of the Work which have been found by the Designer to be defective or not in accordance with the Contract Documents shall be condemned and shall be removed from the Project by the Contractor, and immediately replaced by new Work in accordance with the Contract Documents at no additional cost to the Owner. Work or property of the Owner or others damaged or destroyed by virtue of such condemned Work shall be made good at the expense of the Contractor.

Correction of condemned Work described above shall be commenced by the Contractor within twenty-four (24) hours after notice from the Designer or the Owner and shall be pursued to completion. Should the Contractor fail to proceed reasonably with the above- mentioned corrections, the Owner may, three (3) days after the notice specified in the

preceding sentence, proceed with correction, paying the cost, including costs of uncovering such condemned Work, of such corrections from amounts due or to become due to the Contractor.

Condemned Work removed shall be the property of the Contractor and shall be removed from the Project by him within ten (10) days after notice to remove it, and if not then removed, thereafter may be disposed of by the Owner without compensation to the Contractor and the cost of such disposal shall be deducted from amounts due or to become due to the Contractor.

Should the cost of correction of the Work and, if applicable, disposal of the condemned Work by the Owner exceed amounts due or to become due the Contractor, then the Contractor and the Contractor's sureties shall be liable for and shall pay to the Owner the amount of such excess.

ARTICLE 18. CORRECTION OF WORK AFTER SUBSTANTIAL COMPLETION; WARRANTIES AND GUARANTIES

18.1 Neither the final certificate, Final Payment, occupation of the premises by the Owner, nor any provision of the Contract Documents, nor any other act or instrument of the Owner or the Designer shall relieve the Contractor from responsibility for negligence, defective material or workmanship, or failure to comply with the Contract Documents.

18.2 The Contractor shall, at the Contractor's sole cost and expense, make all necessary repairs, replacements, and corrections of any nature or description, interior or exterior, structural or non-structural, that shall become necessary by reason of defective workmanship or materials which appear within a period of one (1) year from the date of Substantial Completion; provided, however that notwithstanding the preceding, if any longer guarantee period is specified for any particular materials or workmanship under the Contract Documents, or under any subcontract, or in connection with any manufactured unit which is installed in the Project, or under the laws of the State of North Carolina, the longer guarantee period shall govern.

18.3 If, within any guarantee period, repairs or changes are required in connection with the Work, which are rendered necessary as the result of the use of materials, equipment, or workmanship which are inferior, defective, or not in accordance with the terms of the Contract Documents, the Contractor shall, promptly upon receipt of notice from the Designer and without expense to the Owner:

a) Completely repair or replace the Work so that it conforms to the Contract Documents;

b) Correct all defects therein;

c) Make good all damage which, in the opinion of the Designer, is the result of the use of materials, equipment, or workmanship which are inferior, defective, or not in accordance with the terms of the Contract Documents; and

d) Make good any Work or material, or any equipment or contents disturbed in fulfilling any such guarantee.

If, in fulfilling the requirements of the Contract Documents or of any guarantee embraced therein or required thereby, the Contractor disturbs any work, facility, premises, or construction belonging to the Owner, the Contractor shall restore such disturbed work to a condition satisfactory to the Owner, and shall guarantee such restored work to the same extent as if it were Work under the Contract Documents.

If the Contractor, after notice, fails to proceed promptly to comply with the terms of the guarantee, the Owner may have the defects corrected, and the Contractor and the Contractor's sureties shall be liable for all expenses incurred. "Promptly" is defined as within twenty-four (24) hours for systems necessary to normal operation of the building and within seventy-two (72) hours for all other items. All special guarantees applicable to definite parts of the Work that may be shown in or required by Contract Documents shall be subject to the terms of this paragraph during the first year of the life of such special guarantee. Manufacturer's standard guarantees or warranties which do not comply with the time limit specified herein shall be extended by the Contractor automatically without further action on the part of the Owner or the Designer.

18.4 In the eleventh calendar month after the date of Substantial Completion, and at the request of the Owner, the Contractor, the Owner and the Designer shall make an inspection of the Work for the purpose of identifying defective workmanship and/or materials. If the Contractor, having been requested to do so by the Owner, fails to participate in such inspection, the Contractor shall be conclusively bound by any decision or ruling by the Designer as to any defective workmanship or material and as to the Contractor's responsibility for its repair or replacement.

ARTICLE 19. OWNER'S RIGHT TO DO WORK

19.1 If, during the progress of the Work or during any period of guarantee, the Contractor fails to prosecute the Work properly or to perform any provision of the Contract Documents, the Owner, after three (3) days written notice to the Contractor from the Designer, or from the Owner after Final Payment, may perform or have performed that portion of the Work and may deduct the cost thereof from any amounts due or to become due the Contractor. Notwithstanding any action by the Owner under this paragraph, all warranties and bonds given or to be given by the Contractor shall remain in effect or shall be given by the Contractor.

19.2 Should the cost of such action by the Owner exceed the amount due or to become due the Contractor, the Contractor and his sureties shall be liable for and shall pay to the Owner the amount of such excess.

ARTICLE 20. PARTIAL PAYMENTS

20.1 Within thirty (30) days after his initial receipt of the Construction Agreement for signatures, the Contractor shall submit to the Designer a Schedule of Values. The Schedule of Values shall indicate the value of the Work, including applicable overhead and profit, for each Division and section of the Project Specifications. The Designer and Owner shall be provided with the Contractor's estimate papers, Subcontractor agreements, supplier quotes, or other documents substantiating these values if so requested in writing by the Designer. The Contractor shall provide the requested documentation within seven (7) days after receipt of the Designer's written request. The Schedule of Values shall be subject to approval by the Owner, and if the Owner and the Contractor cannot agree upon the

Schedule of Values, the Designer shall prepare it, and the Schedule of Values as prepared by the Designer shall be binding on the Owner and the Contractor. No Request for Payment shall be certified by the Designer until the Designer has issued approval of said Schedule of Values.

20.2 Not later than the fifth (5th) day of each calendar month the Contractor shall submit to the Designer a Request for Payment for Work done during the previous calendar month. The Request for Payment shall be in form of AIA Document G702 (latest edition) and shall show substantially the value of Work done (including the value of material delivered to the Project or stored by the Contractor at another site, subject to the conditions hereinafter set forth) during the previous calendar month, and shall sum up the financial status of the Work with the following information:

a) Total Contract Price, including any adjustment thereto made pursuant to the Contract Documents.

b) Value of Work completed and materials properly stored to date. c)

Less amount retained.

d) Less previous payments. e)

Current amount due.

f) Balance remaining.

The Contractor, upon request of the Designer, shall substantiate the request with invoices, vouchers, payrolls, or other evidence.

20.3 When payment is requested or made on an account of stored materials, such materials must be stored on the Owner's property at such places and in such a manner as may be designated by the Designer. However, in the sole discretion of the Owner, with permission in writing from the Designer and Owner and under such circumstances as may be determined by the Owner, such materials may be stored in a bonded warehouse. The location and conditions for storage of such materials away from the Owner's property in a bonded warehouse shall be within the sole discretion of the Owner. Requests for Payment on account of stored materials shall be accompanied by paid invoices, bills of sale, warehouse receipts, or other documentary evidence establishing Owner's title to such materials, evidence that the stored materials are insured against loss and damage, and such other documentation as required by the Designer. Responsibility for the quantity, quality, and condition of such stored materials, whether stored on the Owner's property or away from the Owner's property, shall remain with the Contractor regardless of ownership or title. No payment shall be made on account of materials stored in a bonded warehouse unless the Contractor has acquired written permission from the Designer for such storage of materials and has complied with all conditions set forth in such permission regarding such storage of materials in a bonded warehouse.

20.4 Any Request for Payment received by the Designer on or before the fifth (5th) of the calendar month shall be certified for payment or returned for re-submission to the Contractor on or before the fifteenth (15th) of the calendar month. The Designer's certification shall be for the amount which was requested or that which the Designer has

decided was justly due, and shall state in writing to the Contractor and Owner the reasons for withholding payment of any or all of the amount requested.

20.5 The Designer may fail to certify all or part of any payment requested for any of the following reasons:

a) Defective Work not corrected.

b) Suits, actions, or claims of any character filed against the Contractor, or due to the operations of the Contractor, or information or notice that a suit, action, or claim will be filed or has been made.

c) Information or notice that a Subcontractor or a supplier has not received payment. d)

The balance unpaid of the Contract Price is insufficient to complete the Work in the

judgment of the Designer or Owner.

e) Damage to the Owner or another contractor.

f) Inability of the Contractor to meet a Completion Date, including an anticipated failure to meet a Completion Date entitling the Owner to withhold anticipated Liquidated Damages in accordance with paragraphs 13.15 and 13.17 hereof.

g) Failure to furnish Submittal as required by the Contract Documents on a timely basis in accordance with the Submittal Register.

h) Such other reason as to the Designer may appear prudent, proper, or equitable. When

grounds for withholding certification have been corrected, the Designer shall so

certify to the Owner and the Owner shall make any payment due with respect to such certification as a part of his next payment after such certification.

20.6 No certificate issued or progress payment made shall constitute an acceptance of the Work or any part thereof.

20.7 Retainage may not be withheld on contracts less than $100,000 per N.C.G.S. 143.134 (b1). For contracts exceeding $100,000, the amount certified by the Designer for payment shall be ninety-five percent (95%) of the value of Work completed and materials stored since the Designer's last certification as shown on the Request for Payment, less any amounts not certified in accordance with paragraph 20.4, and this amount shall be paid by the Owner on or before the last business day of the month, but payment shall not be past due until not paid within fifteen (15) days thereafter.

20.8 After certification by the Designer that the Work is fifty percent (50%) complete, based on a determination that the Contractor's gross project invoices, excluding the value of materials stored off-site, equal or exceed fifty percent (50%) of the value of the Contract, (except the value of materials stored on-site shall not exceed twenty percent (20%) of the Contractor's gross project invoices for the purpose of determining whether the Project is fifty percent (50%) complete) and the Contractor has provided to the Owner the written consent of its sureties to the cessation of further percentage retention, the amount certified for payment with respect to subsequent Requests for Payment shall be one hundred percent (100%) of

the value of Work completed and materials stored since the Designer's last certification as shown on the Request for Payment, less any amounts not certified in accordance with paragraphs 20.4 and 20.5; provided, however, that the aggregate of periodic payments shall not exceed ninety-seven and one half percent (97.5%) of the Contract Price. If the Owner determines that the Contractor's performance under the Contract is unsatisfactory, the Owner may resume withholding percentage retention from each subsequent periodic payment application up to the maximum amount of five percent (5%) of the Contract Price.

ARTICLE 21. FINAL PAYMENT

21.1 If the Work of the Contractor is limited to demolition, pilings, caissons and/or structural steel, the remaining unpaid balance of the Contractor's Contract Price, less a sum equal to five-tenths percent (0.5%) of the Contract Price, shall be paid within sixty days following receipt of the following documents, all of which must be received before payment shall become due: (i) request for payment from the Contractor; (ii) receipt of consent from the Contractor's surety to the payment; and (iii) approval or certification from the Designer that the work performed by the Contractor is acceptable and in accordance with the Contract Documents.

21.2 Except as set forth in paragraph 21.1, within forty five days after Substantial Completion of the Project, the remaining unpaid balance of the Contract Price shall be paid to the Contractor, less an amount equal to two and one-half times the value of punch list work or other work remaining to be completed or corrected, as reasonably estimated by the Owner.

21.3 Upon Substantial Completion, the Designer shall prepare and submit to the Contractor a deficiency list identifying all portions of the Work which are known by the Designer at that time to be incomplete or defective. Within thirty (30) days of receipt of this deficiency list, the Contractor shall complete and correct all items on that list along with all other Work required to achieve Final Completion of the Work. At any time prior to completion of the period of warranty, the Designer may submit to the Contractor a supplemental deficiency list, in which case the Contractor shall complete or correct any and all new items identified on the Supplemental deficiency list within the time period stipulated in paragraph 18.3.

21.4 Final Payment of any remaining balance of the Contract Price shall not be due to the Contractor until the Contractor achieves Final Completion of the Project.

21.5 The making and acceptance of Final Payment shall constitute a waiver of all claims by the Owner except:

a) Claims arising from unsettled liens or claims against the Contractor. b)

Defective Work or materials appearing after Final Payment.

c) Failure of the Contractor to perform the Work in accordance with the Contract Documents.

d) As conditioned in the Performance Bond.

e) Claims made prior to Final Payment which remain unsettled. f)

Amounts due arising under Articles 18 and 28.

g) Claims for recovery of overpayment based upon incorrect measurement, estimate, or certificate.

21.6 The making and acceptance of Final Payment shall constitute a waiver of all claims by the Contractor except those claims previously made in writing pursuant to paragraph 15.2 and not finally resolved.

21.7 The Designer shall not authorize Final Payment until all of the Work under the Contract Documents has been certified by the Designer as completed, proper and suitable for occupancy and use, and has been approved by all federal, state and local agencies having jurisdiction.

21.8 The final Request for Payment shall be identified on its face as such and shall be presented by the Contractor to the Designer within thirty (30) days of completion of the Work. Final payment of the retained amount due the Contractor shall be made by the Owner within thirty (30) days after the later of (i) full and Final Completion of all Work required by the Contract Documents, and certification of such Work in accordance with paragraph 20.4; (ii) submission of the affidavits of other documentation required by Article 22; (iii) submission by the Contractor of a Request for Payment identified on its face as final and including the Designer's certification.

ARTICLE 22. CONTRACTOR, SUBCONTRACTOR AND SUPPLIER AFFIDAVIT

22.1 The Final Payment due the Contractor on account of the Contract Documents shall not become due until the Contractor has furnished to the Owner through the Designer: (A) an affidavit by the Contractor signed, sworn, and notarized to the effect that all payments for materials, services, or for any other reason in connection with the Work or performance of the Contract Documents have been satisfied and that no claims or liens exist against the Contractor in connection with the same; (B) affidavits from each Subcontractor and supplier signed, sworn, and notarized to the effect that (i) each such Subcontractor or supplier has been paid in full by the Contractor for all Work performed and/or materials supplied by him in connection with the Project, and (ii) that all payments for materials, services, and for any other reason in connection with the subcontract or supply contract have been satisfied and that no claims or liens exist against the Subcontractor or supplier in connection therewith; and (C) the written consent of the Contractor's sureties to Final Payment. In the event that the Contractor cannot obtain an affidavit, as required above, from any Subcontractor or supplier, the Contractor shall state in the Contractor's affidavit that no claims or liens exist against such Subcontractor or supplier to the best of the Contractor's knowledge, and that if any appear afterwards, the Contractor shall save the Owner harmless for all costs and expenses, including attorneys fees, on account thereof.

ARTICLE 23. ASSIGNMENTS AND SUBCONTRACTS

23.1 The Contractor shall not assign any portion of this Agreement nor subcontract the Work in its entirety without the prior written consent of the Owner. Except as may be required under terms of the bonds required by the Contract Documents, no funds or sums of money due or to become due to the Contractor under the Contract Documents may be assigned.

ARTICLE 24. MEASUREMENTS

24.1 Before ordering material or doing Work which is dependent for proper size or installation

upon coordination with building conditions, the Contractor shall verify all dimensions and shall be responsible for the correctness of same. No consideration will be given for any claim based on differences between the actual dimensions and those indicated in the Contract Documents. Any discrepancies between the Contract Documents and the existing conditions shall be referred to the Designer for adjustment before any Work affected thereby is begun.

ARTICLE 25. CONTRACTOR AND SUBCONTRACTOR RELATIONSHIPS

25.1 Within thirty (30) days after initial receipt of the Construction Agreement for signatures the Contractor shall submit to the Designer and Owner for acceptance a current list of the names of Subcontractors and such other persons and organizations (including those who are to furnish materials or equipment fabricated to a special design) proposed for any and all portions of the Work. The Contractor shall provide this list at this time even if the Contractor was required to submit a list of proposed Subcontractors with the Contractor's bid. The Designer shall promptly reply to the Contractor in writing stating whether or not the Owner or the Designer, after due investigation, has objection to any such proposed person or entity or if it needs additional information to evaluate the persons on the list. Failure of the Designer to reply within ten (10) days after the Contractor has furnished all required information shall constitute notice of no objection.

The Contractor shall not contract with any such proposed person or entity to whom the Owner or the Designer has made reasonable objection. If the Designer or Owner has reasonable objection to any such proposed person or entity, the Contractor shall submit a substitute to whom the Owner and the Designer have no reasonable objection. The Contractor shall make no substitution for any Subcontractor, person, or entity previously allowed without first notifying the Designer and Owner in writing and no substitution may be made if the Owner or Designer makes a reasonable objection to such substitution.

25.2 The Contractor agrees that the terms of the Contract Documents, including all portions thereof, shall apply to all Subcontractors of the Contractor as if they were the Contractor, and that the Subcontractors of the Contractor shall, by means of their subcontracts, be bound by all the terms of the Contract Documents including, but not limited to, Article 26 of these General Conditions.

25.3 Payments to Subcontractors shall be made in accordance with the provisions of N.C. Gen. Stat. §143-134.1.

ARTICLE 26. USE OF PREMISES

26.1 The Contractor shall confine apparatus, the storage of materials, the operations of workers, and the disposal of material to limits indicated by law, ordinances, permits, and directions of the Designer, if any.

26.2 The Contractor shall not load or permit any part of the Work to be loaded with a weight that will endanger its safety, intended performance, or configuration.

26.3 The Contractor shall enforce all of the Designer's instructions, including, but not limited to, those regarding signs, advertisements, fires, and smoking.

ARTICLE 27. CUTTING, PATCHING AND FITTING

27.1 The Contractor shall do all cutting, fitting, and patching of the Work that may be required to make its several parts come together properly and fit it to receive or to be received by Work shown in or which can be reasonably implied from the Contract Documents.

ARTICLE 28. DISPUTE RESOLUTION

28.1 The laws of the State of North Carolina shall apply to the interpretation and enforcement of this Agreement. Any and all suits or actions to enforce, interpret, or seek damages with respect to any provision of, or the performance or nonperformance of, this Agreement shall be brought in the General Court of Justice of North Carolina sitting in Wake County, North Carolina, and it is agreed by the parties that no other court shall have jurisdiction or venue with respect to such suits or actions. Appendix A shall be a part of the Contract Documents. Prior to initiating an action under this Article, any party to this Agreement shall initiate the mediation process as provided in Appendix A to these General Conditions of the Contract for Construction.

28.2 Any person or firm that expressly or impliedly agrees to perform labor or services or to provide material, supplies, equipment, work, performance or payment bonds, insurance or indemnification for the construction of the Project or the Work shall be deemed a party to this Agreement solely for the purpose of this Article 28. The Contractor, by means of its subcontracts, shall specifically require its Subcontractors to be bound by this Article.

ARTICLE 29. TAXES

29.1 The Contractor has included in the Contract Price and shall pay all taxes assessed by any authority on the Work or the labor and materials used therein. The Contractor shall maintain all tax records during the life of the Project and furnish the Owner with a complete listing of all taxes paid by taxing authority, invoice number, date, amount, etc. in a form acceptable to the Owner. The Contractor is required to maintain a file showing taxes paid on the Project for three (3) years after Final Payment or turn said documents over to the Owner for his files.

29.2 The following is a list of requirements to be followed by the Contractor in maintaining proper records and reporting the North Carolina Sales and Use Tax and Local Sales and Use Tax. The Contractor shall comply fully with the requirements outlined below, in order that the Owner may recover the amount of the tax permitted under the law.

a) It shall be the Contractor's responsibility to furnish the Owner documentary evidence showing the materials used and sales and use tax paid by the Contractor and each of his Subcontractors. Such evidence shall be transmitted to the Owner with each pay request regardless of whether taxes were paid in that period.

b) The documentary evidence shall consist of a certified statement by the Contractor and each of the Contractor’s Subcontractors individually, showing total purchases of materials from each separate vendor and total sales and use taxes paid to each vendor. Certified statements must show the invoice number, or numbers, covered, and inclusive dates of such invoices.

c) Materials used from Contractor's or Subcontractor's warehouse stock shall be shown in a certified statement at warehouse stock prices.

d) The Contractor shall not be required to certify the Subcontractor's statements.

ARTICLE 30. OPERATION OF OWNER'S FACILITIES

30.1 The Contractor agrees that all Work done under the Contract Documents shall be carried on in such a manner so as to ensure the regular and continuous operation of the adjoining or adjacent facilities. The Contractor further agrees that the sequence of operations under the Contract Documents shall be scheduled and carried out so as to ensure said regular and continuous operation. The Contractor shall not close any areas of construction until so authorized by the Designer. The Contractor shall control operations to assure the least inconvenience to the public. Under all circumstances, safety shall be the most important consideration.

ARTICLE 31. THIRD PARTY BENEFICIARY CLAUSE

31.1 It is specifically agreed between the parties executing the Agreement that, with the specific exception set forth paragraph 7.24 hereof, and that exception only, the Contract Documents and the provisions therein are not intended to make the public, or any member thereof, a third-party beneficiary of the Agreement, or to authorize anyone not a party to the Contract Documents to maintain a suit for personal injuries or property damage pursuant to the terms of provisions of the Contract Documents.

ARTICLE 32. MEASUREMENT OF QUANTITIES

32.1 All Work completed under the Contract Documents shall be measured by the Contractor using United States customary units of measurement. The method of measurement and computations to be used in determination of quantities of material furnished and of Work performed under the Contract Documents shall be those methods set forth in the Contract Documents or, if not specifically set forth therein, the method generally recognized as conforming to good engineering practice.

ARTICLE 33. TERMINATION BY THE OWNER FOR CAUSE

33.1 If the Contractor fails to begin or complete the Work under the Contract Documents within the time specified, or fails to perform the Work with sufficient labor and equipment or with sufficient materials to insure the prompt completion of said Work, or shall perform the Work unsuitably or shall discontinue the prosecution of the Work for three (3) days, or if the Contractor shall become insolvent, be declared bankrupt, commit any act of bankruptcy or insolvency, allow any final judgment to stand against the Contractor or its affiliated companies unsatisfied for a period of forty-eight (48) hours, make an assignment for the benefit of creditors, or for any other cause whatsoever shall not carry on the Work in an acceptable manner, the Owner may give notice in writing to the Contractor and the Contractor's sureties of such delay, neglect, or default, specifying the same, and if the Contractor within a period of three (3) days after such notice shall not proceed in good faith and with reasonable speed to correct such delay, neglect, or default in accordance with such notice, the Owner shall have full power and authority, to the extent permitted by law, without violating the Contract Documents, to take the prosecution of the Work out of the

hands of the Contractor, to appropriate or use any or all materials and equipment at the Project as may be suitable and acceptable, and may enter into an agreement for the completion of the Work or pursue such other methods as in the Owner's opinion shall be necessary or appropriate for the completion of the Work in an acceptable manner. All costs and charges incurred by the Owner in proceeding in accordance with the preceding sentence, including attorney's fees, and all costs incurred by the Owner in completing the Work shall be deducted from any money due or which becomes due the Contractor. If such costs and expenses incurred by the Owner shall be less than the sum which would have been payable under Contract Documents if it had been completed by the Contractor, then the Contractor shall be entitled to receive the difference, but if such costs and expenses shall exceed the sum which would have been payable under the Contract Documents, the Contractor and the Contractor's surety shall be liable to the Owner for and shall pay to the Owner the amount of such excess.

ARTICLE 34. TERMINATION OR SUSPENSION BY THE OWNER FOR CONVENIENCE

34.1 The Owner may, without cause, order the Contractor to terminate, suspend, delay, or interrupt the Work in whole or in part for such period of time as the Owner may determine.

34.2 If the Contractor is subsequently ordered by the Owner to resume the Work, any cost or expenses to which the Contractor may be entitled by reason of the suspension, delay, or interruption shall be recovered by means of a Change Order in accordance with Articles 13 and 14 hereof and the Contract Construction Schedule shall be adjusted in accordance with Article 13 hereof.

34.3 The Owner shall terminate the Work or portion thereof by written notice when the Contractor is prevented from proceeding with the Work as a direct result of an executive order of the President with respect to the prosecution of war or in the interest of national defense.

34.4 In the event of termination by the Owner under this Article, the Contractor shall be entitled to receive the reasonable and documented direct costs incurred prior to termination, including the cost of materials purchased for the Work which purchases cannot be canceled or which material cannot reasonably be used by the Contractor on other work, and the cost of closing down the Project in a safe and efficient manner, plus ten percent (10%) thereof for overhead and profit, subject to the following conditions:

a) When the Contract is terminated before completion of all items of Work, payment shall be made for the actual number of units or items of Work completed at the applicable contract prices, or as mutually agreed for items of Work partially complete. If a mutual agreement cannot be reached, the Owner shall have the authority to make such equitable adjustment as it deems warranted and the Final Payment shall be made accordingly.

b) Reimbursement for organization of any Work and moving equipment to and from the job shall be considered when not otherwise provided for in the Contract Documents where the volume of completed Work is too small to compensate the Contractor for those expenses under unit prices. If a mutual agreement cannot be reached, the Owner will have the authority to make such equitable adjustments as it deems warranted and the Final Payment will be made accordingly.

c) Materials obtained by the Contractor for the Work that have been inspected and accepted by the Designer and that are not incorporated in the Work shall, at the request of the Contractor, be purchased from the Contractor at the Contractor's actual cost as shown by receipted bills and actual costs records at such points of delivery as may be determined by the Owner.

d) No payment shall be made by Owner to Contractor except as herein above provided. No claim for loss of anticipated profits shall be considered or allowed.

e) Termination of the Contract shall not relieve the Contractor of his responsibilities for any completed portion of the Work nor shall it relieve his sureties of their obligation for and concerning any just claims arising out of the Work performed.

The Contractor shall not be entitled to any other compensation, including compensation for lost profit, lost opportunity, or any other direct or consequential cost, loss, or damage.

ARTICLE 35. MINORITY BUSINESS ENTERPRISE PROGRAM

35.1 The Contractor shall at all times comply with the latest edition of the Town of Zebulon Minority Business Enterprise Policy. All documentation substantiating compliance with the requirements of this program shall be delivered to the Owner as stipulated in the Contract Documents. A copy of the Town of Zebulon Minority Business Enterprise Policy is included in the Project Manual.

ARTICLE 36. GENERAL

36.1 If any provision of the Agreement shall be declared invalid or unenforceable, the remainder of the Agreement shall continue in full force and effect.

36.2 The titles to Articles herein are for convenience only, are not substantive parts of the General Conditions, and are not to be considered in interpreting the Contract Documents.

END OF GENERAL CONDITIONS OF THE
CONTRACT FOR CONSTRUCTION

TYPICAL SUPPLEMENTARY GENERAL CONDITIONS

GENERAL

These Supplementary Conditions contain changes and additions to the project "GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION", as published herein. Where any Article of the General Conditions is modified or any Paragraph, Subparagraph or Clause thereof is modified or deleted by these Supplementary Conditions, the unaltered provisions of the Article, Paragraph, Subparagraph or Clause shall remain in effect.

ARTICLE 1 - DEFINITIONS

Paragraph 1.13: At the end of the existing paragraph, add the following:

The Contractor shall achieve Substantial Completion of the entire Work not later than 270 calendar days form the date of commencement. Final Completion for the entire work for this project shall be achieved within 30 calendar days from the date of Substantial Completion.

Project Close Out shall be completed, approved and finalized within 60 consecutive calendar days of Substantial Completion.

Paragraph 1.18: Delete the last sentence in its entirety and substitute the following in lieu thereof:

"A list of the Drawings is contained in the "Supplementary General Conditions."

The Drawings applicable to this Contract are as follows:

Coversheet	
C0.10	Survey
C1.00	Overall Existing Conditions and Demolition Plan
C1.01	Enlarged Existing Conditions and Demolition Plan
C200	Overall Site Plan
C201	Enlarged Site Plan
C300	Erosion Control Notes and Sequence
C301	Overall Erosion Control Plan
C302	Erosion Control Plan Phase 1
C302-1	Erosion Control Plan Phase 2
C303	Erosion Control Plan Final Phase
C304	Overall Grading Plan
C305	Enlarged Grading Plan
C306	Driveway Profile
C400	Overall Utility Plan

C401	Enlarged Utility Plan
C500	Restroom and Shelter Details
C501	Site Construction Details
C502	Site Construction Details
C503	Site Construction Details
C504	Site Construction Details
C505	Site Construction Details
C600	Overall Landscape Plan
C601	Landscape Plan
C700	Site Lighting Plan
E0.1	Electrical Legend and Notes
E0.2	Electrical Site Plan
E1.0	Electrical Floor Plan and Riser

ARTICLE 3. FAMILIARITY WITH WORK, CONDITIONS AND LAWS

Add the following paragraph:

"3.5 A mandatory pre-bid conference will be held **at 11:00 a.m., local prevailing time, on 12/4/2025 at Little River Park's gravel parking lot off Water Plant Road and on the east side of Little River (1800 W. Gannon Avenue, Zebulon, NC 27597).** Purpose of conference is for prospective Bidders to familiarize themselves with the site and to ask questions pertaining to the Contract Documents. Bidders are reminded that no oral interpretations of meaning of Drawings and Specifications can be made. Conflicts in documents, if any, will be resolved by written addendum. (Reference "Instructions to Bidders, Paragraph 5.)."

ARTICLE 5. INSURANCE AND INDEMNITY

Paragraph 5.1.2: In addition to all other endorsements required by the General Conditions, if the Contractor is required to transport, dispose of or otherwise handle hazardous or toxic waste, material, chemicals, compounds or substances, the policy of insurance shall be further endorsed to include the following:

Insurance Service Office (ISO) Form #CA 00 01 06 92 or its equivalent, amending exclusion 11 in the following manner:

i. Delete section a. (1) a.: (Pollution) "being transported or towed by, or handled for movement into, onto or from, the covered auto."

ii. Delete section a. (1) b.: "Otherwise in the course of transit by the insured."

The Contractor and transporter must comply with all applicable DOT and EPA requirements.

Paragraph 5.1.4: Add the following Paragraph [as necessary if the Contractor or its Subcontractor is required to consolidate, transfer, transport, dispose of, store or otherwise handle hazardous or toxic waste, material, chemicals, compounds or substances at any location]:

"Pollution Legal Liability (PLL)

A PLL policy must be provided for the Project. Coverage must be sudden and non-sudden, and include:

a) Bodily injury, sickness, disease, mental anguish, or shock sustained by any person, including death;

b) property damage including physical injury to or destruction of tangible property including the resulting loss of use thereof, cleanup costs, and the loss of use of tangible property that has not been physically injured or destroyed; and

c) Defense including costs, charges, and expenses incurred in the investigation, adjustment, or defense of claims for such compensatory damages.

The Owner must be named as Additional Insured, and a Non-Owned Disposal Site Endorsement must be provided, scheduling the appropriate landfill.

Minimum PLL limits of coverage shall be:

Per Loss	$1,000,000
All Losses	$2,000,000

ARTICLE 6. OTHER RECORD DOCUMENTS AND SUBMITTALS

Paragraph 6.1: At the end of the existing paragraph, add the following:

" one digital copy of the Contract Documents will be furnished to the General Contractor."

Paragraph 6.6: Special requirements for submittal and record document media:

ARTICLE 7. CONTRACTOR

Paragraph 7.13: Amend with the addition of the following paragraph:

"The General Contractor shall secure and pay for all building permits, including plumbing, electrical, HVAC and for the permit from the office of the Fire Marshall. The Cost for the Express Permit Review, if necessary, will be paid by others and is not the responsibility of the Contractor."

ARTICLE 10. DESIGNER

Add the following paragraphs:

"10.5 As a part of its Basic Services under the Owner-Designer Agreement, the Designer will conduct a single site visit to determine Substantial Completion of the Work. If, after the performance of said site visit, the Designer determines that the Work is not substantially complete, successive site visits to determine Substantial Completion will be deemed Additional Services under the Owner-Designer Agreement. The Contractor shall be liable to the Owner for any Designer's fees incurred as a result of any such Additional Services of the Designer. Any funds due under this paragraph may be deducted by the Owner from the amounts due the Contractor for such additional Designer's fees and paid directly to the Designer. Should the cost for such Additional Services of the Designer exceed the amount due or to become due to the Contractor, then the Contractor and his sureties shall be liable for and shall pay to the Owner the amount of any such excess.

"10.6 As a part of its Basic Services under the Owner-Designer Agreement, the Designer will conduct a single site visit to determine Final Completion of the Work. If, after the performance of said site visit, the Designer determines that the Work is not complete, successive site visits to determine Final Completion of the Work will be deemed Additional Services under the Owner-Designer Agreement. The Contractor shall be liable to the Owner for any Designer's fees incurred as a result of any such Additional Services of the Designer. Any funds due under this paragraph may be deducted by the Owner from the amounts due the Contractor for such additional Designer's fees and paid directly to the Designer. Should the cost for such Additional Services of the Designer exceed the amount due or to become due to the Contractor, then the Contractor and his sureties shall be liable for and shall pay to the Owner the amount of any such excess."

ARTICLE 13 - CONTRACT TIME

Paragraph 13.18: Add the following:

"If the Contractor fails to achieve Substantial Completion of the Work within the Contract Time and as otherwise required by the Contract Documents, the Owner shall be entitled to retain or recover from the Contractor, as Step One Liquidated Damages and not as a penalty, the following per diem amount commencing upon the first day following expiration of the Contract Time and continuing until the actual date of Substantial Completion. Such liquidated damages are hereby agreed to be a reasonable pre-estimate of damages the Owner will incur as a result of delayed Substantial Completion of the Work:

500 Dollars ($500.00) per consecutive calendar day

If the Contractor fails to achieve Final Completion of the Work within thirty (30) consecutive calendar days of the actual date of Substantial Completion of the Work, the Owner shall be entitled to retain or recover from the Contractor, as Step Two Liquidated Damages and not as a penalty, the following per diem amount commencing upon the first day following the actual date of Substantial Completion and continuing until the actual date of Final Completion. Such liquidated damages are hereby agreed to be a reasonable pre-estimate of damages the Owner will incur as a result of delayed Final Completion of the Work:

100 Dollars ($100.00) per consecutive calendar day

The Owner may deduct liquidated damages described above from any unpaid amounts then or thereafter due the Contractor under this Agreement. Should the amount of any liquidated damages exceed the amount due or to become due to the Contractor, then the Contractor and his sureties shall be liable for and shall pay to the Owner the amount of any such excess."

ARTICLE 29 – TAXES

Paragraph 29.1: Add the following to the existing paragraph:

"The Contractor is to use the Sales Tax Reporting Form attached to the contract documents for reporting taxes paid.

ARTICLE 36. GENERAL

Add the following paragraph:

"36.3 Any specific requirement in this Contract that the responsibilities or obligations of the Contractor also apply to a Subcontractor is added for emphasis and is also hereby deemed to include a Subcontractor of any tier. The omission of a reference to a Subcontractor in connection with any of the Contractor's responsibilities or obligations shall not be construed to diminish, abrogate, or limit any responsibilities or obligations

of a Subcontractor of any tier under the Contract Documents or the applicable subcontract."

END OF SUPPLEMENTARY GENERAL CONDITIONS

APPENDIX A
TO GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION

DISPUTE RESOLUTION PROCEDURES FOR TOWN OF ZEBULON BUILDING CONSTRUCTION RENOVATION AND REPAIR PROJECTS

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RULE 1. INITIATING MEDIATED SETTLEMENT CONFERENCES

A. Purpose of Mandatory Settlement Conferences. Pursuant to G.S. §143-128(f1) and 143-135.26(11), these Rules are promulgated to implement a mediated settlement program designed to focus the parties' attention on settlement rather than on claim preparation and to provide an opportunity for orderly settlement negotiations to take place. Nothing herein is intended to limit or prevent the parties from engaging in settlement procedures voluntarily at any time prior to or during commencement of the dispute resolution process.

B. Initiating the Dispute Resolution Process

1. Any party to a Town public construction contract (referred to herein generally as the "Contract") governed by Article 8. Ch. 143 of the General Statutes and identified in G.S. § 143-128(f1) and who is a party to a dispute arising out of the Contract and the construction process in which the amount in controversy is at least $15,000 may submit a written request to the Town for mediation of the dispute.

2. Prior to submission of a written request for mediation to the Town, the parties should give notice of any and all claims in accordance with their respective contracts, obtain decisions on the claims as required or allowed by their respective contracts, and attempt to resolve the dispute according to the terms and conditions in their respective contracts. The Mediator may adjourn any mediated settlement conference if the Mediator believes, in his or her sole discretion, that the parties have not satisfied all of the terms and conditions of their respective contracts and that doing so will enhance the prospects for a negotiated settlement.

C. Condition Precedent to Litigation. Before any party to a Contract may commence a civil action against the Town seeking remedies for breach or non-performance of the Contract by the Town, said party must first initiate the dispute resolution process under these rules and attend the mediated settlement conference.

RULE 2. SELECTION OF MEDIATOR

A. Mediator Listing. A list of Mediators acceptable to the Town is attached to and incorporated by reference into these Rules. The party requesting mediation shall select a Mediator from the designated list. If the town fails to provide a list of acceptable mediators, the list of Mediators shall be deemed to be the list of mediators certified by the North Carolina Dispute Resolution Commission to conduct mediated settlement conferences in the North Carolina Superior Courts.

B. Selection of a Mediator. The party requesting mediation shall select a Mediator from the Town's list of Mediators and shall file, with the Town, a Notice of Selection of Mediator within 21 days of the request for mediation. Such notice shall state the name, address, and phone number of the Mediator selected. If the

Mediator selected is not available or declines to participate for any reason, the requesting party shall select another person from the Town's list of Mediators. If the party requesting mediation does not select and designate a mediator within 21 days of the request for mediation, the Town shall have the right in its absolute discretion to appoint a mediator from its list of Mediators.

C. Disqualification of Mediator. Any party may request replacement of the Mediator for good cause. Nothing in this provision shall preclude Mediators from disqualifying themselves.

RULE 3. THE MEDIATED SETTLEMENT CONFERENCE

A. Where Conference is to be Held. Unless all parties and the Mediator otherwise agree, the mediated settlement conference shall be held in Wake County. The Mediator shall be responsible for reserving a place, making arrangements for the conference, and giving timely notice of the time and location of the conference to all attorneys, unrepresented parties and other persons or entities required to attend.

B. When Conference is to be Held. The mediation shall be completed within 90 days after selection of the Mediator.

C. Request to Accelerate or Extend Deadline for Completion. Any party or the Mediator may request the Town to accelerate or extend the deadline for completion of the conference. Such request shall state the reasons the extension is sought and shall be served by the moving party upon the other parties and the Mediator. Objections to the request must be promptly communicated to the Town and to the Mediator.

The Town, with the concurrence of the designated Mediator, may grant the request by adjusting the time for completion of the conference.

D. Recesses. The Mediator may recess the mediation conference at any time and may set times for reconvening. If the Mediator determines the time and place where the conference is to reconvene before the conference is recessed, no further notice is required to persons present at the conference.

E. Project Delay. The mediated settlement conference that results from a construction contract dispute shall not be cause for the delay of the construction project.

RULE 4. DUTIES OF PARTIES AND OTHER PARTICIPANTS IN FORMAL DISPUTE RESOLUTION PROCESS

A. Attendance.

1. All parties to the dispute must designate an official representative to attend the mediation.

2. "Attendance" means physical attendance, not by telephone or other electronic means. Any attendee representing a party must have authority from that party to bind it to any agreement reached as a result of the mediation.

3. Attorneys representing parties may attend the mediation, but are not required to do so.

4. Sureties and insurance company representatives are required to physically attend the mediation unless the Mediator and all of the other parties to the mediation excuse their attendance or consent to their attendance by telephone or other electronic means.

5. The parties who attend a duly scheduled mediation conference shall have the right to recover their share of the Mediator's compensation from any party or parties who fail to attend the conference without good cause.

B. **Finalizing Agreement.** If an agreement is reached in the conference, the terms of the agreement shall be confirmed in writing and signed by all parties.

C. **Mediation Fees** charged by the Mediator shall be paid in accordance with G.S. § 143-128(f1).

D. **Failure to compensate Mediator.** Any party's failure to compensate the Mediators in accordance with G.S. § 143-128(f1) shall subject that party to a withholding of said amount of money from the party's monthly payment by the Town.

Should the Town fail to compensate the Mediator, it shall hereby be subject to a civil cause of action from the Mediator for the 1/3 portion of the Mediator's total fee as required by G.S. § 143-128(f1).

RULE 5. AUTHORITY AND DUTIES OF MEDIATORS

A. Authority of Mediator.

1. Control of Conference. The Mediator shall at all times be in control of the conference and the procedures to be followed.

2. Private Consultation. The Mediator may communicate privately with any participant or counsel prior to and during the conference. The fact that private communications have occurred with a participant shall be disclosed to all other participants at the beginning of the conference.

3. Scheduling the Conference. The Mediator shall make a good faith effort to schedule the conference at a time that is convenient with the participants,

attorneys and Mediator. In the absence of agreement, the Mediator shall select the date for the conference.

4. Determining good cause for a party's failure to appear at a scheduled mediation conference.

B. Duties of Mediator.

1. The Mediator shall define and describe the following at the beginning of the conference:
    a. The process of mediation.
    b. The difference between mediation and other forms of conflict resolution.
    c. The costs of the mediated settlement conference.
    d. That the mediated settlement conference is not a trial, the Mediator is not a judge, and the parties retain their legal rights if they do not reach settlement; however, the Mediator will advise all parties that failure to appear at mediation without good cause may result in imposition of sanctions and may be asserted as a bar to lawsuits by claimants who have failed to exhaust this administrative remedy.
    e. The circumstances under which the Mediator may meet and communicate privately with any of the parties or with any other person.
    f. Whether and under what conditions communications with the Mediator will be held in confidence during the conference.
    g. The inadmissibility of conduct and statements as provided by G.S. §7A-38.1(1).
    h. The duties and responsibilities of the Mediator and the participants.
    i. That any agreement reached will be reached by mutual consent.

2. Disclosure: The Mediator has a duty to be impartial and to advise all participants of any possible bias, prejudice or partiality.

3. Declaring Impasse: The Mediator may determine at any time during the mediation conference that an impasse exists and that the conference should end.

4. Reporting Results of Conference. The Mediator shall submit a written report to the Town and the other parties within 10 days of the conference stating whether or not the parties reached an agreement. The Mediator's report shall indicate the absence of any party from the mediated settlement conference without permission or good cause.

5. Scheduling and Holding the Conference. It is the duty of the Mediator to schedule the conference and conduct it prior to the deadline of completion set by the rules. The Mediator shall strictly observe deadlines for completion of the conference unless said time limit is changed by agreement of the parties.

RULE 6. COMPENSATION OF THE MEDIATOR

A. The parties shall compensate the Mediator for mediation services at the rate proposed by the Mediator and agreed to by the parties at the time the Mediator is selected.

RULE 7. RULE MAKING

A. These Rules may be amended by the Town at any time. Amendments will not affect mediations where claims and/or requests for mediation have been filed at the time the amendment takes effect

RULE 8. DEFINITIONS

A. "Town" shall mean the Town of Zebulon, Wake County, North Carolina.

B. **"**Project Designer" is that person or firm stipulated as project designer in the Contract Documents for the project.

C. "Claim" is a demand or assertion by a party seeking adjustment or interpretation of Contract terms, payment of money, extension of time or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the parties to a Contract involved in the Town's building construction renovation and repair projects arising out of or relating to the Contract or the construction process. Claims must be initiated by a written notice. The responsibility to substantiate Claims shall rest with the party making the Claim.

D. "Good Cause" generally includes any circumstance beyond the control of a party, which prevents that party from meeting obligations. When good cause is asserted as an excuse for a party's failure to appear at a mediation conference or to otherwise comply with the requirements of these Rules, the Mediator, in his or her sole discretion, will determine whether good cause exists to excuse the party's failure to appear or otherwise comply with these rules.

RULE 9. TIME LIMITS

A. Any time limit provided for by these Rules may be waived or extended at the sole discretion of the Town, if no Mediator has been selected, and at the discretion of the Town with concurrence of the Mediator if a Mediator has been selected.

APPENDIX B

CONTRACTOR'S SALES TAX REPORT

N.C. STATE & LOCAL SALES TAXES PAID

Owner: _____ Project: _____

Contractor: _____ For Period: _____

Address: _____ To: _____

Vendor	Material Purchased	Address	Invoice Number	Date	Invoice Subtotal	NC Tax	County Tax	Transit Tax	Name of County Where Goods Were Received
					$0.00	$0.00	$0.00	$0.00	
					$0.00	$0.00	$0.00	$0.00	
					$0.00	$0.00	$0.00	$0.00	
					$0.00	$0.00	$0.00	$0.00	
					$0.00	$0.00	$0.00	$0.00	
					$0.00	$0.00	$0.00	$0.00	
					$0.00	$0.00	$0.00	$0.00	
					$0.00	$0.00	$0.00	$0.00	
					$0.00	$0.00	$0.00	$0.00	
				Totals:	$0.00	$0.00	$0.00	$0.00	

I hereby certify that, during the period stated above, North Carolina sales and use taxes were paid as listed above, with respect to building materials, supplies, fixtures, and equipment which have become a part of, or annexed to, a building or structure erected, altered or repaired for the County of Wake, and that the vendors from whom the property was purchased, the dates and numbers of the invoices covering the purchases, the total amount of the invoices of each vendor, the North Carolina sales and use taxes paid thereon, and the cost of property withdrawn from warehouse stock and North Carolina sales or use taxes paid thereon are as set forth above.

Sworn to and Subscribed before me, this _____ day of _____ By: _____

_____ Notary

My Commission expires _____ Title: _____

FROEHLING & ROBERTSON, INC.

Report of Subsurface Exploration and Geotechnical Engineering Evaluation

Little River Park – Phase I
Zebulon, North Carolina
F&R Project No. 66C-0145

Prepared For:
benesch
8000 Regency Parkway, Suite 175
Cary, North Carolina 27518

Prepared By:
Froehling & Robertson, Inc.
310 Hubert Street
Raleigh, North Carolina 27603

December 24, 2024

FROEHLING & ROBERTSON

Engineering Stability Since 1881

December 24, 2024

Joe Pung, PLA, LEED AP
Project Manager
benesch
8000 Regency Parkway, Suite 175
Cary, North Carolina 27518

Subject: Report of Subsurface Exploration & Geotechnical Engineering Evaluation
Little River Park – Phase I
Zebulon, North Carolina
F&R Project No. 66C-0145

Dear Mr. Pung:

Froehling & Robertson, Inc. (F&R) has completed the authorized subsurface exploration and geotechnical engineering evaluation for the above-referenced project in Zebulon, North Carolina. Our services were performed in general accordance with F&R's Proposal 2466-00107 (REV1) dated June 3, 2024. The attached report presents our understanding of the project, reviews our exploration procedures, describes existing site and subsurface conditions, and presents geotechnical recommendations for design and construction of the project.

We have enjoyed working with you on this project, and are prepared to assist you with the recommended quality assurance observation and testing services during construction. Please contact us if you have any questions regarding this report or if we may be of further service.

Sincerely,

FROEHLING & ROBERTSON, INC.

Dave Morse, M.S., E.I.
Geotechnical Staff Engineer

NORTH CAROLINA PROFESSIONAL SEAL 029927 ENGINEER Michael S. Sabodish, Jr

Michael S. Sabodish, Jr., Ph.D., P.E.
Geotechnical Department Manager

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APPENDIX I

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APPENDIX II

Boring Coordinates Table
Key to Soil Classification
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APPENDIX III

Laboratory Test Results

APPENDIX IV

GBA Document “Important Information about This Geotechnical Engineering Report”

EXECUTIVE SUMMARY

This Executive Summary is provided as a brief overview of our geotechnical engineering evaluation for the project and is not intended to replace more detailed information contained elsewhere in this report. As an overview, this summary inherently omits details that could be very important to the proper application of the provided geotechnical design/construction recommendations. This report should be read in its entirety prior to implementation into design and construction.

- *The subsurface exploration consisted of performing 8 soil test borings and 1 offset boring (B-1 to B-8, and B-1A) to depths ranging from 3.3 to 10 feet below the existing ground surface.*

- *At the existing ground surface, or below the surficial organic soils, fill and possible fill soils were encountered in each of the borings, and extended to depths ranging from 2 to 3.5 feet below the existing ground surface. The encountered fill and possible fill soils consisted of very loose to medium dense silty sands (USCS – SM) with SPT N-values ranging from 2 to 16 bpf; and very soft to soft low-plasticity clay (USCS – CL) with SPT N-values ranging from 2 to 3 bpf. Based on the SPT N-values of the sampled fill soils, this material was generally placed with poor compactive effort. The samples were also noted to contain deleterious materials such as wood fragments and gravel, indicative of fill placement without the use of formal construction techniques.*

- *Residual soils were encountered below the fill or possible fill soils in 6 borings. The encountered residual soils extended to depths ranging from 4 to 10 feet below the existing ground surface. The residual soils consisted of loose to medium dense silty and clayey sands (USCS – SM & SC) with SPT N-values ranging from 6 to 30 bpf; firm to stiff low-plasticity clays (USCS – CL) with SPT N-values ranging from 8 to 10 bpf; and firm high-plasticity clays (USCS – CH) with an SPT N-value of 7 bpf.*

- *PWR was encountered in 5 borings at depths ranging from 2 to 5.4 feet below the existing ground surface. Once encountered, the PWR typically extended less than 2 feet before auger refusal was encountered and the boring was terminated. Auger refusal materials were encountered in 5 borings at depths ranging from 3.3 to 5.4 feet below the existing ground surface.*

- *Very loose/soft to soft soils (SPT N-value ≤ 4 bpf) were encountered in the upper 2 to 3.5 feet of the soil profile in 5 borings. Based on the provided grading plans, these low-consistency soils may be present at the proposed subgrade elevations. If encountered at the finished subgrade, these soils will need to be undercut and replaced with suitable structural fill.*

- *Stabilized groundwater was encountered in 2 borings, B-5 and B-6, at depths of 2.4 and 7.6 feet below the existing ground surface, respectively. Wet soil conditions were encountered in borings B-5 and B-6, from depths of 2 to 10 feet and 6.5 to 10 feet below the existing ground surface. As such, it is possible that wet soils and/or groundwater may be encountered during earthwork and/or utility installation at the site, and dewatering may be necessary to maintain drained,*

stable excavations, and to prevent softening/loosening of the excavation subgrades. The groundwater should be lowered to a depth of at least 3 to 4 feet below the bottom elevation of proposed excavations prior to construction.

- *It is our opinion that the subsurface conditions are suitable for the proposed development from a geotechnical engineering perspective. However, the above mentioned subsurface conditions should be considered during the design phase of this project. Allowances should be made in the construction documents for quantities of various subgrade repair procedures.*

1.0 PURPOSE & SCOPE OF SERVICES

The purpose of the subsurface exploration and geotechnical engineering evaluation was to explore the subsurface conditions in the area of the planned Little River Park – Phase I development and to provide geotechnical engineering recommendations that can be used during the design and construction phases of the project.

F&R's scope of services included the following:

- Completion of 8 soil test borings (B-1 to B-8) and one offset boring (B-1A) to depths ranging from 3.3 to 10 feet below the existing ground surface;
- Preparation of typed boring logs and development of a subsurface profile;
- Performing geotechnical laboratory testing on representative soil samples;
- Performing a geotechnical engineering evaluation of the subsurface conditions with regard to their suitability for the proposed construction; and
- Preparation of this geotechnical report by professional engineers.

2.0 PROJECT INFORMATION

2.1 SITE LOCATION AND DESCRIPTION

The project site is located on the north side of Water Plant Road, just north of the intersection of Water Plant Road and W. Gannon Avenue in Zebulon, North Carolina. The site is comprised of two parcels of land identified with Parcel Identification Numbers (PINs) 1795254279 and 1795145894, according to information obtained from the Wake County online GIS database. Based on a desktop review and our boring layout performed on November 13, 2024, the site typically consists of hilly, grass-covered land with isolated pockets of moderately wooded land and rock outcroppings adjacent to the eastern bank of the river. Little River is present at the west side of the site and traverses the site in a north to south orientation. An existing water tank, likely associated with the water treatment plant present just east of the site, is located at the south side of the project site near the existing park entrance.

Based on a review of historical images, the site consisted of agricultural and wooded land as early as 1959. An existing residence was located near the present park entrance at this time. Sometime prior to 1964, the existing water treatment plan was constructed east of the site. The previously-

mentioned residence was razed sometime prior to 1983. Since 1983, the site has remained relatively unchanged except for isolated periods where trails were cut and maintained within the grassed portion of the site. These trails have been allowed to become overgrown and new trails have been cut in the site over the years. Since 2023, the site appears to have been relatively unchanged and allowed to naturally mature into its current state.

Based on a review of topographic information from the Wake County GIS online database, the site generally slopes down towards the river from a high elevation of approximately 272 feet just west of the existing water treatment plant, to a low elevation of approximately 226 feet along the eastern bank of the river at the park entrance. The terrain is fairly steep in the wooded areas adjacent to the river, whereas the northern and eastern sections of the larger parcel are gently sloping to relatively flat.

2.2 PROPOSED CONSTRUCTION

Based on the provided Schematic Design drawings dated November 26, 2024, work planned in this first phase will consist of the construction of asphalt and gravel trails, a natural classroom, asphalt-paved parking areas, and a shelter/restroom structure. Structural loading information was not available at the time of this report preparation. F&R was informed by benesch that traffic loading conditions for this project would be similar to the provided conditions for Epsom Park, where F&R performed a subsurface exploration in December 2023. Based on the provided plans and existing site grades, it appears that soil cut and fill depths of 6 feet or less will be required to establish finished site grades.

3.0 EXPLORATION PROCEDURES

3.1 SUBSURFACE EXPLORATION

F&R advanced a total of eight (8) soil test borings (B-1 to B-8) and one offset boring (B-1A) to depths ranging from 3.3 to 10 feet below the existing ground surface. The approximate boring locations are shown on the Boring Location Plans presented as Figures 2 and 2A in Appendix I. The test boring locations were established in the field by F&R using a hand-held GPS unit. Ground

surface elevations at the boring locations were interpolated from the provided Schematic Design drawings. Given these methods of determination, the boring locations and ground surface elevations should only be considered approximate.

The test borings were advanced by a track-mounted CME-55 drill rig using 2-1/4" inside diameter (I.D.) hollow stem augers for borehole stabilization. Representative soil samples were obtained using a standard two-inch outside diameter (O.D.) split-barrel sampler in general accordance with ASTM D1586, Standard Penetration Test (SPT) and Split-Barrel Sampling of Soils. The number of blows required to drive the split barrel sampler three consecutive 6-inch increments with an automatic hammer is recorded, and the blows of the last two 6-inch increments are summed to obtain the Standard Penetration Test (SPT) N-value representing the penetration resistance of the soil. Five (5) Standard Penetration Tests were performed within the top 10 feet.

A representative portion of the soil from each SPT sample was retrieved and sealed in a glass jar, labeled, and transported to our laboratory for classification and analysis by a geotechnical engineer. The soil samples were classified in general accordance with the Unified Soil Classification System (USCS) using visual-manual identification procedures (ASTM D2488). The boring logs for the exploration are presented in Appendix II of this report.

Groundwater level measurements were attempted at the termination of drilling and after a stabilization period of approximately 24-hours following the completion of drilling in each of the borings. Temporary piezometers were installed in four (4) borings (B-2, B-6, B-7, and B-8) to facilitate the measurement of stabilized groundwater levels. The temporary piezometers consisted of 1-inch diameter hand-slotted PVC pipe installed into the completed borings. Following the collection of the stabilized groundwater readings, the temporary piezometers were removed from the borings and each of the boreholes were backfilled with soil cuttings.

3.2 LABORATORY TESTING

F&R selected three (3) representative soil samples and subjected them to geotechnical index testing consisting of natural moisture content, sieve analysis (% passing #200 sieve only), and

Atterberg Limits determinations. The purpose of the index testing was to aid in our classification of the soil samples and development of engineering recommendations. In addition, two (2) bulk soil samples were subjected to Standard Proctor testing and CBR testing to aid in the pavement design recommendations. The laboratory testing was performed in general accordance with applicable ASTM standards. The laboratory test results are presented in Appendix III of this report.

4.0 REGIONAL GEOLOGY & SUBSURFACE CONDITIONS

4.1 REGIONAL GEOLOGY

The project site is located in the Piedmont Physiographic Province of North Carolina. The Piedmont Province generally consists of hills and ridges that are intertwined with an established system of draws and streams. According to the Geologic Map of North Carolina (1985), the site is underlain by foliated to massive granitic rock, which is described as megacrystic to equigranular.

The virgin soils of the Piedmont Physiographic region are the residual product of in-place chemical weathering of rock that was similar to the rock presently underlying the site. In areas not altered by erosion or disturbed by the activities of man, the typical residual soil profile consists of clayey soils near the surface, where soil weathering is more advanced, underlain by silts, sandy silts, and silty sands above partially weathered rock and bedrock. The boundary between soil and rock is not sharply defined. This transitional zone, termed "Partially Weathered Rock," is typically found overlying the parent bedrock. Partially Weathered Rock (PWR) is defined, for engineering purposes, as residual material exhibiting Standard Penetration Resistances in excess of 100 blows per foot (bpf). Weathering is facilitated by fractures, joints and by the presence of less resistant rock types. Consequently, the profile of the PWR and hard rock can be quite irregular, even over short horizontal distances. Commonly, lenses and boulders of hard rock and zones of PWR can be encountered within the soil mantle, well above the general bedrock level. PWR and/or hard rock were encountered in five (5) soil test borings and 1 offset boring.

4.2 SUBSURFACE CONDITIONS

4.2.1 General

The subsurface conditions discussed in the following paragraphs and those shown on the attached boring logs represent an estimate of the subsurface conditions based on interpretation of the boring data using normally-accepted geotechnical engineering judgments. Although individual soil test borings are representative of the subsurface conditions at the boring locations on the dates shown, they are not necessarily indicative of subsurface conditions at other locations or at other times. Data from the specific soil test borings are shown on the boring logs presented in Appendix II of this report.

A subsurface profile has been prepared from the boring data to graphically illustrate the subsurface conditions encountered at the site, and is presented as Figure 3 in Appendix I. Strata breaks designated on the boring logs and subsurface profile represent approximate boundaries between soil types. The transition from one soil type to another may be gradual or occur between soil samples. This section of the report provides a general discussion of subsurface conditions encountered within areas of proposed construction at the project site. More detailed descriptions of the subsurface conditions at the individual boring locations are presented on the boring logs provided in Appendix II of this report.

4.2.2 Surficial Materials

Surficial organic soils were encountered at the existing ground surface in each of the borings, with the exception of boring B-7, with thicknesses ranging from 2 to 4 inches. The surficial organic soil generally consisted of dark-colored soil material containing roots, fibrous matter, and/or other organic components, and is generally unsuitable for engineering purposes. F&R has not performed any laboratory testing to determine the organic content or other horticultural properties of the observed surficial organic soil materials. Therefore, the term surficial organic soil is not intended to indicate suitability for landscaping and/or other purposes. The surficial organic soil thicknesses provided in this report are based on driller observations and should be

considered approximate. We note that the transition from surficial organic soil to underlying materials may be gradual, and therefore the observation and measurement of surficial organic soil thicknesses are subjective and should be expected to vary.

4.2.3 Fill and Possible Fill Soils

Fill soils include materials deposited by man, and are highly variable in composition and consistency. Sometimes the relatively small and disturbed sample obtained in the field is insufficient to definitively describe the origin of the subsurface material. Since man-made materials, deleterious materials, or other obvious evidence of fill were not encountered in the some of the soil samples, the materials believed to be fill are referred to as "possible fill." Fill and possible fill soils were encountered immediately beneath the surficial materials in each of the test borings, except B-7, which encountered fill soils at the existing ground surface. The encountered fill and possible fill soils extended to depths ranging from 2 to 3.5 feet below the existing ground surface. The encountered fill and possible fill soils consisted of very loose to medium dense silty sands (USCS – SM) with SPT N-values ranging from 2 to 16 bpf; and very soft to soft low-plasticity clay (USCS – CL) with SPT N-values ranging from 2 to 3 bpf. The fill soils were noted to contain varying amounts of wood fragments, roots, and/or gravel.

Fill soils exhibiting SPT N-values of 4 bpf or less are generally indicative of fill with poor compaction, while soils exhibiting SPT N-values of 5 to 8 bpf are generally indicative of fill with moderate compaction. Well-compacted fill without gravel or deleterious materials would generally be expected to exhibit N-values of 9 bpf or greater. Based on the results of the test borings and a review of SPT N-values, it appears the fill and possible soils were generally poorly-compacted, with the exception of the well-compacted material encountered in boring B-7, which was located within an existing walking trail. However, it is noted the presence of the roots and gravel could have amplified the observed SPT N-values. As such, the observed SPT N-values may not reflect the true consistency of the fill and/or possible fill materials.

4.2.4 Residual Soils

Residual soils were encountered below the fill or possible fill soils in borings B-1, B-2, B-3, B-5, B-6, and B-8. The encountered residual soils extended to depths ranging from 4 to 10 feet below the existing ground surface. The residual soils consisted of loose to medium dense silty and clayey sands (USCS – SM & SC) with SPT N-values ranging from 6 to 30 bpf; firm to stiff low-plasticity clays (USCS – CL) with SPT N-values ranging from 8 to 10 bpf; and firm high-plasticity clays (USCS – CH) with an SPT N-value of 7 bpf.

A layer of highly plastic clay was encountered within boring B-1 from a depth of 2 to 3.5 feet below the existing ground surface, and was noted to contain a trace amount of roots.

A chemical odor was noted within the residual soil of boring B-6 at a sampling depth of 3.5 to 5 feet below the existing ground surface.

4.2.5 Partially Weathered Rock (PWR) & Auger Refusal Materials

PWR is defined for engineering purposes as material that exhibits an SPT N-value of at least 100 blows per foot (bpf). PWR was encountered in five (5) borings, B-1, B-3, B-4, B-7, and B-8, at depths ranging from 2 to 5.4 feet below the existing ground surface. Once encountered, the PWR typically extended less than 2 feet before auger refusal was encountered and the boring was terminated. In boring B-8, the encountered PWR extended from a depth of 4 feet to the termination depth of 8.7 feet below the existing ground surface. The SPT N-values of the PWR ranged from 50 blows with 5” of split spoon penetration (50/5”) to 50/0”. The sampled PWR was typically described as a silty or clayey sand with trace rock fragments.

Auger refusal is a designation applied to any material that cannot be penetrated by the soil auger and typically includes boulders, hard rock lenses/ledges, and bedrock. Auger refusal materials were encountered in four (4) borings, B-1, B-3, B-4, and B-7, and offset boring B-1A, at depths ranging from 3.3 to 5.4 feet below the existing ground surface. It is our opinion that the auger refusal materials encountered were large boulders or bedrock.

4.3 SOIL MOISTURE AND GROUNDWATER CONDITIONS

A majority of the recovered soil samples were described in a moist condition (i.e., within 3 to 5 percentage points of the estimated optimum moisture content). Wet soils (5 percentage points or greater over the estimated optimum moisture content) were encountered in borings B-5 and B-6, from depths of 2 to 10 feet and 6.5 to 10 feet below the existing ground surface, respectively.

Groundwater level measurements were attempted at the termination of drilling in each of the borings, and groundwater was only encountered in boring B-5 at an approximate depth of 2.9 feet below the existing ground surface. After a stabilization period of about 24-hours following completion of drilling, groundwater levels were measured again, and stabilized groundwater was encountered in borings B-5 and B-6, at depths of 2.4 and 7.6 feet below the existing ground surface, respectively.

It should be noted that the groundwater levels fluctuate depending upon seasonal factors such as precipitation and temperature. As such, soil moisture and groundwater conditions at other times may vary from those described in this report.

5.0 GEOTECHNICAL DESIGN RECOMMENDATIONS

5.1 GENERAL

The conclusions and recommendations contained in this section of the report are based upon the results of the 8 soil test borings and 1 offset boring performed by F&R, our experience with similar subsurface conditions and projects, and the limited information provided to us regarding the proposed construction. From a geotechnical perspective, it is our opinion that the subsurface conditions encountered at the project site are generally suitable for the proposed development, provided the recommendations presented in subsequent sections of this report are followed throughout the design and construction phases of this project.

Certain subsurface conditions revealed during the explorations will impact site development and grading activities, and should be considered during the planning and design phases of this project. Allowances should be made in the construction documents for various subgrade repair

procedures, quantities and materials. The subsurface conditions of particular note include the following:

- Very loose/soft to soft soils (SPT N-value ≤ 4 bpf) were encountered in the upper 2 to 3.5 feet of the soil profile in 5 borings. Based on the provided grading plans, these low-consistency soils may be present at the proposed subgrade elevations. If encountered at the finished subgrade, these soils will need to be undercut and replaced with suitable structural fill.

- PWR was encountered in 5 borings, at depths ranging from 2 to 5.4 feet below the existing ground surface. Auger refusal materials were encountered in 4 borings and one offset boring, at depths ranging from 3.3 to 5.4 feet below the existing ground surface. Based on the provided site grading plans, PWR/rock excavation could be required to establish final grades for the drive lanes and eastern section of the parking lot, and to install utility lines.

- Stabilized groundwater was encountered in two (2) borings, B-5 and B-6, at depths of 2.4 and 7.6 feet below the existing ground surface, respectively. Additionally, wet soil conditions were encountered in borings B-5 and B-6, from depths of 2 to 10 feet and 6.5 to 10 feet below the existing ground surface. As such, it is possible that wet soils and/or groundwater may be encountered during earthwork and/or utility installation at the site, and dewatering may be necessary to maintain drained, stable excavations, and to prevent softening/loosening of the excavation subgrades. The groundwater should be lowered to a depth of at least 3 to 4 feet below the bottom elevation of proposed excavations prior to construction.

- Existing fill and possible fill soils were encountered within the upper 2 to 3.5 feet of the soil profile in each of the borings. Based on the SPT N-values of the sampled fill soils, this material was generally placed with poor compactive effort. The samples were also noted to contain deleterious materials such as wood fragments and gravel, indicative of fill placement without the use of formal construction techniques. Although some of this material encountered within our borings exists in planned cut areas, or should be undercut per our above recommendations, it is possible that fill soils will be encountered in unexplored areas of the project site. Therefore, the contractor should be prepared to perform additional undercutting should poorly-compacted fill soils or fill soils containing deleterious materials be revealed during construction.

5.2 PAVEMENT DESIGN

5.2.1 General

Based on the provided site plan, a standard-duty asphalt-paved driving lane and parking lot with approximately 50 parking stalls is planned to be located centrally at the project site, just west of the existing water treatment plant. Additionally, 6 to 8-foot wide light-duty asphalt and gravel trails will traverse a majority of the site.

The pavement subgrade materials are anticipated to consist of existing fill and residual soils including silty/clayey sands (SM/SC) and low-plasticity clays (CL), and approved structural fill materials. While not anticipated, if highly plastic clays (CH) are encountered at the pavement subgrade level, they should be undercut and replaced with approved lower plasticity soils or granular materials.

As part of our investigation, F&R obtained four (4) bulk samples from borings performed within the planned parking/drive areas and trails. Two (2) of these samples were subjected to California Bearing Ratio (CBR) testing (ASTM D1883). These laboratory results are listed below, and are presented in Appendix III.

Test No.	Boring	Soil Type	USCS Classification	Average CBR
CBR-1	B-2	Clayey SAND	SC	8.4
CBR-2	B-6	Clayey SAND	SC	5.4

5.2.2 Flexible Asphalt Pavements for Parking/Drive Areas & Asphalt Trails

Subgrade preparation and evaluation for the proposed pavement areas should be performed as outlined in subsequent sections of this report. The design pavement section is dependent upon the anticipated soil subgrade strength, evaluation of the exposed subgrade soils beneath the proposed pavement, and completion of any necessary repairs to establish a stable subgrade prior to pavement construction. As previously mentioned, some subgrade repairs should be anticipated considering the prevalence of existing fill and very loose/soft to soft near-surface soils.

F&R has made the following assumptions and performed pavement designs using the "NCDOT Pavement Design Procedure – AASHTO 1993 Method." For the design, F&R used the following data:

- Average daily traffic (ADT): 400 cars (assumed); no truck traffic/heavy vehicles; occasional light truck traffic on paved paths
- Combined standard error of traffic and performance prediction SO = 0.45;
- Design life of 20 years;
- Direction factor of 100% (assumes all of ADT travels in each direction);
- Design CBR value of 5 (based on laboratory data);
- Annual growth rate of 1 percent (assumed);
- Reliability of 85% (standard normal deviate, ZR = -1.036 for secondary roads);
- Terminal serviceability index of 2.5; and
- Lane distribution factor of 1.0 (1 lane in each direction).

The required structural number was calculated to be 1.22. Based on the design data listed above and layer coefficients of 0.44 for asphalt surface course (S9.5B) and 0.14 for compacted ABC stone, the following pavement design is recommended:

Standard Duty Pavement

Pavement Section	Thickness (Inches)
Asphalt Pavement Surface Course, Type S9.5B	2*
Aggregate Base Course (ABC stone)	6

*applied in two 1-inch lifts

In addition to the above section, it is often recommended that a geotextile be installed on the exposed soil subgrade beneath the compacted Aggregate Base Course.

5.2.3 Gravel Pavements

For the 6 to 8-foot wide gravel trails throughout the project site, daily pedestrian traffic and minimal light maintenance traffic has been assumed. For light maintenance traffic, we recommend an 8 inch layer of compacted ABC stone to be placed on the trails. Since the trails will not be paved, we recommend a woven geotextile (Mirafi 140 N or equivalent) be installed

on the subgrade prior to placement of the ABC stone. The stability of the subgrade should be confirmed prior to placement of the geotextile. Newly exposed subgrade should be proofrolled with a loaded tandem-axle dump truck, scraper, or other similar type of construction equipment. The proofrolling operations should be observed by a geotechnical engineer or their representative. If proofrolling reveals unstable conditions, the method of repair should be as directed by the project geotechnical engineer. Methods of repair may include, but are not necessarily limited to: drying and re-compaction; undercutting and replacement with suitable structural fill; use of geo-textiles and/or geo-grids with select fill; use of lime stabilization, or other methods deemed appropriate by the project geotechnical engineer.

Due to the presence of very loose/soft to soft soils, wet soils, and stabilized groundwater encountered at borings B-5 and B-6, additional subgrade repairs may be required in these areas. Upon completion of the recommended subgrade repairs (if required), F&R recommends the placement of a separation geotextile (such as Mirafi 140 N or equivalent) be placed over the newly exposed subgrade. Above the geotextile, F&R recommends the placement of compacted ABC stone to finished pavement grade. The separation textile will provide some stability to the subgrade soils for the required compaction of the ABC stone as well as mitigate the migration of fines from the subgrade soils into the ABC stone, which may lead to a reduction in ABC stone stability. F&R recommends the ABC stone be placed in loose lifts not exceeding 6 to 8 inches and compacted with vibratory smooth drum roller. All ABC stone should be compacted to at least 100 percent of the Modified Proctor maximum dry density (ASTM D1557).

It should be noted that periodic maintenance of the gravel trails may be required, which may consist of re-grading and re-compaction of the ABC Stone as well as placing new ABC Stone to keep final trail grades. The amount of maintenance required will be dependent on weather conditions and the amount/type of traffic the ABC Stone pavement section receives.

5.3 CUT AND FILL SLOPES

Based on the provided plans, it appears that constructed slopes will generally be 2.5H:1V or flatter. F&R recommends designing the permanent project slopes at 2.5H:1V or flatter for slopes less than approximately 5 feet in height. The tops of the slopes should be located a minimum of 10 feet from structural limits. If steeper or higher slopes are planned, F&R should be contacted during early grading plan development to perform slope stability analyses prior to finalizing the grading plans. It is F&R's opinion that 2.5H:1V slopes will be stable from a slope stability standpoint, provided the fill slopes are constructed of properly-compacted and tested structural fill and on subgrades approved by the geotechnical engineer. However, seepage and surface runoff may cause the slopes to slough and erode resulting in shallow surface failures. The slopes should be vegetated as soon as possible to minimize surface sloughing and erosion. A swale or shallow ditch should be constructed near the tops of slopes to prevent surface water from flowing onto the slopes. We recommend that all cut and fill slopes be observed by a geotechnical engineer or their representative during construction. Additional slope drainage and protection measures may be required in certain areas depending upon conditions observed at the time of slope construction.

6.0 GEOTECHNICAL CONSTRUCTION RECOMMENDATIONS

6.1 SITE PREPARATION

Initial site development should include the removal of any former or existing foundations, and all of the existing utility lines that are to be abandoned below finished grades. The resulting excavations should be backfilled with compacted structural fill as recommended in a subsequent section of this report. It should be noted that as with any site where previous construction has occurred, there is some potential of encountering construction debris, unknown fills, or isolated soft soils in areas adjacent to the previous construction, in unexplored portions of the project, or in areas affected by demolition activities. As such, close observation of subgrade conditions should be performed across the site, especially in areas of the previously-razed structures. Additionally, if any abandoned or open pipes/conduits are to be left in-place, they should be bulk-

headed or grouted as they may serve as conduits for subsurface erosion. After clearing and grubbing, all surficial organic soils, roots, vegetation, and any other deleterious materials should be stripped from structure and pavement areas. The stripping should extend a distance of at least 5 feet beyond grading limits.

Following the stripping of deleterious material from proposed structural areas, the exposed subgrade soils at the finished subgrade level and in fill sections should be proofrolled with a loaded tandem-axle dump truck, scraper, or other similar type of construction equipment, to give an indication as to the stability of the subgrade soils. The proofroll operations should be observed by a geotechnical engineer or their representative. If proofrolling reveals unstable conditions, the method of repair should be as directed by the project geotechnical engineer. Methods of repair may include, but are not necessarily limited to: drying and re-compaction; undercutting and replacement with suitable structural fill; use of geo-textiles and/or geo-grids with select fill; use of lime stabilization; or other methods deemed appropriate by the project geotechnical engineer.

As previously indicated, very loose/soft to soft soils (SPT N-values of 4 bpf or less) were encountered in the upper 2 to 3.5 feet of the soil profile in borings B-1, B-2, B-3, B-5, and B-8. Similar layers of very soft to soft soils may be encountered in unexplored areas of the planned development. Upon final grade determination, low-consistency soils present at finished subgrade (e.g., roadway and building pad subgrades) will require undercutting and repair as outlined in this report.

As previously indicated, highly plastic soils were encountered in boring B-1. Highly plastic silts and clays (MH and CH) are considered poor material for use as structural fill and poor material for direct support of building foundations, slabs, and roadways. As such, if these soils are encountered in cut areas, it is generally recommended that they be used in non-load bearing areas or in the lower portion of deeper fills provided they can be properly placed and compacted. The highly plastic soils are also not desirable subgrade soils, and if present at finished subgrade, undercutting and repair with low-plasticity materials will generally be recommended to create suitable subgrades for pavements and structures.

Depending upon the time of year grading is performed, some of the excavated soils may require moisture conditioning (most likely drying of wet soils, but possibly wetting of dry soils) to be successfully used as compacted structural fill. The most common method of soil drying is by discing and manipulating soil, which is most-readily accomplished during the seasonally dry periods of the year. Other methods of drying include mixing with drier soils, use of lime or cement, and mechanical heating.

6.2 STRUCTURAL FILL PLACEMENT AND COMPACTION

If on-site soils are to be used for structural fill, the low plasticity soils (USCS – SM, SC, and CL) are generally considered fair to good materials for use as structural earth fill. As previously indicated, a majority of the soil samples were described in a moist condition. However, two borings encountered predominantly wet soils, therefore some moisture conditioning may be required (i.e., drying of wet soils) prior to being used as structural fill. As such, it is recommended that earthwork be performed during the summer months when weather conditions are more conducive to moisture conditioning of fill materials.

Higher plasticity soils (USCS – CH and MH) are generally considered poor material for use as structural fill and are considered poor material for direct support of the building foundations, slabs and roadways. As such, if highly plastic soils are encountered in cut areas, it is generally recommended that they be used in the lower portion of deeper fills, provided they can be properly placed and compacted.

If soils are required to be imported to the site to achieve finished grades, F&R recommends that a qualified geotechnical engineer or their representative approve the suitability of the imported soils prior to their delivery to the site. Imported structural fill should consist of low plasticity soil (LL<35, PI<20), have a maximum dry density of at least 100 pcf, and be free of organic and other deleterious materials.

All structural earth fill should be compacted at a moisture content within ±3 percentage points of the optimum moisture content. In areas of the site where conventional pavements will be

utilized, the structural earth fill (i.e., fill placed in load bearing areas or slopes) should be placed in loose lifts not exceeding 8 inches and be compacted to at least 95 percent of the Standard Proctor maximum dry density as determined by ASTM D698. The top 12 inches of fill should be compacted to at least 100 percent of the Standard Proctor maximum dry density. All areas requiring grade increases that are steeper than a slope of 4H:1V should be plowed, stepped, and leveled to assure that fill is placed on near-level surfaces. All structural fill material should be placed and compacted under the full-time control and supervision of a qualified geotechnical engineer or their representative. The placement and compaction of all fill material should be tested at frequent intervals to confirm the recommended degree of compaction is achieved.

As previously stated, the on-site soils have sufficient clay and silt content to render them moisture sensitive. The on-site soils will become unstable (i.e., pump and rut) during normal construction activities when in the presence of excess moisture. Soils with a moisture content greater than 3 percentage points above the optimum moisture content are generally considered to have excessive moisture, and soil with a moisture content more than 3 percentage points below the optimum moisture content are generally considered to be dry. During earthwork and construction activities, surface-water runoff must be drained away from the construction areas to prevent water from ponding on or saturating the soils within excavations or on subgrades. Due to the moisture sensitivity of the on-site soils and potential for wet conditions, it is typically recommended that earthwork operations be performed during the seasonally-drier months (typically May to October) when weather conditions are more-conducive to moisture conditioning of earth fill (e.g., drying) and achieving proper compaction of structural fill. If earthwork is performed during the seasonally-wet months, additional subgrade undercutting and repair will likely be required and it may be difficult to properly compact structural fill.

6.3 PWR AND HARD ROCK EXCAVATION

As previously mentioned, PWR was encountered in five (5) borings, at depths ranging from 2 to 5.4 feet below the existing ground surface. Additionally, auger refusal materials were encountered in five (5) borings, at depths ranging from 3.3 to 5.4 feet below the existing ground

surface. As such, it is possible that PWR and hard rock excavation may be necessary during mass grading activities to establish proposed subgrades, to install utility lines, and possibly during foundation excavation. If PWR is encountered in mass grading areas, heavy excavating equipment with ripping tools (e.g., D-8 dozer with single shank ripper) is typically effective in removing softer PWR (i.e., PWR with N-values of 50/6" to 50/3"). Removal of harder PWR (i.e., PWR with N-values of 50/2" to 50/0") and hard rock during mass grading in open areas will not likely be possible with ripping equipment and will require hammering, chipping, or blasting.

It is possible that removal of softer PWR from confined excavations (e.g., utility excavations) may be accomplished using a large track hoe (e.g., CAT 330 with new rock teeth); however, excavation will likely be slow, and blasting is typically performed to pre-loosen the PWR. Removal of harder PWR in confined excavations will likely not be possible with conventional equipment and typically requires blasting. The speed and ease of PWR and rock excavation will depend upon the equipment utilized, experience of the equipment operators, and geologic structure of the materials.

General excavation should first be attempted with conventional earthwork equipment including ripping with a D-8 dozer and/or large track hoe. In areas where this equipment is not successful in removing weathered rock material, the owner and geotechnical engineer should be contacted to verify that such materials cannot be excavated with heavy construction equipment. Materials that cannot be removed economically through the use of conventional earthwork equipment and ripping will likely require blasting or use of a ram hoe attachment to the excavation equipment to loosen the rock for removal.

6.4 PAVEMENT CONSTRUCTION

Pavement subgrades should be prepared as outlined in previous sections of this report. Proofrolling of the pavement subgrades, and placement of ABC base course and asphalt surface courses, should be observed, tested, and approved by the project geotechnical engineer. All base course stone beneath flexible pavement should be compacted to at least 100 percent of the

modified Proctor maximum dry density (ASTM D1557). We emphasize that good base course drainage is essential for successful pavement performance. The ABC stone should be maintained in a drained condition at all times. Water build-up in the base course could result in premature pavement failures. Proper drainage may be aided by grading the site such that surface water is directed away from pavements and by the construction of swales adjacent to pavements. All pavements should be graded such that surface water is directed towards the outer limits of the paved area or to catch basins located such that surface water does not remain on the pavement.

Flexible asphalt pavements and bases should be constructed in accordance with the guidelines of the latest applicable NCDOT Standard Specifications for Roads and Structures. Materials, weather limitations, placement and compaction are specified under appropriate sections of this publication.

6.5 DEWATERING

As previously mentioned, stabilized groundwater was encountered in two (2) borings, B-5 and B-6, at depths of 2.4 and 7.6 feet below the existing ground surface, respectively. Additionally, wet soil conditions were encountered in borings B-5 and B-6, from depths of 2 to 10 feet and 6.5 to 10 feet below the existing ground surface. As such, it is possible that wet soils and/or groundwater may be encountered during earthwork and/or utility installation at the site, and dewatering may be necessary to maintain drained, stable excavations, and to prevent softening/loosening of the excavation subgrades. The groundwater should be lowered to a depth of at least 3 to 4 feet below the bottom elevation of proposed excavations prior to construction. However, groundwater elevations will likely vary throughout the year, and will be elevated especially during the seasonally-wet months (October through April). If groundwater is encountered, dewatering may be possible by utilizing sump and pumping techniques. During periods of inclement weather, sump pits and pumping may not be sufficient to control both groundwater and surface water, and more extensive drainage/dewatering measures may be required. The method of surface water and groundwater control should be determined and designed by the contractor, but may require well points, sheet piling, or other means.

It should be noted that if groundwater levels are not effectively maintained below the base of the excavations during construction, unstable and loosened subgrade conditions could develop, which may cause excessive settlements to develop beneath utilities or require additional subgrade repair (e.g., densification, undercutting & replacement with washed stone, etc.). Therefore, efforts should be incorporated in the construction sequence to properly control groundwater levels prior to, and during, construction. Additionally, it is recommended that only excavation contractors experienced in similar excavations and groundwater control should be allowed to perform this work.

6.6 Slope Construction Recommendations

Fill slopes should be prepared as outlined in sections 6.1 and 6.2 of this report. Fill slopes should be over built at least 1-foot and then cut back to assure the slope face consists of well-compacted material. The slopes should be vegetated as soon as possible to minimize surface sloughing and erosion. However, seepage and surface runoff may cause the slopes to slough and erode resulting in shallow surface failures. A swale or shallow ditch should be constructed near the top of slopes to prevent surface water from flowing onto the slopes. We recommend that all cut and fill slopes be observed by a geotechnical engineer or their representative during construction. Slope maintenance and stabilization to prevent surface sloughs and erosion may be difficult on slopes graded at 2H:1V or steeper. Additional slope drainage and protection/stabilization measures (e.g., high-performance turf reinforcement matting) may be required in certain areas depending upon conditions observed at the time of slope construction.

6.7 Temporary Excavations

Mass excavations and other excavations required for construction of this project must be performed in accordance with the United States Department of Labor, Occupational Safety and Health Administration (OSHA) guidelines (29 CFR 1926, Subpart P, Excavations) or other applicable jurisdictional codes for permissible temporary side-slope ratios and/or shoring requirements. The OSHA guidelines require daily inspections of excavations, adjacent areas, and protective systems by a “competent person” for evidence of situations that could result in cave-

ins, indications of failure of a protective system, or other hazardous conditions. All excavated soils, equipment, building supplies, etc., should be placed away from the edges of excavations at a distance equaling or exceeding the depth of the excavation. F&R cautions that actual excavation slopes will need to be evaluated frequently each day by the "competent person" and flatter slopes or the use of shoring may be required to maintain a safe excavation depending upon excavation-specific circumstances. The contractor is responsible for providing the "competent person" and all aspects of site excavation safety. F&R can evaluate specific excavation slope situations if we are informed and requested to by the owner, designer, or contractor's "competent person".

7.0 CONTINUATION OF SERVICES

As previously discussed, the geotechnical engineer of record should be retained to monitor and test earthwork activities and subgrade preparations for slopes, foundations, and pavements. It should be noted that the actual soil conditions at the various subgrade levels will vary across this site and thus the presence of the geotechnical engineer and/or their representative during construction will serve to validate the subsurface conditions and recommendations presented in this report.

We recommend that F&R be retained to monitor the earthwork and pavement construction, and to report that the recommendations contained in this report are completed in a satisfactory manner. Our continued involvement on the project will aid in the proper implementation of the recommendations discussed herein. The following is a recommended scope of services:

- Review of project plans and construction specifications to verify that the recommendations presented in this report have been properly interpreted and implemented;
- Development of allowance quantities for various anticipated subgrade repairs;
- Observe the earthwork process to document that subsurface conditions encountered during construction are consistent with the conditions anticipated in this report;
- Observe the subgrade conditions before placing structural fill including proofroll observations;

- Observe the placement and compaction of any structural fill and backfill, and perform laboratory and field compaction testing of the fill;
- Observe proofrolling of pavement subgrades and perform field density testing of base course layer; and,
- Observe asphalt placement, including compaction and rolling patterns, temperature monitoring, and cleaning and tacking, and perform field compaction testing of asphalt pavements using a nuclear density gauge.

8.0 LIMITATIONS

This report has been prepared for the exclusive use of benesch and/or their agents for specific application to the referenced project in accordance with generally-accepted soil and foundation engineering practices. No other warranty, express or implied, is made. Our evaluations and recommendations are based on design information furnished to us, the data obtained from the previously-described subsurface exploration program, and generally-accepted geotechnical engineering practice. The evaluations and recommendations do not reflect variations in subsurface conditions, which could exist intermediate of the boring locations or in unexplored areas of the site. Should such variations become apparent during construction, it will be necessary to re-evaluate our recommendations based upon our on-site observations of the conditions.

There are important limitations to this and all geotechnical studies. Some of these limitations are discussed in the information prepared by GBA, which is included in Appendix IV. We ask that you please review this information.

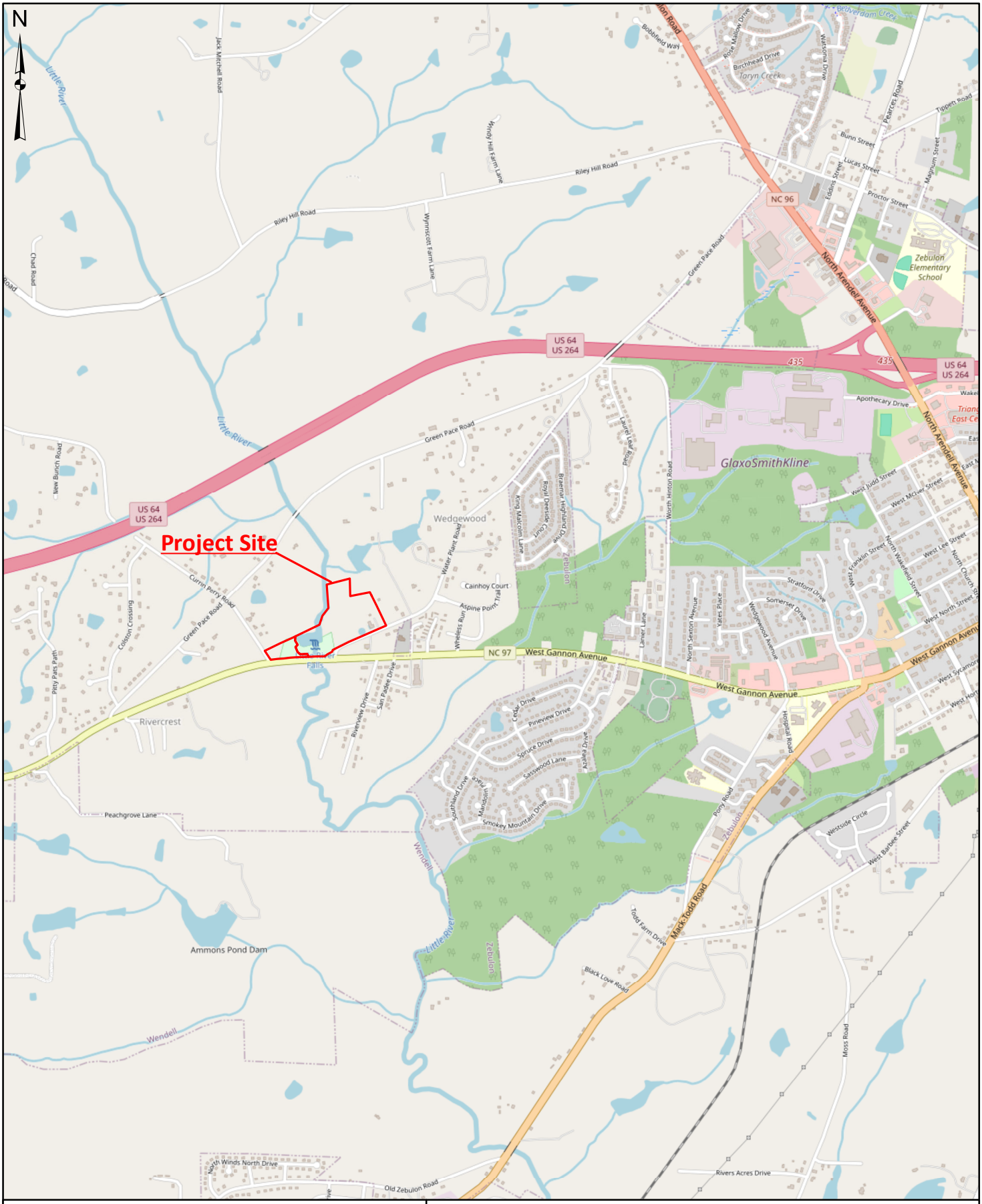
Regardless of the thoroughness of a subsurface exploration, there is the possibility that conditions between borings will differ from those at the boring locations, that conditions are not as anticipated by the designers, or that the construction process has altered the soil conditions. Therefore, experienced geotechnical engineers should evaluate earthwork, pavement, and foundation construction to verify that the conditions anticipated in design actually exist.

Otherwise, we assume no responsibility for construction compliance with the design concepts, specifications, or recommendations.

In the event that changes are made in the design or location of the proposed structures, the recommendations presented in this report shall not be considered valid unless the changes are reviewed by our firm and conclusions of this report modified and/or verified in writing. If this report is copied or transmitted to a third party, it must be copied or transmitted in its entirety, including text, attachments, and enclosures. Interpretations based on only a part of this report may not be valid.

APPENDIX I

FIGURES



Site Vicinity Map

0 500 1,000 2,000 3,000 4,000 Feet

FROEHLING & ROBERTSON
Engineering Stability Since 1881
310 Hubert Street
Raleigh, North Carolina 27603
T 919.828.3441

Client:	Benesch
Project:	Little River Park
Location	Zebulon, Wake County, NC
Project Number:	66C-0145
Data:	Open Street
Date:	December 2024
Scale:	1 inch = 2,000 feet

FIGURE No.: 1

Boring Location Plan

0 75 150 300 450 600 Feet

N

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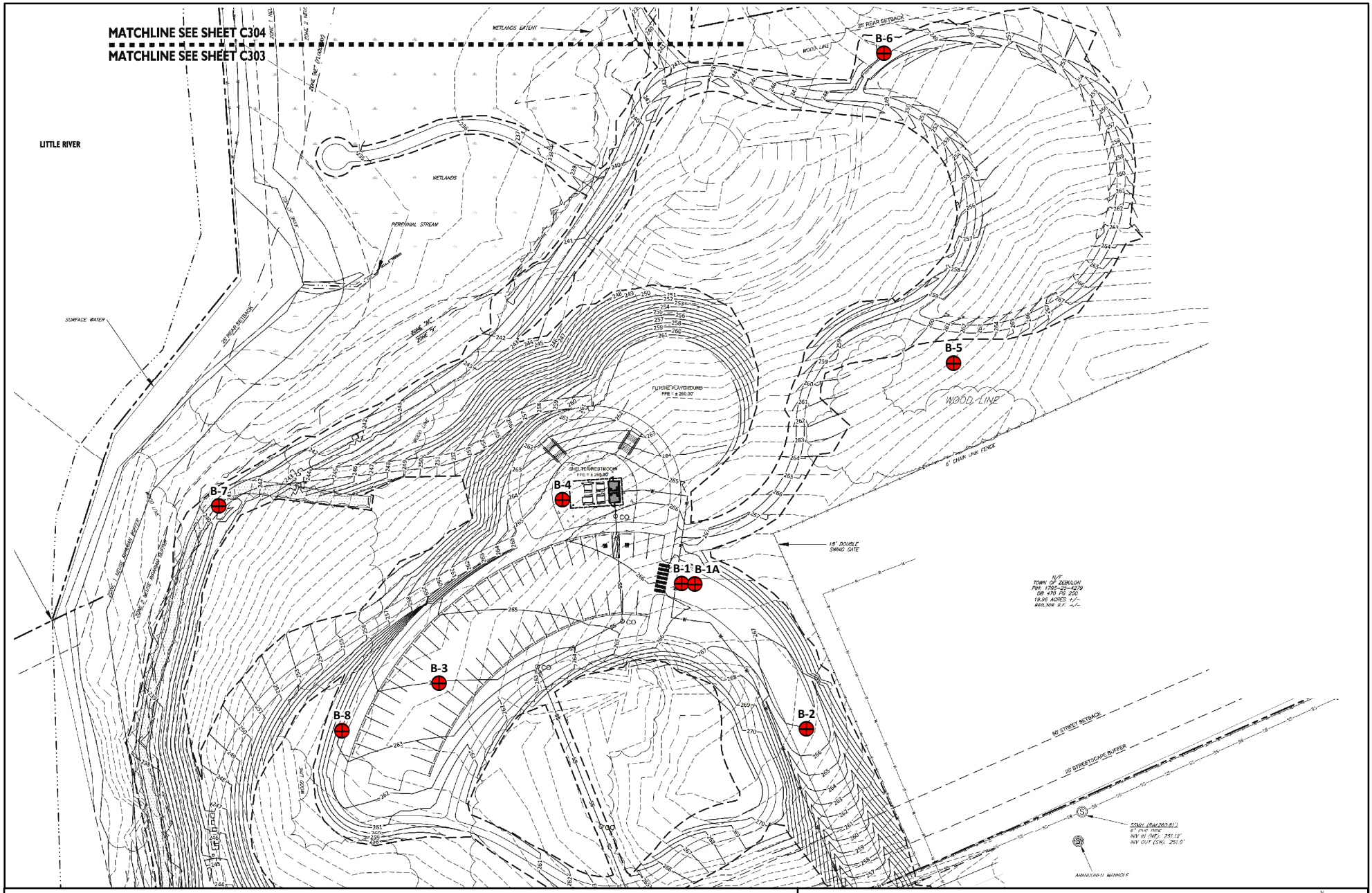
310 Hubert Street
Raleigh, North Carolina 27603
T 919.828.3441

Client:	Benesch		
Project:	Little River Park		
Location	Zebulon, Wake County, NC		
Project Number:	66C-0145		FIGURE No.: 2
Data:	NCOne Map Parcel 2024/Aerial 2021		
Date:	December 2024	Scale: 1 inch = 300 feet	



Boring Location Plan

0 25 50 100 150 200 Feet

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310 Hubert Street
Raleigh, North Carolina 27603
T 919.828.3441

Client:	Benesch	
Project:	Little River Park	
Location	Zebulon, Wake County, NC	
Project Number:	66C-0145	FIGURE No.: 2A
Data:	NCOne Map Parcel 2024/Aerial 2021	
Date:	December 2024	Scale: 1 inch = 100 feet

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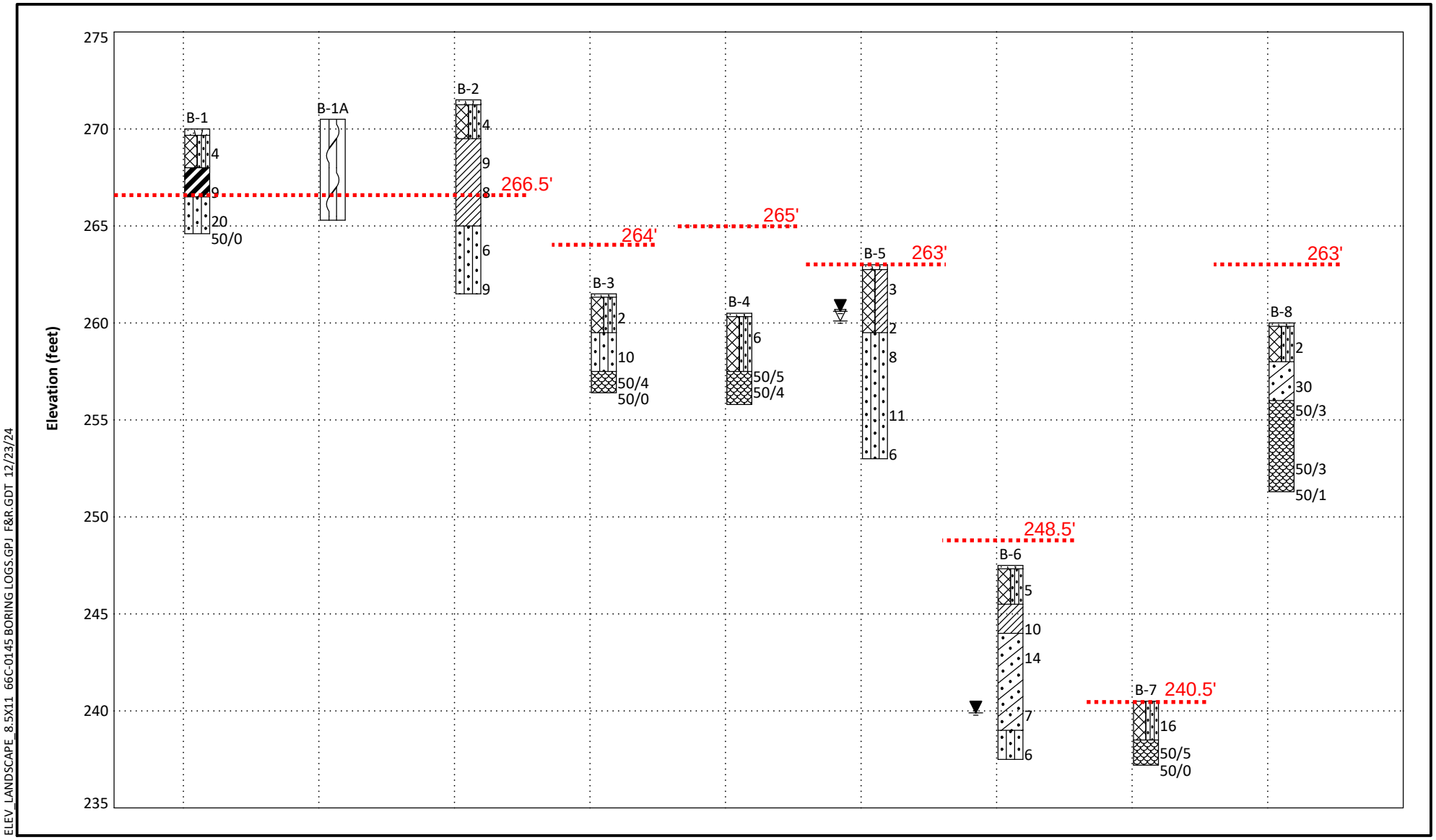
SUBSURFACE PROFILE

Plot Based on Elevation
Profile Name: Figure No. 3

Project No: 66C-0145
Client: benesch
Project: Little River Park
City/State: Zebulon, NC

= Proposed Finished Grade



ELEV_LANDSCAPE_8.5X11 66C-0145 BORING LOGS.GPJ F&R.GDT 12/23/24

APPENDIX II

BORING LOGS

Table of Boring Coordinates

Little River Park
F&R Project No. 66C-0145

Boring ID	Northing (Y)	Easting (X)
B-1	2192604	755278
B-2	2192698	755169
B-3	2192421	755203
B-4	2192514	755341
B-5	2192808	755444
B-6	2192756	755677
B-7	2192255	755336
B-8	2192348	755167

KEY TO SOIL CLASSIFICATION

Correlation of Penetration Resistance with Relative Density and Consistency

Sands and Gravels

No. of Blows, N	Relative Density
0 - 4	Very loose
5 - 10	Loose
11 - 30	Medium dense
31 - 50	Dense
Over 50	Very dense

Silts and Clays

No. of Blows, N	Relative Density
0 - 2	Very soft
3 - 4	Soft
5 - 8	Firm
9 - 15	Stiff
16 - 30	Very stiff
31 - 50	Hard
Over 50	Very hard

Particle Size Identification (Unified Classification System)

Boulders:	Diameter exceeds 8 inches
Cobbles:	3 to 8 inches diameter
Gravel:	**Coarse** - 3/4 to 3 inches diameter **Fine** - 4.76 mm to 3/4 inch diameter
Sand:	**Coarse** - 2.0 mm to 4.76 mm diameter **Medium** - 0.42 mm to 2.0 mm diameter **Fine** - 0.074 mm to 0.42 mm diameter
Silt and Clay:	Less than 0.07 mm (particles cannot be seen with naked eye)

Modifiers

The modifiers provide our estimate of the amount of silt, clay or sand size particles in the soil sample.

Approximate Content	Modifiers
≤ 5%:	Trace
5% to 12%:	Slightly silty, slightly clayey, slightly sandy
12% to 30%:	Silty, clayey, sandy
30% to 50%:	Very silty, very clayey, very sandy

Field Moisture Description	
Saturated:	Usually liquid; very wet, usually from below the groundwater table
Wet:	Semisolid; requires drying to attain optimum moisture
Moist:	Solid; at or near optimum moisture
Dry:	Requires additional water to attain optimum moisture

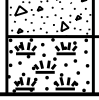
Ground Water

▽ Water Level in Bore Hole Immediately after Drilling

▼ Static Water Level after 24 Hours

SINCE F&R 1881

UNIFIED SOIL CLASSIFICATION SYSTEM (USCS)

MAJOR DIVISION				TYPICAL NAMES
GRAVELS More than 50% of coarse fraction larger than No. 4 sieve	CLEAN GRAVEL (little or no fines)		GW	Well graded gravels
			GP	Poorly graded gravels
	GRAVELS with fines		GM	Silty gravels
			GC	Clayey gravels
SANDS More than 50% of coarse fraction smaller than No. 4 sieve	CLEAN SAND (little or no fines)		SW	Well graded sands
			SP	Poorly graded sands
	SAND with fines		SM	Silty sands, sand/silt mixtures
			SC	Clayey sands, sand/clay mixtures
SILTS AND CLAYS Liquid Limit is less than 50			ML	Inorganic silts, sandy and clayey silts with slightly plasticity
			CL	Sandy or silty clays of low to medium plasticity
			OL	Organic silts of low plasticity
SILTS AND CLAYS Liquid Limit is greater than 50			MH	Inorganic silts, sandy micaceous or clayey elastic silts
			CH	Inorganic clays of high plasticity, fat clays
			OH	Organic clays of medium to high plasticity
HIGHLY ORGANIC SOILS			PT	Peat and other highly organic soils
MISCELLANEOUS MATERIALS				PWR (Partially Weathered Rock)
				Rock
				Asphalt
				ABC Stone
				Concrete
				Surficial Organic Soil

FROEHLING & ROBERTSON
Engineering Stability Since 1881

BORING LOG

Boring: B-1 (1 of 1)

Project No: 66C-0145
Client: benesch
Project: Little River Park
City/State: Zebulon, NC

Elevation: 270 ±
Total Depth: 5.4'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" I.D. HSA
Hammer Type: Automatic
Date Drilled: 11/26/24
Driller: A. Sturchio

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
269.7	0.3	SURFICIAL ORGANIC SOIL	1-1-3	0.0	4	GROUNDWATER DATA 0-Hr: Dry, Caved at 3.6' 24-Hr: Dry, Caved at 3.0'
		POSSIBLE FILL: Sampled as Very Loose, Brown, Moist, Silty Fine to Coarse SAND (SM)		1.5		
268.0	2.0		3-4-5	2.0	9	
		RESIDUAL: Stiff, Brown and Orange, Moist, Fine Sandy CLAY (CH) with Trace Roots		3.5		
266.5	3.5		3-4-16		20	
		Medium Dense, White, Brown, and Orange, Moist, Silty Fine to Coarse SAND (SM) with Some Clay		5.0		
264.6	5.4		50/0	5.4	100+	
		Boring Terminated by Auger Refusal at 5.4 feet				

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

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BORING LOG

Boring: B-1A (1 of 1)

Project No: 66C-0145
Client: benesch
Project: Little River Park
City/State: Zebulon, NC

Elevation: 270.5 ±
Total Depth: 5.2'
Boring Location: Offset 10' E of B-1

Drilling Method: 2.25" I.D. HSA
Hammer Type: Automatic
Date Drilled: 11/26/24
Driller: A. Sturchio

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
		Auger Only to 5.2 feet				
265.3	5.2	Boring Terminated by Auger Refusal at 5.2 feet				

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

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Engineering Stability Since 1881

BORING LOG

Boring: B-2 (1 of 1)

Project No: 66C-0145
Client: benesch
Project: Little River Park
City/State: Zebulon, NC

Elevation: 271.5 ±
Total Depth: 10.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" I.D. HSA
Hammer Type: Automatic
Date Drilled: 11/26/24
Driller: A. Sturchio

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
271.3	0.3	SURFICIAL ORGANIC SOIL	1-1-3	0.0	4	GROUNDWATER DATA 0-Hr: Dry inside PVC 24-Hr: Dry inside PVC
		POSSIBLE FILL: Sampled as Very Loose, Orange and Brown, Moist, Silty Fine to Coarse SAND (SM) with Trace Clay		1.5		
269.5	2.0		3-4-5	2.0	9	
		RESIDUAL: Firm to Stiff, Orange, Brown, and Tan, Moist, Fine to Coarse Sandy CLAY (CL) with Trace Mica	3-3-5	3.5		
				5.0	8	
265.0	6.5	Loose, Tan and Black, Moist, Silty Fine to Medium SAND (SM) with Trace Mica	2-3-3	6.5		
				8.0	6	
			4-4-5	8.5		
261.5	10.0			10.0	9	
		Boring Terminated at 10 feet				

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON
Engineering Stability Since 1881

BORING LOG

Boring: B-3 (1 of 1)

Project No: 66C-0145
Client: benesch
Project: Little River Park
City/State: Zebulon, NC

Elevation: 261.5 ±
Total Depth: 5.1'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" I.D. HSA
Hammer Type: Automatic
Date Drilled: 11/25/24
Driller: A. Sturchio

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
261.3	0.2	SURFICIAL ORGANIC SOIL	1-1-1	0.0	2	GROUNDWATER DATA 0-Hr: Dry, Caved at 3.1' 24-Hr: Dry, Caved at 3.1'
		FILL: Sampled as Very Loose, Brown, Moist, Silty Fine to Medium SAND (SM) with Trace Roots		1.5		
259.5	2.0	RESIDUAL: Loose, Orange and Black, Moist, Silty Fine to Coarse SAND (SM) with Trace Clay and Mica	4-5-5	2.0	10	
				3.5		
257.5	4.0	PARTIALLY WEATHERED ROCK: Sampled as Brown and Orange, Moist, Silty Fine to Medium SAND with Trace Clay and Mica	34-50/4	4.3	100+	
256.4	5.1	Boring Terminated by Auger Refusal at 5.1 feet	50/0	5.1	100+	

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON
Engineering Stability Since 1881

BORING LOG

Boring: B-4 (1 of 1)

Project No: 66C-0145
Client: benesch
Project: Little River Park
City/State: Zebulon, NC

Elevation: 260.5 ±
Total Depth: 4.7'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" I.D. HSA
Hammer Type: Automatic
Date Drilled: 11/26/24
Driller: A. Sturchio

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
260.3	0.2	SURFICIAL ORGANIC SOIL	2-3-3	0.0	6	GROUNDWATER DATA 0-Hr: Dry, Caved at 2.8' 24-Hr: Dry, Caved at 2.9'
		POSSIBLE FILL: Sampled as Loose, Brown, Moist, Silty Fine to Medium SAND (SM)		1.5		
			5-9-50/5	2.0		
257.5	3.0	PARTIALLY WEATHERED ROCK: Sampled as Orange, Brown, and Tan, Moist, Silty Fine to Medium SAND with Trace Mica	50/4	3.4	100+	
255.8	4.7	Boring Terminated by Auger Refusal at 4.7 feet		4.7	100+	

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

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Engineering Stability Since 1881

BORING LOG

Boring: B-5 (1 of 1)

Project No: 66C-0145
Client: benesch
Project: Little River Park
City/State: Zebulon, NC

Elevation: 263 ±
Total Depth: 10.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" I.D. HSA
Hammer Type: Automatic
Date Drilled: 11/26/24
Driller: A. Sturchio

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
262.8	0.3	SURFICIAL ORGANIC SOIL	1-1-2	0.0	3	GROUNDWATER DATA 0-Hr: 2.9', Caved at 3.7' 24-Hr: 2.4', Caved at 3.0'
		FILL: Sampled as Very Soft to Soft, Brown, Orange, and Gray, Moist to Wet, Fine Sandy CLAY (CL) with Trace Fine Gravel, Mica, and Roots		1.5		
			1-1-1	2.0	2	
259.5	3.5	Wet from 2-3.5'	2-3-5	3.5	8	
		RESIDUAL: Loose to Medium Dense, Orange and Tan, Wet, Silty Fine to Coarse SAND (SM) with Trace Clay and Mica		5.0		
			5-5-6	6.5	11	
				8.0		
			2-2-4	8.5	6	
253.0	10.0	Boring Terminated at 10 feet		10.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

FROEHLING & ROBERTSON
Engineering Stability Since 1881

BORING LOG

Boring: B-6 (1 of 1)

Project No: 66C-0145
Client: benesch
Project: Little River Park
City/State: Zebulon, NC

Elevation: 247.5 ±
Total Depth: 10.0'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" I.D. HSA
Hammer Type: Automatic
Date Drilled: 11/26/24
Driller: A. Sturchio

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
247.3	0.2	SURFICIAL ORGANIC SOIL	1-2-3	0.0	5	GROUNDWATER DATA 0-Hr: Dry inside PVC 24-Hr: 7.6' inside PVC
		FILL: Sampled as Loose, Brown and Orange, Moist, Silty Fine to Medium SAND (SM) with Trace Wood Fragments		1.5		
245.5	2.0		3-4-6	2.0	10	
244.0	3.5	RESIDUAL: Stiff, Gray and Orange-Brown, Moist, Fine Sandy CLAY (CL)	5-5-9	3.5	14	Sample noted to have a chemical odor
		Loose to Medium Dense, Gray and Brown, Moist to Wet, Clayey Fine to Coarse SAND (SC) with Trace Mica and Fine Quartz/Feldspar Fragments Wet from 6.5-8'		5.0		
			2-3-4	6.5	7	
				8.0		
239.0	8.5	Loose, Orange, Brown, and Gray, Wet, Silty Fine to Coarse SAND (SM) with Trace Mica	2-2-4	8.5	6	
237.5	10.0	Boring Terminated at 10 feet		10.0		

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

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Engineering Stability Since 1881

BORING LOG

Boring: B-7 (1 of 1)

Project No: 66C-0145
Client: benesch
Project: Little River Park
City/State: Zebulon, NC

Elevation: 240.5 ±
Total Depth: 3.3'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" I.D. HSA
Hammer Type: Automatic
Date Drilled: 11/25/24
Driller: A. Sturchio

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
		FILL: Sampled as Medium Dense, Dark Brown and Orange, Moist, Silty Fine to Coarse SAND (SM) with Some Fine Gravel and Trace Clay	6-7-9	0.0 1.5	16	GROUNDWATER DATA 0-Hr: Dry inside PVC 24-Hr: Dry inside PVC
238.5	2.0	PARTIALLY WEATHERED ROCK: Sampled as Brown and Orange, Moist, Clayey Fine to Coarse SAND with Trace Rock Fragments	50/5	2.0	100+	
237.2	3.3	Boring Terminated by Auger Refusal at 3.3 feet	50/0	3.3	100+	

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

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BORING LOG

Boring: B-8 (1 of 1)

Project No: 66C-0145
Client: benesch
Project: Little River Park
City/State: Zebulon, NC

Elevation: 260 ±
Total Depth: 8.6'
Boring Location: See Boring Location Plan

Drilling Method: 2.25" I.D. HSA
Hammer Type: Automatic
Date Drilled: 11/25/24
Driller: A. Sturchio

Elevation	Depth	Description of Materials (Classification)	* Sample Blows	Sample Depth (feet)	N-Value (blows/ft)	Remarks
259.8	0.2	SURFICIAL ORGANIC SOIL	1-1-1	0.0	2	GROUNDWATER DATA 0-Hr: Dry inside PVC 24-Hr: Dry inside PVC
		FILL: Sampled as Very Loose, Brown and Dark Brown, Moist, Silty Fine SAND (SM) with Trace Mica		1.5		
258.0	2.0		5-6-24	2.0	30	
		RESIDUAL: Medium Dense, Brown, Orange, and Black, Moist, Clayey Fine to Coarse SAND (SC) with Trace Mica and Roots	40-50/3	3.5 4.3	100+	
256.0	4.0	PARTIALLY WEATHERED ROCK: Sampled as Tan, Orange, and Black, Moist, Silty Fine to Coarse SAND with Some Clay and Trace Rock Fragments and Mica	5-50/3	6.5 7.3	100+	
251.3	8.7	Boring Terminated at 8.7 feet	50/1	8.5	100+	

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments. The sum of the second and third increments of penetration is termed the standard penetration resistance, N-Value.

APPENDIX III

LABORATORY TEST RESULTS

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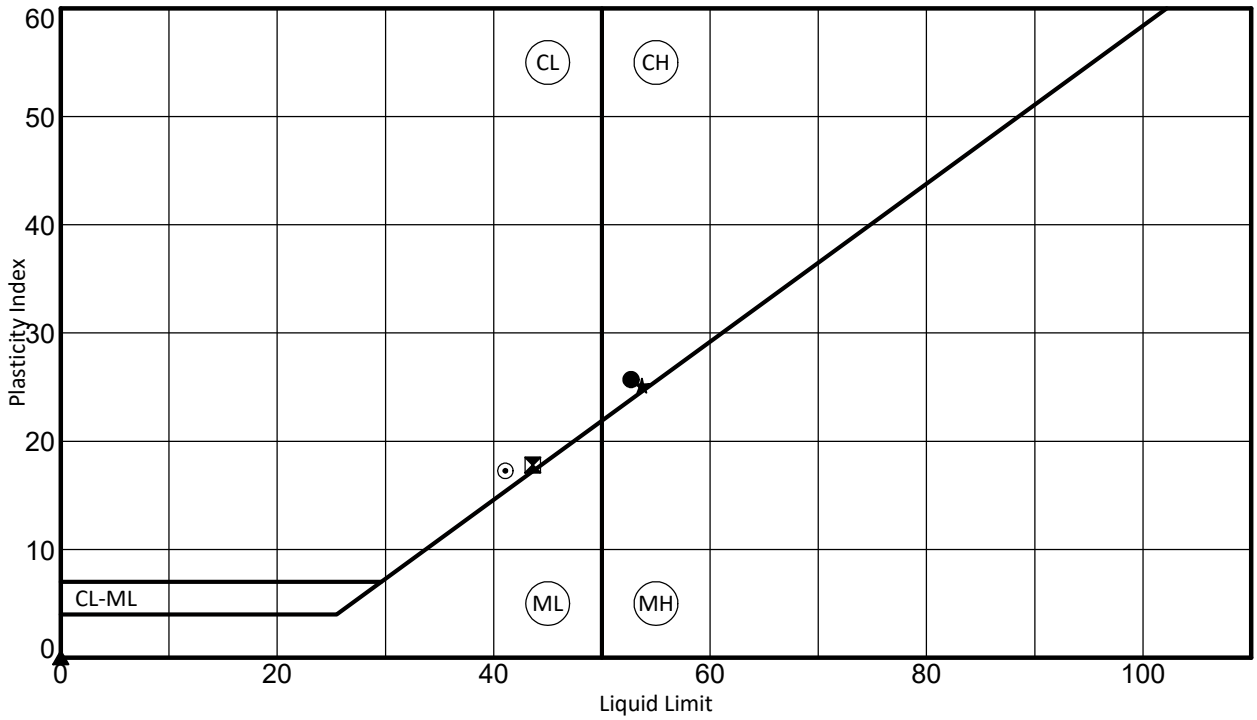
ATTERBERG LIMITS

Sheet: 1 of 1

Project No: 66C-0145
Client: Alfred Benesch & Company
Project: Little River Park
City/State: Zebulon, NC



Sample No.	Location	Depth	LL	PL	PI	% PASSING #200	Classification	% Natural Water Content
● S-2	B-1	2.0' - 3.5'	53	27	26	54.4	SANDY FAT CLAY (CH)	23.4
⊠ S-1	B-5	0.0' - 1.5'	44	26	18	52.8	SANDY LEAN CLAY (CL)	19.7
▲ S-1	B-8	0.0' - 1.5'	NP	NP	NP	17.9	SILTY SAND (SM)	11.8
★ Bulk	B-2	1.0' - 4.0'	54	29	25	48.2	CLAYEY SAND (SC)	22.2
⊙ Bulk	B-6	1.0' - 4.0'	41	24	17	39.1	CLAYEY SAND (SC)	16.7

ATTERBERG_LIMITS_USCS_W/_LOCATION LAB TESTING.GPJ F&R.GDT 12/18/24

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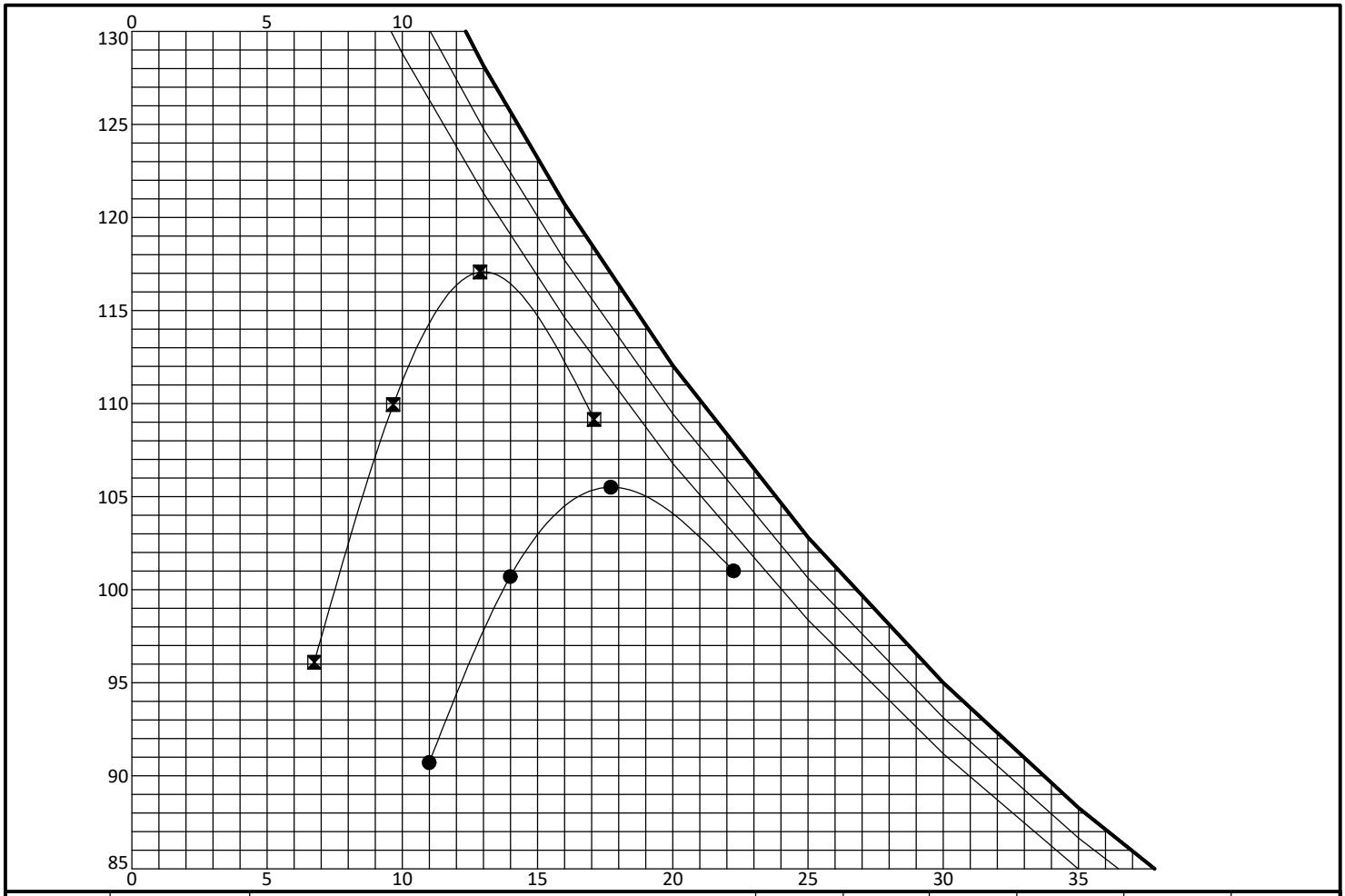
ASTM MOISTURE-DENSITY RELATIONSHIP

Project No: 66C-0145
Client: Alfred Benesch & Company
Project: Little River Park
City/State: Zebulon, NC



Sample	Depth (ft)	Classification	LL	PL	PI	% GRAVEL (+ #4)	% SAND (#4 - #200)	% FINES (- #200)
● Bulk	1.0' - 4.0'	Brown, CLAYEY SAND (SC)	54	29	25	0.1	51.7	48.2
⊠ Bulk	1.0' - 4.0'	Brown, CLAYEY SAND (SC)	41	24	17	1.0	59.9	39.1

Sample	Max Dry Density (pcf)	Optimum Moisture (%)	ASTM	Sample Location	% Oversize	Natural Moisture (%)	Sample Notes
● Bulk	105.5	17.7	D-698 A	B-2	0.0	22.2	5.5 lb. Hammer, 12" Drop
⊠ Bulk	117.1	13.1	D-698 A	B-6	0.0	16.7	5.5 lb. Hammer, 12" Drop

PROCTOR CURVE LAB TESTING.GPJ F&R.GDT 12/18/24

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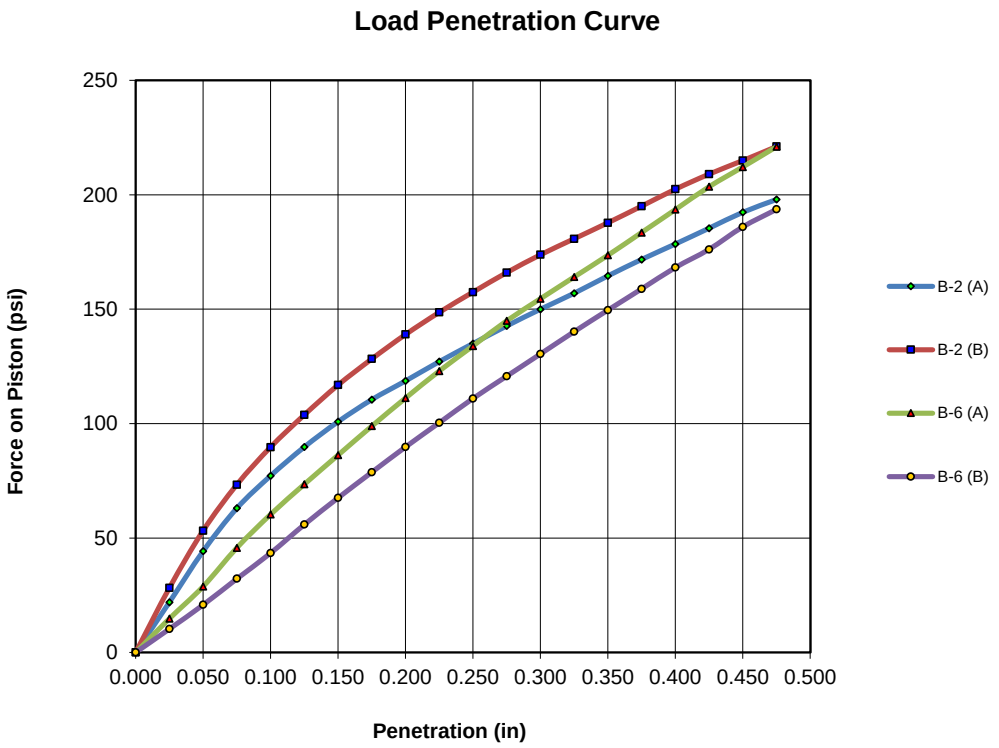
California Bearing Ratio Test Report - ASTM D-1883



SOAKED CBR TEST RESULTS					
Results	**B-2 (A)**	**B-2 (B)**	**B-6 (A)**	**B-6 (B)**	
0.1" Penetration	7.7	9.0	6.1	4.7	
0.2" Penetration	7.9	9.3	7.5	6.2	
Moisture Before Soaking (%)	17.3	17.3	13.3	13.3	
Dry Density Before Soaking (pcf)	105.2	106.0	118.1	117.8	
Moisture - Top 1" After Soaking (%)	21.9	20.0	14.5	14.8	
Surcharge Weight (lbs.)	10.0	10.0	10.0	10.0	

Project Information		**Natural Moisture (%)**		
Project Name:	Little River Park	CBR-1	22.2	
Client Name:	Benesch	CBR-2	16.7	
Project Number:	66C-0145	**Percent Swell**	**A**	**B**
Date Received:	12/18/2024	CBR-1	0.920	0.790
Project Location:	Zebulon, NC	CBR-2	0.250	0.190

Sample Information		***Proctor Test Method (ASTM D-698)***		
Sample Number	**Description**	**Max. Dry Density (pcf)**	**Optimum Moisture %**	
CBR-1	Clayey Sand	105.5	17.7	
CBR-2	Clayey Sand	117.1	13.1	
Sample Number	**Sample Location**	**USCS *(ASTM D-2487)***	**% - #200**	**% +19mm**
CBR-1	B-2	SC	48.2	-
CBR-2	B-6	SC	39.1	-

Specific Gravity		**Remarks**	
CBR-1	2.72	CBR-1	Specific Gravity Assumed
CBR-2	2.72	CBR-2	Specific Gravity Assumed

Performed By: Henry Sanchez Date: 12/19/2024

APPENDIX IV

GBA DOCUMENT

Important Information about This

Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

The Geoprofessional Business Association (GBA) has prepared this advisory to help you – assumedly a client representative – interpret and apply this geotechnical-engineering report as effectively as possible. In that way, clients can benefit from a lowered exposure to the subsurface problems that, for decades, have been a principal cause of construction delays, cost overruns, claims, and disputes. If you have questions or want more information about any of the issues discussed below, contact your GBA-member geotechnical engineer. Active involvement in the Geoprofessional Business Association exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project.

Geotechnical-Engineering Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical-engineering study conducted for a given civil engineer will not likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client. *Those who rely on a geotechnical-engineering report prepared for a different client can be seriously misled*. No one except authorized client representatives should rely on this geotechnical-engineering report without first conferring with the geotechnical engineer who prepared it. *And no one – not even you – should apply this report for any purpose or project except the one originally contemplated.*

Read this Report in Full

Costly problems have occurred because those relying on a geotechnical-engineering report did not read it *in its entirety*. Do not rely on an executive summary. Do not read selected elements only. *Read this report in full.*

You Need to Inform Your Geotechnical Engineer about Change

Your geotechnical engineer considered unique, project-specific factors when designing the study behind this report and developing the confirmation-dependent recommendations the report conveys. A few typical factors include:

- the client's goals, objectives, budget, schedule, and risk-management preferences;
- the general nature of the structure involved, its size, configuration, and performance criteria;
- the structure's location and orientation on the site; and
- other planned or existing site improvements, such as retaining walls, access roads, parking lots, and underground utilities.

Typical changes that could erode the reliability of this report include those that affect:

- the site's size or shape;
- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light-industrial plant to a refrigerated warehouse;
- the elevation, configuration, location, orientation, or weight of the proposed structure;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes – even minor ones – and request an assessment of their impact. *The geotechnical engineer who prepared this report cannot accept responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.*

This Report May Not Be Reliable

Do not rely on this report if your geotechnical engineer prepared it:

- for a different client;
- for a different project;
- for a different site (that may or may not include all or a portion of the original site); or
- before important events occurred at the site or adjacent to it; e.g., man-made events like construction or environmental remediation, or natural events like floods, droughts, earthquakes, or groundwater fluctuations.

Note, too, that it could be unwise to rely on a geotechnical-engineering report whose reliability may have been affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. *If your geotechnical engineer has not indicated an "apply-by" date on the report, ask what it should be*, and, in general, *if you are the least bit uncertain* about the continued reliability of this report, contact your geotechnical engineer before applying it. A minor amount of additional testing or analysis – if any is required at all – could prevent major problems.

Most of the "Findings" Related in This Report Are Professional Opinions

Before construction begins, geotechnical engineers explore a site's subsurface through various sampling and testing procedures. *Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing were performed*. The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgment to form opinions about subsurface conditions throughout the site. Actual sitewide-subsurface conditions may differ – maybe significantly – from those indicated in this report. Confront that risk by retaining your geotechnical engineer to serve on the design team from project start to project finish, so the individual can provide informed guidance quickly, whenever needed.

This Report's Recommendations Are Confirmation-Dependent

The recommendations included in this report – including any options or alternatives – are confirmation-dependent. In other words, *they are not final*, because the geotechnical engineer who developed them relied heavily on judgment and opinion to do so. Your geotechnical engineer can finalize the recommendations *only after observing actual subsurface conditions* revealed during construction. If through observation your geotechnical engineer confirms that the conditions assumed to exist actually do exist, the recommendations can be relied upon, assuming no other changes have occurred. *The geotechnical engineer who prepared this report cannot assume responsibility or liability for confirmation-dependent recommendations if you fail to retain that engineer to perform construction observation.*

This Report Could Be Misinterpreted

Other design professionals' misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer serve as a full-time member of the design team, to:

- confer with other design-team members,
- help develop specifications,
- review pertinent elements of other design professionals' plans and specifications, and
- be on hand quickly whenever geotechnical-engineering guidance is needed.

You should also confront the risk of constructors misinterpreting this report. Do so by retaining your geotechnical engineer to participate in prebid and preconstruction conferences and to perform construction observation.

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical-engineering report, along with any attachments or appendices, with your contract documents, *but be certain to note conspicuously that you've included the material for informational purposes only*. To avoid misunderstanding, you may also want to note that "informational purposes" means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report, but they may rely on the factual data relative to the specific times, locations, and depths/elevations referenced. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, *only* from the design drawings and specifications. Remind constructors that they may perform their own studies if they want to, and *be sure to allow enough time* to permit them to do so. Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

Read Responsibility Provisions Closely

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely*. Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The personnel, equipment, and techniques used to perform an environmental study – e.g., a "phase-one" or "phase-two" environmental site assessment – differ significantly from those used to perform a geotechnical-engineering study. For that reason, a geotechnical-engineering report does not usually relate any environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated subsurface environmental problems have led to project failures*. If you have not yet obtained your own environmental information, ask your geotechnical consultant for risk-management guidance. As a general rule, *do not rely on an environmental report prepared for a different client, site, or project, or that is more than six months old.*

Obtain Professional Assistance to Deal with Moisture Infiltration and Mold

While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, none of the engineer's services were designed, conducted, or intended to prevent uncontrolled migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, ***proper implementation of the geotechnical engineer's recommendations will not of itself be sufficient to prevent moisture infiltration.*** Confront the risk of moisture infiltration by including building-envelope or mold specialists on the design team. ***Geotechnical engineers are not building-envelope or mold specialists.***

GEOPROFESSIONAL BUSINESS ASSOCIATION

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SECTION 01100 - SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Work covered by the Contract Documents.
2. Type of the Contract.
3. Work phases.
4. Work under other contracts.
5. Products ordered in advance.
6. Owner-furnished products.
7. Use of premises.
8. Owner's occupancy requirements.
9. Work restrictions.
10. Specification formats and conventions.

1.3 WORK COVERED BY CONTRACT DOCUMENTS

A. Project Identification:

1. Project Location: 1800 West Gannon Avenue
   Zebulon, North Carolina

B. Owner: Town of Zebulon

C. Engineer: Alfred Benesch & Company, Inc., 8000 Regency Parkway, Suite 110, Cary, NC 27518.

D. The Work consists of the following:

1. Construction and/or installation including project management, coordination,

scheduling, site clearing and grubbing, selective demolition, staking, layout, erosion control, earthwork, storm sewer, utilities, concrete, asphalt, landscaping, pre-engineered restroom facility and shelter, site furnishings, landscaping and ancillary work illustrated in the contract documents.

1.4 TYPE OF CONTRACT

A. Project will be constructed under a single prime contract.

1.5 PERMITS AND INSPECTIONS

A. The Architect has applied for permits and received approval from the following local and state authorities. The contractor shall remain responsible for any other required permits and regulatory approvals.

a.	Wake County	Watershed Management Construction Plan Approval
b.	Town of Zebulon	Zoning and Site Plan
c.	Town of Zebulon	Floodplain Development Permit
d.	NCDEQ	Sedimentation & Erosion Control
e.	NCDOT	Driveway Permit
f.	NCDOT	Encroachment Agreement

B. Permits: The Contractor shall contact each permitting authority and arrange to secure the permits.

a.	Town of Zebulon	Building Permit

1.6 OWNER-FURNISHED PRODUCTS

A. Owner will furnish products indicated. The Work includes providing support systems to receive Owner's equipment**.**

1. Owner will arrange for and deliver Shop Drawings and Product Data to Contractor.
2. Owner will arrange and pay for delivery of Owner-furnished items.
3. After delivery, Owner will inspect delivered items for damage. Contractor shall be present for and assist in Owner's inspection.
4. If Owner-furnished items are damaged, defective, or missing, Owner will arrange for replacement.
5. Owner will arrange for manufacturer's field services and for delivery of manufacturer's warranties to Contractor.
6. Owner will furnish Contractor the earliest possible delivery date for Owner-furnished products. Using Owner-furnished earliest possible delivery dates, Contractor shall designate delivery dates of Owner-furnished items in Contractor's Construction Schedule.
7. Contractor shall review Shop Drawings and Product Data and return them to Engineer noting discrepancies or anticipated problems in use of product.
8. Contractor is responsible for receiving, unloading, and handling Owner-furnished

items at Project site.

9. Contractor is responsible for protecting wner-furnished items from damage during storage and handling, including damage from exposure to the elements.
10. If Owner-furnished items are damaged as a result of Contractor's operations, Contractor shall repair or replace them.
11. Contractor shall install and otherwise incorporate Owner-furnished items into the Work.

B. Owner-Furnished Products:

1. Description of Product

1.6 USE OF PREMISES

A. General: Contractor shall have limited use of premises for construction operations as indicated on Drawings by the Contract limits.

B. Use of Site: Limit use of premises to work in areas indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.

1. Owner Occupancy: Allow for Owner occupancy of Project site.
2. Driveways and Entrances: Keep driveways and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.

a. Schedule deliveries to minimize use of driveways and entrances.
b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

C. Owner Occupancy of Completed Areas of Construction: Owner reserves the right to occupy and to place and install equipment in completed areas before Substantial Completion, provided such occupancy does not interfere with completion of the Work. Such placement of equipment and partial occupancy shall not constitute acceptance of the total Work.

1.7 WORK RESTRICTIONS

A. On-Site Work Hours: Work shall be generally performed during normal business working hours.

1. Weekend Hours: **Comply with Town of Zebulon noise ordinance.**
2. Early Morning Hours: **Comply with Town of Zebulon noise ordinance.**
3. Hours for Utility Shutdowns: **Comply with Town of Zebulon utility company requirements.**

1.8 SPECIFICATION FORMATS AND CONVENTIONS

A. Specification Format: The Specifications are organized into Divisions and Sections using the 16-division format and CSI/CSC's "MasterFormat" numbering system.

1. Section Identification: The Specifications use Section numbers and titles to help cross- referencing in the Contract Documents. Sections in the Project Manual are in numeric sequence; however, the sequence is incomplete because all available Section numbers are not used. Consult the table of contents at the beginning of the Project Manual to determine numbers and names of Sections in the Contract Documents.
2. Division 1: Sections in Division 1 govern the execution of the Work of all Sections in the Specifications.

B. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:

1. Abbreviated Language: Language used in the Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be inferred as the sense requires. Singular words shall be interpreted as plural, and plural words shall be interpreted as singular where applicable as the context of the Contract Documents indicates.
2. Imperative mood and streamlined language are generally used in the Specifications. Requirements expressed in the imperative mood are to be performed by Contractor. Occasionally, the indicative or subjunctive mood may be used in the Section Text for clarity to describe responsibilities that must be fulfilled indirectly by Contractor or by others when so noted.

a. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.

1.9 MISCELLANEOUS PROVISIONS

PART 2 - PRODUCTS (Not used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01100

SECTION 01210 - ALLOWANCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes administrative and procedural requirements governing allowances.

1. Certain items are specified in the Contract Documents by allowances. Allowances have been established in lieu of additional requirements and to defer selection of actual materials and equipment to a later date when additional information is available for evaluation. If necessary, additional requirements will be issued by Change Order.

B. Types of allowances include the following:

1. Lump-sum allowances.
2. Unit-cost allowances.
3. Quantity allowances.
4. Contingency allowances.

C. Related Sections include the following:
1. Division 01 Section "Contract Modification Procedures" for procedures for submitting and handling Change Orders for allowances.
2. Division 01 Section "Unit Prices" for procedures for using unit prices.
3. Division 01 Section "Quality Requirements" for procedures governing the use of allowances for testing and inspecting.
4. Divisions 02 through 49 Sections for items of Work covered by allowances.

1.3 SELECTION AND PURCHASE

A. At the earliest practical date after award of the Contract, advise Architect of the date when final selection and purchase of each product or system described by an allowance must be completed to avoid delaying the Work.
B. At Architect's request, obtain proposals for each allowance for use in making final selections. Include recommendations that are relevant to performing the Work.
C. Purchase products and systems selected by Architect from the designated supplier.

1.4 SUBMITTALS

A. Submit proposals for purchase of products or systems included in allowances, in the form specified for Change Orders.
B. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.
C. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.

1.5 COORDINATION

A. Coordinate allowance items with other portions of the Work. Furnish templates as required to coordinate installation.

1.6 LUMP-SUM UNIT-COST AND QUANTITY ALLOWANCES

A. Allowance shall include cost to Contractor of specific products and materials ordered by Owner or selected by Architect under allowance and shall include taxes, freight, and delivery to Project site.
B. Unless otherwise indicated, Contractor's costs for receiving and handling at Project site, labor, installation, overhead and profit, and similar costs related to products and materials ordered by Owner or selected by Architect under allowance shall be included as part of the Contract Sum and not part of the allowance.

1.7 CONTINGENCY ALLOWANCES

A. Use the contingency allowance only as directed by Architect for Owner's purposes and only by Change Orders that indicate amounts to be charged to the allowance.

B. Contractor's overhead, profit, and related costs for products and equipment ordered by Owner under the contingency allowance are included in the allowance and are not part of the Contract Sum. These costs include delivery, installation, taxes, insurance, equipment rental, and similar costs.
C. Change Orders authorizing use of funds from the contingency allowance will include Contractor's related costs and reasonable overhead and profit margins.
D. At Project closeout, credit unused amounts remaining in the contingency allowance to Owner by Change Order.

PART 2 - PRODUCTS (Not Used)
PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine products covered by an allowance promptly on delivery for damage or defects. Return damaged or defective products to manufacturer for replacement.

3.2 PREPARATION

A. Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related work.

3.3 SCHEDULE OF ALLOWANCES

A. General Contingency: Include a contingency allowance of 5% of the Base Bid for each project for use according to the Owner's instructions. This amount shall be included in the total bid amount. See the bid form proposal.
B. Allowance No. 1: Include a construction testing allowance of $3,000 in the total bid amount for project for use as directed by the Architect and recommended in the Report of Subsurface Exploration and Geotechnical Engineering Evaluation for construction testing. Contractor is responsible for coordination, communication, sequencing of work, and payments to construction testing company. The Architect and Owner reserve the right to select the construction testing company.
C. Allowance No. 2: Include an allowance of $256,000 in the total bid amount for the project for use as directed by the Architect for the proposed restroom/shelter. Refer to specifications and plans and detail sheets for additional information. Contractor is responsible for coordination, communication, sequencing of work, and payments to vendors. The Architect and Owner reserve the right to select the restroom/shelter vendor. Allowance should include delivery of materials, excavation, reinforced foundation installation, electrical and plumbing, building assembly, and concrete slab installation.
D. Note: UP-1 through UP-9 are EXCLUDED from the total bid amount. See the Bid Form proposal additional information.

END OF SECTION 01210

SECTION 01270 – UNIT PRICES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for unit prices.

1.2 DEFINITIONS

A. Unit price is an amount proposed by bidders, stated on the Bid Form, as a price per unit of measurement for materials or services added to or deducted from the Contract Sum by appropriate modification, if estimated quantities of Work required by the Contract Documents are increased or decreased.

1.3 PROCEDURES

A. Unit prices include all necessary material, plus cost for delivery, installation, insurance, applicable taxes, overhead and profit.
B. Owner reserves the right to reject Contractor's measurement of work-in-place that involves use of established unit prices and to have this work measured, at Owner's expense, by an independent surveyor acceptable to Contractor.
C. List of Unit Prices: A list of unit prices is included in Part 3. Specification Sections referenced in the schedule contain requirements for materials described under each unit price.

PART 2 - PRODUCTS (Not Used)

PART 3 – EXECUTION

3.1 LIST OF UNIT PRICES

A. These Unit Prices **ARE NOT INCLUDED** in the Total Bid value. Costs are determined by multiplying Unit Cost value by the specified quantity here and shall be included in the Bid Form. Unit price is an amount proposed by bidders, stated on the Bid Form, as a price per unit of measurement for work to be performed and material or services added to or deducted from the Contract Sum by appropriate modification, if estimated quantities of Work required by the Contract Documents are increased or decreased.

A. **Unit Price No. 1:** Base cost on 100 cubic yards of Site/Mass Rock Removal and Disposed of On-Site as defined in contract documents. Unit price shall be utilized to make adjustments in quantity actually used, as verified by Owner's independent testing agency.

B. **Unit Price No. 2:** Base cost on 100 cubic yards of Site/Mass Rock Removal and Disposed of Off-Site as defined in contract documents. Unit price shall be utilized to make adjustments in quantity actually used, as verified by Owner's independent testing agency.

C. **Unit Price No. 3:** Base cost on 100 cubic yards of Unsuitable Soils Removal and Disposed of On-Site as defined in contract documents. Unit price shall be utilized to make adjustments in quantity actually used, as verified by Owner's independent testing agency.

D. **Unit Price No. 4:** Base cost on 100 cubic yards of Unsuitable Soils Removal and Disposed of Off-Site as defined in contract documents. Unit price shall be utilized to make adjustments in quantity actually used, as verified by Owner's independent testing agency

E. **Unit Price No. 5:** Base cost on 100 cubic yards of Additional Imported Structural Engineered Fill as defined in contract documents. Unit price shall be utilized to make adjustments in quantity actually used, as verified by Owner's independent testing agency

F. **Unit Price No. 6:** Base cost on 100 tons of CABC stone purchased, transported to the site, installed and compacted in place. This unit will apply if additional material is needed for increasing base under a paved area, or general site construction use.

G. **Unit Price No. 7:** Base cost on 100 SY of concrete sidewalk material purchased, transported to the site, and installed.

H. **Unit Price No. 8:** Base cost on 1,000 SF of grass seeding. Cost includes purchase, transportation, installation of seed, fertilizer, lime, mulch as noted in specifications.

I. **Unit Price No. 9:** Base cost on 100 tons of asphalt, S9.5B material purchased, transported to the site, and installed.

END OF SECTION 01270

SECTION 01310 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:

1. Administrative and supervisory personnel.
2. Project meetings.
3. Requests for Interpretation (RFIs).

B. Each contractor shall participate in coordination requirements. Certain areas of responsibility will be assigned to a specific contractor.

1.3 DEFINITIONS

A. RFI: Request from Contractor seeking interpretation or clarification of the Contract Documents.

1.4 COORDINATION

A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections, that depend on each other for proper installation, connection, and operation.

B. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

1. Preparation of Contractor's Construction Schedule.
2. Preparation of the Schedule of Values.
3. Installation and removal of temporary facilities and controls.
4. Delivery and processing of submittals.
5. Progress meetings.
6. Pre-installation conferences.
7. Project closeout activities.
8. Startup and adjustment of systems.
9. Project closeout activities.

1.5 ADMINISTRATIVE AND SUPERVISORY PERSONNEL

A. General: In addition to Project superintendent, provide other administrative and supervisory personnel as required for proper performance of the Work.

1.6 PROJECT MEETINGS

A. General: Schedule and conduct meetings and conferences at Project site.

1.7 REQUESTS FOR INTERPRETATION (RFIs)

A. Procedure: Immediately on discovery of the need for interpretation of the Contract Documents, and if not possible to request interpretation at Project meeting, prepare and submit an RFI in the form specified.

1. RFIs shall originate with Contractor. RFIs submitted by entities other than Contractor will be returned with no response.
2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work.

B. Content of the RFI: Include a detailed, legible description of item needing interpretation and the following:

1. Project name.
2. Date.
3. Name of Contractor.
4. Name of Engineer.
5. RFI number, numbered sequentially.
6. Specification Section number and title and related paragraphs, as appropriate.

7. Drawing number and detail references, as appropriate.
8. Field dimensions and conditions, as appropriate.
9. Contractor's suggested solution(s). If Contractor's solution(s) impact the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
10. Contractor's signature.
11. Attachments: Include drawings, descriptions, measurements, photos, Product Data, Shop Drawings, and other information necessary to fully describe items needing interpretation.
    a. Supplementary drawings prepared by Contractor shall include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments.

C. Hard-Copy RFIs: CSI Form 13.2A.

1. Identify each page of attachments with the RFI number and sequential page number.

D. Software-Generated RFIs: Software-generated form with substantially the same content as indicated above.

1. Attachments shall be electronic files in Adobe Acrobat PDF format.

E. Engineer’s Action: Engineer will review each RFI, determine action required, and return it. Allow 7 working days for Engineer's response for each RFI. RFIs received after 1:00 p.m. will be considered as received the following working day.

1. The following RFIs will be returned without action:

    a. Requests for approval of submittals.
    b. Requests for approval of substitutions.
    c. Requests for coordination information already indicated in the Contract Documents.
    d. Requests for adjustments in the Contract Time or the Contract Sum.
    e. Requests for interpretation of Architect's actions on submittals.
    f. Incomplete RFIs or RFIs with numerous errors.

2. Engineer’s action may include a request for additional information, in which case Engineer’s time for response will start again.
3. Engineer’s action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Division 1 Section "Contract Modification Procedures."

    a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Engineer in writing within 10 days of receipt of the RFI response.

F. On receipt of Engineer's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Engineer within seven days if Contractor disagrees with response.

G. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01310

SECTION 01330 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

1.3 SUBMITTAL PROCEDURES

A. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.

B. Submittals Schedule: Comply with requirements in Division 1 Section "Construction Progress Documentation" for list of submittals and time requirements for scheduled performance of related construction activities.

C. Processing Time: Allow enough time for submittal review, including time for re-submittals, as follows. Time for review shall commence on Engineer's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including re-submittals.

1. Initial Review: Allow 10 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Engineer will advise Contractor when a submittal being processed must be delayed for

coordination.

2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
3. Re-submittal Review: Allow 10 days for review of each re-submittal.

D. Identification: Place a permanent label or title block on each submittal for identification.

1. Indicate name of firm or entity that prepared each submittal on label or title block.
2. Provide a space approximately **6 by 8 inches** on label or beside title block to record Contractor's review and approval markings and action taken by Engineer.
3. Include the following information on label for processing and recording action taken:

    a. Project name.
    b. Date.
    c. Name and address of Engineer.
    d. Name and address of Contractor.
    e. Name and address of subcontractor.
    f. Name and address of supplier.
    g. Name of manufacturer.
    h. Submittal number or other unique identifier, including revision identifier.

        1) Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., 06100.01). Re-submittals shall include an alphabetic suffix after another decimal point (e.g.,06100.01.A).

    i. Number and title of appropriate Specification Section.
    j. Drawing number and detail references, as appropriate.
    k. Location(s) where product is to be installed, as appropriate
    l. Other necessary identification.

E. Deviations: Highlight or otherwise specifically identify deviations from the Contract Documents on submittals.

F. Additional Copies: Unless additional copies are required for final submittal, and unless Engineer observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.

G. Transmittal: Package each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form.

PART 2 - PRODUCTS

A. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.

1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:

a. Dimensions.
b. Identification of products.
c. Fabrication and installation drawings.
d. Roughing-in and setting diagrams.
e. Wiring diagrams showing field-installed wiring, including power, signal, and control wiring.
f. Shopwork manufacturing instructions.
g. Templates and patterns.
h. Schedules.
i. Design calculations.
j. Compliance with specified standards
k. Notation of coordination requirements.
l. Notation of dimensions established by field measurement.
m. Relationship to adjoining construction clearly indicated
n. Seal and signature of professional engineer if specified.
o. Wiring Diagrams: Differentiate between manufacturer-installed and field-installed wiring.

2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop
Drawings on sheets at least **8-1/2 by 11 inches (215 by 280 mm)** but no larger than **30 by 40 inches (750 by 1000 mm)**.
3. Number of Copies: Submit 6 opaque copies of each submittal, unless copies are required for operation and maintenance manuals.

B. Contractor's Construction Schedule: Comply with requirements specified in Division 1 Section
"Construction Progress Documentation" for Construction Manager's action.

C. Application for Payment: Comply with requirements specified in Division 1 Section "Payment Procedures."

D. Schedule of Values: Comply with requirements specified in Division 1 Section "Payment Procedures."

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

A. Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Engineer.

B. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 ENGINEER'S / ACTION

A. General: Engineer will not review submittals that do not bear Contractor's approval stamp and will return them without action.

B. Action Submittals: Engineer will review each submittal, make marks to indicate corrections or modifications required, and return it. Engineer will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action taken, as follows:

C. Partial submittals are not acceptable, will be considered nonresponsive, and will be returned without review.

D. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

END OF SECTION 01330

SECTION 1780 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:

1. Inspection procedures.
2. Warranties.
3. Final cleaning.

B. Related Sections include the following:

1. Division 01 Section "Payment Procedures" for requirements for Applications for Payment for Substantial and Final Completion.
2. Division 01 Section "Execution" for progress cleaning of Project site.
3. Division 01 Section "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
4. Division 01 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
5. Divisions 02 through 49 Sections for specific closeout and special cleaning requirements for the Work in those Sections.

1.3 SUBSTANTIAL COMPLETION

A. Preliminary Procedures: Before requesting inspection for determining date of Substantial Completion, complete the following. List items below that are incomplete in request.

1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
2. Advise Owner of pending insurance changeover requirements.
3. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
4. Obtain and submit releases permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
5. Prepare and submit Project Record Documents, operation and maintenance manuals, damage or settlement surveys, and similar final record information.

6. Deliver tools, spare parts, extra materials, and similar items to location designated by Owner. Label with manufacturer's name and model number where applicable.
7. Complete startup testing of systems.
8. Terminate and remove temporary facilities from Project site, construction tools, and similar elements.
9. Advise Owner of changeover in utilities.
10. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
11. Complete final cleaning requirements, including touchup painting.
12. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

B. Inspection: Submit a written request for inspection for Substantial Completion. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for Final Completion.

1.4 FINAL COMPLETION

A. Preliminary Procedures: Before requesting final inspection for determining date of Final Completion, complete the following:

1. Submit a final Application for Payment according to Division 01 Section "Payment Procedures."
2. Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
3. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
4. Submit pest-control final inspection report and warranty.
5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.

B. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.5 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Preparation: Submit three copies of list. Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.

1. Organize list in sequential order.
2. Organize items applying to each major element, including categories for grading, utilities, landscaping, paving, site improvements, and building systems.
3. Include the following information at the top of each page:

a. Project name.
b. Date.
c. Name of Architect.
d. Name of Contractor.
e. Page number.

1.6 WARRANTIES

A. Submittal Time: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated.

B. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.

1. Bind warranties and bonds in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch (paper.
2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.

C. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 3 - EXECUTION

3.1 FINAL CLEANING

A. General: Provide final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial cleaning maintenance program. Comply with manufacturer's written instructions.

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a portion of Project:

a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
d. Remove tools, construction equipment, machinery, and surplus material from Project site.
e. Remove snow and ice to provide safe access to building.
f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
h. Sweep concrete floors broom clean in unoccupied spaces.
i. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
j. Remove labels that are not permanent.
k. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.

1) Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.

l. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
m. Replace parts subject to unusual operating conditions.
n. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.

o. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
p. Clean ducts, blowers, and coils if units were operated without filters during construction.
q. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.
r. Leave Project clean and ready for occupancy.

C. Pest Control: Engage an experienced, licensed exterminator to make a final inspection and rid Project of rodents, insects, and other pests. Prepare a report.
D. Comply with safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from Project site and dispose of lawfully.

END OF SECTION 01 77 00

SECTION 01 78 23 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
   1. Operation manuals for systems, subsystems, and equipment.
   2. Maintenance manuals for the care and maintenance of products, materials**,** and finishes and systems and equipment.

B. Related Sections include the following:
   1. Division 01 Section "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.
   2. Division 01 Section "Closeout Procedures" for submitting operation and maintenance manuals.
   3. Division 01 Section "Project Record Documents" for preparing Record Drawings for operation and maintenance manuals.
   4. Divisions 02 through 49 Sections for specific operation and maintenance manual requirements for the Work in those Sections.

1.3 DEFINITIONS

A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.
B. Subsystem: A portion of a system with characteristics similar to a system.

1.4 SUBMITTALS

A. Initial Submittal: Submit 2 draft copies of each manual at least 15 days before requesting inspection for Substantial Completion. Architect will return one copy of draft and mark whether general scope and content of manual are acceptable.
B. Final Submittal: Submit one copy of each manual in final form at least 15 days before final inspection. Architect will return copy with comments within 15 days after final inspection.

   1. Correct or modify each manual to comply with Architect's comments. Submit 3 copies of each corrected manual within 15 days of receipt of Architect's comments.

1.5 COORDINATION

A. Where operation and maintenance documentation includes information on installations by more than one factory-authorized service representative, assemble and coordinate information furnished by representatives and prepare manuals.

PART 2 - PRODUCTS

2.1 MANUALS, GENERAL

A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:

1. Title page.
2. Table of contents.
3. Manual contents.

B. Title Page: Enclose title page in transparent plastic sleeve. Include the following information:

1. Subject matter included in manual.
2. Name and address of Project.
3. Name and address of Owner.
4. Date of submittal.
5. Name, address, and telephone number of Contractor.
6. Name and address of Architect.
7. Cross-reference to related systems in other operation and maintenance manuals.

C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.

1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.

D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.

1. Binders: Heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.

a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.

b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents. Indicate volume number for multiple-volume sets.

2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software diskettes for computerized electronic equipment.
4. Supplementary Text: Prepared on 8-1/2-by-11-inch white bond paper.
5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.

a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

2.2 OPERATION MANUALS

A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:

1. System, subsystem, and equipment descriptions.
2. Performance and design criteria if Contractor is delegated design responsibility.
3. Operating standards.
4. Operating procedures.
5. Operating logs.
6. Wiring diagrams.
7. Control diagrams.
8. Piped system diagrams.
9. Precautions against improper use.
10. License requirements including inspection and renewal dates.

B. Descriptions: Include the following:

1. Product name and model number.
2. Manufacturer's name.
3. Equipment identification with serial number of each component.
4. Equipment function.
5. Operating characteristics.
6. Limiting conditions.
7. Performance curves.
8. Engineering data and tests.
9. Complete nomenclature and number of replacement parts.

C. Operating Procedures: Include the following, as applicable:

1. Startup procedures.
2. Equipment or system break-in procedures.
3. Routine and normal operating instructions.
4. Regulation and control procedures.
5. Instructions on stopping.
6. Normal shutdown instructions.
7. Seasonal and weekend operating instructions.
8. Required sequences for electric or electronic systems.
9. Special operating instructions and procedures.

D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.

E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

2.3 PRODUCT MAINTENANCE MANUAL

A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.

C. Product Information: Include the following, as applicable:

1. Product name and model number.
2. Manufacturer's name.
3. Color, pattern, and texture.
4. Material and chemical composition.
5. Reordering information for specially manufactured products.

D. Maintenance Procedures: Include manufacturer's written recommendations and the following:

1. Inspection procedures.
2. Types of cleaning agents to be used and methods of cleaning.
3. List of cleaning agents and methods of cleaning detrimental to product.
4. Schedule for routine cleaning and maintenance.
5. Repair instructions.

E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

1. Include procedures to follow and required notifications for warranty claims.

2.4 SYSTEMS AND EQUIPMENT MAINTENANCE MANUAL

A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.

B. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.

C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:

1. Standard printed maintenance instructions and bulletins.
2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
3. Identification and nomenclature of parts and components.
4. List of items recommended to be stocked as spare parts.

D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:

1. Test and inspection instructions.
2. Troubleshooting guide.
3. Precautions against improper maintenance.
4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
5. Aligning, adjusting, and checking instructions.
6. Demonstration and training videotape, if available.

E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.

1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.

F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.

G. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

1. Include procedures to follow and required notifications for warranty claims.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

A. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.

B. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.

1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.

C. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.

1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.

D. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in Record Drawings to ensure correct illustration of completed installation.

1. Do not use original Project Record Documents as part of operation and maintenance manuals.
2. Comply with requirements of newly prepared Record Drawings in Division 01 Section "Project Record Documents."

E. Comply with Division 01 Section "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION 01 78 23

SECTION 01 78 39 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for Project Record Documents, including the following:

1. Record Drawings.
2. Miscellaneous Records.

B. Related Sections include the following:
1. Division 01 Section "Closeout Procedures" for general closeout procedures.
2. Division 01 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
3. Divisions 02 through 49 Sections for specific requirements for Project Record Documents of the Work in those Sections.

1.3 SUBMITTALS

A. Record Drawings: Comply with the following:
1. Number of Copies: Submit copies of Record Drawings as follows:

a. Initial Submittal: Submit one set of marked-up Record Prints. Architect will mark whether general scope of changes, additional information recorded, and quality of drafting are acceptable. Architect will return prints for corrections and final submittal.
b. Final Submittal: Make corrections noted on initial submittal and submit one set of marked-up Record Prints, Submit each Drawing, whether or not changes and additional information were recorded.

B. Miscellaneous Records: Submit one copy of miscellaneous records.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

A. Record Prints: Maintain one set of blue- or black-line white prints of the Contract Drawings and Shop Drawings.

1. Preparation: Mark Record Prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to prepare the marked-up Record Prints.

    a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
    b. Accurately record information in an understandable drawing technique.
    c. Record data as soon as possible after obtaining it. Record and check the markup before enclosing concealed installations.

2. Content: Types of items requiring marking include, but are not limited to, the following:

    a. Dimensional changes to Drawings.
    b. Revisions to details shown on Drawings.
    c. Depths of foundations below first floor.
    d. Locations and depths of underground utilities.
    e. Revisions to routing of piping and conduits.
    f. Revisions to electrical circuitry.
    g. Actual equipment locations.
    h. Duct size and routing.
    i. Locations of concealed internal utilities.
    j. Changes made by Change Order or Construction Change Directive.
    k. Changes made following Architect's written orders.
    l. Details not on the original Contract Drawings.
    m. Field records for variable and concealed conditions.
    n. Record information on the Work that is shown only schematically.

3. Mark the Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. If Shop Drawings are marked, show cross-reference on the Contract Drawings.
4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
5. Mark important additional information that was either shown schematically or omitted from original Drawings.
6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

B. Newly Prepared Record Drawings: Prepare new Drawings instead of preparing Record Drawings where Architect determines that neither the original Contract Drawings nor Shop Drawings are suitable to show actual installation.

1. New Drawings may be required when a Change Order is issued as a result of accepting an alternate, substitution, or other modification.
2. Consult Architect for proper scale and scope of detailing and notations required to record the actual physical installation and its relation to other construction. Integrate newly prepared Record Drawings into Record Drawing sets; comply with procedures for formatting, organizing, copying, binding, and submitting.

C. Format: Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.

1. Record Prints: Organize Record Prints and newly prepared Record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
2. Identification: As follows:

    a. Project name.
    b. Date.
    c. Designation "PROJECT RECORD DRAWINGS."
    d. Name of Architect.
    e. Name of Contractor.

2.2 MISCELLANEOUS RECORD SUBMITTALS

A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

A. Recording: Maintain one copy of each submittal during the construction period for Project Record Document purposes. Post changes and modifications to Project Record Documents as they occur; do not wait until the end of Project.
B. Maintenance of Record Documents and Samples: Store Record Documents and Samples in the field office apart from the Contract Documents used for construction. Do not use Project Record Documents for construction purposes. Maintain Record Documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to Project Record Documents for Architect's reference during normal working hours.

END OF SECTION 01 78 39

02 41 19 - SELECTIVE DEMOLITION

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Demolition and removal of selected site elements.
   2. Salvage of existing items to be reused or recycled.

B. Related Requirements:

   1. Section 011000 "Summary" for restrictions on use of the premises, Owner-occupancy requirements, and phasing requirements.
   2. Section 017300 "Execution" for cutting and patching procedures.
   3. Section 311000 "Site Clearing" for site clearing and removal of above- and below-grade improvements not part of selective demolition.

1.3 DEFINITIONS

A. Remove: Detach items from existing construction and dispose of them off-site unless indicated to be salvaged or reinstalled.
B. Remove and Salvage: Detach items from existing construction, in a manner to prevent damage, and deliver to Owner ready for reuse.
C. Remove and Reinstall: Detach items from existing construction, in a manner to prevent damage, prepare for reuse, and reinstall where indicated.
D. Existing to Remain: Leave existing items that are not to be removed and that are not otherwise indicated to be salvaged or reinstalled.

E. Dismantle: To remove by disassembling or detaching an item from a surface, using gentle methods and equipment to prevent damage to the item and surfaces; disposing of items unless indicated to be salvaged or reinstalled.

1.4 MATERIALS OWNERSHIP

A. Unless otherwise indicated, demolition waste becomes property of Contractor.
B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.

   1. Carefully salvage in a manner to prevent damage and promptly return to Owner.
   2. Review areas where existing construction is to remain and requires protection.

1.5 SUBMITTALS

A. Proposed Protection Measures: Submit report, including Drawings, that indicates the measures proposed for protecting individuals and property**,** for environmental protection, for dust control, and for noise control. Indicate proposed locations and construction of barriers.

B. Schedule of Selective Demolition Activities: Indicate the following:

1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.
2. Interruption of utility services. Indicate how long utility services will be interrupted.
3. Coordination for shutoff, capping, and continuation of utility services.
4. Use of elevator and stairs.
5. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.

C. Predemolition Photographs or Video: Show existing conditions of adjoining construction, including finish surfaces, that might be misconstrued as damage caused by demolition operations. Comply with Section 013233 "Photographic Documentation." Submit before Work begins.

1.6 CLOSEOUT SUBMITTALS

A. Inventory: Submit a list of items that have been removed and salvaged.

1.7 FIELD CONDITIONS

A. Owner will occupy buildings immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.

B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.

1. Hazardous materials will be removed by Owner before start of the Work.
2. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.

E. Storage or sale of removed items or materials on-site is not permitted.

F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.

1. Maintain fire-protection facilities in service during selective demolition operations.

1.8 COORDINATION

A. Arrange selective demolition schedule so as not to interfere with Owner's operations.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
B. Standards: Comply with ASSE A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that utilities have been disconnected and capped before starting selective demolition operations.

B. Review Project Record Documents of existing construction or other existing condition and hazardous material information provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in Project Record Documents.

C. Contact utility locate prior to any excavation. Contact owner for identification of any other known utilities.
D. Retain "Steel Tendons" Paragraph below if selective demolition includes pretensioned or post-tensioned concrete slabs.

E. Verify that hazardous materials have been remediated before proceeding with building demolition operations.
F. Survey of Existing Conditions: Record existing conditions by use of preconstruction photographs or video.

1. Comply with requirements specified in Section 013233 "Photographic Documentation."
2. Inventory and record the condition of items to be removed and salvaged. Provide photographs or video of conditions that might be misconstrued as damage caused by salvage operations.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.

3.3 PROTECTION

A. Temporary Protection: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.

B. Temporary Shoring: Design, provide, and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain.

1. Strengthen or add new supports when required during progress of selective demolition.

C. Remove temporary barricades and protections where hazards no longer exist.

3.4 SELECTIVE DEMOLITION, GENERAL

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
1. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
2. Dispose of demolished items and materials promptly.

B. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

C. Removed and Salvaged Items:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in a secure area until delivery to Owner.
4. Transport items to Owner's storage area designated by Owner.
5. Protect items from damage during transport and storage.

D. Removed and Reinstalled Items:

1. Clean and repair items to functional condition adequate for intended reuse.
2. Pack or crate items after cleaning and repairing. Identify contents of containers.
3. Protect items from damage during transport and storage.
4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

E. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable,

protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.5 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

A. Concrete or Asphalt pavement: Full Depth saw-cut perimeter of area to be demolished, and then break up and remove.

3.6 DISPOSAL OF DEMOLISHED MATERIALS

A. Remove demolition waste materials from Project site and dispose of them in an EPA-approved construction and demolition waste landfill acceptable to authorities having jurisdiction**.**

1. Do not allow demolished materials to accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Burning: Do not burn demolished materials.

3.7 CLEANING

A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION 02 41 19

03 30 00 – CAST IN PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.
B. Design Mixtures: For each concrete mixture.

1.3 QUALITY ASSURANCE

A. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

B. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction**,** qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.

C. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:

1. ACI 301, "Specifications for Structural Concrete," Sections 1 through 5**.**
2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

D. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.

PART 2 - PRODUCTS

2.1 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.

B. Plain-Steel Welded Wire Reinforcement: ASTM A 185/A 185M, plain, fabricated from as-drawn steel wire into flat sheets.

C. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice.

2.2 CONCRETE MATERIALS

A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:

1. Portland Cement: ASTM C 150, Type I.

B. Normal-Weight Aggregates: ASTM C 33, graded.

1. Maximum Coarse-Aggregate Size: 1 inch nominal.
2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

C. Water: ASTM C 94/C 94M and potable.

2.3 ADMIXTURES

A. Air-Entraining Admixture: ASTM C 260.
B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
2. Retarding Admixture: ASTM C 494/C 494M, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

C. Sheet Vapor Retarder: Polyethylene sheet, ASTM D 4397, not less than 10 mils

2.4 CURING MATERIALS

A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.
C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
D. Water: Potable.

E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.

F. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, nondissipating.

G. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.

2.5 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber or ASTM D 1752, cork or self-expanding cork.

2.6 CONCRETE MIXTURES

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.

B. Admixtures: Use admixtures according to manufacturer's written instructions.

1. Use water-reducing or plasticizing admixture in concrete, as required, for placement and workability.
2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.

C. Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: 3600 psi at 28 days or as indicated.
2. Maximum Water-Cementitious Materials Ratio: 0.50.
3. Slump Limit: 4 inches

2.7 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.8 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M and ASTM C 1116/C 1116M, and furnish batch ticket information.

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

PART 3 - EXECUTION

3.1 FORMWORK

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.
B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

3.2 EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

3.3 VAPOR RETARDERS

A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder according to ASTM E 1643 and manufacturer's written instructions.

1. Lap joints 6 inches and seal with manufacturer's recommended tape.

3.4 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.

1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

3.5 JOINTS

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.

1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.

3.6 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.

B. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.

1. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.

C. Cold-Weather Placement: Comply with ACI 306.1.

D. Hot-Weather Placement: Comply with ACI 301.

3.7 FINISHING FLOORS AND SLABS

A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.

1. Apply a trowel finish to surfaces indicated.
2. Finish and measure surface so gap at any point between concrete surface and an unleveled, freestanding, 10-ft.- long straightedge resting on two high spots and placed anywhere on the surface does not exceed 1/8 inch.

C. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces indicated. While concrete is still plastic, slightly scarify surface with a fine broom.

1. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.

D. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and elsewhere as indicated.

3.8 CONCRETE PROTECTING AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.

B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

C. Cure concrete according to ACI 308.1, by one or a combination of the following methods:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days.
2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

    a. Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound will not interfere with bonding of floor covering used on Project.

4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.9 CONCRETE SURFACE REPAIRS

A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.

3.10 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.

END OF SECTION 03 30 00

SECTION 055213 - PIPE AND TUBE RAILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Steel pipe and tube railings.

1.3 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.
B. Coordinate installation of anchorages for railings. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
C. Schedule installation so wall attachments are made only to completed walls. Do not support railings temporarily by any means that do not satisfy structural performance requirements.

1.4 ACTION SUBMITTALS

A. Product Data: For the following:

1. Manufacturer's product lines of mechanically connected railings.
2. Railing brackets.
3. Grout, anchoring cement, and paint products.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
C. Samples: For each type of exposed finish required.
1. Assembled Sample of railing system, made from full-size components, including top rail, post, handrail, and infill. Sample need not be full height.

a. Show method of connecting and finishing members at intersections.

D. Delegated-Design Submittal: For railings, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For testing agency.

B. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers certifying that shop primers are compatible with topcoats.

1.6 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1.7 DELIVERY, STORAGE, AND HANDLING

A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

1.8 FIELD CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain each type of railing from single source from single manufacturer.

2.2 METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.
B. Embedment: Embed railing to depth indicated on drawings.

2.3 STEEL

A. Tubing: ASTM A 500 (cold formed) or ASTM A 513.

B. Pipe: ASTM A 53/A 53M, Type F or Type S, Grade A, Standard Weight (Schedule 40), unless another grade and weight are required by structural loads.

C. Plates, Shapes, and Bars: ASTM A 36/A 36M.

2.4 FASTENERS

A. Exposed Fasteners: No exposed bolts or screws.

2.5 MISCELLANEOUS MATERIALS

A. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

B. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.

C. Shop Primer for Galvanized Steel: Primer formulated for exterior use over zinc-coated metal and compatible with finish paint systems indicated.

D. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107/C 1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.

E. Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound.

1. Water-Resistant Product: At exterior locations provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and that is recommended by manufacturer for exterior use.

2.6 FABRICATION

A. General: Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage and as required to support structural loads.

B. Shop assemble railings 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. Use connections that maintain structural value of joined pieces.

C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm) unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

D. Form work true to line and level with accurate angles and surfaces.

E. Fabricate connections that are exposed to weather in a manner that excludes water. Provide weep holes where water may accumulate.

F. Connections: Fabricate railings with welded connections unless otherwise indicated.

G. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove flux immediately.
4. At exposed connections, finish exposed surfaces smooth and blended so no roughness shows after finishing and welded surface matches contours of adjoining surfaces.

H. Form Changes in Direction as Follows:

1. As detailed on drawings.

I. For changes in direction made by bending, use jigs to produce uniform curvature for each repetitive configuration required. Maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.

J. Close exposed ends of railing members with prefabricated end fittings.

K. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated. Close ends of returns unless clearance between end of rail and wall is 1/4 inch (6 mm) or less.

L. For railing posts set in concrete, provide steel sleeves not less than 6 inches long with inside dimensions not less than 1/2 inch (13 mm) greater than outside dimensions of post, with metal plate forming bottom closure.

2.7 STEEL AND IRON FINISHES

A. Galvanized Railings:

1. Hot-dip galvanize exterior steel railings after fabrication.
2. Comply with ASTM A 123/A 123M for hot-dip galvanized railings.
3. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.
4. Fill vent and drain holes that are exposed in the finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.

B. Preparing Galvanized Railings for Shop Priming: After galvanizing, thoroughly clean railings of grease, dirt, oil, flux, and other foreign matter, and treat with etching cleaner.

C. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning." SSPC-SP 3, "Power Tool Cleaning." requirements indicated below:

1. Exterior Railings: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
2. Railings Indicated to Receive Zinc-Rich Primer: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."

D. Primer Application: Apply shop primer to prepared surfaces of railings unless otherwise indicated. Comply with requirements in SSPC-PA 1, "Shop, Field, and Maintenance Painting of Steel," for shop painting. Primer need not be applied to surfaces to be embedded in concrete or masonry.

1. Shop prime uncoated railings with universal shop primer.

E. Shop-Painted Finish: Comply with Section 099113 "Exterior Painting.

1. Color: As selected by Architect from manufacturer's full range. Most likely the color will be black.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine railing location and sequence work with retaining wall installation.

3.2 INSTALLATION, GENERAL

A. Fit exposed connections together to form tight, hairline joints.
B. Perform cutting, drilling, and fitting required for installing railings. Set railings accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.

1. Do not weld, cut, or abrade surfaces of railing components that are coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
2. Set posts plumb within a tolerance of 1/16 inch in 3 feet (2 mm in 1 m).
3. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet (6 mm in 3.5 m).

C. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.
D. Adjust railings before anchoring to ensure matching alignment at abutting joints.
E. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction.

3.3 RAILING CONNECTIONS

A. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in "Fabrication" Article whether welding is performed in the shop or in the field.

3.4 ANCHORING POSTS

A. Use metal sleeves preset and anchored into concrete for installing posts. After posts are inserted into sleeves, fill annular space between post and sleeve with nonshrink, nonmetallic grout or anchoring cement, mixed and placed to comply with anchoring material manufacturer's written instructions.

B. Form or core-drill holes not less than 18 inches deep and 3/4 inch larger than OD of post for installing posts in concrete. Clean holes of loose material, insert posts, and fill annular space between post and concrete with nonshrink, nonmetallic grout or anchoring cement, mixed and placed to comply with anchoring material manufacturer's written instructions.

C. Leave anchorage joint exposed with anchoring material flush with adjacent surface.

3.5 ATTACHING RAILINGS

A. Attach railings to anchoring post as indicated on the drawings.

3.7 ADJUSTING AND CLEANING

A. Retain first "Touchup Painting" Paragraph below if touchup painting is included in this Section.

B. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop painting to comply with SSPC-PA 1 requirements for touching up shop-painted surfaces.

1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.

C. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint.

D. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas, and repair galvanizing to comply with ASTM A 780/A 780M.

3.6 PROTECTION

A. Protect finishes of railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of Substantial Completion.

END OF SECTION 055213

12 93 00 - SITE FURNISHINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1.	Picnic Tables	GC Provided/GC Install
2.	Bike Racks	GC Provided/GC Install
3.	Trash Receptacles	GC Provided/GC Install
4.	Benches	GC Provided/GC Install

B. Related Sections include the following:
   1. Division 31 Section "Earth Moving" for excavation for installation of concrete footings.

1.3 SUBMITTALS

A. Product Data: For each type of product.
B. Manufacturer’s Data: Descriptive data of installation, methods, procedures and maintenance.
   1. Complete shop drawings for all items of work under this section indicating all details of fabrication and installation, including sizes, shapes, finishes, colors, thicknesses, material quality and all other related work applicable to the items of this Section.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain each type of site furnishing(s) through one source from a single manufacturer.

1.5 DELIVERY, STORAGE AND HANDLING

A. Deliver materials with manufacturer’s original containers or packaging, with identifying tags and labels intact and legible.
B. Upon delivery, inspect shipments to assure compliance with requirements of Contract Documents and approved submittals, and that all materials are properly protected and undamaged.
C. Store and handle materials so as to prevent soiling, damage, or deterioration. Make periodic inspections of all stored materials to assure that they remain free from damage and deterioration.

1.6 BASIS OF DESIGN

A. The manufacturers listed in this specification establish the minimum quality of each product. Similar products by other manufacturers will be considered by the Architect, subject to compliance with the specifications and requirements below:

B. Equipment listed in this specification establishes the quality standard for equipment to be provided and installed in this contract. Contractor may substitute products equal to those specified for approval by Architect. The contractor shall bear the burden of proof of equal quality.

C. Sales representatives:

1. Belson Outdoors (800) 323-5664
2. The Park Catalog (866) 280-9894
3. Kay Park (866) 407-5971
4. Bison, Inc. (800) 247-7668
5. Douglas Athletic Equipment (800) 553-8907
6. Kirby Built (866) 965-4729
7. Ultrasite (800) 458-5872
8. Approved Equal

PART 2 - PRODUCTS

2.1 MATERIALS

A. Anchors, Fasteners, Fittings, and Hardware: Manufacturer's standard, corrosion-resistant-coated or non-corrodible materials; commercial quality.

B. Non-shrink, Nonmetallic Grout: Premixed, factory-packaged, non-staining, noncorrosive, nongaseous grout complying with ASTM C 1107; recommended in writing by manufacturer, for exterior applications.

C. Galvanizing: Where indicated for steel and iron components, provide the following protective zinc coating applied to components after fabrication:

2.2 PICNIC TABLES

A. Provided and installed by Contractor. Contractor is responsible to coordinate receipt of picnic tables assembly from supplier, transport to site, assemble, and install in place.

B. 6’ long heavy-duty rectangular picnic table with thermoplastic coating, powder coated frame, stainless steel hardware, portable. Provide 1 ADA Accessible table of similar style.

C. Basis of Design: Ultrasite Heavy-Duty Rectangular Table, 158-UltraCoat, portable mount, thermoplastic finish, rectangle, natural seat color, black frame color, pattern to be determined.

D. Acceptable Manufacturers: See Section 1.6.C above for suppliers.

2.3 BIKE RACKS

A. Provided and installed by Contractor per manufacturer's recommendations. Contractor is responsible to coordinate receipt of 3 bike racks, transport to site, assemble, and install in place. Bike racks shall be in-ground mounted per manufacturer's recommendations in locations shown on plans.

B. 2- bike capacity, 1 7/8" OD 11-gauge round steel tubing, powder-coated black with inground mount.

C. Basis of Design: Park-It 2-Bike Racks by Kirby Built. SKU: VCJ1525-BK

E. Acceptable Manufacturers: See Section 1.6C above for suppliers.

2.4 TRASH RECEPTACLES

A. Provided and installed by Contractor. Contractor is responsible to coordinate receipt of trash receptacles from supplier, transport to site, assemble, and install in place. Receptacles shall be surface mounted per manufacturer's recommendations in locations shown on plans.

B. 32-gallon capacity, UV and moisture resistant pslats, rigid plastic liner, black dome lid with 8" x 12" opening and self-closing door.

C. Basis of Design: Round Slatted 32 Gallon Receptacles with Dome Lid by Kirby Built. SKU: ATR2021-BK.

D. Acceptable Manufacturers: See Section 1.6C above for suppliers.

2.5 BENCHES

A. Provided and installed by Contractor. Contractor is responsible to coordinate receipt of bench assembly from supplier, transport to site, assemble, and install in place. Benches shall be surface mounted per manufacturer's recommendations in locations shown on plans.

B. 6' long cast aluminum, powder-coated bench with high grade, recycled plastic cedar colored slats. Benches are backed and have arms.

C. Basis of Design: 6' long Hampton Bench as manufactured by Kirby Built. SKU: ABC1350-CD

D. Acceptable Manufacturers: See Section 1.6.C above for suppliers.

2.5 FABRICATION

A. Metal Components: Form to required shapes and sizes with true, consistent curves, lines, and angles. Separate metals from dissimilar materials to prevent electrolytic action.

B. Welded Connections: Weld connections continuously. Weld solid members with full-length, full-penetration welds and hollow members with full-circumference welds. At exposed connections, finish surfaces smooth and blended so no roughness or unevenness shows after finishing and welded surface matches contours of adjoining surfaces.

C. Pipes and Tubes: Form simple and compound curves by bending members in jigs to produce uniform curvature for each repetitive configuration required; maintain cylindrical cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of handrail and railing components.
D. Exposed Surfaces: Polished, sanded, or otherwise finished; all surfaces smooth, free of burrs, barbs, splinters, and sharpness; all edges and ends rolled, rounded, or capped.
E. Factory Assembly: Assemble components in the factory to the greatest extent possible to minimize field assembly. Clearly mark units for assembly in the field.

2.6 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.7 ALUMINUM FINISHES

A. Baked-Enamel, Powder-Coat Finish: Manufacturer's standard, baked, polyester, powder-coat finish complying with finish manufacturer's written instructions for surface preparation, including pretreatment, application, baking, and minimum dry film thickness.

2.8 STAINLESS-STEEL FINISHES

A. Remove tool and die marks and stretch lines or blend into finish.
B. Grind and polish surfaces to produce uniform, directionally textured, polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for correct and level finished grade, mounting surfaces, installation tolerances, and other conditions affecting performance.

1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Comply with manufacturer's written installation instructions unless more stringent requirements are indicated. Complete field assembly of site furnishings where required.
B. Unless otherwise indicated, install site furnishings after landscaping and paving have been completed.

C. Install site furnishings level, plumb, true, and securely anchored (unless noted otherwise in Section 2.1 herein) and positioned at locations indicated on Drawings.

D. Post Setting: Set cast-in support posts in concrete footing with smooth top, shaped to shed water. Protect portion of posts above footing from concrete splatter. Verify that posts are set plumb or at correct angle and are aligned and at correct height and spacing. Hold posts in position during placement and finishing operations until concrete is sufficiently cured.

E. Posts Set into Voids in Concrete: Form or core-drill holes for installing posts in concrete to depth recommended in writing by manufacturer of site furnishings and 3/4 inch (19 mm) larger than OD of post. Clean holes of loose material, insert posts, and fill annular space between post and concrete with non-shrink, nonmetallic grout, mixed and placed to comply with anchoring material manufacturer's written instructions, with top smoothed and shaped to shed water.

F. Pipe Sleeves: Use steel pipe sleeves preset and anchored into concrete for installing posts. After posts have been inserted into sleeves, fill annular space between post and sleeve with non-shrink, nonmetallic grout, mixed and placed to comply with anchoring material manufacturer's written instructions, with top smoothed and shaped to shed water.

3.3 CLEANING

A. After completing site furnishing installation, inspect components. Remove spots, dirt, and debris. Repair damaged finishes to match original finish or replace component.

END OF SECTION 12 93 00

13 00 00 – PRE-FABRICATED BUILDINGS

SPECIFICATIONS

Building material package shall be as designed and manufactured by Cedar Forest Products Company and specified herein. Any changes or departures from design shall be explained and documented by complete engineered drawings of a registered structural engineer at least seven days prior to the bid date. Also, bidder must be a reputable manufacturer of pre-cut buildings for at least two years and must be able to show a completed building of the type specified if requested by the owner. All dimensional lumber is nominal and various building products are available upon your request or building requirements. Cedar Forest Products Company also utilizes many other high quality construction materials, depending upon the particular application, justified economics, design considerations, and customer preference. Northern White Cedar is used in wall construction unless otherwise specified.

WALL TIMBERS

Wall timbers are nominal 4" X 8" Northern White Cedar. Timbers are milled to a double tongue and groove, v-groove booth sides. Actual finish size of the timber shall be 3-1/2" thick by 7-1/2" tall with a 6-3/4" face. Moisture content shall not exceed 14% maximum measured throughout the piece. Timber is top-grade, kiln dried, unfinished Northern White Cedar allowing appearance of sound knots and other minimal growth traits. Face surface pattern shall be v- grooved on both interior and exterior faces and end-matched. Pine wall timber systems will not be acceptable.

ALLOWABLE DESIGN STRESSES

FC	Compression parallel to grain:	650 PSI
FC1	Compression perpendicular to grain:	425 PSI
FOV	Horizontal sheer:	75 PSI
FB	Bending:	700 Lbs. PSI
FT	Tension parallel to grain:	425 Lbs. PSI
E	Modulus of elasticity:	1,000,000 PSI

STANDARD AND SPECIES OF LUMBER

All lumber shall conform to the current published standards of the following associations or agencies, as applicable unless otherwise specified herein:

a. ASTM Designation D-245
b. Western Wood Products Association – Grading for Western Lumber – Latest Edition

WALL TIMBERS

Timbers shall each be:

Construction coded, numbered and lettered, for placement per course.
Pre-cut to exact lengths per course.
Pre-drilled for ¼" x 10" timber screws. Screws are to be driven into timbers at < 36" on center.
Pre-drilled for ¼"x 6" corner screws. Screws are to be driven in one per corner.

Notches, beam pockets window and door openings to be pre-cut. Full heights are to be trimmed by the contractor on the building site.

Caulking and/or other air infiltration - heat flow deterrent measures for walls is required by the fabricator and is included.

FINISHES - APPLIED BY OTHERS IN FIELD AFTER CONSTRUCTION
Recommended Exterior Finish: All Cedar to receive two coats of Perma-Chink Lifeline Ultra-2 system and one coat of the Lifeline Advance, or equal. Color to be selected by owner/design professional. *Finish Coats - Material and Labor by Contractor.*

Recommended Interior Finish: All Cedar Timbers, 1" x 8" T&G paneling and trim to receive three coats of water based urethane clear wood finish (Satin-Gloss). Type: non-flammable, acrylic. Color: clear when dry. Composition: acrylic urethane polymers in water. Contains no lead. Satin" also contains silica flattening agent or equal. *Finish Coats - Material and Labor by Contractor.*

STIFFENERS
Material and Quality Assurance: Structural glue laminated timber shall be in conformance with ANSI Standard A.190.1, American National Standard for structural glue laminated timber. Species: Laminated lumber shall be kiln-dried cedar, architectural appearance grade. Laminated stiffeners shall be 3-1/8" X 5-1/2". Manufacturers shall furnish connection steel and hardware for joining structural glue laminated timber members to their supports, exclusive of anchorage and embedment in masonry or concrete *(Anchor bolts, rebar, and other concrete reinforcement items are not furnished by Cedar Forest Products).*

FIRE RESISTANCE STANDARDS
Materials and systems used shall be in accordance with all the provisions of the Uniform Building Code; BOCA National Building Codes and Standard Building Code. Please check local code requirements to assure compliance.

FIRE RESISTANCE RATING
The fire endurance rating of the building load bearing cedar wall timbers shall be determined in accordance with the test procedures set forth in the American Society for Testing Materials, (ASTM E119) Fire Tests of Building Construction and Materials. Symmetrical, load bearing cedar timber wall when tested in accordance with ASTM E119-88, shall meet minimum one hour fire endurance and hose stream test.

A report of a one-hour fire endurance and hose stream test constructed on a symmetrical and load bearing cedar timber wall shall be provided by the manufacturer upon request.

DOORS
Exterior Door: Curries 607 Series Insulated 3/0 X 7/0 steel 18-gauge 1-3/4" thick flush, door. Prime finished grey. Field painting is required. Finish Coats: Surface preparation in accordance with SSPC-1 and or SSPC-2. Prime with Kem Kramik universal primer as manufactured by Sherwin Williams, or equal. Top coats (two required) of heavy duty Alkyd Enamel as manufactured by Sherwin Williams, or equal. Color to be selected by owner/design professional. *Finish Coats - Material and Labor by Contractor.*

Exterior door frames: Curries 16 gauge, knocked down, with plumb anchors. Prime finished grey. Finish Coats: Surface preparation in accordance with SSPC-1 and or SSPC-2. Prime with Kem Kramik universal primer as manufactured by Sherwin Williams, or equal. Top coats (two required) of heavy duty Alkyd Enamel as manufactured by Sherwin Williams, or equal. Color tobe selected by owner/design professional. *Finish Coats - Material and Labor by Contractor.*

HINGES
1-1/2 pair MacPro Five Knuckle Standard Weight MP79 or equal.

DOOR CLOSER
Hager 5200 Series, or equal.

DEAD BOLT
Double Cylinder Hager 3500 Series, or equal.

WINDOWS
Sierra Pacific H3 aluminum clad casements, std. Insulated, or equal.

LAMINATED ARCHES
Laminated timber shall conform to the American Institute of Timber Construction Standards, American Wood Systems and APA. Quality control provided in accordance with the American National Standards Institute ANSI/AITC-A 190.1-(latest edition), kiln-dried Southern Yellow Pine, glue laminated, sealed and wrapped. Laminated columns shall be sized to suit loading requirements. The roof system is designed to withstand 30 PSF live load and 20 PSF wind load.

CONNECTOR PLATES
Plates shall be fabricated from structural steel ASTM-A-36, steel plates shall be Powder coated. Standard color is Black. Unfinished zinc plated bolts.

ROOF DECKING
Machine stress-rated lumber, 2700 Fb-2.2 E (nominal) 2” x 6” #1 grade, single tongue and groove with V-joint on bottom face, kiln-dried Southern Yellow Pine, maximum moisture content shall be 19% or less selected for decking. Roof decking shall be field cut, specified lengths with all joints over supports. Graded in accordance with rules of the Southern Pine Inspection Bureau - (latest edition).

ROOF TRUSSES
TPI (Truss Plate Institute) standards sized for local codes. Pre-built engineered trusses on 24" centers or otherwise specified.

ROOF SHEATHING
APA rated sheathing, EXP 1, 19/32” thick, over trusses, unless otherwise specified.

ROOFING MATERIAL - FIBERGLASS SHINGLES
Shingles shall be square tab fiberglass, Class “A” fire rated, with a 30 year limited warranty. Shingles to be placed over 30 lb. felt and style “D” roof edge, conforms to ASTM D-3018. Roof applications will be per manufacturer’s specifications. Color to be approved by owner/design professional.

Fasteners shall be conventional barbed shank roofing nails (11 or 12 gauge) with 3/8” diameter heads. Nails shall be of sufficient length to penetrate through the plywood sheathing on building with a ceiling. Metal roof edge shall be .024 aluminum brown and shaped as detailed on drawings.

FASCIA
Cedar, S4S, 2” x 8” sound tight knot, kiln dried.

SOFFIT
1” x 8” tongue and groove Cedar, sound tight knot, kiln dried, unless otherwise specified

EXTERIOR TRIM
1 X Cedar "D"/ Better Grade, kiln-dried to be provided, per plan. Contractor will need to cut and install trim based on standard practices. *Finish nails are to be provided by contractor.*

INTERIOR
Walls: Will be per plan, 2" x 4" studs, 16" on center covered by 1" X 8" kiln-dried sound tight knot, T&G Paneling (except on bathroom fixture walls). *Field framed and finished by others.*

Restroom Fixture Walls: 4' x 8' .090 Fiberglass Reinforced Panel sanitary wall covering will be per plan. Color to be white.

Trim: 1 x nominal, species per plan, "D"/ Better Grade, kiln-dried, surfaced on four sides, Contractor will need to cut and install trim based on standard practices. *Finish nails are to be provided by contractor.*

Recommended Interior Finish: All Cedar Timbers, 1" x 8" T&G paneling and trim to receive three coats of water based urethane clear wood finish (Satin-Gloss). Type: non-flammable, acrylic. Color: clear when dry. Composition: acrylic urethane polymers in water. Contains no lead. Satin" also contains silica flattening agent or equal. *Finish Coats - Material and Labor by Contractor.*

PLUMBING & ELECTRICAL PACKAGES AVAILABLE UPON REQUEST
Customized kits of supplies for each building are available, *local plumber or electrician needed for installation and code compliance.*

STRUCTURE RECEIVING & INSTALLATION
The fabricator shall furnish complete drawings showing necessary construction details. Installation of the structure shall be done with a competent supervisor in the construction trades according to Cedar Forest Products installation instructions providing proficient construction practices and procedures. The general contractor is responsible for:

A. Using Non-marring slings and/or padded forks when handling steel and wood.
B. Unloading the carrier/freight company. A crane or lift truck capable of lifting up to 4,000lb bunks is needed for unloading at the destination site.
C. All trucks must be unloaded promptly at destination. Any detention or demurrage charges caused by delay in unloading will be responsibility of contractor/ purchaser.
D. All orders will be scheduled to meet customer's requests to the best of our ability, *however, Cedar Forest Products Company will not be responsible for specific time deliveries nor accept any back-charges for failure of trucks to arrive as scheduled.*
E. Security of materials after its arrival at the destination.
F. Protecting building products after arrival at destination from weather, sunlight, and damage. Materials shall be placed on blocks well off the ground and separated with wood strips so that air can circulate around each member. Cover top and bottom with moisture-resistant paper.
G. Using proper building practices recognized by OSHA and to have experience installing shelters of similar construction. These trades include but are not limited to: masonry work, steel construction, sheet metal work, carpentry, electrical and paint finishing.
H. Required shimming, cutting, and minor adjustments for proper building erection.
I. Examination of final work by verifying that the erection of the structure was done in conformance to the installation instructions provided by Cedar Forest Products and local building codes.
J. Installing all components according to manufacturer's installation instructions and

these specifications.

K. Not attempting any field modifications or repairs without first contacting Cedar Forest Products.
L. Field or Site Tests and Inspections. They are not required by Cedar Forest Products but may be required by the customer and/or by the local building inspector.

ENGINEERING

Building material packages that are designed and manufactured by Cedar Forest Products are reviewed by a registered structural engineer. Stamped structural drawings by a registered engineer licensed in the state of the project are available upon request. Structural calculations are available for an additional fee. Not included in our package is the site specific design of the foundation. No foundation stamped engineer drawings or calculations are provided by Cedar Forest Products. The purchaser must consult with a local registered structural engineer if the soil bearing conditions are different than those indicated in our drawings. The design, excavation, and construction of the structure(s) foundation must be verified by a local registered structural engineer.

END OF SECTION 12 93 00

5601-2

Color: Brown

UPC Code: 07847751700

Country of Origin: United States - **Eligible for ARRA funded projects*

made in USA*

May include one or more globally sourced components.

RECOVERY.GOV

AC Switches

Brand Features

Featuring a look and feel that qualify them as modern classics, Decora Designer Rocker Switches add so much at a modest cost that no home should be without them. Their sleek simplicity and smooth, quiet operation stem from quality materials fitted to tight tolerances and finished with great care, ensuring years of trouble-free service. Easy to wire, they work with tungsten, fluorescent and resistive loads. Legendary Decora® Designer Rocker Switches come in a variety of colors to harmonize with any décor. Their sturdy construction and dependable performance are everything you'd expect from the pre-eminent switch maker.

Item Description

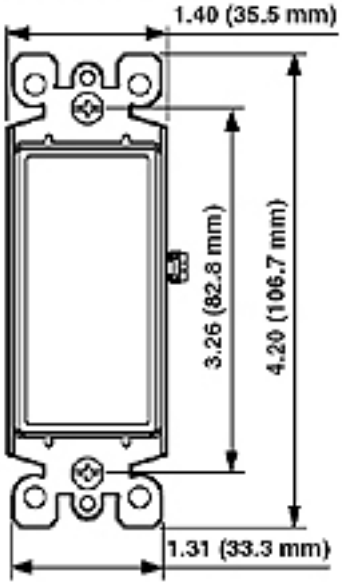
15 Amp, 120/277 Volt, Decora Rocker Single-Pole AC Quiet Switch, Residential Grade, Grounding, Quickwire Push-In & Side Wired - Brown

Technical Information

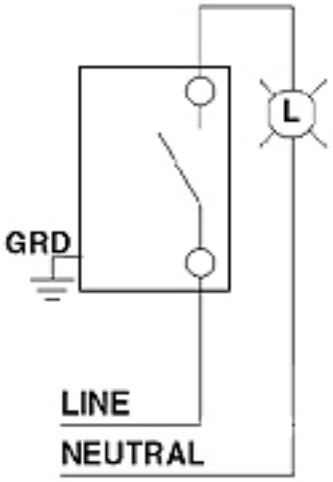
Product Features

Grounding: Grounding
Amperage: 15 Amp
Voltage: 120/277 VAC
Voltage: 120/277 Volt
HP Rating: 1/2HP-120V 2HP-240V-277V
Max. Amperage: 12 Amp
Termination: Quickwire Push-In & Side
Actuator Material: Thermoplastic
Body Material: Thermoplastic
Strap Material: Steel
Color: Brown
Standards and Certifications: UL/CSA
Warranty: 2 Year Limited

Dimensional Diagram



Wiring Diagram
Single Pole



SPECIFICATION SUBMITTAL

JOB NAME:	CATALOG NUMBERS:	
JOB NUMBER:		

Leviton Manufacturing Co., Inc.
201 North Service Road, Melville, NY 11747
Telephone: 1-800-323-8920 · FAX: 1-800-832-9538 · Tech Line (8:30AM-7:30PM E.S.T. Monday-Friday): 1-800-824-3005

Leviton Manufacturing of Canada, Ltd.
165 Hymus Boulevard, Pointe Claire, Quebec H9R 1E9 · Telephone: 1-800-469-7890 ·
FAX: 1-800-824-3005 · www.leviton.com/canada

Leviton S. de R.L. de C.V.
Lago Tana 43, Mexico DF, Mexico CP 11290 · Tel.: (+52)55-5082-1040 · FAX: (+52)5386-1797 · www.leviton.com.mx

Visit our Website at: www.leviton.com
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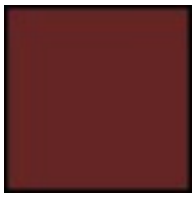
Leviton has a global presence.
If you would like to know where your local Leviton office is located please go to: www.leviton.com/international/contacts/

**Buy American Compliant Logo -- The American Recovery And Reinvestment Act of 2009 ("ARRA") provides federal grants and loans for projects throughout the country. Section 1605 of the Act, named the "Buy American" provision, requires that certain materials and manufactured products used in projects funded by the Act be manufactured in the United States. The appearance of the Recovery Act Logo in relation to a Leviton product is only intended to reflect that such product may be used in an ARRA funded project. It does not mean that such product or Leviton is sponsored or endorsed by, or that Leviton receives funds from, the federal government or the Recovery Accountability and Transparency Board. Nothing in Leviton's use of the logo is intended to suggest anything regarding the requirements for funding under ARRA.*

PRODUCT SPECIFICATIONS / INFO

Color: Brown



80401-N

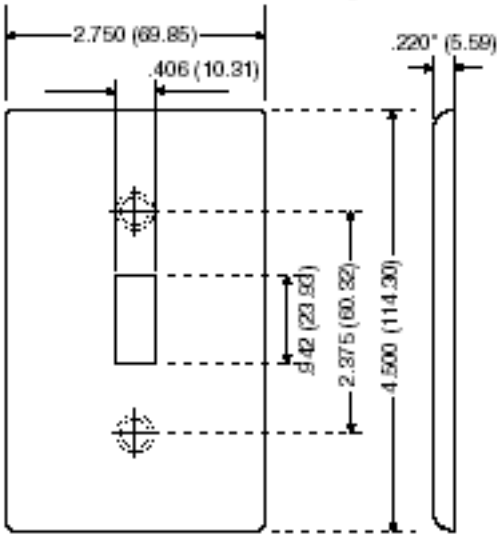
Description

1-Gang Decora/GFCI Device Decora Wallplate, Standard Size, Thermoplastic Nylon, Device Mount, - Brown

Product Features

Type:	Standard Size
Gang:	1
Material:	Thermoplastic Nylon
Color:	Brown
Mount:	Device
Standards and Certifications:	UL/CSA
Warranty:	10-Year Limited

Dimensional Diagram



SPECIFICATION SUBMITTAL

JOB NAME:	CATALOG NUMBERS:
JOB NUMBER:	

Leviton Manufacturing Co., Inc.
59-25 Little Neck Parkway, Little Neck, NY 11362-2591
Telephone: 1-800-323-8920 · FAX: 1-800-832-9538 · Tech Line (8:30AM-7:30PM E.S.T. Monday-Friday): 1-800-824-3005

Leviton Manufacturing of Canada, Ltd.
165 Hymus Boulevard, Pointe Claire, Quebec H9R 1E9 · Telephone: 1-800-469-7890 · FAX: 1-800-824-3005

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Powering Business Worldwide

pe.eaton.com

CH 3/4-inch loadcenter

CH14B100B

UPC:782113097442

Dimensions:

- **Height:** 3.88 IN
- **Length:** 16.75 IN
- **Width:** 14.31 IN

Notes: Loadcenter can be overhead or underground fed by rotating the enclosure and trim 180 degrees.

Warranties:

- Limited lifetime

Specifications:

- **Type:** Main breaker
- **Amperage Rating:** 100A
- **Box Size:** B
- **Bus Material:** Copper
- **Cover:** Ch8bf-combination, ch8bs-surface, not included
- **Enclosure:** NEMA 1
- **Enclosure Material:** Metallic
- **Interrupt Rating:** 10 kAIC
- **Main Circuit Breaker:** CH
- **Number Of Circuits:** 14
- **Number Of Wires:** Three-wire
- **Phase:** Single-phase
- **Wire Size:** #6-1/0 AWG
- **Feed Type:** Overhead or underground

Supporting documents:

- Cutler-Hammer Type CH and BR Loadcenters - Instructions
- Eatons Volume 1-Residential and Light Commercial
- Type CH Circuit Breakers and Loadcenters
- Eaton Specification Sheet - CH14B100B
- Dimensional Drawing - CH 3/4 LOADCENTER,

CH MAIN BREAKER, INDOOR NEMA 1, 120/240 VAC, 1 PHASE

Certifications:

- UL 50
- UL 67

Product compliance: No Data

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Powering Business Worldwide

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Eaton Type CHF 3/4-inch Standard Circuit Breaker

CHF130

UPC:786685361864

Dimensions:

- **Height:** 3.5 IN
- **Length:** 3.5 IN
- **Width:** 1.5 IN

Weight:.28 LB

Notes:HACR Rated, Single-Pole Requires One 2/4-Inch Space, With Trip Indication.

Warranties:

- Limited lifetime residential, 1 year commercial

Specifications:

- **Amperage Rating:** 30A
- **Interrupt Rating:** 10 kAIC
- **Number Of Poles:** Single-pole
- **Voltage Rating:** 120/240V
- **Main Circuit Breaker:** CH
- **Wire Size:** (1) #14-8 AWG, (2) #14-10 AWG Cu/Al
- **Used With:** Type CH Loadcenters

Supporting documents:

- Type CH Circuit Breakers and Loadcenters
- Eatons Volume 1-Residential and Light Commercial
- Eatons CHF Circuit Breaker with Trip Flag
- Eaton Specification Sheet - CHF130

Certifications:

- UL 489

Product compliance: No Data

Product Bulletin for SmartlockPro® Self-Test GFCIs

New SmartlockPro® Self-Test GFCIs For Smarter Protection.

Industry-leading quality, professional grade lockout action, and the slimmest profile on the market make SmartlockPro Self-Test GFCIs a smart choice in ground fault circuit interrupter protection. Engineered to meet the latest UL standard for auto-monitoring (self-test), our complete line of self-test GFCIs periodically conduct an automatic internal test to confirm that protected power is available. If the GFCI detects a problem, one or more of the following will occur:

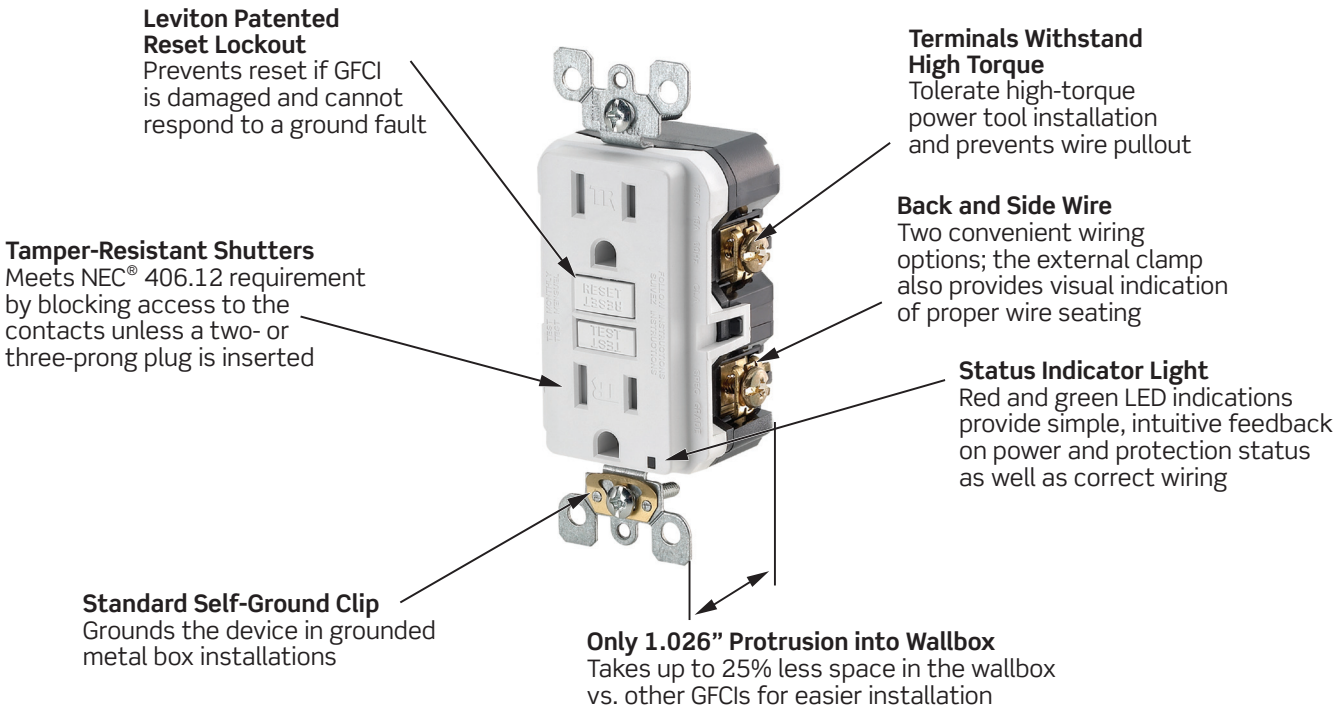
- Power will be denied (trip with the inability to reset)
- Trip with the ability to reset, subject to the next auto-monitoring test cycle or repeatedly trip
- Visual and/or audible indication

Faster and easier to install in any wallbox because the depth is reduced, our slim Self-Test GFCIs flush mount to the wall with minimal protrusion for a sleek, finished look.

Applications

Residential – Kitchens, bathrooms, garages, basements, laundry rooms, wet sink and other wet locations around the home
Educational Facilities – Classrooms, restrooms, laboratories, dormitories and kitchens
Airports – Public bathrooms, general use and maintenance areas
Restaurants, Lodging and Retail Malls – Public bathrooms, general use and maintenance areas
Commercial Offices – Bathrooms, basement areas, hallways and kitchen facilities
Public Areas – Wherever receptacles are located near wet or damp locations

Features and Benefits



Self-Test

- Provides continuous ground fault protection – detects and trips on actual ground fault even when self-test is being conducted
- On initial power up, tests the GFCI within 3 seconds
- Auto-monitoring exceeds the UL requirement
- Auto adapts and shifts to more frequent testing if potential problem is detected
- Testing frequency regularly updates protection status
- Electronics are designed to minimize any false triggers

General Features

- Patented bridge contact provides individual sets of contacts for GFCI receptacle face and downstream receptacles; no power will be delivered to receptacle face if improperly wired (line-load reversed)
- Trip threshold meets or exceeds UL requirements for tripping time
- Improved immunity to high frequency noise reduces nuisance tripping
- Advanced electronics provides superior resistance to electrical surges and over-voltages
- Patented Lockout Action prevents reset if GFCI is damaged and cannot respond to a ground fault
- Status Indicator Light provides simple, intuitive feedback on power and protection status as well as indication of line/load reversal
- Silver alloy contacts
- Impact-resistant thermoplastic cover and body
- One-piece T-design trip latch mechanism provides efficient operation
- Available in 15A and 20A versions, all with Fed Spec rating
- TEST and RESET button colors match device face
- Compatible with all Decora® devices and wallplates; available in select Decora colors
- Limited Two-Year Product Warranty

Tamper-Resistant (TR) Models

- Complies with NEC® requirement mandating that all 15A and 20A receptacles installed in dwelling units be listed as tamper-resistant
- Shutter mechanism inside the receptacle blocks access to the contacts unless a two- or three-prong plug is inserted

Duplex Guide Light Models

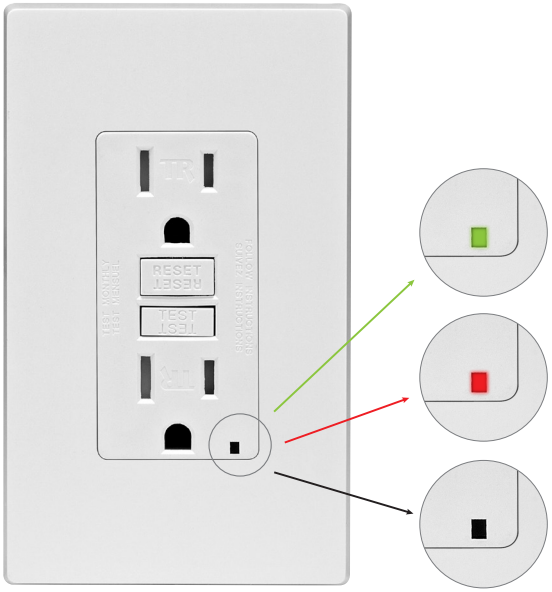
- Sensor provides automatic ON/OFF based on ambient lighting
- Dual lens provides visible light with a variety of plugs or transformers
- Custom designed lenses with edge-mounted LEDs improve light dispersion
- Energy-efficient (~1W of electricity). No bulbs to replace
- Saves space by eliminating the need to use an outlet for a plug-in night light

Weather-Resistant Models

- Designed for wet and damp locations to meet the requirements of NEC Section 406.8
- Stainless steel strap and screws
- Conformal coated PC board to protect critical components from moisture
- Cold impact resistant face and buttons
- UV stabilized plastics

Audible Models

- Audible alarm sounds when the GFCI trips, providing an alert that power has been disconnected from load(s) plugged into or fed from the GFCI
- Indicator light provides visual status



Status Indicator Light

Leviton GFCI devices feature an LED Status Indicator Light which provides a visual indication to the user of the status of GFCI protection. This is a convenient way to check the level of protection at-a-glance.

GREEN LED - NORMAL OPERATION
- GFCI has passed self-test and is providing power

RED LED - ALERT!
- Blinking - Initial self-test upon first power up
- Solid or blinking - Press TEST and RESET buttons to reset GFCI
- If GFCI will not reset OR solid or blinking red continues, replace device

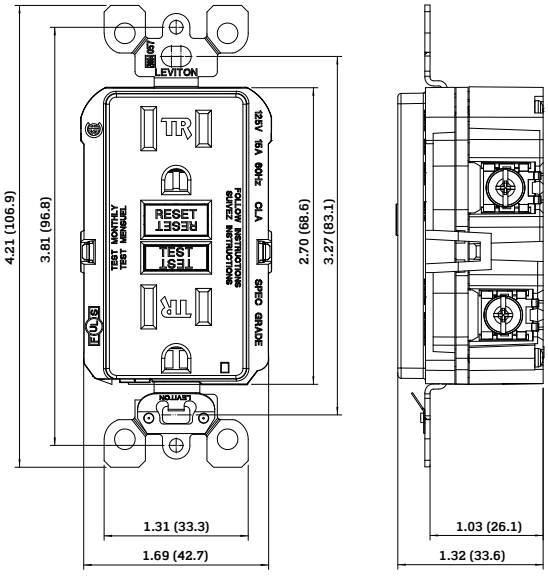
NO LED - NO POWER
- GFCI in tripped state
- Press RESET button
- If GFCI will not reset, no power on the circuit

Agency Standards and Compliance

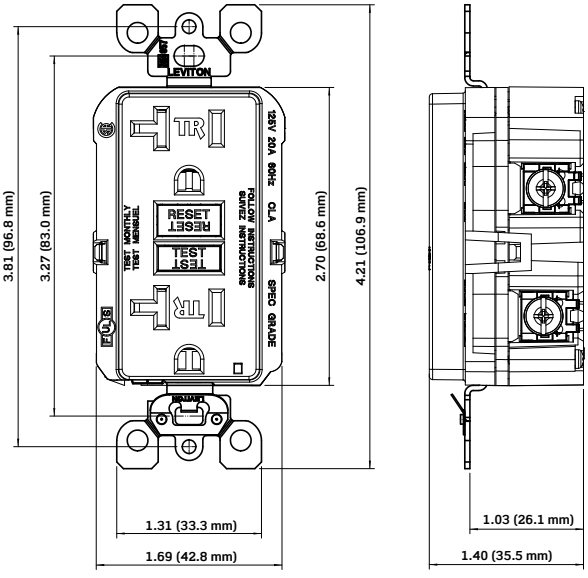
- Meets the latest UL requirements
- UL Standard 943 Class A (GFCI) and 498 (Receptacles)
- UL Listed (File #E-48380)
- CSA Certified (File #LR-57811)
- NOM Certified
- Meets Federal Specification W-C-596G (blank face - exception)

Material Characteristics

- Environmental: Flammability UL-94 V2 Rating
- Operating Temperature: -35°C to 66°C
- Material: Face, Thermoplastic; Body, Polycarbonate



15A SmartlockPro® Self-Test GFCI



20A SmartlockPro® Self-Test GFCI

Ordering Information

Commercial Spec Grade – Back and Side Wired

Description	Color	Cat. No.		Cat. No.	
NEMA		NEMA 5-15R		NEMA 5-20R	
Rating		15A-125V @ Receptacle 20A-125V Feed-Through		20A-125V @ Receptacle 20A-125V Feed-Through	
		TR	**Non-TR**	**TR**	**Non-TR**
Duplex with LED Indicator (with self-grounding clip)	White	GFTR1-W	GFNT1-W	GFTR2-W	GFNT2-W
	Ivory	GFTR1-I	GFNT1-I	GFTR2-I	GFNT2-I
	Light Almond	GFTR1-T	GFNT1-T	GFTR2-T	GFNT2-T
	Gray	GFTR1-GY	GFNT1-GY	GFTR2-GY	GFNT2-GY
	Black	GFTR1-E	GFNT1-E	GFTR2-E	GFNT2-E
	Brown	GFTR1	GFNT1	GFTR2	GFNT2
	Red	-	-	-	GFNT2-R
Duplex Weather-Resistant/ Outdoor Grade with LED Indicator	White	GFWT1-W	GFWR1-W	GFWT2-W	GFWR2-W
	Ivory	GFWT1-I	-	GFWT2-I	-
	Light Almond	GFWT1-T	-	GFWT2-T	-
	Gray	GFWT1-GY	-	GFWT2-GY	-
	Black	GFWT1-E	GFWR1-E	GFWT2-E	GFWR2-E
Duplex Guide Light with LED Indicator (with self-grounding clip)	White	GFNL1-W	-	GFNL2-W	-
	Ivory	GFNL1-I	-	GFNL2-I	-
	Light Almond	GFNL1-T	-	GFNL2-T	-
	Black	GFNL1-E	-	-	-
Duplex with Audible Trip Alert with LED Indicator (with self-grounding clip)	White	GFTA1-W	-	GFTA2-W	-
	Ivory	GFTA1-I	-	GFTA2-I	-
	Light Almond	GFTA1-T	-	GFTA2-T	-
Combination Switch with LED Indicator (with self-grounding clip) (15 Amp @ 120 VAC Switch rating)	White	GFSW1-W	-	-	-
	Ivory	GFSW1-I	-	-	-
	Light Almond	GFSW1-T	-	-	-
Blank Face with LED Indicator (with self-grounding clip) (20A feedthrough rating only)	White	GFRBF-W			
	Ivory	GFRBF-I			
	Light Almond	GFRBF-T			

Leviton Manufacturing Co., Inc. World Headquarters
201 North Service Road, Melville, NY 11747-3138
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Visit our Website at: www.leviton.com/gfci

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ISO 9001 REGISTERED Quality Manufacturer

CR20-GY

Duplex Receptacle Outlet, Commercial Specification Grade, Indented Face, 20 Amp, 125 Volt, Back and Side Wire, NEMA 5-20R, 2-Pole, 3-Wire, Self-Grounding - Gray

Leviton's line of Heavy-Duty Specification Grade receptacles are designed and manufactured to withstand the most demanding environments. Available in a wide variety of configurations, including isolated ground, tamper-resistant, etc., these Commercial Grade devices are the electrical contractor's choice for use in hotels, schools, hospitals and commercial office buildings.

Color: Gray

UPC Code: 07847781544

Country Of Origin: United States

NEMA: 5-20R

Technical Information

AC Horsepower Ratings

At Rated Voltage: 1 HP

Electrical Specifications

Amperage: 20 A

Current Limiting: Full Rated Current

Dielectric Voltage: Withstands 2000V per UL498

Grounding: Self-Grounding

Pole: 2

Temperature Rise: Max 30C after 100 cycles OL at 150 percent rated current

Voltage: 125 VAC

Wire: 3

Environmental Specifications

Operating Temperature: -40°C to 60°C

Material Specifications

Body Material: Thermoplastic

Face Material: Thermoplastic

Ground Clips: Brass

Grounding Screw: Steel 8-32

Line Contacts: Brass .031 Thick

Strap Material: Zinc-Plated Steel

Terminal Screws: Steel 8-32

Mechanical Specifications

Product ID: Ratings are permanently marked on device

Terminal Accom.: 14-10 AWG

Terminal ID: Brass-Hot, Green-Ground, Silver-Neutral

Termination: Back and Side Wire

Product Features

Color: Gray

Device Type: Duplex Receptacle Outlet

Grade: Commercial Specification Grade

NEMA: 5-20R

Standards and Certifications

ANSI: C-73

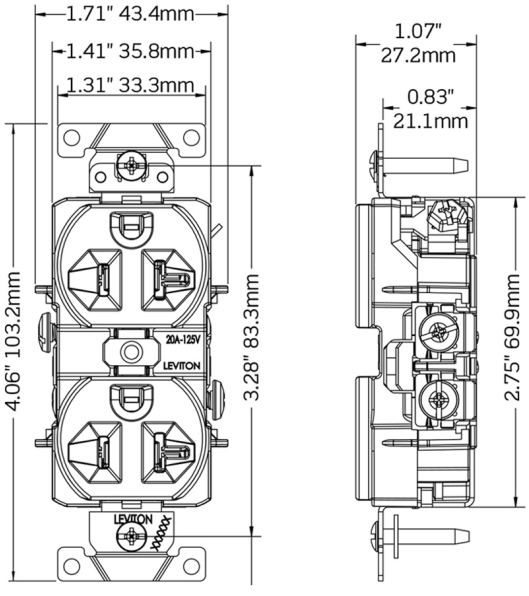
CSA C22.2 No. 42: File 152105

NEMA: WD-1 & WD-6

NOM: 057

UL498: File E13399

Warranty: 10 Year Limited



Drawing Applies to 15 & 20A Devices

SPECIFICATION SUBMITTAL

JOB NAME:	CATALOG NUMBERS:	
JOB NUMBER:		

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ISO 9001 REGISTERED Quality Manufacturer

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Leviton has a global presence.
If you would like to know where your local Leviton office is located please go to:
www.leviton.com/international/contacts/

Lumark

DESCRIPTION

The patented Lumark Crosstour™ LED Wall Pack Series of luminaries provides an architectural style with super bright, energy efficient LEDs. The low-profile, rugged die-cast aluminum construction, universal back box, stainless steel hardware along with a sealed and gasketed optical compartment make the Crosstour impervious to contaminants. The Crosstour wall luminaire is ideal for wall/surface, inverted mount for façade/canopy illumination, post/bollard, site lighting, floodlight and low level pathway illumination including stairs. Typical applications include building entrances, multi-use facilities, apartment buildings, institutions, schools, stairways and loading docks test.

Catalog #		**Type**
Project		
Comments		**Date**
Prepared by		

SPECIFICATION FEATURES

Construction
Slim, low-profile LED design with rugged one-piece, die-cast aluminum hinged removable door and back box. Matching housing styles incorporate both a small and medium design. The small housing is available in 12W, 18W and 26W. The medium housing is available in the 38W model. Patented secure lock hinge feature allows for safe and easy tool-less electrical connections with the supplied push-in connectors. Back box includes three half-inch, NPT threaded conduit entry points. The universal back box supports both the small and medium forms and mounts to standard 3-1/2" to 4" round and octagonal, 4" square, single gang and masonry junction boxes. Key hole gasket allows for adaptation to junction box or wall. External fin design extracts heat from the fixture surface. One-piece silicone gasket seals door and back box. Minimum 5" wide pole for site lighting application. Not recommended for car wash applications.

Optical
Silicone sealed optical LED chamber incorporates a custom engineered mirrored anodized reflector providing high-efficiency illumination. Optical assembly includes impact-resistant tempered glass and meets IESNA requirements for full cutoff compliance. Available in seven lumen packages; 5000K, 4000K and 3000K CCT.

Electrical
LED driver is mounted to the die-cast housing for optimal heat sinking. LED thermal management system incorporates both conduction and natural convection to transfer heat rapidly away from the LED source. 12W, 18W, 26W and 38W series operate in -40°C to 40°C [-40°F to 104°F]. High ambient 50°C models available. Crosstour luminaires maintain greater than 89% of initial light output after 72,000 hours of operation. Three half-inch NPT threaded conduit entry points allow for thru-branch wiring. Back box is an authorized electrical wiring compartment. Integral LED electronic driver incorporates surge protection. 120-277V 50/60Hz or 347V 60Hz models.

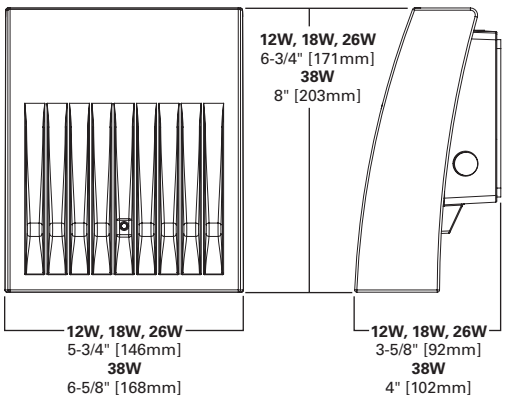
Finish
Crosstour is protected with a Super durable TGIC carbon bronze or summit white polyester powder coat paint. Super durable TGIC powder coat paint finishes withstand extreme climate conditions while providing optimal color and gloss retention of the installed life.

Warranty
Five-year warranty.

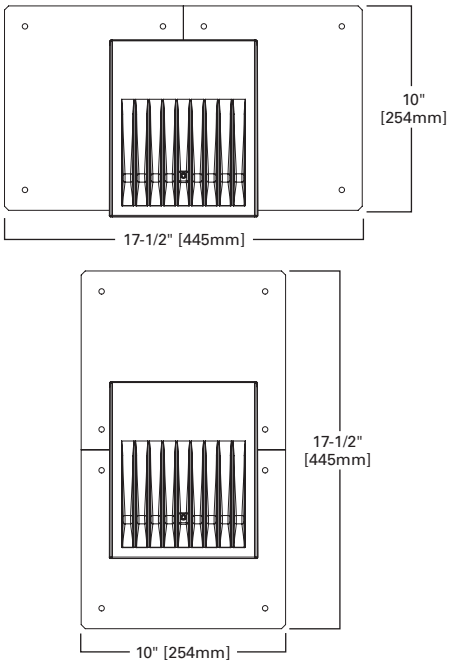
XTOR
CROSSTOUR LED

APPLICATIONS:
WALL / SURFACE
POST / BOLLARD
LOW LEVEL
FLOODLIGHT
INVERTED
SITE LIGHTING

DIMENSIONS



ESCUTCHEON PLATES



CERTIFICATION DATA
UL/cUL Wet Location Listed
LM79 / LM80 Compliant
ROHS Compliant
ADA Compliant
NOM Compliant Models
IP66 Ingressed Protection Rated
Title 24 Compliant
DesignLights Consortium® Qualified*

TECHNICAL DATA
40°C Maximum Ambient Temperature
External Supply Wiring 90°C Minimum

EPA
Effective Projected Area (Sq. Ft.):
XTOR1B, XT0R2B, XT0R3B=0.34
XTOR4B=0.45

SHIPPING DATA:
Approximate Net Weight:
3.7 – 5.25 lbs. [1.7 – 2.4 kgs.]

*www.designlights.org

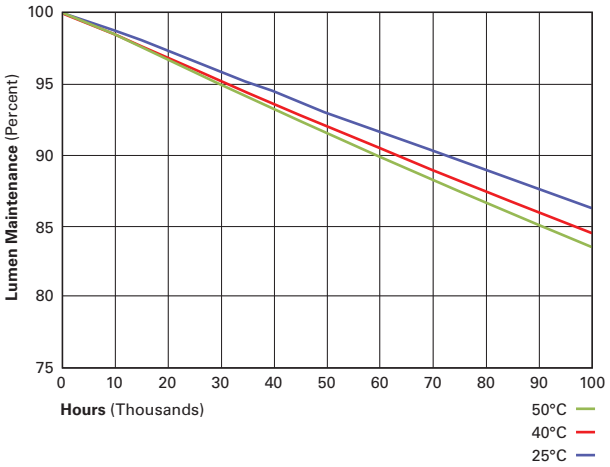
POWER AND LUMENS BY FIXTURE MODEL

LED Information	XTOR1B	XTOR1B-W	XTOR1B-Y	XTOR2B	XTOR2B-W	XTOR2B-Y	XTOR3B	XTOR3B-W	XTOR3B-Y	XTOR4B	XTOR4B-W	XTOR4B-Y
Delivered Lumens (Wall Mount)	1,418	1,396	1,327	2,135	2,103	1,997	2,751	2,710	2,575	4,269	4,205	3,995
Delivered Lumens (With Flood Accessory Kit) [1]	1,005	990	940	1,495	1,472	1,399	2,099	2,068	1,965	3,168	3,121	2,965
B.U.G. Rating [2]	B1-U0-G0	B1-U0-G0	B1-U0-G0	B1-U0-G0	B1-U0-G0	B1-U0-G0	B1-U0-G0	B1-U0-G0	B1-U0-G0	B2-U0-G0	B2-U0-G0	B2-U0-G0
CCT (Kelvin)	5,000	4,000	3,000	5,000	4,000	3,000	5,000	4,000	3,000	5,000	4,000	3,000
CRI (Color Rendering Index)	70	70	70	70	70	70	70	70	70	70	70	70
Power Consumption (Watts)	12W	12W	12W	18W	18W	18W	26W	26W	26W	38W	38W	38W

NOTES: 1 Includes shield and visor. **2** B.U.G. Rating does not apply to floodlighting.

LUMEN MAINTENANCE

Ambient Temperature	TM-21 Lumen Maintenance (72,000 Hours)	Theoretical L70 (Hours)
XTOR1B Model		
25°C	> 90%	255,000
40°C	> 89%	234,000
50°C	> 88%	215,000
XTOR2B Model		
25°C	> 89%	240,000
40°C	> 88%	212,000
50°C	> 87%	196,000
XTOR3B Model		
25°C	> 89%	240,000
40°C	> 88%	212,000
50°C	> 87%	196,000
XTOR4B Model		
25°C	> 89%	222,000
40°C	> 87%	198,000
50°C	> 87%	184,000



CURRENT DRAW

Voltage	Model Series			
	XTOR1B	XTOR2B	XTOR3B	XTOR4B
120V	0.103A	0.15A	0.22A	0.34A
208V	0.060A	0.09A	0.13A	0.17A
240V	0.053A	0.08A	0.11A	0.17A
277V	0.048A	0.07A	0.10A	0.15A
347V	0.039A	0.06A	0.082A	0.12A

ORDERING INFORMATION

Sample Number: XTOR2B-W-WT-PC1

Series [1]	**LED Kelvin Color**	**Housing Color**	**Options** (Add as Suffix)	**Accessories** (Order Separately)
XTOR1B=Small Door, 12W **XTOR2B**=Small Door, 18W **XTOR3B**=Small Door, 26W **XTOR4B**=Medium Door, 38W	**[Blank]**=Bright White (Standard), 5000K **W**=Neutral White, 4000K **Y**=Warm White, 3000K	**[Blank]**=Carbon Bronze (Standard) **WT**=Summit White **BK**=Black **BZ**=Bronze **AP**=Grey **GM**=Graphite Metallic **DP**=Dark Platinum	**PC1**=Photocontrol 120V [2] **PC2**=Photocontrol 208-277V [2, 3] **347V**=347V [4] **HA**=50°C High Ambient [4]	**WG/XTOR**=Wire Guard [5] **XTORFLD-KNC**=Knuckle Floodlight Kit [6] **XTORFLD-TRN**=Trunnion Floodlight Kit [6] **XTORFLD-KNC-WT**=Knuckle Floodlight Kit, Summit White [6] **XTORFLD-TRN-WT**=Trunnion Floodlight Kit, Summit White [6] **EWP/XTOR**=Escutcheon Wall Plate, Carbon Bronze **EWP/XTOR-WT**=Escutcheon Wall Plate, Summit White

NOTES:
1. DesignLights Consortium® Qualified and classified for both DLC Standard and DLC Premium, refer to www.designlights.org for details.
2. Photocontrols are factory installed.
3. Order PC2 for 347V models.
4. Thru-branch wiring not available with HA option or with 347V. XTOR3B not available with HA and 347V or 120V combination.
5. Wire guard for wall/surface mount. Not for use with floodlight kit accessory.
6. Floodlight kit accessory supplied with knuckle (KNC) or trunnion (TRN) base, small and large top visors and small and large impact shields.

STOCK ORDERING INFORMATION

12W Series	**18W Series**	**26W Series**	**38W Series**
XTOR1B=12W, 5000K, Carbon Bronze	**XTOR2B**=18W, 5000K, Carbon Bronze	**XTOR3B**=26W, 5000K, Carbon Bronze	**XTOR4B**=38W, 5000K, Carbon Bronze
XTOR1B-WT=12W, 5000K, Summit White	**XTOR2B-W**=18W, 4000K, Carbon Bronze	**XTOR3B-W**=26W, 4000K, Carbon Bronze	**XTOR4B-W**=38W, 4000K, Carbon Bronze
XTOR1B-PC1=12W, 5000K, 120V PC, Carbon Bronze	**XTOR2B-WT**=18W, 5000K, Summit White	**XTOR3B-WT**=26W, 5000K, Summit White	**XTOR4B-WT**=38W, 5000K, Summit White
XTOR1B-W=12W, 4000K, Carbon Bronze	**XTOR2B-PC1**=18W, 5000K, 120V PC, Carbon Bronze	**XTOR3B-PC1**=26W, 5000K, 120V PC, Carbon Bronze	**XTOR4B-PC1**=38W, 5000K, 120V PC, Carbon Bronze
XTOR1B-W-PC1=12W, 4000K, 120V PC, Carbon Bronze	**XTOR2B-W-PC1**=18W, 4000K, 120V PC, Carbon Bronze		**XTOR4B-W-PC1**=38W, 4000K, 120V PC, Carbon Bronze

Passive Infrared Ceiling Occupancy Sensor

Description

The OSCxx-I0W is a Passive Infrared (PIR) ceiling mount, low voltage occupancy sensor that works in conjunction with the Leviton OSPxx Power Pack to control lighting. The sensor's main function is to turn the lights ON or maintain the lights ON while movement is detected within the sensor's range and to turn the lights OFF when the space is left unoccupied.

The sensor uses a dual element PIR heat detector that resides behind a multi-zone optical lens. This Fresnel lens establishes dozens of zones of detection. The sensor is sensitive to the heat emitted by the human body. In order to trigger the sensor, the source of heat must move from one zone of sensing to another. Non-moving hot objects will not cause the lights to turn ON (like incandescent lights).

Applications

- Classrooms
- Utility closets
- Conference rooms
- Copy rooms
- Hallways
- Small offices
- Open areas
- Private restrooms
- Storage rooms
- Vending rooms
- Open warehouses
- Work spaces

Features

- Fast, simple installation: easy base mount, three wire connection (low voltage) and twist-and-lock
- Self-adjusting: internal microprocessor continually analyzes, evaluates and adjusts the infrared sensitivity and time delay. Performance is kept at a maximum and user complaints are eliminated.
- Flexible base mounting: supplied twist-and-lock base mount permits fast alignment. Supplied cover hides mounting hardware and wires. Can be used with raceways for hard surface installations.
- Range & coverage: 450 sq. feet and 1,500 sq. feet models available
- Maximum reliability, low cost: all digital circuitry uses a minimum of components
- Power base (OPB15) available for line voltage applications
- Ambient light recognition: a light sensor prevents lights from turning on when the room is adequately lit by natural light
- Non-volatile memory: learned and adjusted settings saved in protected memory are not lost during power outages
- Timer setting feature: automatic—30sec-30min. Test mode—6sec with auto exit programming.
- PIR masking: pre-scored masking disks are provided with the device for fine tuning the field-of-view
- Walk-through: provides increased energy savings by decreasing the time delay to 2.5min when someone momentarily walks through the monitored space
- High motion sensitivity: large lens area and multi-element lens design gives excellent range and sensitivity
- Custom off-white color matched for shaded ceilings and most common ceiling tiles
- Device: rugged, high-impact, injection molded plastic. Color coded leads are 6" long (16.24 cm).

Condition	Example	Adaptive Reaction
Timer left in text mode—the sensor remains in a 6 sec. test mode	An installer accidently leaves the sensor in the 6 sec. timer text mode and the lights may go on or off every 6 seconds	The sensor automatically resets the timer to 10 minutes after 15 minutes of test mode
False ON—the sensor incorrectly turns the lights ON	The sensor detects movement in the corridor hallway and the room lights turn ON	After an initial movement is sensed, if another movement is not sensed within the timer setting, then the delayed OFF time setting is automatically reduced
False OFF—the sensor incorrectly turns the lights OFF	The sensor does not detect movement because an occupant sits virtually motionless at a desk and the lights turn OFF	If motion is sensed within a short period after the lights go OFF, then the current delayed OFF time setting is increased

Leviton Manufacturing Co., Inc. Global Headquarters
201 North Service Road, Melville, NY 11747-3138 **tel** 800-323-8920 **tech line** (8:30AM-7:00PM ET Mon-Fri) 800-824-3005
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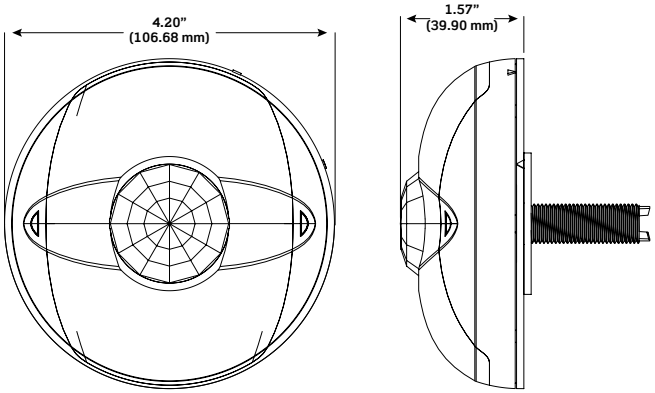
DIP Switch Settings

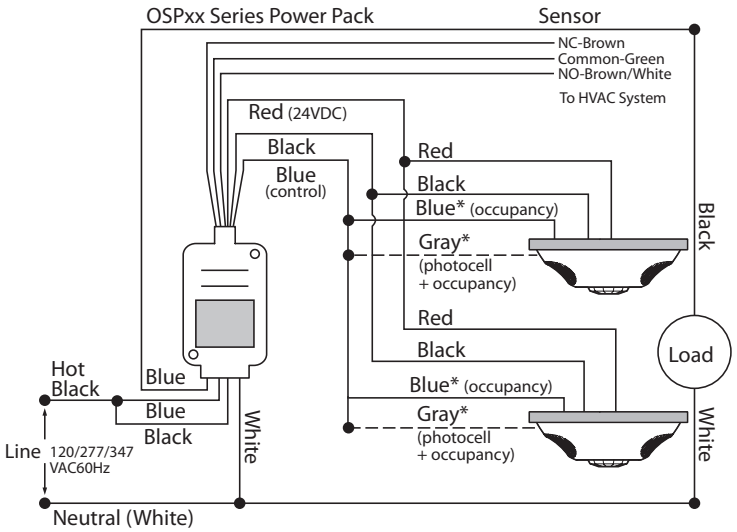
Switch		Switch Functions	Switch Settings
	Bank A	**OFF**	**ON**
A1	N/A		
A2	N/A		
A3	Manual Mode	Auto Adapting Enabled	Auto Adapting Disabled
A4	Walk-Thru Disabled	Walk-Thru Enabled	Walk-Thru Disabled
	Bank B		
B1	Override to ON	Auto Mode	Lights forced ON
B2	Override to OFF	Auto Mode	Lights forced OFF
B3	Test Mode	OFF ON OFF	Enter/Exit Test Mode
B4	LED Disabled	LEDs Enabled	LEDs Disabled

*Bold items are factory defaults

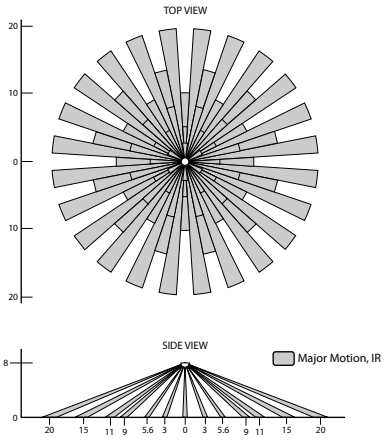
Dimensions Diagrams



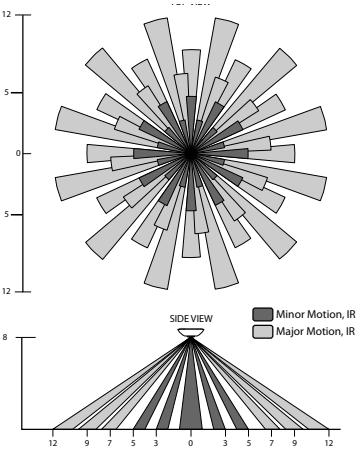
Wiring Diagram



Field-Of-View Diagrams



OSC04



OSC15

Specifications

Electrical	
Power Requirements	24 VDC, 10mA from OSPxx Power Pack or OPB15 Power Base
Power Consumption	10mA
Output	24 VDC active high logic control signal with short circuit protection
Controls	
Infrared Sensitivity	0 to 100%; red knob (factory setting: 75%)
Light Sensor	20 to 3,000 Lux; blue knob factory set at 100% (grey wire required)
Time Delay	30sec-30min; black knob (factory setting: 10min)
Indicators	
Red LED Lamp	Passive infrared motion technology
Environmental	
Operating Temperature Range	32-104°F (0-40°C)
Relative Humidity	0-95% non-condensing, for indoor use only
Other	
Mounting Height	8-10 feet
Energy Codes	Can be used to comply with IECc, ASHRAE 90.1 and 2019 Title 24, Part 6 occupancy sensing requirements
Listings	CUL/US Certified
Warranty	Limited 5-Year

Ordering Information

Header	
Cat. No.	**Description**
OSC04-I0W	Passive Infrared Ceiling Sensor, 450 sq. feet of coverage
OSC04-IAW	Passive Infrared Ceiling Sensor, 1500 sq feet of coverage, made in USA
OSC15-I0W	Passive Infrared Ceiling Sensor, 1500 sq. feet of coverage
OSC15-IAW	Passive Infrared Ceiling Sensor, 1500 sq. feet of coverage, made in USA

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Leviton Manufacturing Co., Inc. Lighting & Controls
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Visit our Website at: www.leviton.com/sensors
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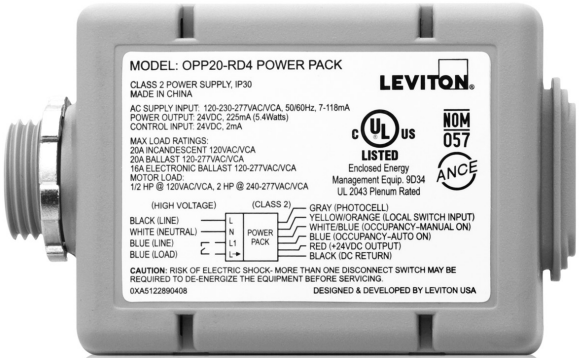
G-8358C/F21-aa
REV JUN 2021

PRODUCT DATA

LEVITON

Super Duty Power Pack Line

High performance line includes models for daylight harvesting, bi-level switching, plug load control, CA Title 24, occupancy sensing control and manual switching



DEFINITION

The OPP20 is the latest addition to the Leviton Power Pack family, delivering a wide array of switching solutions in a single unit. Submitted for stringent testing, this robust power pack line is designed to deliver unmatched performance. The OPP20 line features robust and reliable mechanical latching relays, exclusive fail-safe circuitry, daylight harvesting, bi-level switching and is configurable for energy code requirements. Exclusive Leviton High Inrush Stability (H.I.S.) circuitry is specifically designed to handle high inrush electronic ballast loads and offer unmatched durability and service.

APPLICATIONS

- Can be used to comply with NY LL48, IECC, ASHRAE 90.1 and Title 24, Part 6 daylight harvesting, demand response, bi-level switching and receptacle control requirements
- Auto-ON/auto-OFF with local switch
- Manual-ON/auto-OFF with local switch

OPP20 SOFTWARE FEATURES

- Fail-safe circuitry/return-to-closed capability

OPP20-OD1

- Auto-ON occupancy sensor input

OPP20-OD2

- Exclusive patented self-detect configurable local switch input - momentary or maintained
- Configurable for auto-ON and manual-ON occupancy sensor inputs

OPP20-RD3

- Auto-ON occupancy sensor input
- Photocell ready

OPP20-RD4

- Exclusive patented self-detect configurable local switch input - momentary or maintained
- Configurable for auto-ON and manual-ON occupancy sensor inputs
- Photocell ready

OPP20 HARDWARE FEATURES

- Robust and reliable mechanically held latching relay provides dependability and robust performance for all load types and provides power savings over electrically held relay power packs
- Industry exclusive fail-safe circuitry - in the event of product failure, return-to-closed capability causes relay to default to a closed position (ON) for safe operation and alleviates life safety concerns
- Industry exclusive H.I.S. circuit designed to handle high inrush electronic ballast loads
  - Factory calibrated zero crossing for extended life of the relay
- Submitted and passed for stringent testing:
  - Tested over 1,500,000 loaded cycles
  - Passed NEMA 410 testing for Electronic Ballast Inrush Current
  - UL/cUL 916 listed for Energy Management Equipment
- Power supply output short circuit protection
- Voltage regulated at 24VDC, 225mA
- Optimal installation flexibility
  - Class 2 wires are Teflon coated for UL2043 Plenum Rated applications
  - Mounts inside or outside fluorescent ballast cavity
  - Mounts inside or outside junction box
- RoHS compliant

OPP20-0D1 • OPP20-0D2 • OPP20-RD3 • OPP20-RD4

LED READY

Leviton Manufacturing Co., Inc. Energy Management, Controls and Automation
201 North Service Road, Melville, NY 11747-3138 **tech line** 800-824-3005 **fax** 800-832-9538
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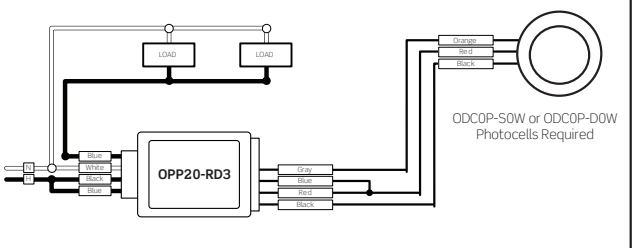
PRODUCT DATA

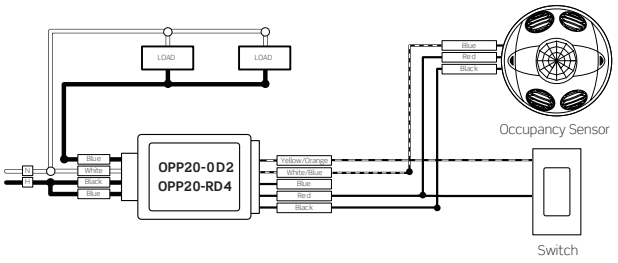
APPLICATION DIAGRAMS

Photocell ONLY Room Control



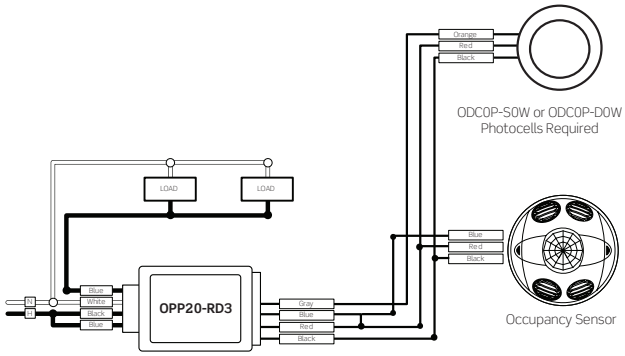
NOTE: Power Pack and the load switched by the power pack MUST be fed from the same phase.

Manual ON/Auto OFF with Local Switch



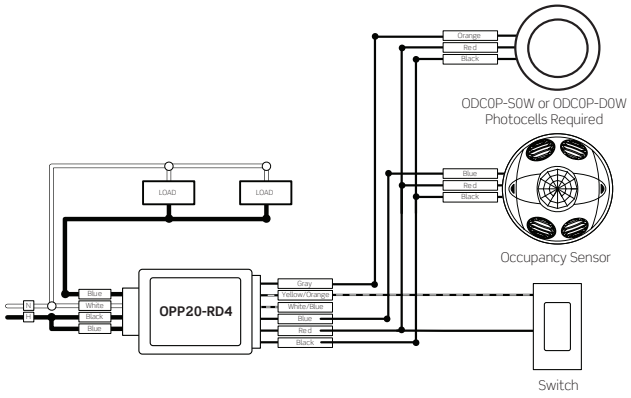
NOTE: Power Pack and the load switched by the power pack MUST be fed from the same phase.

Photocell and Occupancy Sensor Room Control



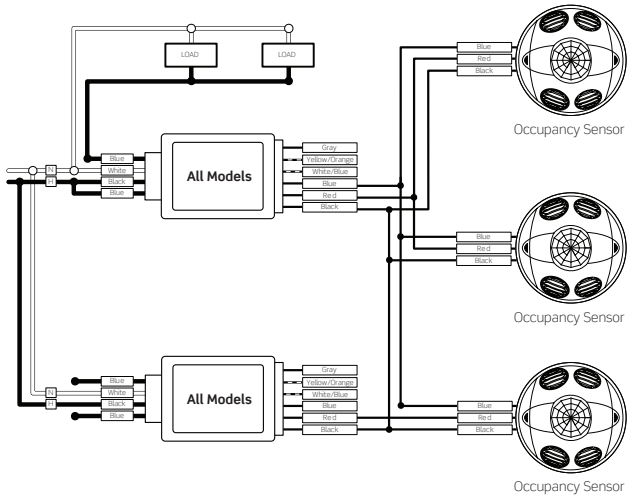
NOTE: Power Pack and the load switched by the power pack MUST be fed from the same phase.

Photocell and Occupancy Sensor with Local Switch



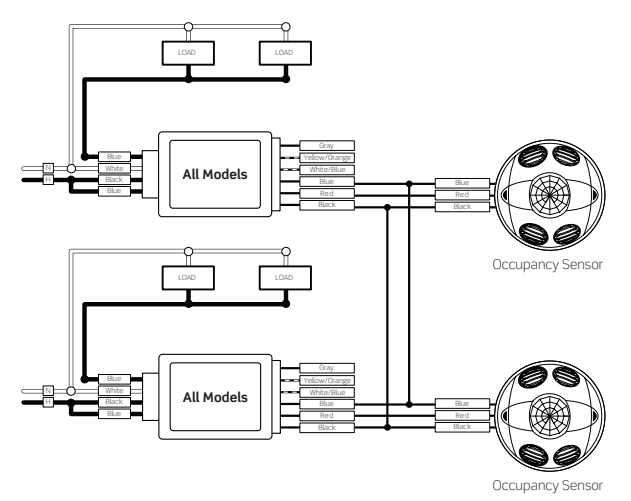
NOTE: Power Pack and the load switched by the power pack MUST be fed from the same phase.

Multiple Occupancy Sensors Exceeding the Power Pack's Rating



NOTE: Power Pack and the load switched by the power pack MUST be fed from the same phase.

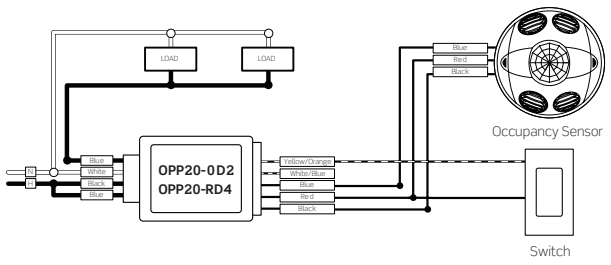
Multiple Loads Exceeding a Single Power Pack's Load Rating



NOTE: Power Pack and the load switched by the power pack MUST be fed from the same phase.

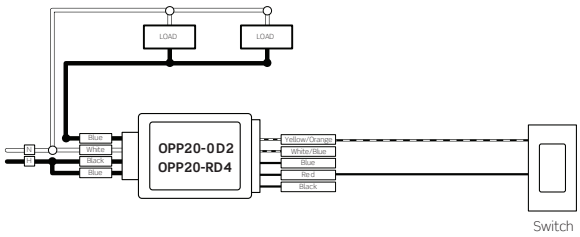
APPLICATION DIAGRAMS

Auto ON/Auto OFF with Local Switch



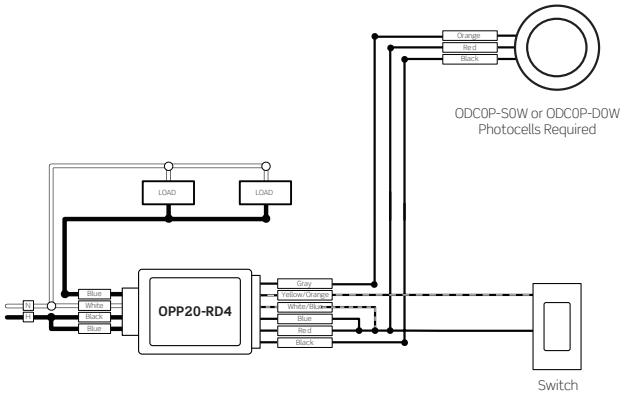
NOTE: Power Pack and the load switched by the power pack MUST be fed from the same phase.

Local Switch ONLY



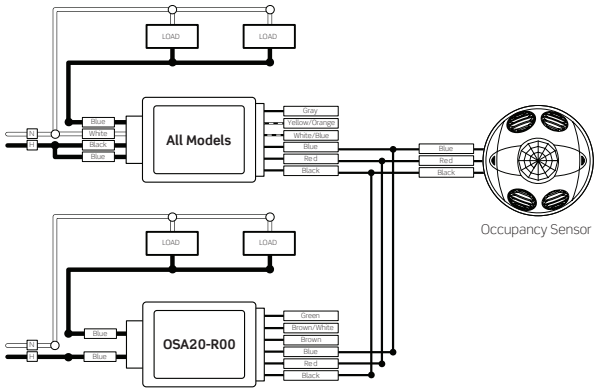
NOTE: Power Pack and the load switched by the power pack MUST be fed from the same phase.

Photocell with Local Switch



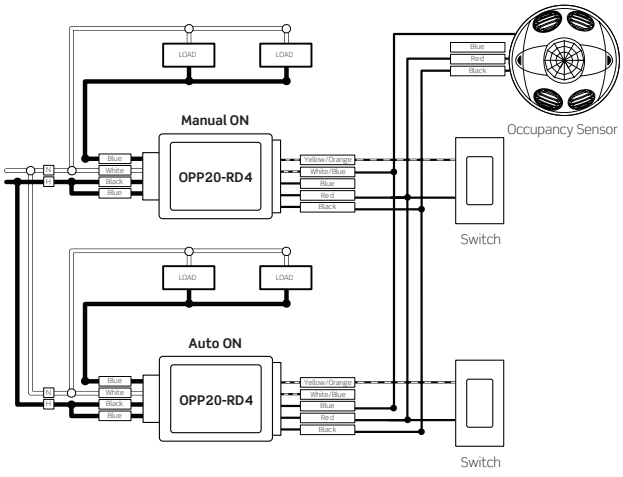
NOTE: Power Pack and the load switched by the power pack MUST be fed from the same phase.

Dual Circuit with the "Add-a-relay" device



NOTE: Power Pack and the load switched by the power pack MUST be fed from the same phase.

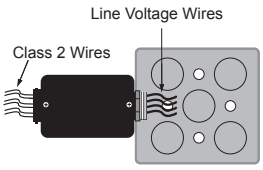
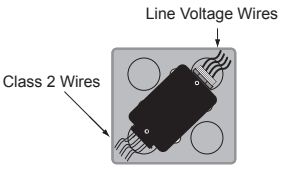
Manual ON/Bi-Level Switching/Title 24



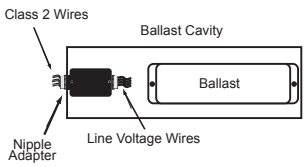
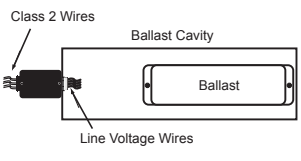
NOTE: Power Pack and the load switched by the power pack MUST be fed from the same phase.

For additional wiring diagrams, see the Occupancy Sensors Application Cookbook at www.leviton.com/lesdrawings.

JUNCTION BOX INSTALLATION

Figure 1	Figure 2
	
Mounts outside junction box	Mounts inside junction box

FLUORESCENT BALLAST INSTALLATION

Figure 3A	Figure 3B
	
Mounts inside Fixture	Mounts outside Fixture

OPP20-0D1 • OPP20-0D2 • OPP20-RD3 • OPP20-RD4

Leviton Manufacturing Co., Inc. Energy Management, Controls and Automation
201 North Service Road, Melville, NY 11747-3138 **tech line** 800-824-3005 **fax** 800-832-9538
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PRODUCT DATA

LEVITON®

SPECIFICATIONS

ENVIRONMENTAL	
Operating Temperature Range	32 to 122°F (0 to 50°C)
Relative Humidity	0 to 90% non-condensing, for indoor use only
OTHER	
Construction	Case: high impact, UL rated plastic Relay: 60A rated magnetic latching relay; silver alloy contacts Wire: 6" leads, 18AWG input; 14AWG load; LV connections: 8" leads 22AWG
Dimensions	2.40"H x 3.81"W x 1.43"D (60.96mm x 96.80mm x 36.37mm)
Listings	UL/cUL Listed, FCC Certified, NOM Certified, can be used to comply with NY LL48, IECC, ASHRAE 90.1 and Title 24, Part 6 daylight harvesting, demand response, bi-level switching and receptacle control requirements, RoHs Compliant
Color	Gray
Warranty	Limited five-year warranty

ORDERING INFORMATION*

DESCRIPTION	CAT. NO.	POWER INPUT	RELAY RATING	CONTROL INPUTS	POWER SUPPLY OUTPUT
Power Back, Basic with Auto-ON	OPP20-0D1	120-230-277VAC, 50/60 Hz	20A, 2400W @ 120V – Resistive 20A, 2400W @ 120V – General Purpose 20A, 2400W @ 120V – Incandescent 20A, 2400W @ 120V – Fluorescent 16A, 1920VA @ 120V – Electronic Ballasts 16A, 1920W @ 120V – LED 20A, 5540W @ 277V – Resistive 20A, 5540W @ 277V – General Purpose 20A, 5540VA @ 277V – Fluorescent 16A, 4430VA @ 277V – Electronic Ballasts 16A, 4430W @ 277V – LED 1/2 HP @ 120V – Motor Load 2 HP @ 240/277V – Motor Load Suitable for general purpose plug load control - 20A, 2400W @120V - Can be used to comply with NY LL48, IECC, ASHRAE 90.1 and Title 24, Part 6 daylight harvesting, demand response, bi-level switching and receptacle control requirements	2mA, 24VDC	225mA, 24VDC, 5.4W
Power pack with auto-ON, manual-ON, and local switch inputs	OPP20-0D2				
Power pack with auto-ON and photocell input	OPP20-RD3				
Power pack with auto-ON, manual-ON, local switch, and photocell input	OPP20-RD4				

*For CE Compliant Lighting Control Module, see the OPPCE data sheet.

POWER PACK CAPACITY FORMULA

Leviton power packs can be used to provide power to one or more occupancy sensors. Since current consumptions of occupancy sensors may vary, the best way to ensure you order the correct number of power packs and add-a-relays is by using this formula:

# of sensor Model As X Sensor A current consumption	+	# of sensor Model Bs X Sensor B current consumption	+	# of Add a Relays X 50mA	≤ 225mA

Power supply output per below chart

DESCRIPTION	CURRENT CONSUMPTION
OSC04-I, OSC15-I, OSWHB-I, OSWLR-I, OSWWV-I	10-15mA
OSC05-M, OSC05-U, OSW12-M	25mA
OSC10-M, OSC10-U	35mA
OSC20-M, OSC20-U	30mA
OSA20-R Add-a-Relay	50mA
ODC0P-S0W Switching Photocell	10mA
ODC0P-D0W Dimming Photocell	10mA

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Visit our Website at: www.leviton.com/sensors

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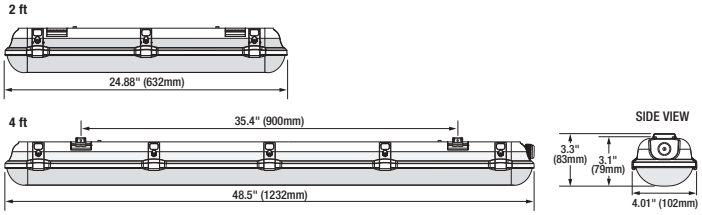
SYLVANIA

LEDVANCE Luminaires

Vapor Tight

Catalog #	Type
Project	
Notes	
Date	
Prepared by	

Dimensions



Dimensions in inches (mm)

Product Features

The Vapor Tight luminaires are environmentally preferable LED alternatives to traditional HID or fluorescent luminaires, offering up to 67% in energy savings. Ideal in place of traditional luminaires, or as new installations, the Vapor Tight series is suitable for illuminating garages, stairwells, industrial areas, canopies, and outdoor walkways.

The Vapor Tight luminaires are IP65 rated and are offered with integrated sensor and emergency backup options. LEDVANCE luminaires assure optimum light engine performance for extended service and rated life (≥66,000 hours L_{70}).

Wattage Comparison Chart

Vapor Tight

Traditional Source	Traditional System Wattage	LED System Wattage	Energy Savings
2 F17T8	33	25	24%
2 F32T8	27	25	7%
50W HPS	62	25	60%
70W HPS	92	25	67%
2 F28 T8	50	40	20%
2 F32 T8	54	40	26%
1 F96 T12	86	40	53%
70W HPS	91	40	56%
2 F28 T8	50	50	0%
2 F32 T8	54	50	7%
1 F96 T12	86	50	42%
70W HPS	91	50	45%

Specifications

Weight: 2 ft: 2.5 lbs. (1.2 kg)
4 ft: 4.8 lbs (2.2 kg) Standard 5.5 lbs (2.5 kg) Emergency
5.1 lbs (2.3 kg) Sensor 5.8 lbs (2.6 kg) Sensor and Emergency

Construction: One-piece polycarbonate housing with one-piece polycarbonate lens and stainless steel clips. The standard color is gray.

LED System: LED system with a life rating of ≥66,000 hours (UNV) and ≥84,000 hours (HUV) at L_{70} @25°C. Luminaire efficacy up to 140 LPW.

Electrical: Offered in 25, 40 and 50 Watts, the luminaire is designed to operate through the 120V-277V$_{AC}$ universal voltage and 347-480V$_{AC}$ high universal voltage range. The LED driver has a 2.5kV inherent surge suppression and is a constant current device, meeting UL1310 and UL48 Class 2 with built-in over temperature protection. The power factor is ≥90% and THD is ≤20%.

Dimming: The driver is 0-10V dimmable (down to 6%). Please reference the dimmer compatibility document (LEDLUM012).

Color Characteristics: CRI>80; CCT of 4000K or 5000K.

Optics: Type V distribution with a clear etched polycarbonate lens.

Installation: Luminaire mounts to recessed outlet box or can be surface or chain mounted (chain not included). Connector available for tandem wiring. External controls can be added through existing knockouts.

Operating Temperature: -40°F to +104°F (-40°C to +40°C);
EM: +14°F to +104°F (-10°C to +40°C).

Listings: cULus listed to UL1598 standards for wet locations and IP65 rated.

Warranty: Standard 5-year luminaire warranty (LEDLUM001).

Note: Specifications subject to change without notice. IES files available online.

*DLC Premium only applicable to 25W and 40W versions with clear lens option

Ordering Guide

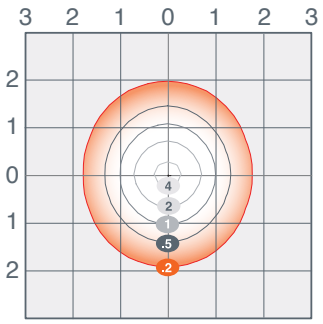
Item Number:

VAPOR	XX	/	XXX	XXX	D	8	XX	/	XX	EC	/	GR	/	XX
Product Name VAPOR	Generation 1A 1B		Wattage 025 = 25 Watts 040 = 40 Watts 050 = 50 Watts	Voltage UNV = 120-277V HUV = 347-480V*	Dimming D = 0-10V	CRI 8≥80	Color Temp (CCT) 40 = 4000K 50 = 5000K		Size 24 = 24" long 48 = 48" long	Optics EC = Etched Lens Type V Distribution		Color/Finish GR = Gray		Options Blank = No Option D = Motion/Daylighting Sensor** E = Emergency**

*HUV version only available in 50W
**Only available on 48" UNV versions

Photometric Data

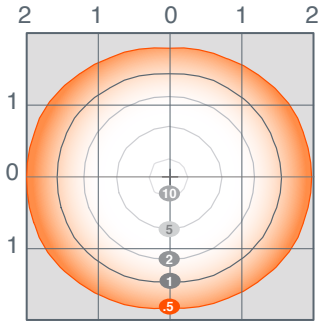
VAPOR1A/025UNVD8X0
Isofootcandle Lines at 15' Mounting Height



For other mounting heights apply the following multipliers:

Mounting Height	10'	12'	15'	18'	20'
Multiplier	2.25	1.56	1.00	0.44	0.36

VAPOR1A/040UNVD8X0
Isofootcandle Lines at 12' Mounting Height



For other mounting heights apply the following multipliers:

Mounting Height	8'	10'	12'	15'	16'	18'
Multiplier	2.25	1.44	1.00	0.73	0.56	0.44

Fixture Spacing Chart

	VAPOR1A/025UNVD840/48EC/GR			VAPOR1B/040UNVD840/48EC/GR		
	On Center Fixture Spacing			On Center Fixture Spacing		
	8'x10'	10'x10'	10'x12'	8'x10'	10'x10'	10'x12'
8'	39	29	23.2	65.6	51.2	40.2
10'	37.9	28.1	22.5	63.6	49.9	39.2
12'	35.2	27.3	21.9	63.4	48.3	38.1
14'	34.2	26.6	21.3	61.7	47.3	37.2
16'	33.2	25.6	20.7	55.5	46.3	36.2
18'	32.3	24.9	20.1	53.9	44.7	35.3

Average Illuminance (fc) at 0" AFF.
80/50/20 reflectances.

Ordering Information

Item Number	Ordering Abbreviation	Power (W)	Input Voltage	Dimming	CRI	Color Temp (CCT)	Total Fixture Lumens Clear Lens	Total Fixture Lumens Diffuse Lens	LPW* Clear Lens	LPW* Diffuse Lens	DLC** Clear Lens	DLC** Diffuse Lens	Options
74530	VAPOR1A/025UNVD840/24EC/GR	25	120-277V	0-10V	>80	4000K	3100	2800	135	121	Prm	Std	–
74531	VAPOR1A/025UNVD850/24EC/GR	25	120-277V	0-10V	>80	5000K	3100	2800	137	123	Prm	Std	–
74222	VAPOR1A/050UNVD840/48EC/GR	50	120-277V	0-10V	>80	4000K	5000	–	102	–	–	–	–
74223	VAPOR1A/050UNVD850/48EC/GR	50	120-277V	0-10V	>80	5000K	5000	–	103	–	–	–	–
74224	VAPOR1A/050UNVD840/48EC/GR/D	50	120-277V	0-10V	>80	5000K	4000	–	102	–	–	–	Sensor
74225	VAPOR1A/050UNVD850/48EC/GR/D	50	120-277V	0-10V	>80	5000K	5000	–	103	–	–	–	Sensor
74227	VAPOR1A/050UNVD850/48EC/GR/E	50	120-277V	0-10V	>80	5000K	5000	–	103	–	–	–	Emergency
74229	VAPOR1A/050UNVD850/48EC/GR/DE	50	120-277V	0-10V	>80	5000K	5000	–	103	–	–	–	Sensor, Emergency
74552	VAPOR1A/050HUVD840/48EC/GR	50	347-480V	0-10V	>80	4000K	5700	–	111	–	Std	–	–
74553	VAPOR1A/050HUVD850/48EC/GR	50	347-480V	0-10V	>80	5000K	5700	–	111	–	Std	–	–
74376	VAPOR1B/040UNVD840/48EC/GR	40	120-277V	0-10V	>80	4000K	5300	4600	139	120	Prm	Std	–
74377	VAPOR1B/040UNVD850/48EC/GR	40	120-277V	0-10V	>80	5000K	5300	4700	137	122	Prm	Std	–
74378	VAPOR1B/040UNVD840/48EC/GR/D	40	120-277V	0-10V	>80	4000K	5400	4500	140	116	Prm	Std	Sensor
74379	VAPOR1B/040UNVD850/48EC/GR/D	40	120-277V	0-10V	>80	5000K	5400	4600	137	119	Prm	Std	Sensor
74554	VAPOR1B/040UNVD840/48EC/GR/E	40	120-277V	0-10V	>80	4000K	5300	4600	139	120	Prm	Std	Emergency
74555	VAPOR1B/040UNVD850/48EC/GR/E	40	120-277V	0-10V	>80	5000K	5300	4700	137	122	Prm	Std	Emergency
74556	VAPOR1B/040UNVD840/48EC/GR/DE	40	120-277V	0-10V	>80	4000K	5400	4500	140	116	Prm	Std	Sensor, Emergency
74557	VAPOR1B/040UNVD850/48EC/GR/DE	40	120-277V	0-10V	>80	5000K	5400	4600	137	119	Prm	Std	Sensor, Emergency

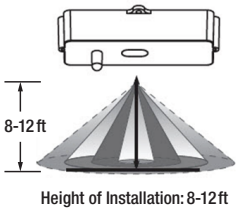
*LPW per LM79 report.
**Prm for DLC Premium; Std for DLC Standard
For further information and to learn more about utility rebates, contact your local SYLVANIA sales representative.

Options Information

Sensor: Motion and Daylight sensors are both available.

Motion Sensor (Default Setting):

Motion	100% lumen output
≥5min with no motion	30% lumen output
≥30min with no motion	Off



Height of Installation: 8-12 ft

Detection Range
Height of installation: 8ft

Daylight (Default Setting): 5fc/24H

For customized settings: Purchase remote control separately and refer to the Vapor Tight Remote document LEDLUM015 for further instructions.

Emergency Battery Backup:

Activates when normal power supply to the fixture fails, providing a minimum of 500 lumens for at least 90 minutes.

Accessories and Replacement Parts

Item Number	Ordering Abbreviation	Item Description
74310	VAPOR1A/REMOTE	Vapor Tight Sensor Remote compatible with VAPOR1A
74541	VAPOR1B/REMOTE	Vapor Tight Sensor Remote compatible with VAPOR1B
74744	VAPOR1X/LENS/24D5	2ft Diffused Lens
74538	VAPOR1X/LENS/48D5	4ft Diffused Lens
74448	VAPOR1A/LENS/48EC	4ft Replacement Lens
74920	VAPOR1A/CONN/BL	Tandem Wiring Connector

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Specifications subject to change without notice.

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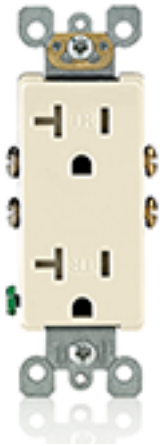
T5825-I

Tamper-Resistant Receptacles



Color: Ivory

UPC Code: 07847745050

Country of Origin: China

Brand Features

Leviton's Decora duplex receptacles are designed for a chic appearance, quick installation and durability. The impact-resistant thermoplastic design allows for a long service life and high performance in homes, offices, schools and other settings. It also coordinates beautifully with Leviton's complete line of Decora devices.

Item Description

Ultrasonically welded, 20A Tamper-Resistant, Decora duplex receptacle. Residential grade, NEMA 5-20R, side wired only, UL, CSA and NOM

Technical Information

Product Features

Amperage: 20 Amp

Voltage: 125 Volt

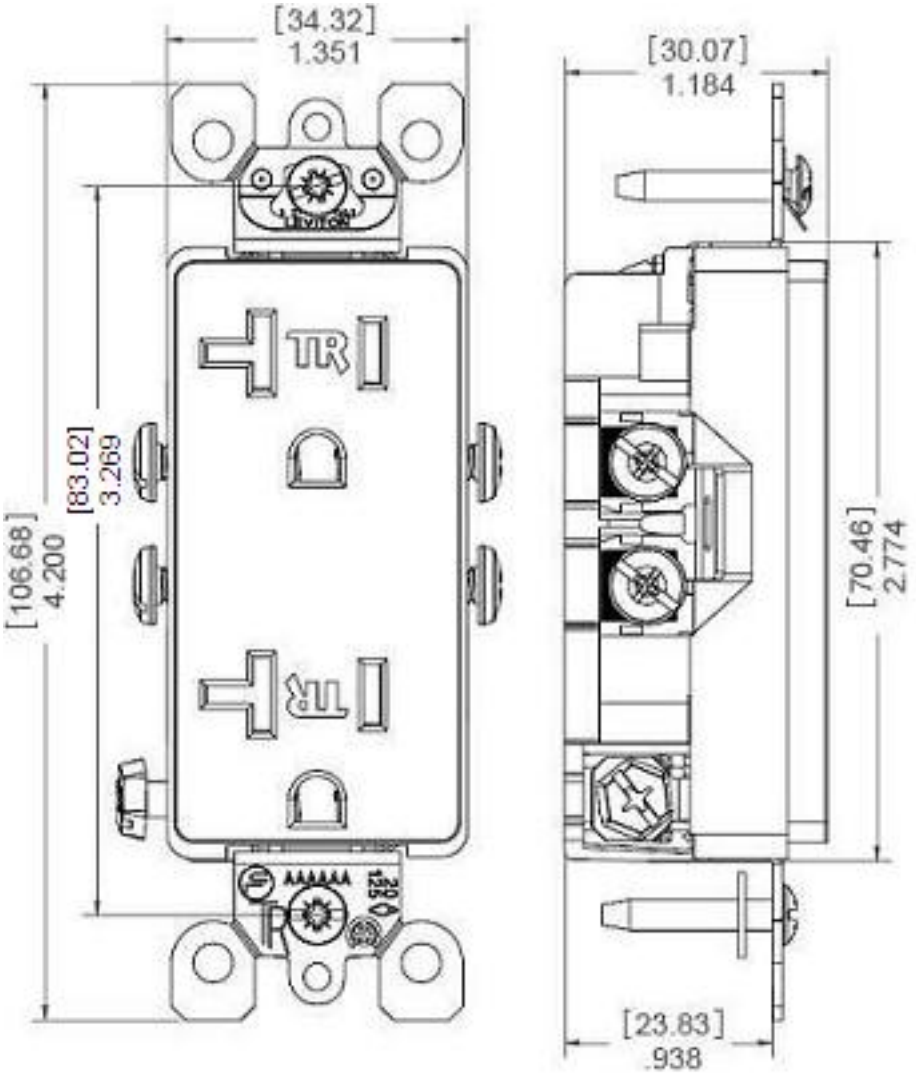
Device Type: Duplex Receptacle

Feature: Tamper-Resistant

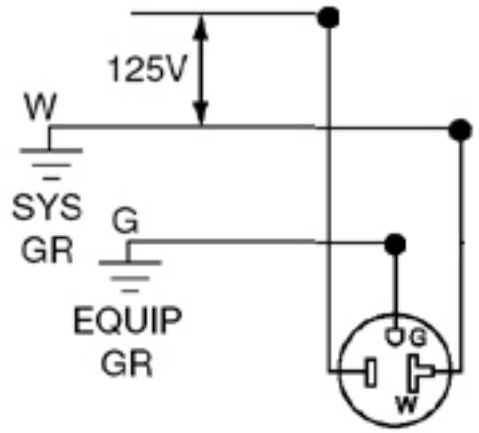
Ratings: 20A-125V

Product Type: Decora

Color: Ivory



Wiring Diagram



5-20R

SPECIFICATION SUBMITTAL

JOB NAME:	CATALOG NUMBERS:	
JOB NUMBER:		

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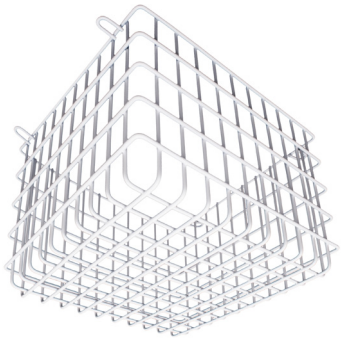
LEVITON

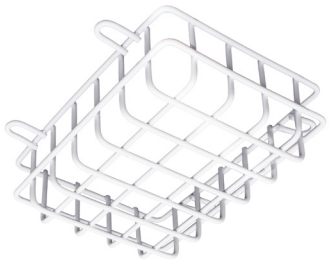
Occupancy Sensor Protective Cages

Constructed from strong, durable coated steel wire, this rugged, easy to install device helps prevent damage without significantly affecting the sensor's range of detection, allowing the unit to be wall or ceiling mounted.

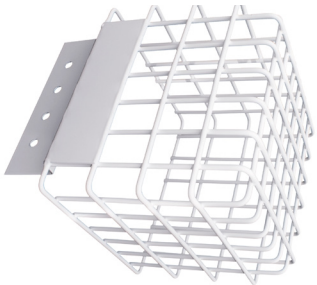
ODCCG-ooW



OSWCG-PoW



OSWWG-PoW



OSFCG-ooW

APPLICATIONS

- Gymnasiums • Warehouses
- Auditoriums • Correctional facilities
- Anywhere sensor protection is required

FEATURES AND BENEFITS

- Helps prevent vandalism or accidental damage
- Patented web-like octagon shape of 9-gauge coated steel wire (ODCCG)
- Models to fit all Leviton ceiling and wall mount sensors are available
  - ODCCG - for use with all ceiling sensors (OSCxx/ODCxx)
  - OSWCG - for use with all low voltage wall mount sensors (OSWxx)
  - OSWWG - for use with all wall switch sensors (ODSxx/OSSxx)
  - OSFCG - for use with all fixture mount sensors (OSFxx)
- Corrosion-resistant polyester coating
- Fast and easy installation
- Simple removal for servicing occupancy sensor
- Lifetime guarantee against breakage from normal use
- May be spray-painted prior to installation to match decor
- UL Listed S3504 (ODCCG)
- NAFTA and ARRA Compliant (OSFCG, OSWCG, OSWWG)

DIMENSIONS

- ODCCG-ooW: 3" H x 7" W x 3.25" D (76mm > 178mm W x 83mm D)
- OSWCG-PoW: 12.735" H x 10.75" W x 7.375" D (314mm H x 273mm W x 187mm D)
- OSWWG-PoW: 6.375" H x 6.25" W x 2.0" D (162mm H x 158mm W x 51mm D)
- OSFCG-ooW: 6.75" H x 6.75" W x 8.0" D (171mm H x 171mm W x 203mm D)

ORDERING INFORMATION

CAT. NO.	DESCRIPTION
ODCCG-ooW	OSC/ODC Ceiling Mount Sensor Protective Cage
OSWCG-PoW	OSW Ceiling/Wall Mount Sensor Protective Cage, White
OSWWG-PoW	ODS/OSS Wall Switch Sensor Protective Cage, White
OSFCG-ooW	OSF High Bay Sensor Protective Cage, White

Leviton Mfg. Co., Inc. Lighting Management Systems
20497 SW Teton Avenue, Tualatin, OR 97062 1-800-736-6682 Tech Line: 1-800-959-6004 Fax: 503-404-5594 www.leviton.com/lms
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CNY LED

LED Canopy/Ceiling Luminaire

Catalog Number

Notes

Type

Hit the Tab key or mouse over the page to see all interactive elements.

Specifications

	CNY LED P0/P1/P2
Width:	10"
Height:	4.7"
Depth:	10"
Weight:	6.5lbs

Introduction

The CNY LED canopy luminaires are energy efficient and budget friendly, perfect for replacing up to 250W metal halide luminaires while saving up to 80% energy costs. Quick mount mechanism significantly reduces the installation time. An LED array and translucent lens create uniform and visually comfortable illumination. CNY LED luminaires are DLC Premium listed and deliver quick payback!

Ordering Information

EXAMPLE: CNY LED P1 50K MVOLT DDB

CNY LED				
Series	**Performance Package**	**Color Temperature[2]**	**Voltage**	**Finish**
CNY LED	P0 3,500 lumens[1] P1 4,500 lumens[1] P2 6,600 lumens	40K 4000K[1] 50K 5000K	MVOLT 120-277V[3]	DDB Dark bronze WH White[1]

Accessories

Ordered and shipped separately.

CNYBCP 14 Inch x 14 Inch Beauty Cover Plate

NOTES

1. WH finish is only available in CNY P0 and P1 packages, and with 40K (4000K) color temperature only.
2. Correlated color temperature (CCT) shown is nominal per ANSI C78, 377-2008.
3. MVOLT driver operates on any line voltage from 120-277V (50/60 Hz).

FEATURES & SPECIFICATIONS

INTENDED USE
CNY LED luminaires are ideal, energy-efficient replacements for up to 250W MH canopy or ceiling luminaires. The CNY LED provides years of maintenance-free illumination for schools, malls, offices, parking areas, covered walkways and loading docks.

CONSTRUCTION
Cast-aluminum, corrosion-resistant housing with polyester powder paint for lasting durability. Castings are sealed with a one-piece gasket. Rated for outdoor installations, -40°C minimum ambient. Frosted lens is designed for uniform light distribution.

ELECTRICAL
Includes an MVOLT (120-277V) driver. LEDs maintain 70% of light output at 50,000 or more hours of service life (L70/50,000 hours). CNY is CRI 80.

INSTALLATION
Mounts to a recessed junction box or surface mount with three conduit entry points. Can be pendant mounted with ¾ NPT pendant stem provided by others. Quick mount mechanism significantly reduces installation time - no need to open the luminaire for installation.

LISTINGS
UL Listed to U.S. and Canadian safety standards for wet locations.
Tested in accordance with IESNA LM-79 and LM-80 standards.
DesignLights Consortium® (DLC) Premium qualified product and DLC qualified product. Not all versions of this product may be DLC Premium qualified or DLC qualified. Please check the DLC Qualified Products List at www.designlights.org/QPL to confirm which versions are qualified. Can be used to comply with California Title 24 Part 6 High Efficacy LED light Source Requirements.

WARRANTY
Five-year limited warranty. Complete warranty terms located at:
www.acuitybrands.com/support/warranty/terms-and-conditions

Note: Actual performance may differ as a result of end-user environment and application.
All values are design or typical values, measured under laboratory conditions at 25 °C.
Specifications subject to change without notice.

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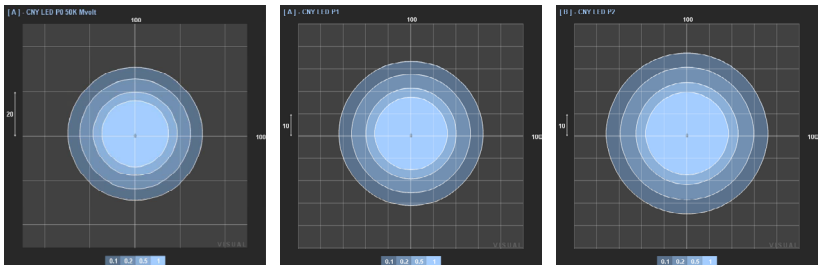
Photometric Diagrams

Full photometric data report available within 2 weeks from request. Contact Acuity Tech Support.

CNY LED - Mounting height = 10

LEGEND

- 0.1 fc
- 0.2 fc
- 0.5 fc
- 1.0 fc

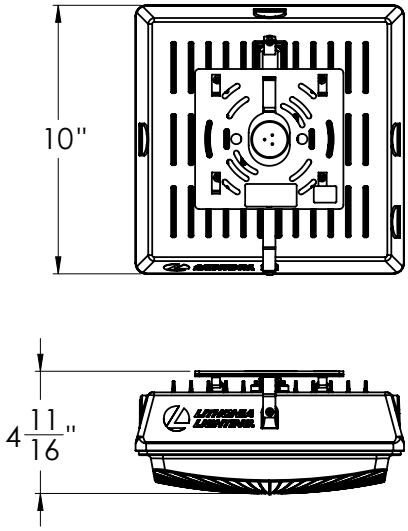


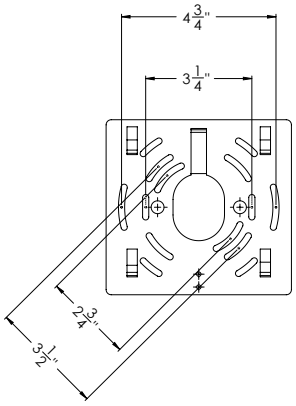
CNY LED P0 | CNY LED P1 | CNY LED P2

Performance Data

Performance Package	Lumens	Input Power	Lumens Per Watt
CNY LED P0	3,500	27W	130
CNY LED P1	4,500	35W	127
CNY LED P2	6,600	52W	128

Line Art





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Project:

Location:

Product Type:

Contact/Phone:

Model #:

WP1100C, WP1200C, WP3100C Series

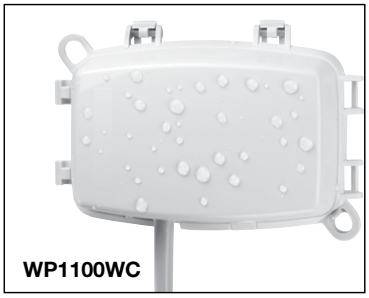
The WP1100C, WP1200C, and WP3100C Series Plastic While-In-Use Covers are easy to install and shipped with gasket, mounting screws, base, and cover assembly, and patented inserts for a variety of applications.

Features

- Complies with 2008 NEC Article 406.8(B)(1)
- 3 patented inserts for GFCI, duplex, toggle or round receptacles
- Two-gang models include 6 snap-together, rotating, inserts that create 70 combinations
- Single-gang covers mount vertically and horizontally
- Heavy-duty polycarbonate construction
- Pre-adhered gasket
- Meets requirements for cold impact testing: -60°F (-51°C)

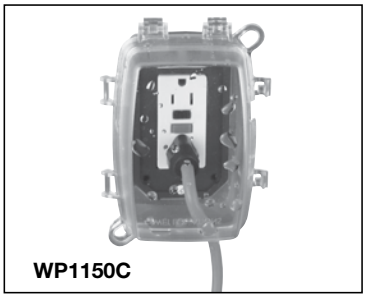
Ratings

Cover:	Clear (white on selected surfaces) UV stabilized polycarbonate with two cord outlets ½" (12.7 mm) wide by 9⁄16" (14.2 mm) high. Models WP1150C and WP1250C – one cord outlet ¾" (19.1 mm) wide by 1 5⁄16" (33.3 mm) high
Mounting Base and Inserts:	Black UV stabilized polycarbonate
Gasket:	Neoprene – ⅛" (4.8 mm) thick with slits for mounting screws
Maximum Cord Size:	Two 14 gauge AWG or One 12 gauge AWG WP1250C and WP1150C: Two 14 gauge AWG or One 10 gauge AWG
Shipping Weight:	WP1110C - .41 lbs. (0.19 kg) WP1150C/WP1230C - .75 lbs. (0.34 kg) WP1220C - .72 lbs. (0.33 kg) WP1250C - .9 lbs. (0.41kg)
Warranty:	Limited 1 year

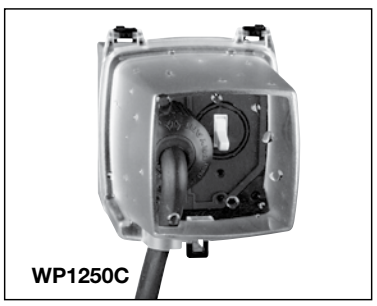

WP1100WC

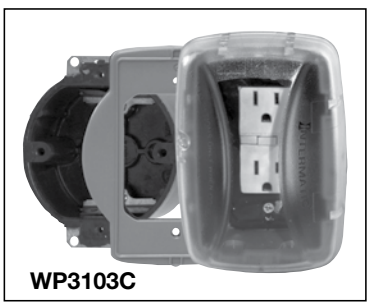
WP1220C

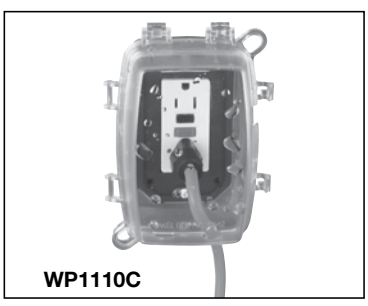
WP1230C


WP1150C

WP3100C


WP1250C


WP3103C


WP1110C

WP1100C, WP1200C, WP3100C Series

Model Number	Type	Depth (in)	Color	Cord Diameter (in)	Exit Port Length (in)	Hidden Hinges	Lockable Hasp
WP1100WC	Single Gang, Horizontal or Vertical (WP17)	2 ¾	White	.5	.75	No	Yes
WP1110C	Single Gang, Horizontal or Vertical (WP17)	3 ⅝	Clear	.5	.75	No	Yes
WP1150C	Single Gang, Horizontal or Vertical (WP17)	4 ¾	Clear	.8	1.27	No	Yes
WP1220C	Two Gang (WP217)	2 ¼	Clear	.5	.75	No	No
WP1230C	Two Gang (WP217)	3 ⅛	Clear	.5	.75	No	No
WP1250C	Two Gang (WP217)	4 ¾	Clear	.8	1.27	No	Yes
WP3100C	Single Gang, Horizontal or Vertical (WP17)	2 ¾	Clear	.5	.97	Yes	Yes
WP3103C	3/0 Adapter Plate for 3” Round Box Applications, Single Gang, Horizontal or Vertical (WP17)	2 ¾	Clear	.5	.97	Yes	Yes

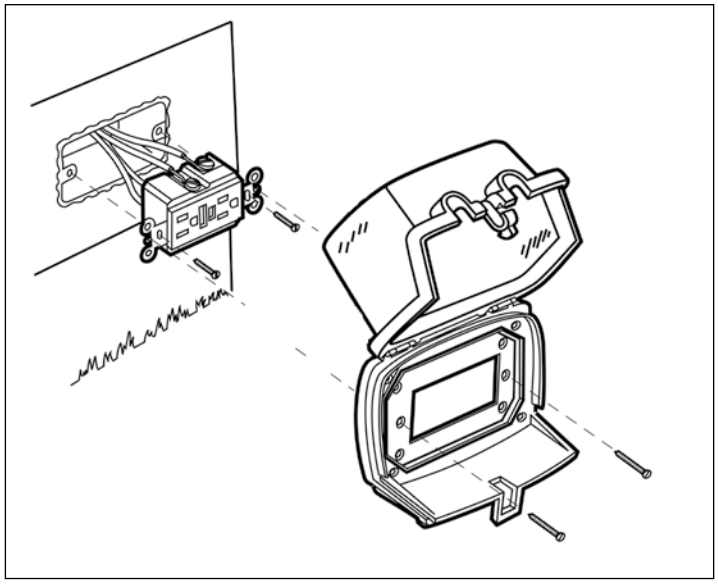
Specification

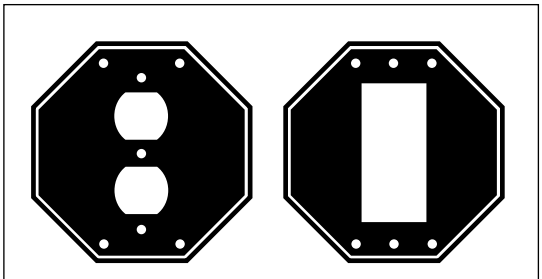
The weatherproof cover (WP1100C/WP3100C) shall be designed to mount on a single gang horizontal or vertical junction box to ensure weather protection for a standard receptacle. The cover shall mount on indoor or outdoor junction boxes and shall include a weatherproof cover/base assembly, a gasket, two universal inserts, and mounting hardware. The weatherproof cover shall include two inserts to provide flexibility in installation. The outlet cover shall meet UL requirements for wet locations. The weatherproof cover shall be designed to meet requirements of 2008 NEC Article 406.8(B)(1) and shall be NEMA 3R rated. The weatherproof cover shall be constructed entirely of UV stabilized high impact polycarbonate material. The cover, which encloses the cord set, shall be clear to allow visual inspection. The cover shall meet agency requirements for cold impact at -60°F (-51°C). The cover shall provide a useable inside depth of _____ (2 ¼")(3 ⅛")(4 ⅝"). The weatherproof cover shall be Intermatic model _____ (See Model Numbers Listed).

Specification

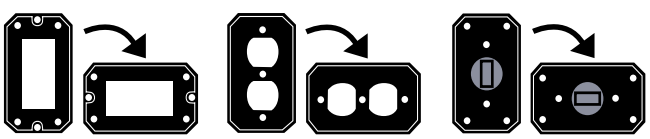
The weatherproof cover (WP1200C) shall be designed to mount on a two gang junction box to ensure weather protection for a standard receptacle. The cover shall mount on indoor or outdoor junction boxes and shall include a weatherproof cover/base assembly, a gasket, six universal inserts, and mounting hardware. The inserts must provide flexibility for mounting at any angle including: 90°, 180°, or 270°. The outlet cover shall meet UL requirements for wet locations. The weatherproof cover shall be designed to meet requirements of 2008 NEC Article 406.8(B)(1) and shall be NEMA 3R rated. The weatherproof cover and base shall be constructed entirely of UV stabilized polycarbonate material. The cover, which encloses the cord set, shall be clear to allow visual inspection. The cover shall meet agency requirements for cold impact at -60°F (-51°C). The cover shall provide a useable inside depth of _____(2 ¼")(3 ⅛") (4 ⅝"). The Weatherproof cover shall be Intermatic model _____ (See Model Numbers Listed).

Diagrams





WP217 Inserts



WP17 Inserts

Sloan® Flushometer 111

▶ Code Number
3780000

▶ Description
Exposed Water Closet Flushometer, for floor mounted or wall hung top spud bowls.

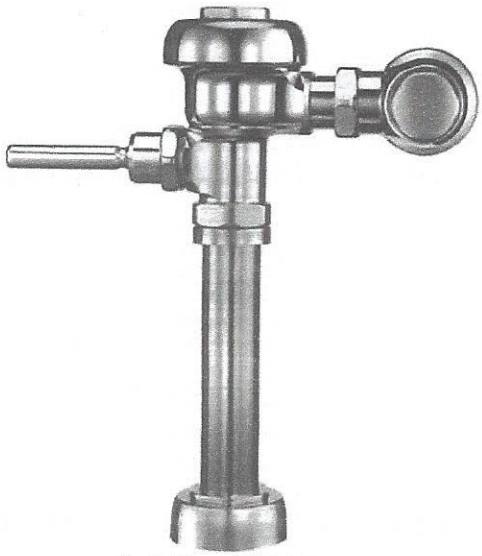
▶ Flush Cycle
1.6 gpf/6.0Lpf

▶ Specifications
Quiet, Exposed, Diaphragm Type, Chrome Plated Closet Flushometer with the following features:

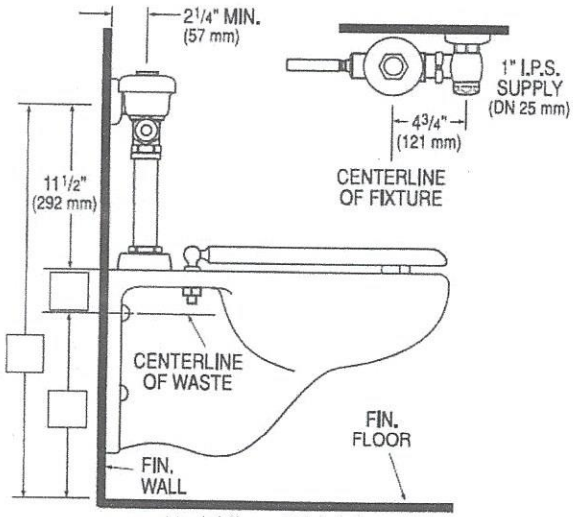
- High Chloramine Resistant PERMEX® Synthetic Rubber Diaphragm with Linear Filtered Bypass and Vortex Cleansing Action™
- 1" I.P.S. Screwdriver Bak-Chek® Angle Stop with Vandal Resistant Stop Cap
- Vacuum Breaker with Flush Connection
- Spud Coupling and Spud Flange for 1½" Top Spud
- Sweat Solder Adapter with Cover Tube and Cast Wall Flange
- Non-Hold-Open Handle and No External Volume Adjustment to Ensure Water Conservation
- Low Consumption flush accuracy
- Diaphragm, Handle Packing and Vacuum Breaker Molded from PERMEX® Rubber Compound for Chloramine Resistance
- ADA Compliant Metal Oscillating Non-Hold-Open Handle

Valve Body, Cover, Tailpiece and Control Stop shall be in conformance with ASTM Alloy Classification for Semi-Red Brass. Valve shall be in compliance with the applicable sections of ASSE 1037 and ANSI/ASME 112.19.2.

▶ Accessories (Sold Separately)
See Accessories Section of the Sloan catalog for available accessories



Model Sloan 111-1.6 shown



Model Sloan 111-1.6 shown

▶ Disclaimer
All information contained within this document subject to change without notice.

▶ Compliance & Certifications
Made In The USA

This space for Architect/Engineer Approval

SLOAN 10500 SEYMOUR AVE. • FRANKLIN PARK, • IL. 60131
Ph: 1-800-9-VALVE-9 or 1-847-671-4300 • Fax: 1-800-447-8329 or 1-847-671-4380 • http://www.sloan.com

American Standard

BARRIER FREE

MADERA™ FloWise® 16-1/2" HEIGHT ELONGATED FLUSHOMETER TOILET

VITREOUS CHINA LESS EVERCLEAN®

MADERA™ FloWise® 16-1/2" HEIGHT ELONGATED LESS EVERCLEAN®

- Floor mount flushometer valve toilet
- Vitreous china
- High Efficiency, Low Consumption. Operates in the range of 1.1 gpf to 1.6 gpf (4.2 Lpf to 6.0 Lpf)
- Meets definition of HET (High Efficiency Toilet) when used with a high efficiency flush valve (1.28 gpf or 1.6 / 1.1 gpf dual flush)
- Fully glazed 2-1/8" trapway
- Elongated bowl
- 10" or 12" roughing-in
- 16-1/2" rim height for accessible application
- Condensation channel
- Powerful direct-fed siphon jet action
- 10" x 12" water surface area
- 1-1/2" inlet spud
- 2 bolt caps
- 100% factory flush tested

☑ **3043.001** Elongated bowl only, top spud
☐ **3248.001** Elongated bowl only, top spud with slotted rim for bedpan holding (White only)
☐ **3249.001** Elongated bowl only, back spud

System MaP* Score:
- 1,000 grams of miso @ 1.1 gpf, 1.28 gpf or 1.6 gpf when used with an American Standard flush valve

* Maximum Performance (MaP) testing performed by IAPMO R&T Lab. MaP Report conducted by Veritec Consulting, Inc. and Koeller and Company.

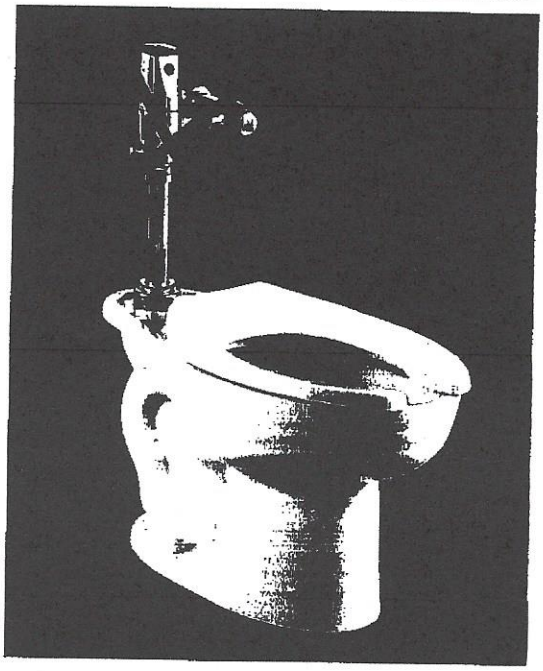
Component Parts:
☐ **047007-0070A** Inlet Spud (furnished with bowl)
☐ **481310-100** Bolt caps with retainers (furnished with bowl)

Nominal Dimensions:
718 x 356 x 419mm
(28-1/4" x 14" x 16-1/2")

Fixture only, less seat and flush valve

Recommended working pressure–between 25 psi at valve when flushing and 80 psi static

Compliance Certifications -
Meets or Exceeds the Following Specifications:
- ASME A112.19.2-2008 / CSA B45.1-08 for Vitreous China Fixtures



SEE REVERSE FOR ROUGHING-IN DIMENSIONS

To Be Specified:
- ☐ Color: ☑ White ☐ Bone
- ☐ Seat:
  - ☐ American Standard #5901.100 Heavy duty open front less cover
  - ☐ American Standard #5905.100 Extra heavy duty open front less cover
- ☐ Flushometer Valve:
  - ☐ 1.6 gpf:
    - ☐ Sensor-Operated: American Standard Selectronic® DC Power #6065.161.002 (Top Spud)
    - ☐ Sensor-Operated: American Standard Selectronic® AC Power #6067.261.002 (Back Spud)
    - ☐ Manual: American Standard #6047.161.002 (Top Spud)
  - ☐ 1.28 gpf:
    - ☐ Sensor-Operated: American Standard Selectronic® DC Power #6065.121.002 (Top Spud)
    - ☐ Sensor-Operated: American Standard Selectronic® AC Power #6067.221.002 (Back Spud)
    - ☐ Manual: American Standard #6047.121.002 (Top Spud)
  - ☐ 1.6 / 1.1 gpf Dual Flush:
    - ☐ Sensor-Operated: American Standard Selectronic® DC Power #6065.761.002 (Top Spud)

MEETS THE AMERICANS WITH DISABILITIES ACT GUIDELINES AND ANSI A117.1 REQUIREMENTS FOR ACCESSIBLE AND USABLE BUILDING FACILITIES - CHECK LOCAL CODES.

WATER EFFICIENT PRODUCT

© 2014 AS America Inc.

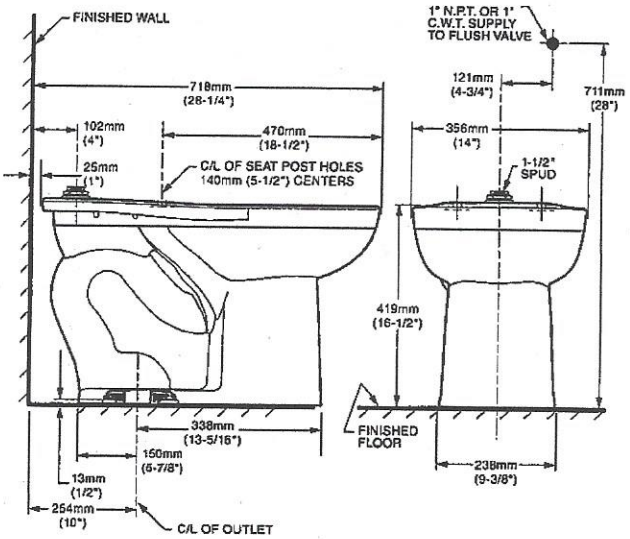
American Standard

BARRIER FREE

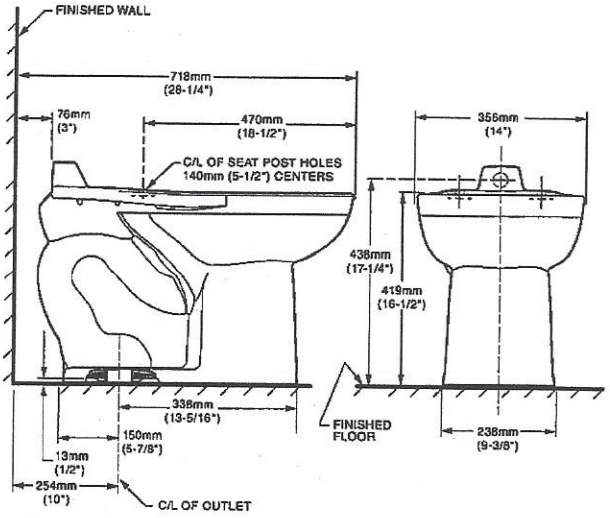
MADERA™ FloWise® 16-1/2" HEIGHT ELONGATED FLUSHOMETER TOILET

VITREOUS CHINA LESS EVERCLEAN®

3043.001/3248.001



3249.001



NOTES:
PRODUCT 3043 SHOWN, 3248 SAME EXCEPT WITH SLOTTED RIM FOR BED PAN HOLDING.
TO COMPLY WITH AREA CODE GOVERNING THE HEIGHT OF VACUUM BREAKER ON THE FLUSHOMETER VALVE, THE PLUMBER MUST VERIFY DIMENSIONS SHOWN FOR SUPPLY ROUGHING.
THIS TOILET DESIGNED TO ROUGH-IN AT A MINIMUM DIMENSION OF 254MM (10") AND A MAXIMUM DIMENSION OF 305MM (12") FROM FINISHED WALL TO C/L OF OUTLET.
FLUSHOMETER VALVE NOT INCLUDED WITH FIXTURE AND MUST BE ORDERED SEPARATELY. FLUSHOMETER VALVE REQUIREMENTS FOR 12" (305MM) ROUGH-IN: SWEAT EXTENSION NIPPLE IS REQUIRED. REFER TO VALVE MANUFACTURER AND LOCAL CODES.

IMPORTANT: Dimensions of fixtures are nominal and may vary within the range of tolerances established by ANSI Standard A112.19.2. These measurements are subject to change or cancellation. No responsibility is assumed for use of superseded or voided pages.

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American Standard

MADERA™ FloWise® 15" HEIGHT ELONGATED FLUSHOMETER TOILET

VITREOUS CHINA LESS EVERCLEAN®

MADERA™ FloWise® 15" HEIGHT ELONGATED LESS EVERCLEAN®

- Floor mount flushometer valve toilet
- Vitreous china
- High Efficiency, Low Consumption. Operates in the range of 1.1 gpf to 1.6 gpf (4.2 Lpf to 6.0 Lpf)
- Meets definition of HET (High Efficiency Toilet) when used with a high efficiency flush valve (1.28 gpf or 1.6 / 1.1 gpf dual flush)
- Fully glazed 2-1/8" trapway
- Elongated bowl
- 10" or 12" roughing-in
- 15" rim height
- Condensation channel
- Powerful direct-fed siphon jet action
- 10" x 12" water surface area
- 1-1/2" inlet spud
- 2 bolt caps
- 100% factory flush tested

☑ **2234.001** Elongated bowl only, top spud
☐ **2623.001** Elongated bowl only, top spud with slotted rim for bedpan holding (White only)
☐ **2624.001** Elongated bowl only, back spud

System MaP* Score:
- 1,000 grams of miso @ 1.1 gpf, 1.28 gpf or 1.6 gpf when used with an American Standard flush valve

* Maximum Performance (MaP) testing performed by IAPMO R&T Lab. MaP Report conducted by Veritec Consulting, Inc. and Koeller and Company.

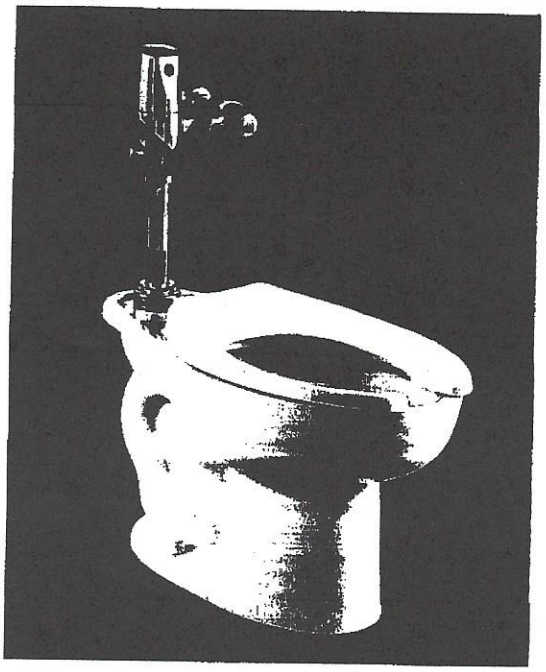
Component Parts:
☐ **047007-0070A** Inlet Spud (furnished with bowl)
☐ **481310-100** Bolt caps with retainers (furnished with bowl)

Nominal Dimensions:
718 x 356 x 381mm
(28-1/4" x 14" x 15")

Fixture only, less seat and flush valve

Recommended working pressure–between 25 psi at valve when flushing and 80 psi static

Compliance Certifications -
Meets or Exceeds the Following Specifications:
- ASME A112.19.2-2008 / CSA B45.1-08 for Vitreous China Fixtures



SEE REVERSE FOR ROUGHING-IN DIMENSIONS

To Be Specified:
☐ Color: ☐ White ☐ Bone
☐ Seat:
- ☐ American Standard #5901.100 Heavy duty open front less cover
- ☐ American Standard #5905.100 Extra heavy duty open front less cover

☐ Flushometer Valve:
- ☐ 1.6 gpf:
  - ☐ Sensor-Operated: American Standard Selectronic® DC Power #6065.161.002 (Top Spud)
  - ☐ Sensor-Operated: American Standard Selectronic® AC Power #6067.261.002 (Back Spud)
  - ☐ Manual: American Standard #6047.161.002 (Top Spud)
- ☐ 1.28 gpf:
  - ☐ Sensor-Operated: American Standard Selectronic® DC Power #6065.121.002 (Top Spud)
  - ☐ Sensor-Operated: American Standard Selectronic® AC Power #6067.221.002 (Back Spud)
  - ☐ Manual: American Standard #6047.121.002 (Top Spud)
- ☐ 1.6 / 1.1 gpf Dual Flush:
  - ☐ Sensor-Operated: American Standard Selectronic® DC Power #6065.761.002 (Top Spud)

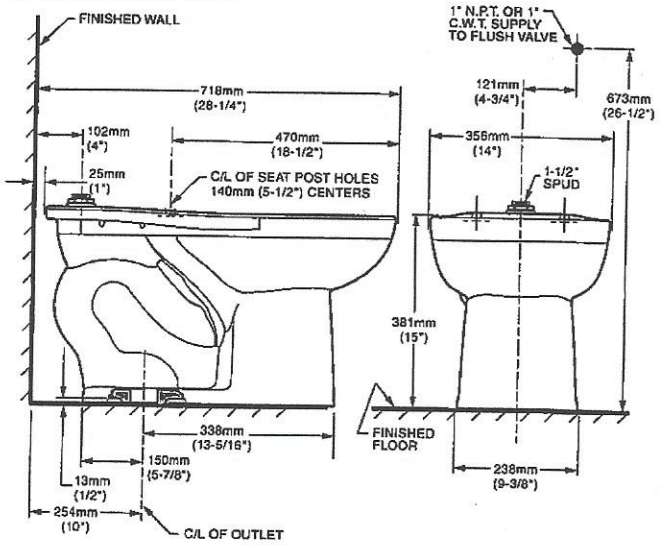
WATER EFFICIENT PRODUCT

© 2014 AS America Inc.

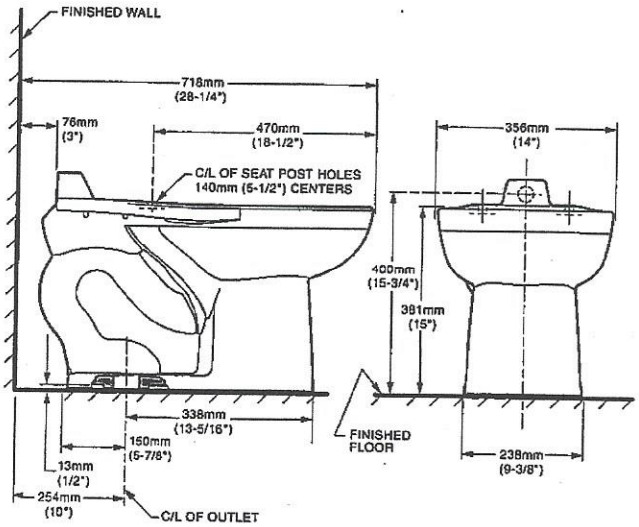
MADERA™ FloWise® 15" HEIGHT ELONGATED FLUSHOMETER TOILET

VITREOUS CHINA LESS EVERCLEAN®

→ 2234.001/2623.001



2624.001



NOTES:
PRODUCT 2234 SHOWN, 2623 SAME EXCEPT WITH SLOTTED RIM FOR BED PAN HOLDING.
TO COMPLY WITH AREA CODE GOVERNING THE HEIGHT OF VACUUM BREAKER ON THE FLUSHOMETER VALVE, THE PLUMBER MUST VERIFY DIMENSIONS SHOWN FOR SUPPLY ROUGHING.
THIS TOILET DESIGNED TO ROUGH-IN AT A MINIMUM DIMENSION OF 254MM (10") AND A MAXIMUM DIMENSION OF 305MM (12") FROM FINISHED WALL TO C/L OF OUTLET.
FLUSHOMETER VALVE NOT INCLUDED WITH FIXTURE AND MUST BE ORDERED SEPARATELY. FLUSHOMETER VALVE REQUIREMENTS FOR 12" (305MM) ROUGH-IN: SWEAT EXTENSION NIPPLE IS REQUIRED. REFER TO VALVE MANUFACTURER AND LOCAL CODES.

IMPORTANT: Dimensions of fixtures are nominal and may vary within the range of tolerances established by ANSI Standard A112.19.2. These measurements are subject to change or cancellation. No responsibility is assumed for use of superseded or voided pages.

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Sloan® Flushometer
186-0.5

▶ Code Number
3782655

▶ Description
Exposed Urinal Flushometer for ¾" top spud urinals.

▶ Flush Cycle
0.5 gpf/1.9 Lpf

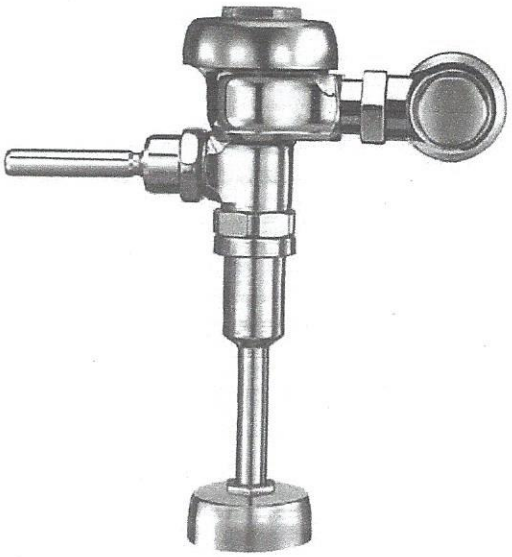
▶ Specifications
Quiet, Exposed, Diaphragm Type, Chrome Plated High Efficiency Urinal Flushometer with the following features:

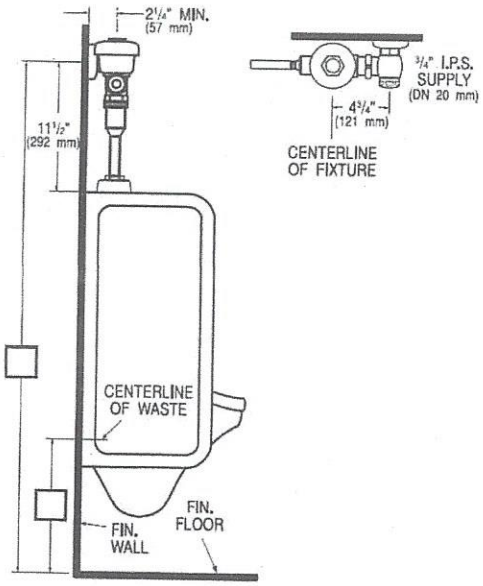
- ¾" I.P.S. Screwdriver Bak-Chek® Angle Stop with Vandal Resistant Stop Cap
- Vacuum Breaker with Flush Connection
- Spud Coupling and Spud Flange for ¾" Top Spud
- Sweat Solder Adapter with Cover Tube and Cast Wall Flange
- Non-Hold-Open Handle and No External Volume Adjustment to Ensure Water Conservation
- High Efficiency flush accuracy
- Diaphragm, Handle Packing and Vacuum Breaker Molded from PERMEX® Rubber Compound for Chloramine Resistance
- ADA Compliant Metal Oscillating Non-Hold-Open Handle

Valve Body, Cover, Tailpiece and Control Stop shall be in conformance with ASTM Alloy Classification for Semi-Red Brass. Valve shall be in compliance with the applicable sections of ASSE 1037 and ANSI/ASME 112.19.2.

▶ Accessories (Sold Separately)
See Accessories Section of the Sloan catalog for available accessories

▶ Fixtures
Consult factory for matching Sloan brand fixture options.





▶ Disclaimer
All information contained within this document subject to change without notice.

▶ Compliance & Certifications
Made In The USA

This space for Architect/Engineer Approval

SLOAN 10500 SEYMOUR AVE. • FRANKLIN PARK, • IL. 60131
Ph: 1-800-9-VALVE-9 or 1-847-671-4300 • Fax: 1-800-447-8329 or 1-847-671-4380 • http://www.sloan.com

American Standard

WASHBROOK® FloWise® UNIVERSAL URINAL

VITREOUS CHINA

BARRIER FREE

WASHBROOK® FloWise® UNIVERSAL URINAL

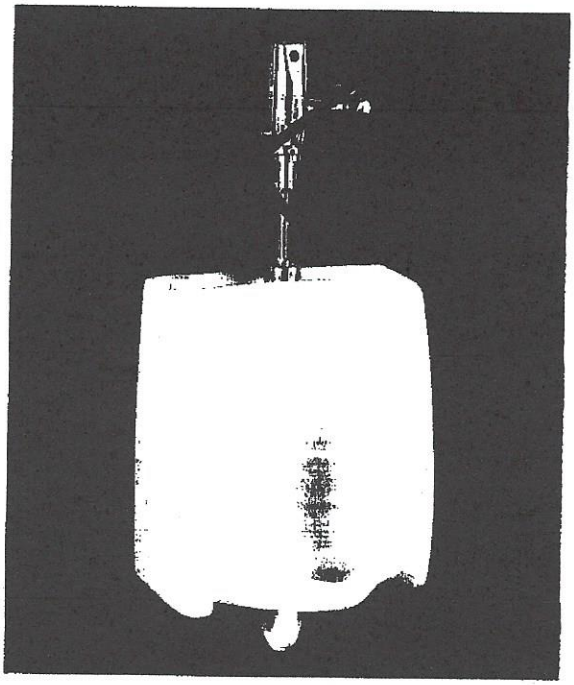
- Vitreous china
- Ultra High Efficiency, Low Consumption. Operates in the range of 0.125gpf to 1.0gpf (0.5 Lpf to 3.8 Lpf)
- Flushing rim
- Elongated 14" rim from finished wall
- Washout flush action
- Extended sides for privacy
- 3/4" inlet spud
- Outlet connection threaded 2" inside (NPTF)
- 2 wall hangers
- Fixture only
- Strainer included
- Meets ASME flush requirements at 0.125 to 1.0 gpf

☑ **6590.001** Universal Top spud
☐ **6515.001** Universal Back spud

Nominal Dimensions:
360 x 480 x 664mm
(14-1/8" x 18-7/8" x 26-1/8")

Recommended working pressure – between 20 psi at valve when flushing and 80 psi static

Compliance Certifications -
Meets or Exceeds the Following Specifications:
- ASME A112.19.2-2008/CSA B45.1-08 for Vitreous China Fixtures



SEE REVERSE FOR ROUGHING-IN DIMENSIONS

To Be Specified:
☐ Color: ☐ White
☐ Flush Valve:

1.0 gpf Flush Valve: Sensor-Operated:
- ☐ American Standard Selectronic® #6063.101.002 DC Power (Top Spud)
- ☐ American Standard Selectronic® #6062.101.002 AC Power (Back Spud)

1.0 gpf Flush Valve: Manual-Operated:
- ☐ American Standard # 6045.101.002

0.5 gpf Flush Valve: Sensor-Operated:
- ☐ American Standard Selectronic® #6063.051.002 DC Power (Top Spud)
- ☐ American Standard Selectronic® #6062.051.002 AC Power (Back Spud)

0.5 gpf Flush Valve: Manual-Operated:
- ☐ American Standard #6045.051.002

0.125 gpf Flush Valve: Sensor-Operated:
- ☐ American Standard Selectronic® #6063.013.002 DC Power (Top Spud)
- ☐ American Standard Selectronic® #6062.013.002 AC Power (Back Spud)

0.125 gpf Flush Valve: Manual-Operated:
- ☐ American Standard #6045.013.002

WaterSense Meets EPA Criteria
Certified by IAPMO R&T
When used with 0.125 gpf or 0.5 gpf urinal flush valves

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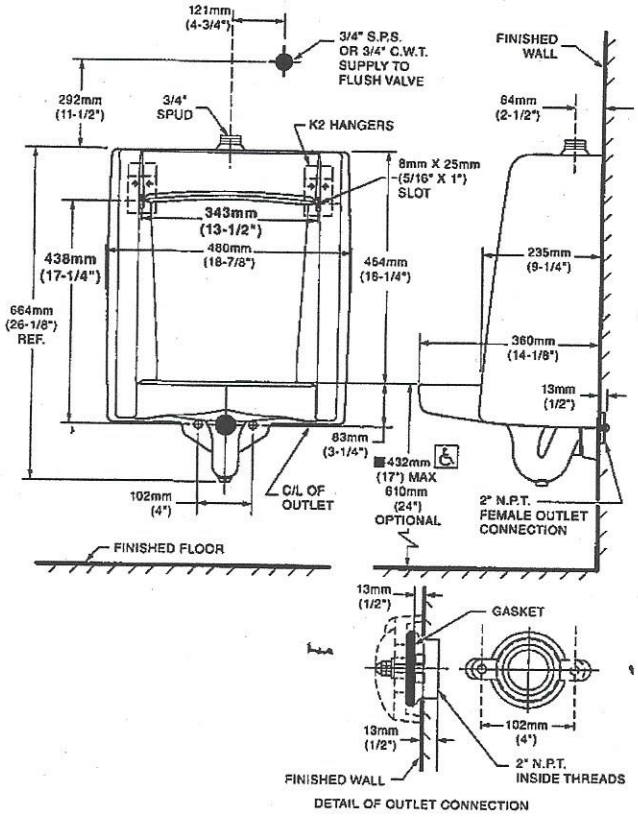
WASHBROOK® FloWise® UNIVERSAL URINAL

VITREOUS CHINA

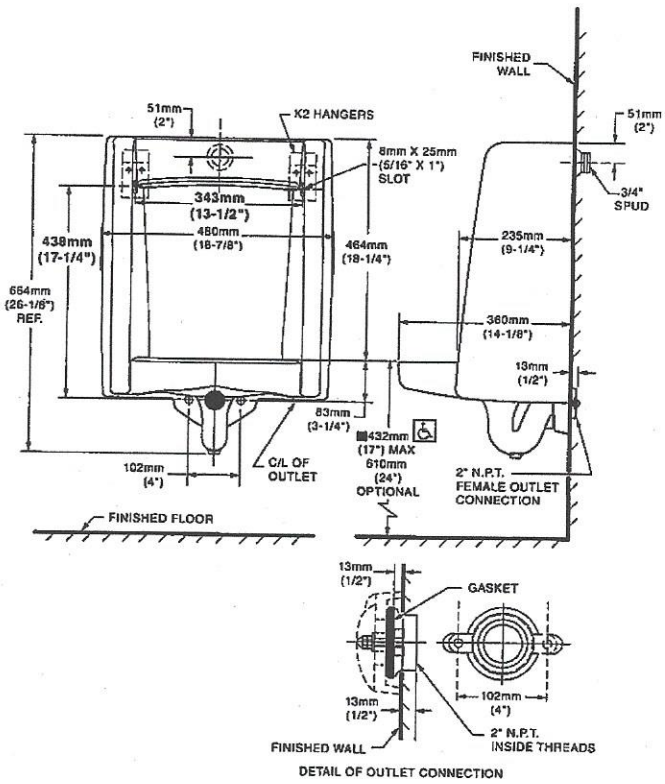
BARRIER FREE

6590.001 TOP SPUD



DETAIL OF OUTLET CONNECTION

6515.001 BACK SPUD



DETAIL OF OUTLET CONNECTION

MEETS THE AMERICANS WITH DISABILITIES ACT GUIDELINES AND ANSI A117.1 ACCESSIBLE AND USABLE BUILDINGS AND FACILITIES - CHECK LOCAL CODES.

- When installed so top of rim is 432mm (17") MAXIMUM from finished floor.

NOTES:
FLUSH VALVE NOT INCLUDED AND MUST BE ORDERED SEPARATELY.
PROVIDE SUITABLE REINFORCEMENT FOR ALL WALL SUPPORTS.

IMPORTANT: Dimensions of fixtures are nominal and may vary within the range of tolerances established by ANSI Standard A112.19.2. These measurements are subject to change or cancellation. No responsibility is assumed for use of superseded or voided pages.

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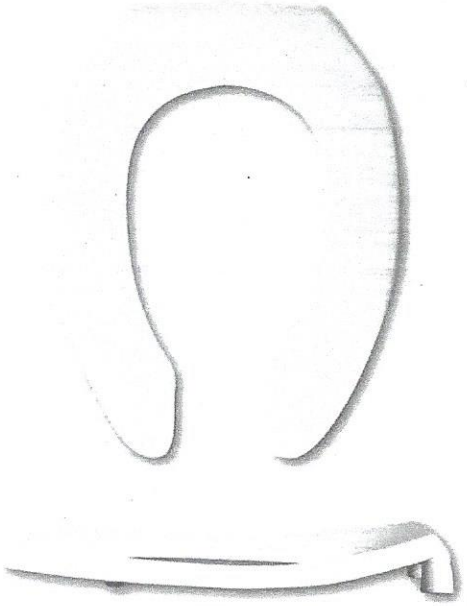
PART OF LIXIL

BEMIS COMMERCIAL

COMMERCIAL HEAVY-DUTY PLASTIC TOILET SEAT



MODEL # 2155CT/2155SSCT

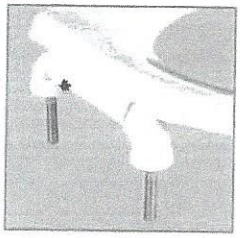
COLOR # _____

DESCRIPTION:

Open front less cover, elongated, heavy-duty, injection molded solid plastic toilet seat. Features four molded-in bumpers, non self sustaining (2155CT) or self-sustaining (2155SSCT) check hinges with non-corrosive 300 Series stainless steel posts and pintles and STA-TITE® Commercial Fastening System™. Seat contains DuraGuard® Antimicrobial Built-In Seat Protection™. This seat complies with American National Standard Z124.5 Toilet (Water Closet) Seat as a class Commercial Heavy Duty

SPECIFICATIONS:

Size:	Elongated
Material:	Plastic
Style:	Open Front less Cover
Bumpers:	Four
Hinges:	Plastic Non Self-Sustaining (2155CT) or Self-Sustaining (2155SSCT) with 300 Series Stainless Steel Posts and Pintles
Fastening System:	STA-TITE® Commercial Fastening System™



PLASTIC HINGES WITH STAINLESS STEEL POSTS AND PINTLES

STA-TITE® COMMERCIAL FASTENING SYSTEM™

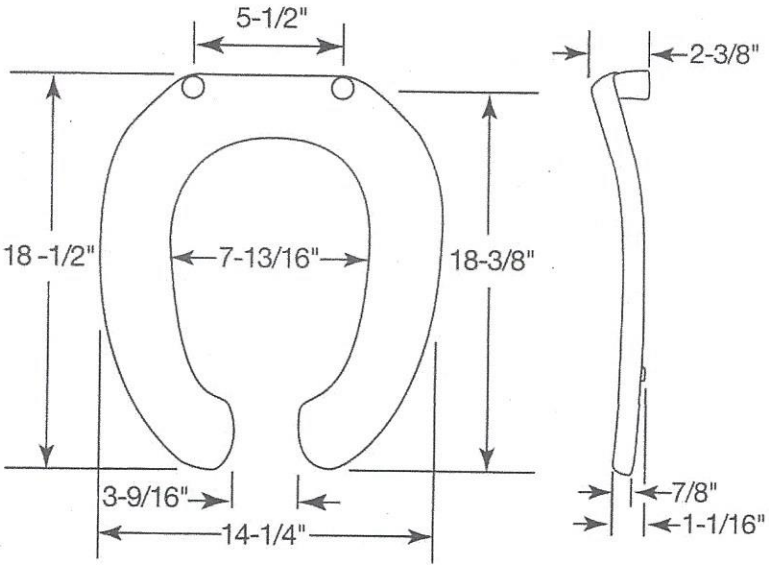
FEATURES:

STA-TITE® Commercial Fastening System™

DuraGuard® Antimicrobial Built-In Seat Protection™

Non-Corrosive 300 Series Stainless Steel Posts and Pintles

DIMENSIONS:



Proudly Made in the USA

Bemis Manufacturing Co., Sheboygan Falls, WI 53085
www.ToiletSeats.com

Phone: 920-467-4621 | 800-558-7651 Fax: 920-467-8573

SYMMONS®
the smart choice™

SCOT® S-60-H

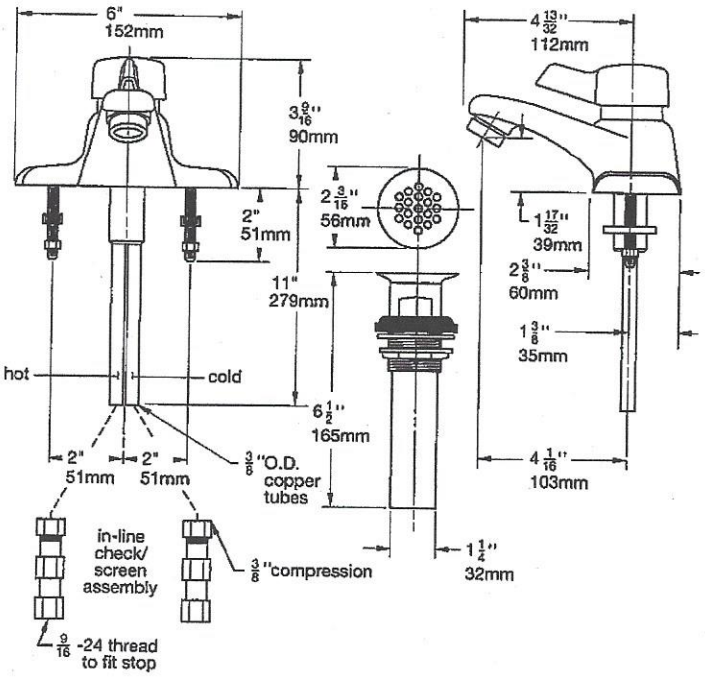
Slow-Closing Omni Temperature Lavatory Faucet

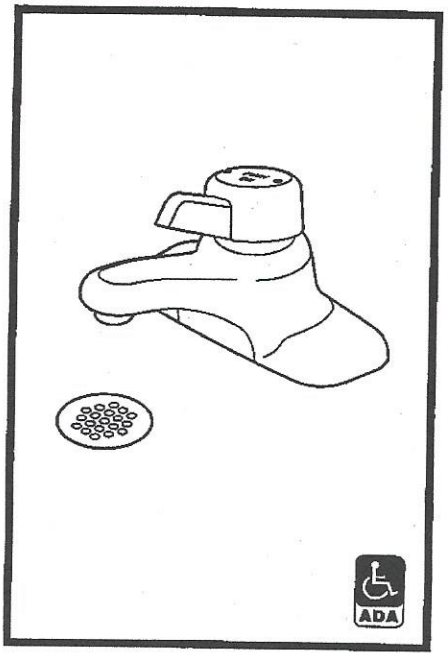
SCOT metering/temperature selection lavatory faucet with blade type handle for handicap accessible applications (replaces S-60 knob style handle). Cast brass 4" centerset with temperature limit stop to adjust outlet temperature and time limit stop to adjust flow time, includes (2) in-line check/screen assemblies. Spray outlet with 0.5 gpm flow rate. Vandal resistant.

- ☑ **S-60-H:** **Faucet only**
- ☐ **S-60-G-H:** **With grid strainer drain assembly**
- ☐ **S-60-P-H:** **With pop-up drain assembly**
- ☐ **S-60-1-H:** **With lift rod only**

Modifications: *Add suffix to model number*

- ☐ **Suffix 1.25:** Vandal resistant aerator in place of 0.5 gpm spray outlet (1.25 GPM at 50 PSI)
- ☐ **Suffix NA:** Non-aerated laminar flow outlet
- ☐ **Suffix IPS:** 1/2" IPS connectors
- ☐ **Suffix STE:** Supply tube extensions, 8" with compression couplings
- ☐ **Suffix DP:** Adaptor plate for 8" center installations
- ☐ **Suffix OFG:** Offset grid strainer





SYMMONS PRODUCTS MEET ANSI A112.18.1M, EPA '92 AND ALL KNOWN FLOW RATE REQUIREMENTS.
Metering Faucets
0.25 gallons per cycle (1.0 L/cycle)

Job/Location

. . . . . .

. . . . . .

Engineer

. . . . . .

. . . . . .

Contractor

. . . . . .

. . . . . .

For ADA compliance (Americans with Disabilities Act) consult ADAAG or your state regulations for proper product choice and mounting locations.

Symmons Industries, Inc. ▪ 31 Brooks Drive ▪ Braintree, MA 02184
(800) 796-6667, (781) 848-2250 ▪ Fax (800) 961-9621, (781) 843-3849
Website: www.symmons.com ▪ Email: customerservice@symmons.com

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SYMMONS®
the smart choice™

American Standard

LUCERNE™ WALL-HUNG LAVATORY

VITREOUS CHINA

BARRIER FREE

LUCERNE™ WALL-HUNG LAVATORY

- Wall-hung sink
- Vitreous china
- Front overflow
- D-shaped bowl
- Self-draining deck area with contoured back and side splash shields
- Faucet ledge
- Compliant with Texas accessibility standard (TAS) for children age group 13 and up

Faucet holes on 203mm (8") centers (Illus.):

❑ **0356.028** For exposed bracket support
Shown with 4801.862 Amarilis Heritage faucet with Triune Cross handles (not included)

❑ **0356.015** For wall hanger (included) or concealed arms support

❑ **0356.915** For wall hanger (included) or concealed arms support
- Less overflow

Faucet holes on 102mm (4") centers:

❑ **0355.027** For exposed bracket support

☒ **0355.012** For wall hanger (included) or concealed arms support

❑ **0355.912** For wall hanger (included) or concealed arms support
- Less overflow

Single center faucet hole (Illus.):

❑ **0356.041** For exposed bracket support
Shown with 1340.000 metering faucet (not included)

❑ **0356.421** For wall hanger (included) or concealed arms support

❑ **0356.921** For wall hanger (included) or concealed arms support
- Less overflow

❑ **0356.439** For wall hanger (included) or concealed arms support
- Single faucet hole on right

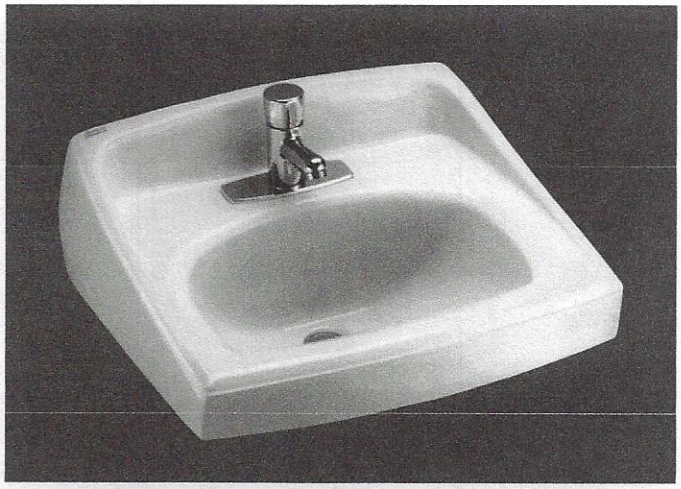
❑ **0356.066** For exposed bracket support
- Single faucet hole on right

Nominal Dimensions:
521 x 464mm
(20-1/2" x 18-1/4")

Bowl sizes:
381mm (15") wide
254mm (10") front to back
165mm (6-1/2") deep

Compliance Certifications - Meets or Exceeds the Following Specifications:
- ASME A112.19.2 / CSA B45.1 for Vitreous China Fixtures

0356.028



0356.041

SEE FOLLOWING PAGES FOR ROUGHING-IN DIMENSIONS

To Be Specified:
- ❑ Color: ❑ White
- ❑ Faucet*:
- ❑ Faucet Finish:
- ❑ Supplies:
- ❑ 1-1/4" Trap:
- ❑ Nipple:
- ❑ Bracket Support (by others):
- ❑ Concealed Arms Support (by others):

* See faucet section for additional models available

MEETS THE AMERICANS WITH DISABILITIES ACT GUIDELINES AND ANSI A117.1 ACCESSIBLE AND USABLE BUILDINGS AND FACILITIES - CHECK LOCAL CODES.
Top of front rim mounted 864mm (34") from finished floor.

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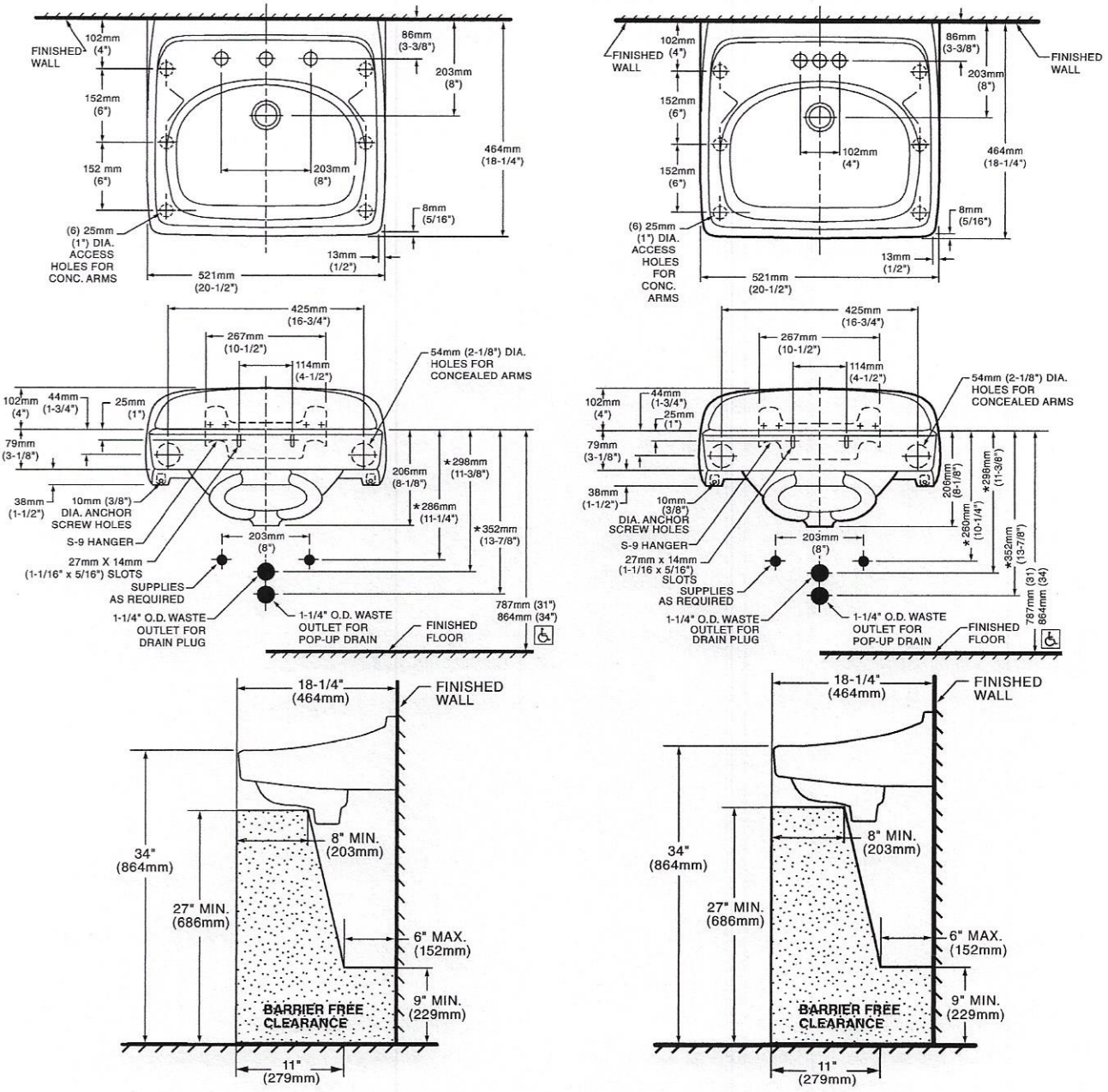
LUCERNE™
WALL-HUNG LAVATORY
VITREOUS CHINA

BARRIER FREE

0356.028 8" CTRS FOR EXPOSED BRACKET SUPPORT
0356.015 8" CTRS FOR WALL HANGER OR CONCEALED ARMS
0356.915 LESS OVERFLOW

0355.027 4" CTRS FOR EXPOSED BRACKET SUPPORT
0355.012 4" CTRS FOR WALL HANGER OR CONCEALED ARMS
0355.912 LESS OVERFLOW



NOTES:
* DIMENSIONS SHOWN FOR LOCATION OF SUPPLIES AND "P" TRAP ARE SUGGESTED.
PROVIDE SUITABLE REINFORCEMENT FOR ALL WALL SUPPORTS.
FITTINGS NOT INCLUDED AND MUST BE ORDERED SEPARATELY.
CONCEALED ARM SUPPORT AS REQUIRED TO BE FURNISHED BY OTHERS.

IMPORTANT: Dimensions of fixtures are nominal and may vary within the range of tolerances established by ANSI Standard A112.19.2. These measurements are subject to change or cancellation. No responsibility is assumed for use of superseded or voided pages.

LAVATORY DESIGNED TO MEET ADA HANDICAPPED GUIDELINES WITH MOUNTING HEIGHT SET AT 864MM (34") ABOVE FINISHED FLOOR.

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PART OF LIXIL

SMITH® JAY R. SMITH MFG. CO.®
MEMBER OF MORRIS GROUP INTERNATIONAL™
POST OFFICE BOX 3237
MONTGOMERY, ALABAMA 36109-0237 (USA)
TEL: 334-277-8520 FAX: 334-272-7396 www.jrsmith.com
CUSTOMER DRIVEN SINCE 1926
MEMBER OF:

LOCATION

LAVATORY SUPPORTS
WITH CONCEALED ARMS
FLOOR MOUNTED WITH "PRO-SET" UPRIGHTS

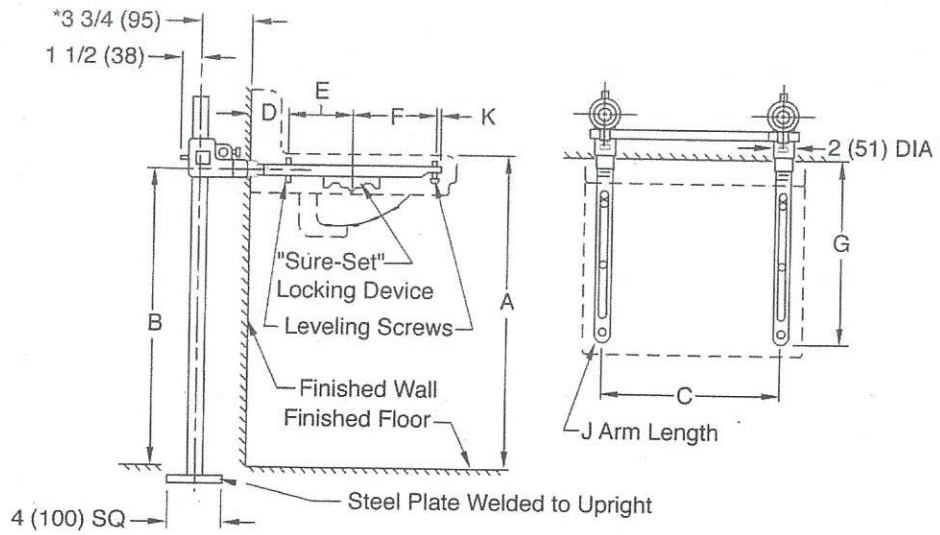
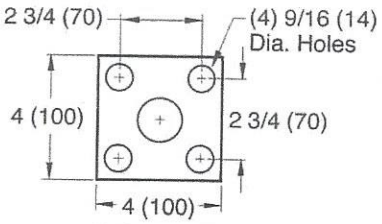


Fig. 0700 . . . FOR HIGH BACK LAVATORIES (shown)

NOTE: The rough-in dimensions listed on this drawing are based on current information available to Jay R. Smith by the fixture manufacturers. We recommend that you verify these dimensions with the fixture manufacturer. We will not accept responsibility for rough-in dimension changes by the fixture manufacturer.

NOTE: Dimensions shown in parentheses are in millimeters.



BASE DETAIL

ROUGHING-IN TABLE

FIXTURE MFG.	NAME	NUMBER	SIZE	A	B	C	D	E	F	G	J	K
AM. STD.	LUCERNE	0355.012	20 (510) x 18 (455)	31 (785)	29 1/4 (745)	16 3/4 (425)	4 (100)	6 (150)	6 (150)	16 1/2 (420)	19 (485)	1/2 (13)
AM. STD.	LUCERNE	0356.015	20 (510) x 18 (455)	31 (785)	29 1/4 (745)	16 3/4 (425)	4 (100)	6 (150)	6 (150)	16 1/2 (420)	19 (485)	1/2 (13)
AM. STD.	LUCERNE	0356.421	20 (510) x 18 (455)	31 (785)	29 1/4 (745)	16 3/4 (425)	4 (100)	6 (150)	6 (150)	16 1/2 (420)	19 (485)	1/2 (13)
AM. STD.	LUCERNE	0356.439	20 (510) x 18 (455)	31 (785)	29 1/4 (745)	16 3/4 (425)	4 (100)	6 (150)	6 (150)	16 1/2 (420)	19 (485)	1/2 (13)
AM. STD.	MURRO	0954.000	22 (560) x 21 (535)	34 (865)	32 3/8 (823)	16 3/4 (425)	4 (100)	6 (150)	4 (100)	14 1/2 (370)	17M (430)	1/2 (13)
AM. STD.	MURRO	0955.000	22 (560) x 21 (535)	34 (865)	32 3/8 (823)	16 3/4 (425)	4 (100)	6 (150)	4 (100)	14 1/2 (370)	17M (430)	1/2 (13)
AM. STD.	MURRO	0958.000	22 (560) x 21 (535)	34 (865)	32 3/8 (823)	16 3/4 (425)	4 (100)	6 (150)	4 (100)	14 1/2 (370)	17M (430)	1/2 (13)
CRANE	HARWICH	1-412	20 (510) x 18 (455)	31 (785)	29 1/4 (745)	16 1/4 (415)	4 (100)	5 5/8 (143)	4 3/8 (111)	16 1/2 (420)	18 (455)	2 1/2 (64)
ELJER	DELWYN	051-1634, 1838	18 (455) x 15 (380)	31 (785)	29 1/4 (745)	15 1/2 (395)	3 (76)	5 (125)	4 3/4 (120)	13 1/2 (345)	17M (430)	3/4 (19)
ELJER	SIGNATURE	051-2101, 4, 8	20 (510) x 18 (455)	34 (865)	32 (815)	17 (430)	4 (100)	5 5/8 (143)	5 5/8 (143)	15 3/4 (400)	18 (455)	1/2 (13)
KOHLER	GREENWICH	K-2030, 1, 2, 4, 6	20 (510) x 18 (455)	31 (785)	29 (735)	17 1/4 (440)	3 1/4 (83)	5 1/4 (135)	5 1/4 (135)	14 1/4 (360)	16 (405)	1/2 (13)
KOHLER	SOHO	K-2053, 4	20 (510) x 18 (455)	31 (785)	29 1/4 (745)	16 1/2 (420)	3 1/4 (83)	5 1/4 (135)	5 1/4 (135)	14 1/4 (360)	17M (430)	1/2 (13)
U. RUNDLE	NEW CAMDEN	4648, 9	20 (510) x 18 (455)	31 (785)	29 3/8 (746)	16 1/4 (415)	4 1/2 (115)	2 1/2 (64)	4 (345)	13 1/2 (345)	16 (405)	2 1/2 (64)

NOTE: *This dimension can be increased when fixture support is to be installed behind the wall. (Specify when required and wall thickness).

REV.	DATE	DESCRIPTION	BY	CKD. BY
J	09/27/10	Updated Drawing	JJ	CL
H	11/23/05	Revised Roughing-in Table	JJ	CL
G	03/19/04	Revised Roughing-in Table	JJ	CL

WEIGHT POUNDS | VOLUME CUBIC FEET | FIGURE NUMBER 0700

FIGURE NUMBER 0700 | DRAWN BY: CR | CHECKED BY: SJM | APPROVED BY: SJM | DATE: 2-20-85 | SCALE: NONE | SIZE A | DRAWING NUMBER S0700 | J

DIMENSIONS ARE SUBJECT TO MANUFACTURERS TOLERANCE AND CHANGE WITHOUT NOTICE
WE CAN ASSUME NO RESPONSIBILITY FOR USE OF SUPERSEDED OR VOID DATA

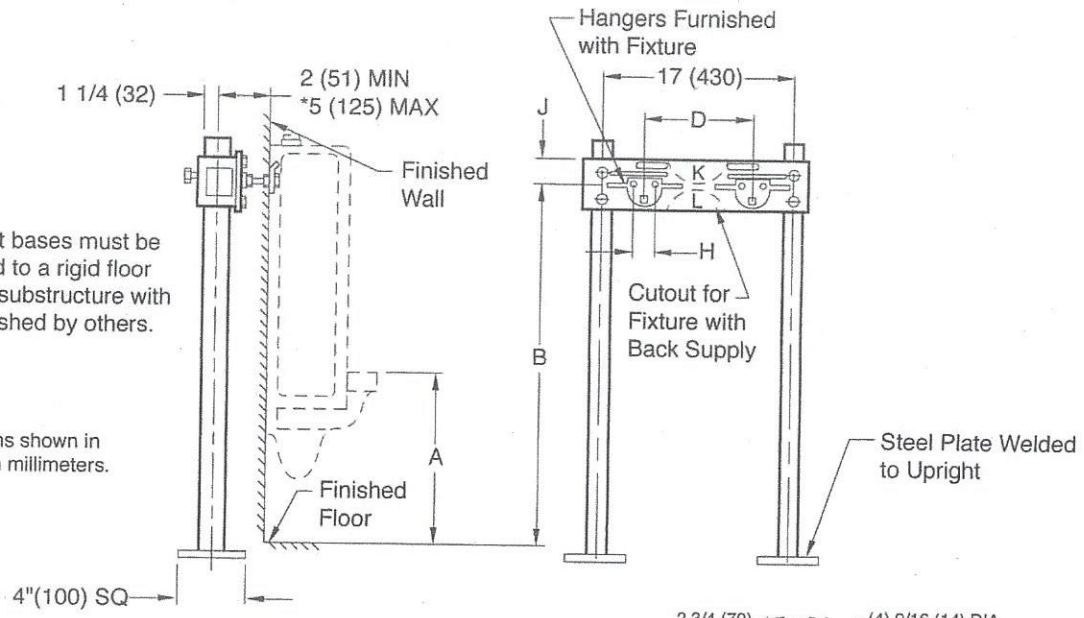
SMITH® JAY R. SMITH MFG. CO.®
MEMBER OF MORRIS GROUP INTERNATIONAL
POST OFFICE BOX 3237
MONTGOMERY, ALABAMA 36109-0237 (USA)
TEL: 334-277-8520 FAX: 334-272-7396 www.jrsmith.com
CUSTOMER DRIVEN SINCE 1925

MEMBER OF:

LOCATION

URINAL SUPPORTS
FOR OFF-THE-FLOOR URINALS

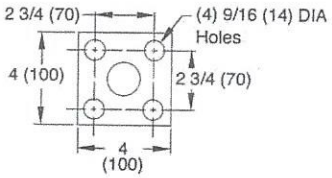
WITH HANGER PLATE FOR BLOWOUT AND WASHOUT URINALS WITH WALL HANGERS



NOTE: All support bases must be securely anchored to a rigid floor and/or other rigid substructure with (4) 1/2" bolts furnished by others.

NOTE: Dimensions shown in parentheses are in millimeters.

*This dimension can be increased when fixture support is to be installed behind the wall (specify when required and wall thickness).



BASE DETAIL

ROUGH-IN TABLE

FIXTURE MFG.	NAME	NUMBER	A	B	D	H	J	K	L
Am. Std.	Washbrook	6501.010	24 (610)	39 (990)	13 1/2 (345)	1 3/16 (30)	2 (51)	X	-
Am. Std.	Washbrook	6506.011	24 (610)	39 (990)	13 1/2 (345)	1 3/16 (30)	2 (51)	X	-
Am. Std.	Lynbrook	6538.010	24 (610)	40 (1015)	13 1/2 (345)	1 3/16 (30)	1 (25)	X	-
Am. Std.	Lynbrook	6531.019	24 (610)	40 (1015)	13 1/2 (345)	1 3/16 (30)	1 (25)	X	-
Am. Std.	Trimbrook	6560.015	24 (610)	37 5/8 (955)	11 (280)	1 3/16 (30)	1 (25)	X	-
Am. Std.	Trimbrook	6560.023	24 (610)	37 5/8 (955)	11 (280)	1 3/16 (30)	1 (25)	X	-
Am. Std.	Trimbrook	6565.014	24 (610)	37 5/8 (955)	11 (280)	1 3/16 (30)	1 (25)	X	-
Am. Std.	Trimbrook	6565.022	24 (610)	37 5/8 (955)	11 (280)	1 3/16 (30)	1 (25)	X	-
Eljer	Correcto	161-1030,45	24 (610)	39 3/8 (1000)	12 (305)	1 (25)	1 (25)	X	-
Eljer	Correcto	161-1060, 75	24 (610)	39 3/8 (1000)	12 (305)	1 (25)	1 (25)	X	-
Eljer	Terminal	161-1100, 3	25 1/2 (650)	33 7/8 (860)	9 1/2 (240)	1 (25)	1 (25)	X	-
Eljer	Dover	161-1160, 75	24 (610)	32 3/8 (822)	6 (150)	1 (25)	1 (25)	X	-
Kohler	Stanwell	K-4970-T,R	24 (610)	40 (1015)	12 (305)	1 (25)	1 (25)	X	-
Kohler	Stanwell	K-4972-T,R	24 (610)	40 (1015)	12 (305)	1 (25)	1 (25)	X	-
Kohler	Bardon	K-4980-T,R	24 (610)	40 1/2 (1030)	12 (305)	1 (25)	1 (25)	X	-
Kohler	Freshman	K-4985-T,R	24 (610)	35 7/16 (900)	10 (255)	1 (25)	2 (51)	-	-
Kohler	Derry	K-5007-T,R	24 (610)	29 1/2 (750)	6 (150)	1 (25)	3 1/2 (89)	-	X
Kohler	Dexter	K-5014-T,R	24 (610)	32 1/8 (816)	6 1/2 (165)	1 (25)	1 (25)	X	-
Sloan	Universal	SU-1009	24 (610)	36 5/8 (904)	12 (305)	-	2 (51)	X	-

For Lavatory Use See Opposite Side

REV.	DATE	DESCRIPTION	BY	CKD. BY
L	4-16-14	Revised Table	TBW	TWK
K	2-23-12	Rev. Dim., Base Plate	TBW	TWK
J	04/22/09	Added Note	JJ	AM

WEIGHT POUNDS | VOLUME CUBIC FEET | FIGURE NUMBER 0636

FIGURE NUMBER 0636 | L | DRAWING NUMBER S0636 | SIZE A | SCALE: NONE | DATE: 11-7-84 | APPROVED BY: JD | CHECKED BY: JD | DRAWN BY: VGD

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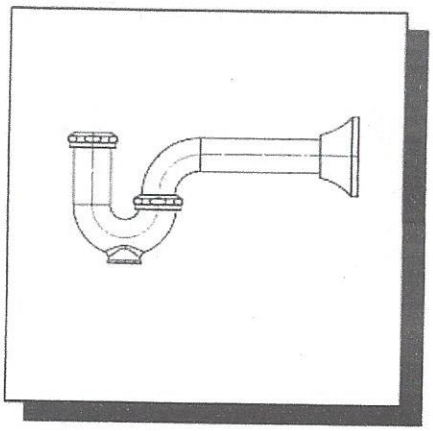
Dearborn® Brass
4675 W. 160th St.
Cleveland, Ohio 44135
Ph: (800) 321-9532
Fax: (800) 321-9535
www.dearbornbrass.com

SUBMITTAL SPECIFICATION

BRASS TUBULAR
1-¼" SEMI-CAST P-TRAPS

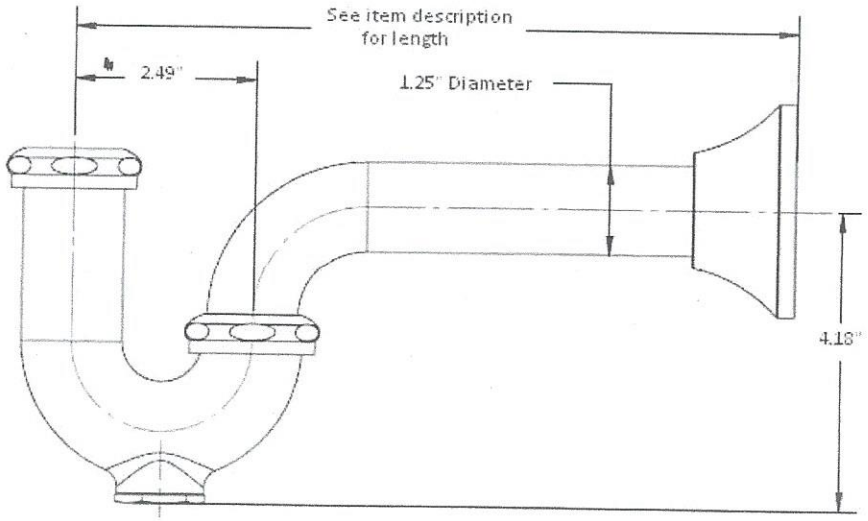
Engineering Specification: Dearborn Brass 1-¼" Semi-Cast Brass P-Traps are designed for installation in commercial applications.

Job Reference



DESCRIPTION

- Chrome Finished
- 17 Gauge Brass
- Semi-Cast P-Trap
  - Cast J-Bend with Cleanout
  - Quarter Bend
  - Deep Metal Flange
  - Cleanout Plug
  - Fiber Cleanout Washer
  - (2) Brass Nuts
  - (1) 1-½" x 1-¼" Reducing Washer
  - (2) 1-¼" Poly Washers
  - (2) 1-¼" Rubber Washers
- Designed for installation in commercial applications



✓	Product No.	Description	Carton Quantity	Carton Weight (lbs)
✓	507-1	1-¼" x 12" Semi Cast Brass P-Trap – 17 Gauge with Deep Flange & Brass Nuts	12	17
	5507-1	1-¼" x 12" Semi Cast Brass P-Trap – 17 Gauge with Deep Flange & Brass Nuts – White Box	12	17
	5507A-1	1-¼" x 15" Semi Cast Brass P-Trap – 17 Gauge with Deep Flange & Brass Nuts	12	19

Data is subject to manufacturing tolerances.

Product Submittal Form

For Residential and Commercial Applications

Job Name	Engineer / Architect
Job Location	Wholesaler
Submittal Date	Contractor

OCR1912A/ OCR1915A/ OCR1920A Copper Faucet Supply Kit - Multi-Turn Compression Angle Stop

Use: For use with water in accessible locations only. Not intended for recirculating water systems that produce continuous use temperatures above 115° F. For those applications, use our KT™ series ball stop supply kits.

Design Features:

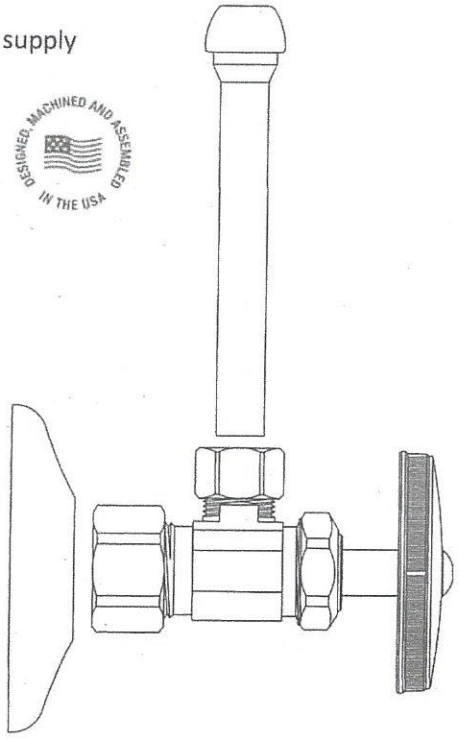
- **Everything you need.** These kits combine our trusted BrassCraft® supply stop, copper riser, and escutcheon for an easy-to-install connection
- **100%** compliant

Copper riser provides:

- **One-piece** construction
- **Cut-to-length** for a clean, professional installation

Multi-Turn stop provides:

- **Machined one-piece brass body** provides strength, durability, and long-lasting performance
- **Oval knurled handle** provides a secure grip and smooth on/off operation
- **Easy-to-remove handle** helps protect against accidental stop operation during rough-ins



Operating Specifications:

Temperature: 40°- 140° F
Pressure: 125 PSI maximum

Tubing Diameter: 3/8" OD

Standard

CONNECTOR MATERIAL SPECIFICATIONS	
Tube	*Copper or copper, chrome plated*
Insert	*POM*

Compliant

CONNECTOR MATERIAL SPECIFICATIONS	
Tube	*Copper or copper, chrome plated*
Insert	*POM*

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BrassCraft®

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OCR1912A/ OCR1915A/ OCR1920A Copper Faucet Supply Kit - Multi-Turn Compression Angle Stop

Product Submittal Form

Standard

STOP MATERIAL SPECIFICATIONS	
Body	Brass or brass, chrome plated
Stem	POM; brass; or brass, chrome plated
Handle	Zinc die cast, plated; ABS, plated; or Polycarbonate
Handle Screw	Steel, zinc plated
Bib & Packing Washer	Rubber
Packing Nut	Brass or brass, chrome plated
Loose Key	Zinc die cast
Loose Key Stem	Brass, chrome plated
Lock Shield	Brass, chrome plated
Escutcheon	Stainless steel

Compliant

STOP MATERIAL SPECIFICATIONS	
Body	Compliant brass or Compliant brass, chrome plated
Stem	POM; Compliant brass; or Compliant brass, chrome plated
Handle	Zinc die cast, plated; ABS, plated; or Polycarbonate
Handle Screw	Steel, zinc plated
Bib & Packing Washer	Rubber
Packing Nut	Brass or brass, chrome plated
Loose Key	Zinc die cast
Loose Key Stem	Brass, chrome plated
Lock Shield	Compliant brass or Compliant brass, chrome plated
Escutcheon	Stainless steel

Standard Part Listing:

☐	OCR1912A C	1/2" nom compression x 3/8" OD compression stop with 3/8" OD tube x 11-1/2" length riser & shallow escutcheon, chrome plated
☐	OCR1912A R	1/2" nom compression x 3/8" OD compression stop with 3/8" OD tube x 11-1/2" length riser & shallow escutcheon, rough finish
☐	OCR1912AZ C	1/2" nom compression x 3/8" OD compression stop, brass stem with 3/8" OD tube x 11-1/2" length riser & shallow escutcheon, chrome plated
☐	OCR1915A C	1/2" nom compression x 3/8" OD compression stop with 3/8" OD tube x 14-1/2" length riser & shallow escutcheon, chrome plated
☐	OCR1920A C	1/2" nom compression x 3/8" OD compression stop with 3/8" OD tube x 19-1/2" length riser & shallow escutcheon, chrome plated
☐	OCR1920AZ C	1/2" nom compression x 3/8" OD compression stop, brass stem with 3/8" OD tube x 19-1/2" length riser & shallow escutcheon, chrome plated
☐	OCR1920AZ R	1/2" nom compression x 3/8" OD compression stop, brass stem with 3/8" OD tube x 19-1/2" length riser & shallow escutcheon, rough finish
☐	OCR1920A BZ	1/2" nom compression x 3/8" OD compression stop with 3/8" OD tube x 19-1/2" length riser & shallow escutcheon, oil rubbed bronze
☐	OCR1920A NS	1/2" nom compression x 3/8" OD compression stop with 3/8" OD tube x 19-1/2" length riser & shallow escutcheon, satin nickel
☐	SCR1912A C	1/2" nom compression x 3/8" OD compression stop with 3/8" OD tube x 11-1/2" length riser & shallow escutcheon, loose key, chrome plated
☐	SCR1915A C	1/2" nom compression x 3/8" OD compression stop with 3/8" OD tube x 14-1/2" length riser & shallow escutcheon, loose key, chrome plated
☐	SCR1920A C	1/2" nom compression x 3/8" OD compression stop with 3/8" OD tube x 19-1/2" length riser & shallow escutcheon, loose key, chrome plated
☐	STCR1920A C	1/2" nom compression x 3/8" OD compression stop with 3/8" OD tube x 19-1/2" length riser & shallow escutcheon, loose key, stuffing box, lock shield, chrome plated

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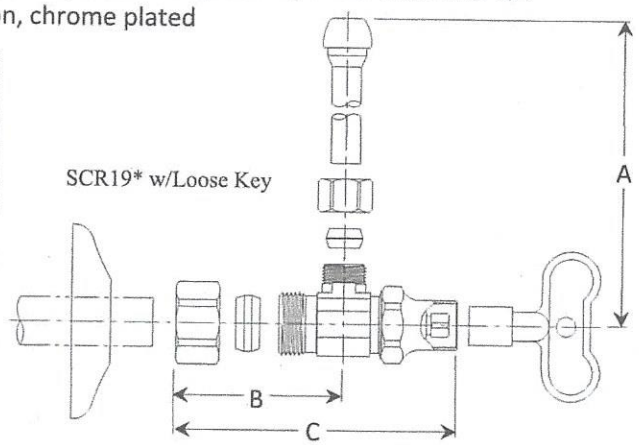
OCR1912A/ OCR1915A/ OCR1920A Copper Faucet Supply Kit - Multi-Turn Compression Angle Stop

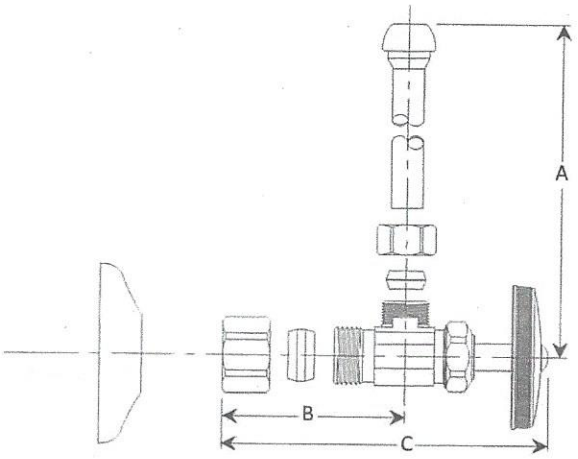
Product Submittal Form

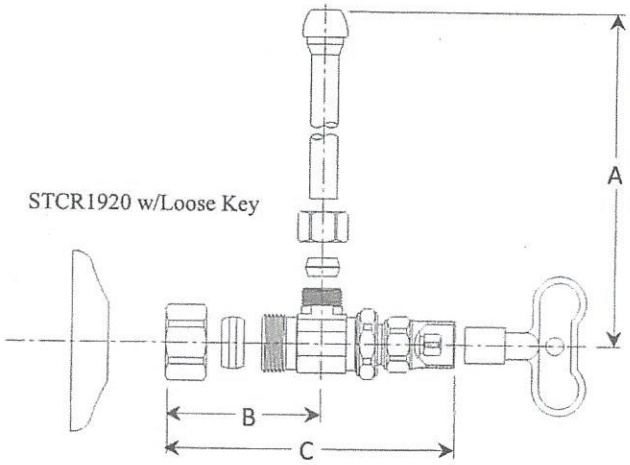
Compliant Part Listing:

☐	OCR1912AX C	1/2" nom compression x 3/8" OD compression stop with 3/8" OD tube x 11-1/2" length riser & shallow escutcheon, chrome plated
☐	OCR1912AZX C	1/2" nom compression x 3/8" OD compression stop, brass stem with 3/8" OD tube x 11-1/2" length riser & shallow escutcheon, chrome plated
☐	OCR1915AX C	1/2" nom compression x 3/8" OD compression stop with 3/8" OD tube x 14-1/2" length riser & shallow escutcheon, chrome plated
☐	OCR1920AX C	1/2" nom compression x 3/8" OD compression stop with 3/8" OD tube x 19-1/2" length riser & shallow escutcheon, chrome plated
☑	SCR1912AX C	1/2" nom compression x 3/8" OD compression stop with 3/8" OD tube x 11-1/2" length riser & shallow escutcheon, loose key, chrome plated
☐	SCR1915AX C	1/2" nom compression x 3/8" OD compression stop with 3/8" OD tube x 14-1/2" length riser & shallow escutcheon, loose key, chrome plated
☐	SCR1920AX C	1/2" nom compression x 3/8" OD compression stop with 3/8" OD tube x 19-1/2" length riser & shallow escutcheon, chrome plated

PART DIMENSIONS (Inches)			
Model	**DIM. A**	**DIM. B**	**DIM. C**
OCR1912A /AZ	12.0	1.16	2.84
OCR1915A	15.0	1.16	2.84
OCR1920A /AZ	20.0	1.16	2.84
SCR1912A	12.0	1.20	2.64
SCR1915A	15.0	1.20	2.64
SCR1920A	20.0	1.20	2.64
STCR1920A	20.0	1.20	3.03







Listings & Certifications:

- IAPMO listed to ASME A112.18.1 / CSA B125.1 (File # 0645)
- CSA listed to ASME A112.18.1 / CSA B125.1 (File # 204593)
- Compliant product CSA listed to Low Lead Content Certification Program – Plumbing Products Class 6853-01

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Cleveland, Ohio 44135
Ph: (800) 321-9532
Fax: (800) 321-9535
www.dearbornbrass.com

SUBMITTAL SPECIFICATION

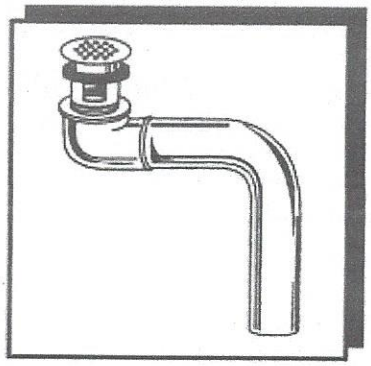
CAST GRID WHEELCHAIR PATENT OUTLET PLUG

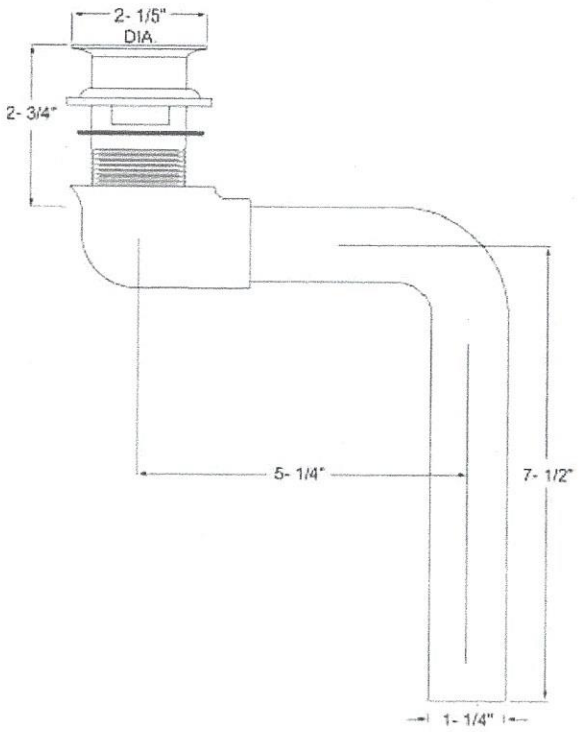
Engineering Specification: Dearborn Brass Semi-Cast Wheelchair Grid Patent Overflow Plug with 1- ¼" – 17 gauge tailpiece.

Job Reference

DESCRIPTION

- Chrome Finished
- Includes: Cast Grid, P.O. Plug with nuts and washers, 90° Elbow and 17 gauge tailpiece
- Designed for installation in most commercial applications





✓	Product No.	Description	Carton Quantity	Carton Weight (lbs)
✓	760W-1	Semi-Cast Grid Wheelchair Patent Overflow Plug with 1-¼" – 17 gauge Tailpiece	10	14

Data is subject to manufacturing tolerances.

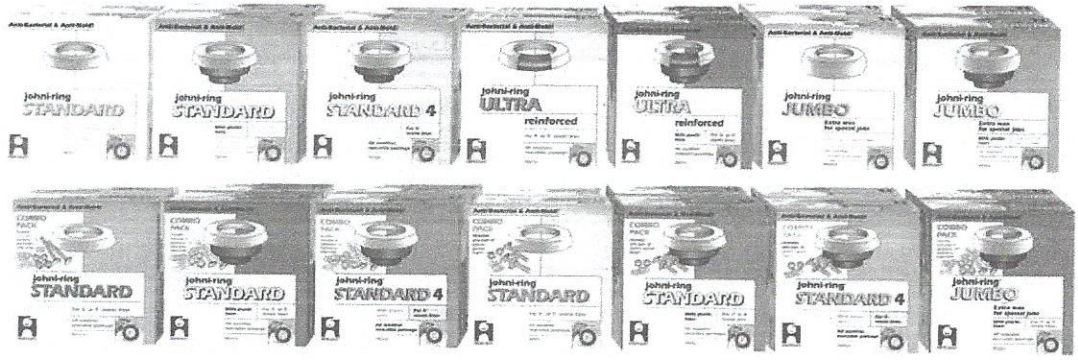
HECWRS
NOSEEP #1 WAX BOWL GSKT 90-220
W/SLEEVE

HEJB
JOHNI QUICK BOLT SET/BRS 90905
(OLD #90124)

johni-ring®

Spec Sheet #S01068
June 2005

Specialized Wax Gaskets



DESCRIPTION

ANTI-BACTERIAL
ANTI-MOLD

Johni-ring wax gaskets provide a permanent, sanitary, gas and watertight seal on most types of water closets. Constructed of high-quality golden wax, **johni-rings** will not dry out, harden, or deteriorate. **Johni-rings contain microbial additives guarding against mold, mildew, and bacterial growth on the wax.** Each wax ring is carefully extracted from its mold and packaged in an exclusive all-weather, non-stick plastic wrapper for easy removal and installation. **Hercules** sturdy polypropylene horn has full downward extension to eliminate splash-backs - ensures positive, non-interrupted flow through the floor flange.

johni-ring jumbo has 40% more wax than the standard **johni-ring** – for applications where the floor flange is excessively recessed. Eliminates the need for "double stacking."

johni-ring ultra – contains a built-in polyethylene mesh to ensure stability in installations where side or top pressure could be applied. Unlike urethane foam-reinforced products, will not tear or break.

johni-ring for urinals - felt reinforced, 2" diameter for most wall-installed urinals. Can be used on cast iron, copper or plastic fittings.

johni-ring for back outlet toilets – felt reinforced, fits most 4" wall toilets.

johni-ring combination packs – contain both the wax gasket and a set of either **johni-bolts** or **johni quick bolts**.

SIZES AND PACKING

STOCK NO.	SIZE	PACKING	WEIGHT/CASE
johni-ring standard			
90210	for 3" or 4" waste lines	48	23.8 lbs.
→ 90220	for 3" or 4" waste lines	24 with plastic horn	14.3 lbs.
90230	for 4" waste lines	24 with plastic horn	14.3 lbs.
johni-ring jumbo			
90243	for 3" or 4" waste lines	24	15.5 lbs.
90241	for 3" or 4" waste lines	24 with plastic horn	18.2 lbs.
johni-ring ultra			
90252	for 3" or 4" waste lines	48	24.4 lbs.
90256	for 3" or 4" waste lines	24 with plastic horn	14.5 lbs.
johni-ring plus for urinals*			
90260	for 2" waste lines	24	7.0 lbs.
johni-ring plus for back outlet toilets*			
90270	for 4" waste lines	24	11.5 lbs.
johni-ring standard combo pack / johni-bolts			
90214	for 3" or 4" waste lines	48 regular flat ring	29.5 lbs.
90224	for 4" waste lines	24 with plastic horn	16.4 lbs.
90234	for 3" or 4" waste lines	24 with plastic horn	17.1 lbs.
johni-ring standard combo pack / johni quick bolts			
96401	for 3" or 4" waste lines	48	27.0 lbs.
96402	for 3" or 4" waste lines	24 with plastic horn	16.0 lbs.
96403	for 4" waste lines	24 with plastic horn	16.0 lbs.
johni-ring jumbo combo pack / johni-bolt XL			
90203	for 3" or 4" waste lines	24 with plastic horn	16.4 lbs.

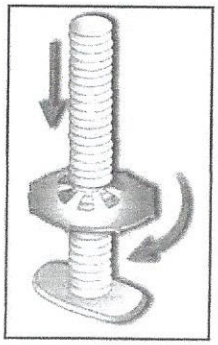
* anti-bacterial / anti-mold not included

HERCULES®

specifications

johni-ring®

johni-ring®
Specialized wax gaskets



For a quick, secure and "no wobble" way to install a toilet, use **Hercules johni quick bolts.**

APPROVALS AND LISTINGS

Meets Federal Specification TT-P-1536A.

SPECIFIC USES

Wax gasket rings for sanitary seal for floor mounted, back outlet toilet drainage fittings and urinals.

SPECIFIC APPLICATIONS*

Designed to work with all types of installations such as cast iron, copper and plastics.

PHYSICAL PROPERTIES

Specific Gravity:	.82 - .86
Solubility in water:	Insoluble
Appearance and color:	Golden wax

WARNINGS OR CAUTIONS

Read all cautions and directions carefully before using this product.

DIRECTIONS FOR USE

Johni-Ring for Floor Mounted Toilets: Remove wrapping. With bowl upside down on a protective pad, place wax ring around opening. Plastic sleeve should face upward. Press wax ring firmly into place to assure adhesion when bowl is inverted. Carefully set toilet on bolts. Twist bowl slightly and apply downward pressure to compress wax and bring base of toilet in contact with floor. Tighten bolts. (Wax ring works best at room temperature.)

Johni-Ring plus for Urinals: Remove wrapping from wax bowl ring. Place wax ring firmly onto urinal flange. Set urinal firmly against flange and tighten bolts evenly. (Wax ring works best at room temperature.)

Johni-Ring plus for Back Outlet Toilets: Remove wrapping from wax bowl ring. With bowl on protective pad, have rear side of bowl face you. Place wax ring around outlet opening. Make sure wax ring is firmly in place to assure adhesion. Carefully install toilet to drainage fittings. (Wax ring works best at room temperature.)

MATERIAL SAFETY INFORMATION

FOR MORE INFORMATION ON THIS PRODUCT, REQUEST MATERIAL SAFETY DATA SHEET (MSDS) #68.

For Delivery by Fax	Call 1-800-942-4636
Internet	See MSDS section of **www.herchem.com**
Mail	Contact Hercules at address below or any Hercules representative

This product is defined as an "article" and is not classified as hazardous in accordance with OSHA 1910.1200.

HMIS Hazard warning 0-1-0-A.

INGREDIENTS	CAS#
Petrolatum	8009-03-8

*For special applications which may not be covered on this or other Hercules literature, please contact Hercules Technical Services Department by phone 1-800-221-9330, or fax 1-800-333-3456, or visit our technical database web-site at www.herchem.com.

HERCULES®

Hercules Chemical Company, Inc.
111 South Street, Passaic, NJ 07055-9100
Phone: 800-221-9330 • Fax: 800-333-3456
e-mail: info@herchem.com
http://www.herchem.com

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ISO 9001: 2000 Certified

HERCULES® AN EMPLOYEE OWNERSHIP CORPORATION

johni-bolt® and johni quick bolt®

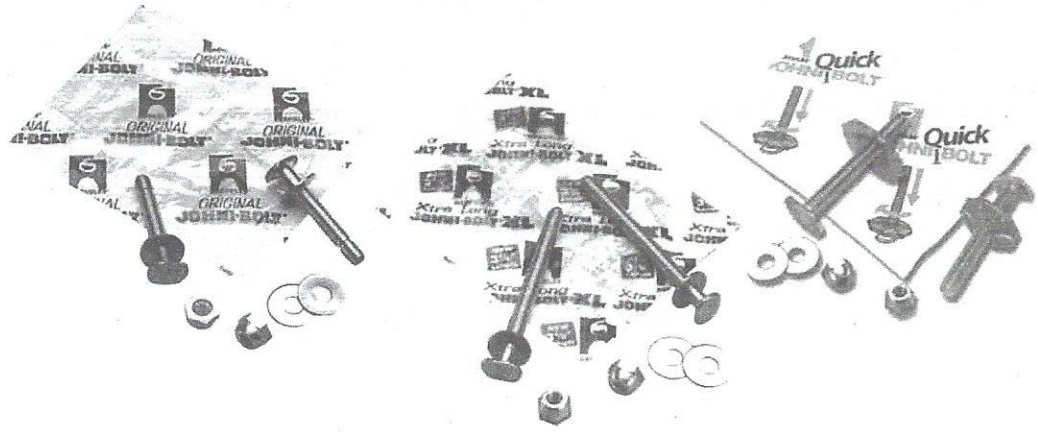
Spec Sheet #S1071
April 2004

Closet Bolts

HERCULES®

specifications

johni-bolt® and johni quick bolt®



DESCRIPTION

johni-bolt

The original patented, solid brass closet bolt - with time saving snap-off slot and captive washer. A pair of pliers easily snaps off the top of the bolt. Captive washer keeps bolt upright and prevents it from falling through the flange. Oversized solid brass acorn nuts, stainless steel washers. Packaged in pairs (two bolts with captive washer, two washers, two brass acorn nuts per plastic bag). Specially designed head fits into every flange and slides easily into position. Won't rust or corrode. Nuts will not strip or round out easily. The **johni-bolt XL** is extra long to accommodate those remodeling projects where multiple floor surfaces require a longer bolt to secure the water closet to the existing flange. Because of the wide variance in required length, **XL** bolts do not have break-off notches, but may easily be sawed flush as needed.

johni quick bolt

The **johni quick bolt** is a unique bolting system for mounting toilets. Eliminates wobbly bolts and the need for double-nutting, flimsy wax, putty, or thin plastic washers. Fast; easy; and secure. Just push down on the gold-colored plastic washer (no need to "screw on"), and then turn to tighten.

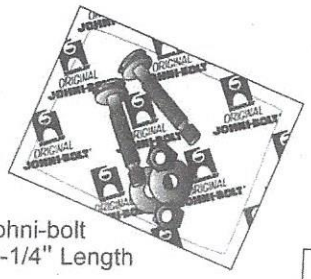
Patent-Pending

SIZES AND PACKING

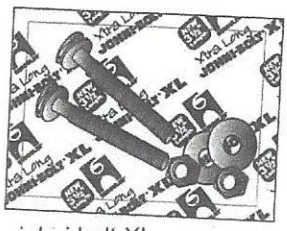
STOCK NO.	SIZE	PACKING	WEIGHT/CASE
johni-bolt 2-1/4" length			
90104	1/4" dia.	100 bags	12.5 lbs.
90124	5/16" dia.	100 bags	17.0 lbs.
johni-bolt XL 3-1/2" length			
90154	1/4" dia.	100 bags	14.0 lbs.
90174	5/16" dia.	100 bags	19.0 lbs.
johni quick bolt 2-1/4" length			
90904	1/4" dia.	100 bags	10.5 lbs.
→ 90905	5/16" dia.	100 bags	13.5 lbs.
johni quick bolt XL 3-1/2" length			
90906	1/4" dia.	50 bags	11.5 lbs.
90907	5/16" dia.	50 bags	14.5 lbs.

Spec Sheet #S1071

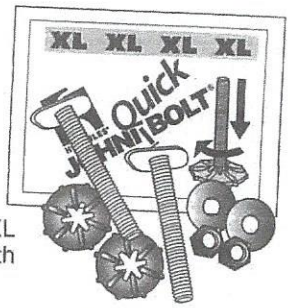
johni-bolt® and johni quick bolt®



johni-bolt
2-1/4" Length



johni bolt XL
3-1/2" Length



johni quick bolt XL
3-1/2" Length

APPROVALS AND LISTINGS

Many plumbing codes require use of solid brass bolts.

SPECIFIC USES

Johni-bolts are used to secure water closets to flanges.

SPECIFIC APPLICATIONS*

Johni-bolts are designed to be used with a wax ring to provide leak-proof perimeter around water closet base.
Johni-bolts can be used on new installations or replacement of existing water closets.

PHYSICAL PROPERTIES

Appearance: **johni-bolt and johni-bolt XL,** two solid brass bolts with captive washer, and cap nuts with two stainless steel washers.
johni quick bolt, two gold-color plastic washers, two solid brass bolts and two cap nuts with two stainless steel washers.

WARNINGS OR CAUTIONS

Read all cautions and directions carefully before using product.

DIRECTIONS FOR USE

Use with wax gaskets to install water closets.

1) Remove wrapper of wax ring.
2) With bowl upside down on a protective pad, place wax ring, flat edge and plastic horn (if applicable) facing away from toilet base, in recessed groove around opening.
3) Press wax ring firmly into place to assure adhesion when bowl is inverted.
4) Slide bolts into slots on either side of the waste line flange. If using **johni quick bolts:** After sliding bolts into slots on either side of the waste line flange, hold gold-colored plastic "washer" over bolt and press down firmly (no need to screw on). Then, just turn and tighten to hold bolt secure (gold-colored plastic "washer" can also be placed on bolt *before* bolt is inserted into flange).
5) Carefully set toilet bottom outlet on waste flange with bolts extending through holes in base of toilet. Press down firmly and twist bowl slightly to compress wax. When the base of the toilet is in uniform contact with the floor, place washer and nut on each bolt and tighten lightly. Do not over-tighten, as porcelain may crack. Nuts can always be retightened if bowl begins to wobble after a period of use. Replace decorative caps. (Wax rings work best at room temperature.)

For Delivery by Fax	Call 1-800-942-4636
Internet	See MSDS section of **www.herchem.com**
Mail	Contact Hercules at address below or any Hercules representative

This product is defined as an "article" and is not classified as hazardous in accordance with OSHA 1910.1200.

* For special applications which may not be covered in this or other Hercules literature, please contact Hercules Technical Services Department by phone at 1-800-221-9330 or send a fax to 1-800-333-3456 or visit our web-site at www.herchem.com.

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HERCULES®
AN EMPLOYEE OWNERSHIP CORPORATION

FlowCo™

Non-Thermostatic Heater Ideal for Handwashing And Other Fixed-Flow Applications

Specifications
Tankless Electric Water Heater

Applications

- Handwashing
- Kitchen, bar, utility sink
- Point-of-use & fixed-flow fixture
- One (1) lavatory faucet, sensor faucet or metering faucet

Performance Features

- Self-diagnostics with intelligent controls actively protect heater in installed environment
- InfoCue™ visible LED indicator communicates system status and heater operation feedback
- SafeStart™ technology engages upon start-up to help avoid dry-fire occurrence
- Low activation flow starting at 0.25 GPM turn on (model dependent)
- Mounts in any orientation for a flexible installation
- Compact size fits almost anywhere; suitable for ADA compliant facilities
- Only one cold water line needed for an easy installation
- No T&P relief valve needed (check local codes); Ready to go, right out-of-the-box
- Save water and time by installing unit at the point-of-use
- Integral 3/8" compression fittings; no soldering or sweat connections required
- Control system activates heater only on demand
- High temperature limit switch enables safe operation
- 5-year limited warranty on leaks, 1-year on parts

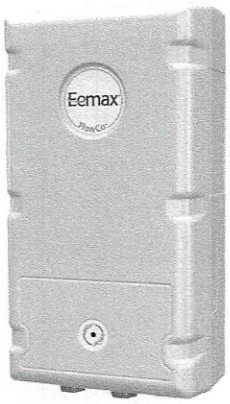
Product Specifications

Dimensions:	10.75" H x 5.25" W x 3" D
Product Weight: (model dependent)	2.75 lb/3 lb
Cover:	ABS-UL 94 5VA
Color:	White
Min. Dynamic Operating Pressure:	30 PSI
Max. Dynamic Operating Pressure:	150 PSI
Element:	Replaceable nichrome cartridge insert
Fittings:	3/8" compression fittings
UL listed file number:	E86887

U.S. Patent Pending Technology

Special Design Service

Inquiries for units for unique applications are welcome. Call our Technical Service department at **1-800-543-6163**.



c UL us LISTED

Tested and certified by the Water Quality Association against NSF/ANSI 372 for lead free compliance.

Assembled In USA

bimobject Find our products on bimobject.com BIM

Note: For optimum performance, mounting location should be within 2 feet of fixture.

Suggested Specification

Tankless water heater shall be an Eemax model number SPEX2412

Unit shall have ABS-UL 94 5VA rated cover. Unit shall allow mounting in any orientation. Element shall be replaceable cartridge insert. Element shall be iron-free, nickel-chrome material. Unit shall have replaceable filter in the inlet connector. Unit shall include an integrated flow meter to ensure accurate turn-on / turn-off flow rate. Heater shall be fitted with 3/8" compression fittings to eliminate the need for soldering. Maximum operating pressure of 150 PSI. Diagnostic features to include LED error/fault indicator. Heater shall employ technology that engages upon start-up to avoid dry-fire occurrence. Hot water storage tanks prohibited. Unit shall be Eemax or approved equal.

NOTE: Refer to rating chart for product information.

Specification options to be included with SPEX models:

____ **N4** NEMA 4 steel cabinet with powder coat finish
____ **N4X** NEMA 4 stainless steel, corrosion-resistant cabinet

Information and product specifications contained in this document are subject to change without notice. REV 2020-01

FlowCo

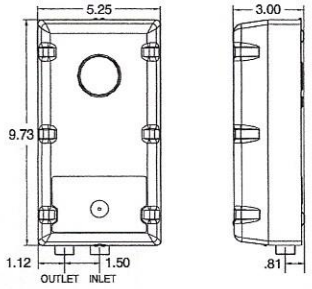
Non-Thermostatic Heater Ideal for Handwashing And Other Fixed-Flow Applications

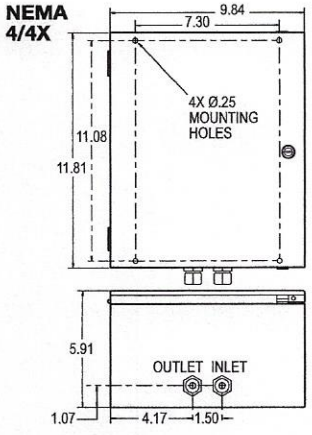
Specifications
Tankless Electric Water Heater

	MODEL NUMBER	kW	AMPS	RECOMMENDED WIRE SIZE (75° C/CU)	TURN ON (GPM)	TEMPERATURE RISE °F 0.3 GPM	0.5 GPM	0.75 GPM	1.0 GPM	1.5 GPM	2.0 GPM
	VOLTS 120										
	SPEX1812	1.8	15	14 AWG	0.2	41°	25°	16°	12°	8°	6°
C	**SPEX1812CA** (Canadian model)	1.8	15	14 AWG	0.2	41°	25°	16°	12°	8°	6°
	SPEX2412	2.4	20	14 AWG	0.25	55°	33°	22°	16°	11°	8°
C	**SPEX2412CA** (Canadian model)	2.4	20	14 AWG	0.25	55°	33°	22°	16°	11°	8°
	SPEX3012	3.0	25	12 AWG	0.25	68°	41°	27°	20°	14°	10°
C	**SPEX3012CA** (Canadian model)	3.0	25	12 AWG	0.25	68°	41°	27°	20°	14°	10°
	SPEX3512	3.5	29	10 AWG	0.3	80°	48°	32°	24°	16°	12°
C	**SPEX3512CA** (Canadian model)	3.5	29	10 AWG	0.3	80°	48°	32°	24°	16°	12°
	VOLTS 208 Single Phase										
	SPEX3208	3.0	15	14 AWG	0.25	68°	41°	27°	20°	14°	10°
C	**SPEX3208CA** (Canadian model)	3.0	15	14 AWG	0.25	68°	41°	27°	20°	14°	10°
	SPEX4208	4.1	20	14 AWG	0.4	–	56°	37°	28°	19°	14°
C	**SPEX4208CA** (Canadian model)	4.1	20	14 AWG	0.4	–	56°	37°	28°	19°	14°
	SPEX8208	8.3	40	8 AWG	0.7	–	–	76°	57°	38°	28°
C	**SPEX8208CA** (Canadian model)	8.3	40	8 AWG	0.7	–	–	76°	57°	38°	28°
	VOLTS 240*										
	SPEX35	3.5	15	14 AWG	0.3	80°	48°	32°	24°	16°	12°
	SPEX35 (derated 208V performance)	2.6	13	14 AWG	0.3	59°	36°	24°	18°	12°	9°
C	**SPEX35CA** (Canadian model)	3.5	15	14 AWG	0.3	80°	48°	32°	24°	16°	12°
	SPEX48	4.8	20	14 AWG	0.4	–	66°	44°	33°	22°	16°
	SPEX48 (derated 208V performance)	3.6	17	14 AWG	0.4	–	49°	33°	25°	16°	12°
C	**SPEX48CA** (Canadian model)	4.8	20	14 AWG	0.4	–	66°	44°	33°	22°	16°
	SPEX55	5.5	23	12 AWG	0.5	–	75°	50°	38°	25°	19°
	SPEX55 (derated 208V performance)	4.1	20	12 AWG	0.5	–	56°	37°	28°	19°	14°
C	**SPEX55CA** (Canadian model)	5.5	23	12 AWG	0.5	–	75°	50°	38°	25°	19°
	SPEX65	6.5	27	10 AWG	0.7	–	–	59°	44°	30°	22°
	SPEX65 (derated 208V performance)	4.8	23	10 AWG	0.7	–	–	44°	33°	22°	16°
C	**SPEX65CA** (Canadian model)	6.5	27	10 AWG	0.7	–	–	59°	44°	30°	22°
	SPEX75	7.5	32	10 AWG	0.7	–	–	68°	51°	34°	26°
	SPEX75 (derated 208V performance)	5.6	27	10 AWG	0.7	–	–	51°	38°	25°	19°
C	**SPEX75CA** (Canadian model)	7.5	32	10 AWG	0.7	–	–	68°	51°	34°	26°
	SPEX95	9.5	40	8 AWG	0.8	–	–	–	65°	43°	32°
	SPEX95 (derated 208V performance)	5.6	34	8 AWG	0.8	–	–	–	38°	25°	19°
C	**SPEX95CA** (Canadian model)	9.5	40	8 AWG	0.8	–	–	–	65°	43°	32°
	VOLTS 277 Single Phase										
	SPEX3277	3.0	11	14 AWG	0.25	68°	41°	27°	20°	14°	10°
C	**SPEX3277CA** (Canadian model)	3.0	11	14 AWG	0.25	68°	41°	27°	20°	14°	10°
	SPEX4277	4.1	15	14 AWG	0.4	–	56°	37°	28°	19°	14°
C	**SPEX4277CA** (Canadian model)	4.1	15	14 AWG	0.4	–	56°	37°	28°	19°	14°
	SPEX60	6.0	22	12 AWG	0.7	–	–	55°	41°	27°	20°
C	**SPEX60CA** (Canadian model)	6.0	22	12 AWG	0.7	–	–	55°	41°	27°	20°
	SPEX80	8.0	29	10 AWG	0.7	–	–	73°	55°	36°	27°
C	**SPEX80CA** (Canadian model)	8.0	29	10 AWG	0.7	–	–	73°	55°	36°	27°
	SPEX90	9.0	33	10 AWG	0.7	–	–	82°	61°	41°	31°
C	**SPEX90CA** (Canadian model)	9.0	33	10 AWG	0.7	–	–	82°	61°	41°	31°
	SPEX100	10.0	36	8 AWG	0.8	–	–	–	68°	46°	34°
C	**SPEX100CA** (Canadian model)	10.0	36	8 AWG	0.8	–	–	–	68°	46°	34°

* 240V units can be used on 208V single phase with 25% reduced temperature output. Please note per UL standards the rating plate and installation instructions will all be according to a 240V applied voltage. Check with local officials prior to derating the electrical infrastructure.

"C"indicates evaluation and compliance to either Underwriters Laboratories (UL) or Intertek (ETL) under CAN/CSA-C22.2 No. 64/No. 88.





Anti-Siphon Freezeless Wall Hydrants

Model 65/B65/RB65

The Model 65, B65, RB65 are automatic draining, freezeless wall hydrants with single check hose connection anti-siphon vacuum breakers. Hydrants drain as handle is shut off, *even if hose is attached.* All models are designed for irrigation purposes to blend in with modern architecture for installation on restaurants, schools, office buildings, churches, apartments, motels, stores, shopping centers and industrial buildings.

SPECIFICATIONS:

MODEL 65/B65/RB65
- Approved under ASSE Standard 1019-B
- Listed by IAPMO®
- Meets Government Specification WW-P-541b

VACUUM BREAKER - ANTI SIPHON -
- NIDEL® Model 34HA with ¾ inch male hose thread
- Approved under ASSE 1011
- Listed by IAPMO®

VALVE SEAT – Permanent type brass valve body with hemispherical seating surface.

VALVE – One piece valve plunger accurately controls both flow and drainage with a minimum number of turns and without need for adjustments.

DRAIN – Under nozzle away from hands of operator and with a lip to divert water away from building.

CASING – Copper tubes.

NO LEAD SOLDER - All solder joints.

STEM – Hardened stainless steel stem resists damage.

TEE KEY – Loose key operates hydrant.

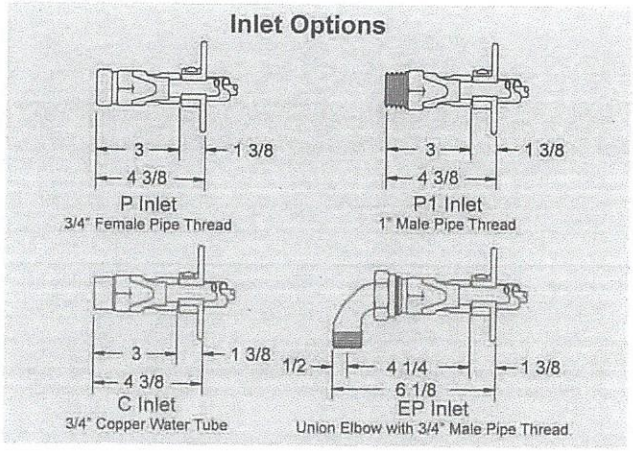
OPERATING ROD – 3/8" solid brass operating rod.

INLETS – As shown.

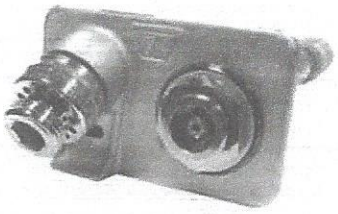
WALL CLAMP – Furnished on all 60 series except close coupled.

MAX PRESSURE – 125 p.s.i.

MAX TEMPERATURE - 120° F

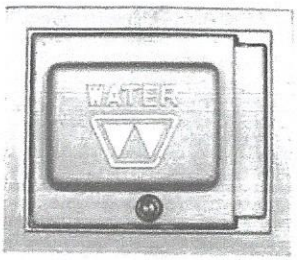


Specify as follows:
Wall hydrant shall be Woodford Model 65 (exposed type), B65, RB65 or MB65 (concealed box type), automatic draining with anti-siphon vaccum breaker. ASSE Standard 1019-B approved. ¾" inlet and outlet (specify type of inlet). Hardened stainless steel operating stem and one-piece valve plunger to control both flow and drain functions. Exterior finish to be Chrome Plated (options: Polished Brass or Rough Brass). Loose tee key to be furnished with each hydrant. Wall thickness to be _____ inches.



Model 65

Standard - Chrome (CH)
Optional - Brass (BR) Polished Brass (PB)
Fits one standard modular brick course.



Model B65

Exterior Finish: Box & Door
Standard - Chrome (CH)
Optional - Brass (BR) Polished Brass (PB)
Anodized Aluminum Box (AL)
Fits two std. modular brick course or one course of facing tile.

Model RB65

Exterior Finish: Box & Door - Chrome (CH) Only
Designed especially for tilt-up wall construction.
Install through 6" diameter hole.
Two 3/8"-16 tapped holes for all-thread anchors in back of box.
Lift and latch door stays open when hydrant is in use.

SEE WOODFORDMFG.COM FOR INSTRUCTIONS AND DETAILS OF APPLICABLE PATENTS AND PATENTS PENDING OR CALL 1-800-621-6032

When ordering, specify model, inlet and wall thickness

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Rev. 12/15 Form No. 65.112

BOBRICK

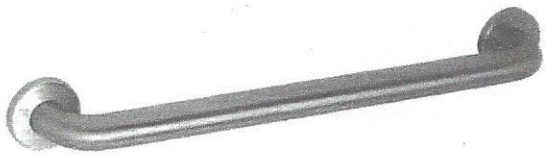
Technical Data

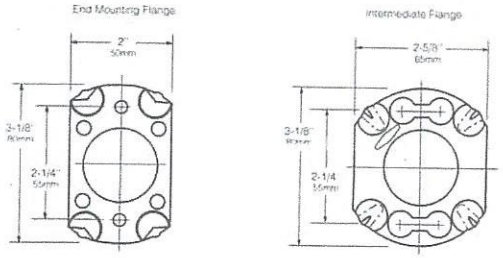
1½" (38mm) DIAMETER STAINLESS STEEL GRAB BARS WITH SNAP FLANGE

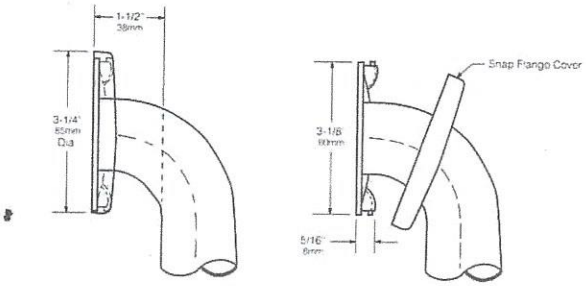
B-6806 SERIES

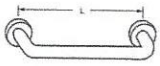
Specify Finish Required:

- ☐ Satin finish
- ☐ Satin finish with peened gripping surface; add suffix .99 to model number

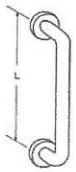




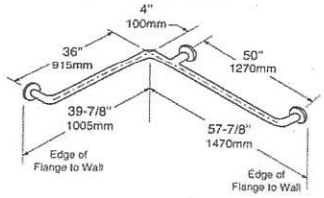




HORIZONTAL



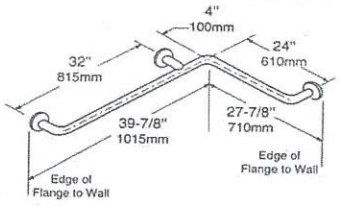
VERTICAL



TWO-WALL WHEELCHAIR COMPARTMENT

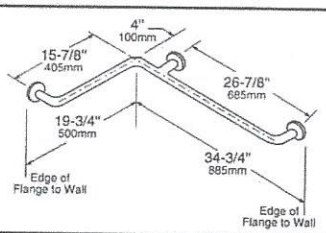
B-6806 x 12, 18, 24, 30, 36, 42, 48

B-68137



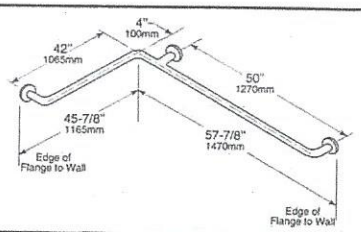
HORIZONTAL TUB / SHOWER COMPARTMENT BAR 24 x 36

B-68616



HORIZONTAL TWO-WALL BAR for Shower Stall

B-6861



TWO-WALL TOILET COMPARTMENT BAR 42 x 54

B-6897

continued . . .

The illustrations and descriptions herein are applicable to production as of the date of this Technical Data Sheet.
The manufacturer reserves the right to, and does from time to time, make changes and improvements in designs and dimensions.

Rev. 9/1/17 SB Printed in U.S.A.
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MATERIALS:

Grab Bar — 18-8 S, type-304, 18-gauge (1.2mm) stainless steel tubing with satin-finish. 1-1/2" (38mm) outside diameter. Ends are heliarc welded to flanges. Clearance between the grab bar and wall is 1-1/2" (38mm).

Concealed Mounting Flanges — 18-8 S, type-304, 11-gauge (3.2mm) thick, stainless steel plate; end flanges 2" x 3-1/8" (50 x 80mm) with holes for attachment to wall. Intermediate flanges 2-5/8" x 3-1/8" (65 x 80mm) wide x 3-1/8" (80mm) diameter.

Snap Flange Covers — 18-8 S, type-304, 22-gauge (0.8mm) drawn stainless steel with satin-finish. 3-1/4" (85mm) diameter x 1/2" (13mm) deep. Each cover snaps over mounting flange to conceal mounting screws.

STRENGTH:

Bobrick grab bars that provide 1-1/2" (38mm) clearance from wall can support loads in excess of 900 pounds (408kg) if properly installed. Other grab bar configurations can support loads in excess of 250 pounds (113kg) if properly installed, complying with accessible design (including ADAAG in the U.S.A.) for structural strength

Safety Warning: Grab bars are no stronger than the anchors and walls to which they are attached and, therefore, must be firmly secured in order to support the loads for which they are intended. To avoid potential injury, the building owner or maintenance personnel should remove the grab bar from service if the grab bar is not adequately secured to wall or if there is any observed damage to the welds.

INSTALLATION:

Provide concealed anchor device or backing as specified or required in accordance with local building codes before wall is finished. Fasten concealed mounting flanges to anchor device or backing with at least two screws opposing each other in each flange. Snap flange covers over each mounting flange to conceal mounting screws. Concealed anchor devices and mounting screws are not included with Bobrick grab bars and must be specified as an accessory.

For Grab Bars with an Intermediate Flange(s), Pull Snap-Flange Covers away from mounting flanges. Place grab bar in desired mounting location. Use intermediate flange as a template to mark location of mounting screws at intermediate flange only. Mark screw locations at the center of the slot in the middle of the double-keyhole shaped mounting holes (2) in the intermediate flange. Remove grab bar from wall. Drive the intermediate flange mounting screws into wall at marked locations. **Note:** Make sure to leave a space of just over 1/8" (3.17mm) between the underside of the screw head and the wall. Install grab bar on the wall by placing the round ends of the intermediate flange double-keyhole shaped mounting holes over the mounting screws (2) are located in the middle of the flange slots. Install the mounting screws into the wall at the end flanges and secure tightly. Tighten the mounting screws at the intermediate flange. Press all snap-flange covers into place to conceal mounting flanges.

Note: Recommend use of 1/4" or #14 sheet metal or wood screws to install Intermediate Flange. #12 screws may also be used.

Important Notes:

1. **Mounting Kits** — Bobrick offers a mounting kit for installing grab bars; **one Bobrick mounting kit is required for each flange.**

Mounting Kit No.	Description
252-30	Consists of # (3) 14 x 2½" type-304 stainless steel, Phillips round-head, sheet-metal screws.

2. **Grab Bar Fastener** — Bobrick offers a grab bar fastening system that secures all Bobrick grab bar series; **one Bobrick fastener is required for each flange.** Install grab bar without backing in wall requires minimum 5/8" (16mm) thick painted or tiled drywall.

WingIt™ Fastener No.	Description
251-4	Consists of 10–32 x 5/16" round-head, Phillips 18/8 stainless steel screws. (1) WingIt grab bar fastener.

3. **Optional Anchor Device** — Bobrick grab bar anchor device includes stainless steel machine screws to be used for attaching grab bars to anchors. **one Bobrick concealed anchor device is required for each flange.**

Optional Anchor No.	Description
2583	Anchor for 3/4" to 1" (19-25mm) panel 1 anchor required for each flange.
2586	Anchor for 1/2" to 1" (13mm) panel 1 anchor required for each flange.

SPECIFICATION:

Grab bar shall be type-304 stainless steel with satin-finish. Grab bar shall have 18-gauge (1.2mm) wall thickness and 1-1/2" (38mm) outside diameter. Clearance between the grab bar and wall shall be 1-1/2" (38mm). Concealed mounting flanges shall be 11-gauge (3.2mm) thick stainless steel plate, 2" x 3-1/8" (50 x 80mm), and equipped with at least two screw holes for attachment to wall. Flange covers shall be 22 gauge (0.8mm), 3-1/4" (85mm) diameter x 1/2" (13mm) deep, and shall snap over mounting flange to conceal mounting screws and/or WingIt fasteners. Ends of grab bar shall pass through concealed mounting flanges and be heliarc welded to form one structural unit. Grab bar shall comply with accessible design (including ADAAG in the U.S.A.) for structural strength.

Grab Bar shall be Model _____ (insert model number) of Bobrick Washroom Equipment, Inc., Clifton Park, New York; Jackson, Tennessee; Los Angeles, California; Bobrick Washroom Equipment Company, Scarborough, Ontario; Bobrick Washroom Equipment Pty. Ltd., Australia; and Bobrick Washroom Equipment Limited, United Kingdom.

The illustrations and descriptions herein are applicable to production as of the date of this Technical Data Sheet.
The manufacturer reserves the right to, and does from time to time, make changes and improvements in designs and dimensions.

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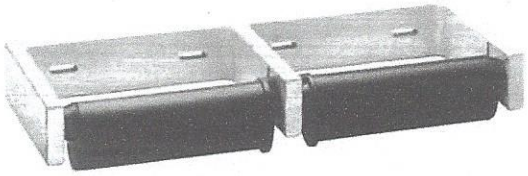
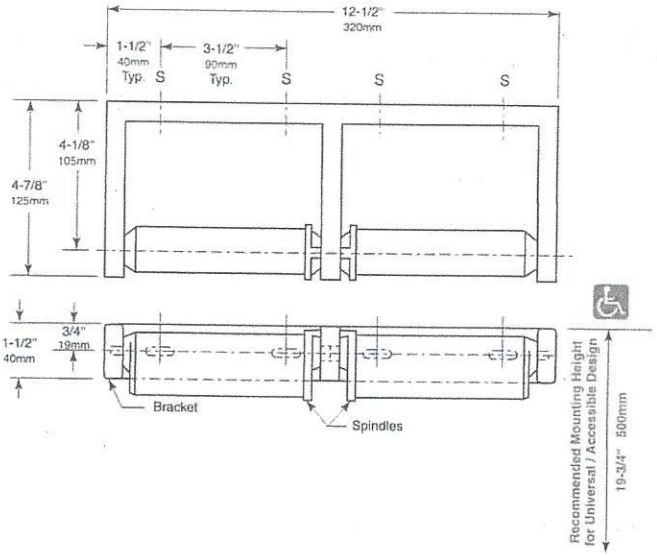
BOBRICK

Technical Data

DOUBLE-ROLL TOILET TISSUE DISPENSER

B-2740





MATERIALS:

Bracket — Heavy-duty cast aluminum with satin finish.

Spindles (2) — Molded high-impact ABS. Equipped with retractable pin and concealed locking mechanism.

OPERATION:

Accommodates two standard-core toilet tissue rolls up to 6" (152mm) diameter (2000 sheets). Spindles can only be removed with special key furnished. Theft-resistant.

INSTALLATION:

For partitions with particle-board or other solid core, provide sheet-metal screws or through-bolts, nuts, and washers.

For hollow-core metal partitions, provide solid backing into which sheet-metal screws can be secured. If two units are installed back-to-back, then provide threaded sleeves and machine screws for the full thickness of partition.

For plaster or dry wall construction, provide concealed backing to comply with local building codes, then secure unit with sheet-metal screws.

For other wall surfaces, provide sheet-metal screws and fiber plugs or expansion shields, or provide 1/8" (3mm) toggle bolts or expansion bolts.

SPECIFICATION:

Double-roll toilet tissue dispenser shall have a heavy-duty cast-aluminum bracket with satin finish. Theft-resistant spindles shall be molded high-impact ABS with retractable pins and concealed locking mechanisms. Unit shall accommodate two standard-core toilet tissue rolls up to 6" (152mm) diameter (2000 sheets).

Double-Roll Toilet Tissue Dispenser shall be Model B-2740 of Bobrick Washroom Equipment, Inc., Clifton Park, New York; Jackson Tennessee; Los Angeles, California; Bobrick Washroom Equipment Company, Scarborough, Ontario; Bobrick Washroom Equipment Pty. Ltd., Australia; and Bobrick Washroom Equipment Limited, United Kingdom.

The illustrations and descriptions herein are applicable to production as of the date of this Technical Data Sheet.
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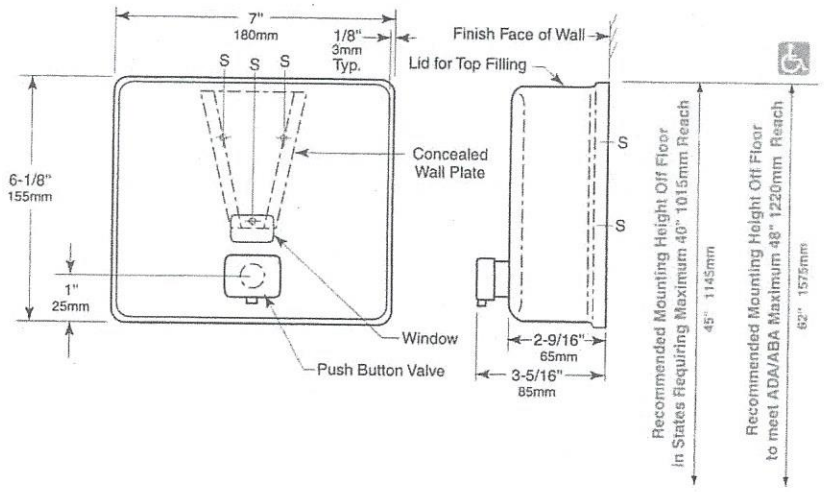
BOBRICK

Technical Data

ConturaSeries® SURFACE-MOUNTED SOAP DISPENSER

B-4112



MATERIALS:

Container — Body is 18-8, Type-304, 20-gauge (1.0mm) stainless steel with satin-finish. Drawn, one-piece, seamless construction. Front has same degree of arc as other Bobrick ConturaSeries washroom accessories. Radius on corners and edges complement other ConturaSeries accessories. Back plate is 22-gauge (0.8mm) stainless steel with 20-gauge (1.0mm) stainless steel mounting bracket attached. Container body and back plate are epoxy-sealed to prevent warping and leakage. Concealed wall plate is 20-gauge (1.0mm) stainless steel. Equipped with a plastic soap refill-indicator window and a locked, hinged stainless steel lid for top filling. Capacity: 40-fl oz (1.2-L).

Valve — Black molded plastic push button. Soap head-holding mushroom valve. Stainless steel spring. U-packing seal and duckbill. Antibacterial-soap-resistant plastic cylinder.

OPERATION:

Corrosion-resistant valve dispenses commercially marketed all-purpose hand soaps. To prevent corrosion, use only chloride-free pH-netural liquid soaps, non-iodine based soaps and do not use alcohol based sanitisers. Valve operates with one hand, without tight grasping, pinching, or twisting of the wrist, and with less than 5 pounds of force (22.2 N) to comply with accessible design guidelines (including ADAAG in U.S.A.). Window indicates when refill is required. The locked, hinged lid opens for top filling with special key provided. Concealed, vandal-resistant mounting.

INSTALLATION:

Secure wall plate to the wall with screws furnished at points indicated by an *S*. Slide mounting bracket of container down onto wall plate and secure unit with furnished locking-screw. For plaster or dry wall construction, provide concealed backing to comply with local building codes, then secure unit with screws furnished. For other wall surfaces, provide fiber plugs or expansion shields for use with screws furnished, or provide 1/8" (3mm) toggle bolts or expansion bolts.

Note: Surface-mount the dispenser plumb and true with valve 6" (152mm) to right or left of lavatory center. Provide 4" (102mm) minimum clearance from the lid to the underside of any horizontal projection. Push buttons should be located 44" (1120mm) maximum above the finish floor. Where a high reach is over an obstruction (countertop), the high forward reach shall be 48" (1220mm) maximum where the reach depth is 20" (510mm) maximum. Where the reach depth exceeds 20" (510mm) the high forward reach shall be 44" (1120mm) maximum and the reach depth shall be 25" (635mm) maximum.

SPECIFICATION:

Surface-mounted soap dispenser shall be Type-304 stainless steel with satin-finish. Corrosion-resistant valve shall dispense commercially marketed all-purpose hand soaps. To prevent corrosion, use only chloride-free pH-netural liquid soaps. Valve shall be operable with one hand and with less than 5 pounds of force (22.2 N) to comply with accessible design guidelines (including ADAAG in U.S.A.). Front of soap dispenser shall have same degree of arc and match other Bobrick ConturaSeries accessories in the washroom. Radius on corners and edges of soap dispenser shall complement other Bobrick ConturaSeries washroom accessories. Container body and back plate shall be epoxy-sealed to prevent warping and leakage. Soap dispenser shall have concealed, vandal-resistant mounting. Locked, hinged stainless steel lid for top filling shall require special key to open. Capacity shall be 40-fl oz (1.2-L).

Surface-Mounted Stainless Steel Soap Dispenser shall be Model B-4112 of Bobrick Washroom Equipment, Inc., Clifton Park, New York; Jackson, Tennessee; Los Angeles, California; Bobrick Washroom Equipment Company, Scarborough, Ontario; Bobrick Washroom Equipment Pty. Ltd., Australia; and Bobrick Washroom Equipment Limited, United Kingdom.

The illustrations and descriptions herein are applicable to production as of the date of this Technical Data Sheet.
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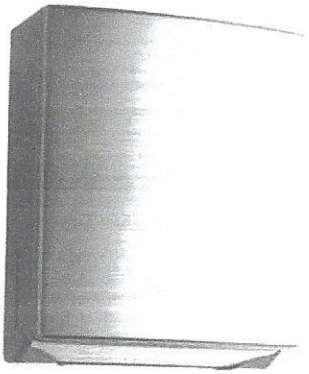
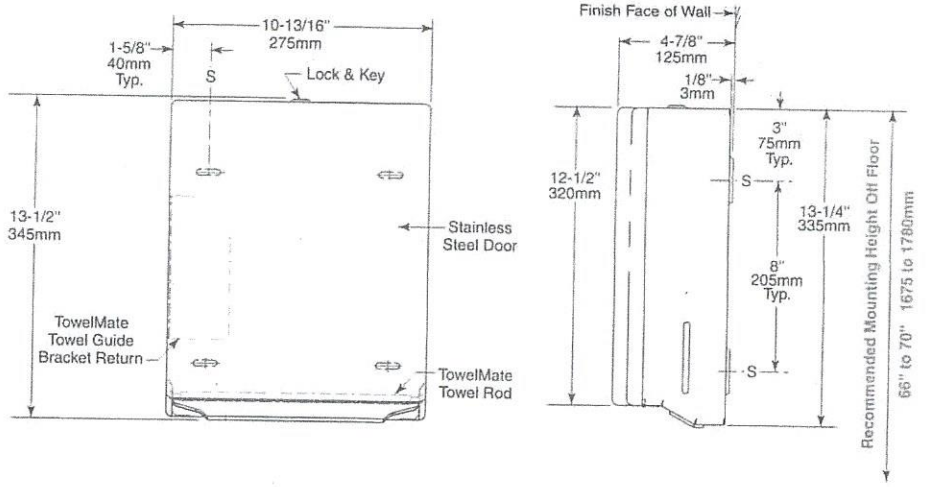
BOBRICK

Technical Data

ConturaSeries® SURFACE-MOUNTED PAPER TOWEL DISPENSER

B-4262





MATERIALS:

Cabinet — 18-8, type-304, 22-gauge (0.8mm) stainless steel. All-welded construction. Exposed surfaces have satin finish. Radius on corners of cabinet match corners and edges of door and other Bobrick ConturaSeries washroom accessories. Back has recessed mounting slots to prevent mounting screw heads from snagging towels. Rounded towel tray has hemmed opening to dispense paper towels without tearing. Cabinet inside equipped with 90° return towel guide bracket to prevent paper towels from falling forward out when door is opened for servicing. Unit equipped with TowelMate consisting of a 90° return towel guide angle inside cabinet to prevent paper towels from falling forward out when door is opened for servicing and a Nylon Rod across the center of the towel tray to dispense paper towels one at a time. Equipped with a tumbler lock keyed like other Bobrick washroom accessories. Unit shall be capable of dispensing 400 C-fold or 525 multifold paper towels 2-1/2" to 3-13/16" (64–97mm) deep.

Door — 18-8, type-304, 22-gauge (0.8mm) stainless steel with satin finish. Drawn, one-piece, seamless construction. Front of door has same degree of arc as other Bobrick ConturaSeries washroom accessories. Radius on corners and edges match corners of cabinet and other ConturaSeries accessories. Secured to cabinet with a full-length stainless steel piano-hinge.

TowelMate® Towel Rod Assembly — Consisting of a round Nylon Rod and (2) stainless steel Rod Screws for attachment, is field replaceable. Stainless steel Stop Screws (2) lock TowelMate Rod assembly in place. To retrofit TowelMate into existing installed units manufactured prior to June 2010, order TowelMate Accessory Bobrick Model No. 369-130.

OPERATION:

Unit dispenses C-fold or multifold paper towels 2-1/2" to 3-13/16" (64–97mm) deep without adjustment or use of adapters. Load paper in towel tray, and then pull one sheet of paper towel over the TowelMate towel rod and out to conceal rod and start dispense. Slots in sides of cabinet indicate refill time. After unlocking with key provided, door swings down for loading paper towels into cabinet.

INSTALLATION:

Mount unit on wall with four #10 x 1-1/4" sheet-metal mounting screws (not furnished) at points indicated by an *S*. For plaster or dry wall construction, provide concealed backing to comply with local building codes, then secure unit with sheet-metal screws. For other wall surfaces, provide fiber plugs or expansion shields for use with sheet-metal screws, or provide 1/8" (3mm) toggle bolts or expansion bolts.

SPECIFICATION:

Surface-mounted paper towel dispenser shall be type-304 stainless steel with all-welded construction; exposed surfaces shall have satin finish. Front of paper towel dispenser door shall have same degree of arc as other Bobrick ConturaSeries accessories in the washroom. Radius on corners and edges of door and cabinet shall complement other Bobrick ConturaSeries washroom accessories. Unit equipped with TowelMate consisting of a 90° return towel guide bracket inside cabinet to prevent paper towels from falling forward out when door is opened for servicing and a Nylon Rod across the center of the towel tray to dispense paper towels one at a time. Door shall be drawn, one-piece, seamless construction; secured to cabinet with a full-length stainless steel piano-hinge; and equipped with a tumbler lock keyed like other Bobrick washroom accessories. Unit shall be capable of dispensing 400 C-fold or 525 multifold paper towels 2-1/2" to 3-13/16" (64–97mm) deep without adjustment or use of adapters.

Surface-Mounted Paper Towel Dispenser shall be Model B-4262 of Bobrick Washroom Equipment, Inc., Clifton Park, New York; Jackson, Tennessee; Los Angeles, California; Bobrick Washroom Equipment Company, Scarborough, Ontario; Bobrick Washroom Equipment Pty. Ltd., Australia; and Bobrick Washroom Equipment Limited, United Kingdom.

The illustrations and descriptions herein are applicable to production as of the date of this Technical Data Sheet.
The manufacturer reserves the right to, and does from time to time, make changes and improvements in designs and dimensions.

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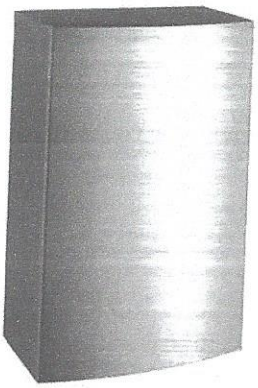
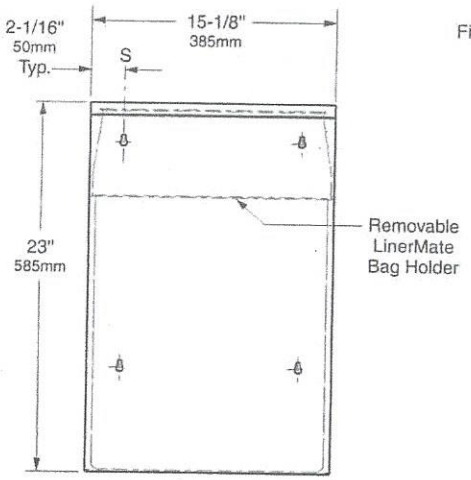
BOBRICK

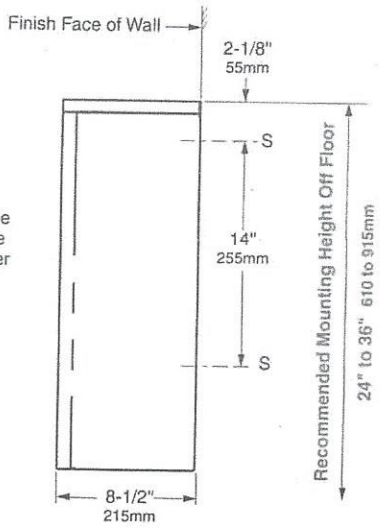
Technical Data

ConturaSeries® SURFACE-MOUNTED WASTE RECEPTACLE with LinerMate®

B-277







MATERIALS:

Receptacle — 18-8, type-304, 20-gauge (1.0mm) stainless steel. All-welded construction. Exposed surfaces have satin finish. Front of waste receptacle has same degree of arc as other Bobrick ConturaSeries washroom accessories. Radius on side edges of waste receptacle complement other ConturaSeries accessories. Top edge hemmed and bottom has recessed finger grip. Stainless steel reinforcement straps on back of unit provide strength to the four mounting screw holes. Capacity: 12.75-gal. (48.3-L).

LinerMate Trash Liner Holder — Unit equipped with LinerMate to facilitate installation and removal of disposable trash liners and retains liner inside waste receptacle. LinerMate shall have a molded plastic sleeve with a 20-gauge (1.0mm) stainless steel, U-shaped support strap hemmed for safety; riveted construction. LinerMate shall rest inside of waste receptacle area.

OPERATION:

Top edge of waste receptacle is hemmed and bottom has a recessed finger grip for safe handling. The space between bottom of waste receptacle and the floor when unit is properly mounted facilitates floor cleaning. Unit is equipped with LinerMate to accommodate disposable trash liners. LinerMate eliminates unsightly trash liner overhang and facilitates installation and removal of disposable trash liners.

To insert disposable trash liner, lift LinerMate up and forward and rest over edge of waste receptacle front panel with the bottom notches of LinerMate engaged on top front edge of receptacle. Place disposable trash liner inside LinerMate and fold disposable trash liner over LinerMate sleeve. Tie a knot in the corner of the bag, then place LinerMate with disposable trash liner back into receptacle. To empty, gather disposable trash liner from LinerMate sleeve and lift bag up.

INSTALLATION:

Mount unit on wall with four sheet-metal screws (not furnished) at points indicated by an *S*. For plaster or dry wall construction, provide concealed backing to comply with local building codes and secure with sheet-metal screws. For other wall surfaces, provide fiber plugs or expansion shields for use with sheet-metal screws, or provide 1/8" (3mm) toggle bolts or expansion bolts.

SPECIFICATION:

Surface-mounted waste receptacle shall be type-304 stainless steel with all-welded construction; exposed surfaces shall have satin finish. Front of waste receptacle shall have same degree of arc and match other Bobrick ConturaSeries accessories in the washroom. Radius on side edges of waste receptacle shall complement other Bobrick ConturaSeries washroom accessories. Top edge shall be hemmed and bottom of waste receptacle shall have recessed finger grip for safe handling. Waste receptacle shall be equipped with LinerMate to facilitate installation and removal of disposable trash liners and retains liner inside waste receptacle. LinerMate shall have a molded plastic sleeve with a 20-gauge (1.0mm) stainless steel, U-shaped support strap hemmed for safety; riveted construction. LinerMate shall rest inside of waste receptacle area. Capacity shall be 12.75-gal. (48.3-L).

Surface-Mounted Waste Receptacle shall be Model B-277 of Bobrick Washroom Equipment, Inc., Clifton Park, New York; Jackson, Tennessee; Los Angeles, California; Bobrick Washroom Equipment Company, Scarborough, Ontario; Bobrick Washroom Equipment Pty. Ltd., Australia; and Bobrick Washroom Equipment Limited, United Kingdom.

The illustrations and descriptions herein are applicable to production as of the date of this Technical Data Sheet.
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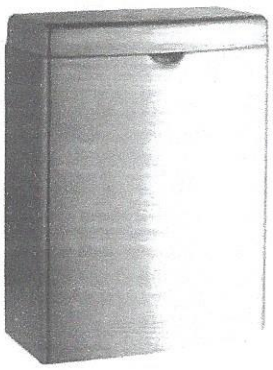
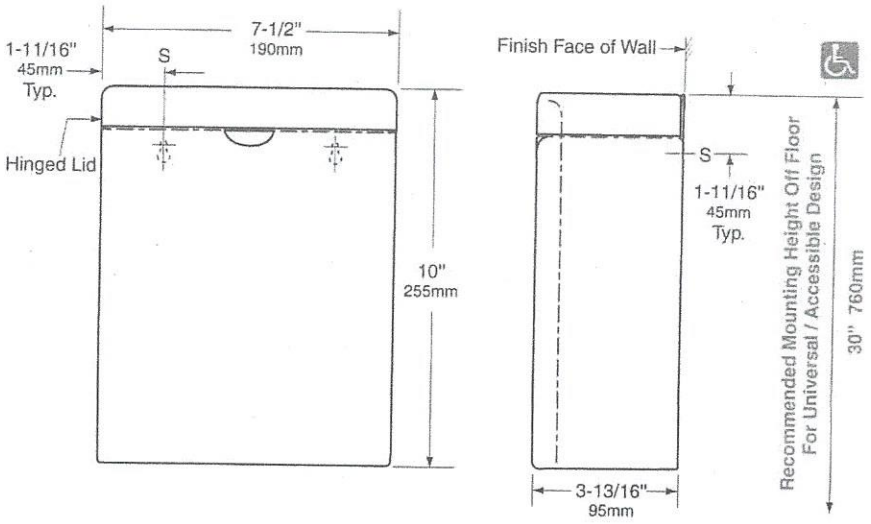
BOBRICK

Technical Data

ConturaSeries® SURFACE-MOUNTED SANITARY NAPKIN DISPOSAL

B-270





MATERIALS:

Container — 18-8, type-304, 22-gauge (0.8mm) stainless steel. All-welded construction. Exposed surfaces have satin finish. Integral finger depression for opening cover. Front of container has same degree of arc as front of cover and other Bobrick ConturaSeries washroom accessories. Radius on side edges of container match corners and edges of cover and other ConturaSeries accessories.

Cover — 18-8, type-304, 22-gauge (0.8mm) stainless steel with satin finish. Drawn, one-piece, seamless construction. Front of cover has same degree of arc as front of container and other Bobrick Contura Series washroom accessories. Radius on corners and edges of cover match side edges of container and other Contura Series accessories. Secured to container with a full-length stainless steel piano-hinge.

OPERATION:

Cover flips up for disposal of sanitary napkins and for servicing container.

INSTALLATION:

For partitions with particle-board or other solid core, secure with two #8 x 3/4" (4.2 x 19mm) sheet-metal screws (not furnished) at all points indicated by an *S*, or provide through-bolts, nuts, and washers.

For hollow-core metal partitions, provide solid backing into which sheet-metal screws can be secured. If two units are installed back-to-back, then provide threaded sleeves and machine screws for the full thickness of partition.

For masonry walls, provide fiber plugs or expansion shields for use with sheet-metal screws, or provide 3/16" (5mm) toggle bolts or expansion bolts.

For plaster or dry wall construction, provide concealed backing to comply with local building codes, then secure unit with sheet-metal screws.

SPECIFICATION:

Surface-mounted sanitary napkin disposal shall be type-304 stainless steel with all-welded construction; exposed surfaces shall have satin finish. Front of sanitary napkin disposal shall have same degree of arc and match other Bobrick ConturaSeries accessories in the washroom. Radius on corners and edges of sanitary napkin disposal shall complement other Bobrick ConturaSeries washroom accessories. Cover shall be drawn, one-piece, seamless construction and secured to container with a full-length stainless steel piano-hinge. Container shall have integral finger depression for opening cover.

Surface-Mounted Sanitary Napkin Disposal shall be Model B-270 of Bobrick Washroom Equipment, Inc., Clifton Park, New York; Jackson, Tennessee; Los Angeles, California; Bobrick Washroom Equipment Company, Scarborough, Ontario; Bobrick Washroom Equipment Pty. Ltd., Australia; and Bobrick Washroom Equipment Limited, United Kingdom.

The illustrations and descriptions herein are applicable to production as of the date of this Technical Data Sheet.
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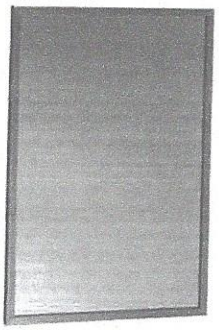
BOBRICK

Technical Data

MIRROR WITH STAINLESS STEEL CHANNEL FRAME

B-165 SERIES

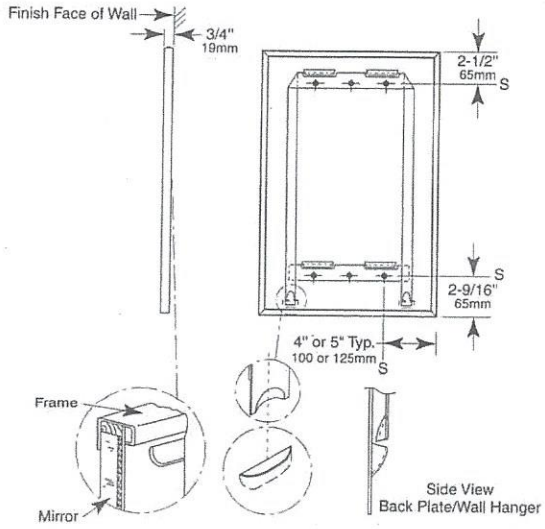


Designer's Notes:

1. Special-order sizes available on request.
2. Maximum size mirror available, 96" x 72" (244 x 183cm); minimum size, 12" x 12" (30 x 30cm).
3. All Bobrick framed mirrors are manufactured to overall width and height dimensions. EXAMPLE: A 24" x 36" (61 x 91cm) mirror will be furnished 24" x 36" (61 x 91cm) outside-of-frame to outside-of-frame.
4. To specify special sizes use Series Number followed by width x height in inches. EXAMPLE: B-165 2024 20" x 24" (51 x. 61cm)
5. Bobrick framed mirrors are manufactured to a tolerance 1/8" (3.2mm).
6. For sufficient space to lift mirror onto wall hanger(s), provide 1" (25mm) minimum clearance above top of mirror frame.
7. Provide 1" (25mm) minimum clearance at bottom of mirror for unlocking mirror from wall and 1/2" (12.7mm) minimum clearance on each side.

Snap Locking Design (Rear View)

Figure: 1

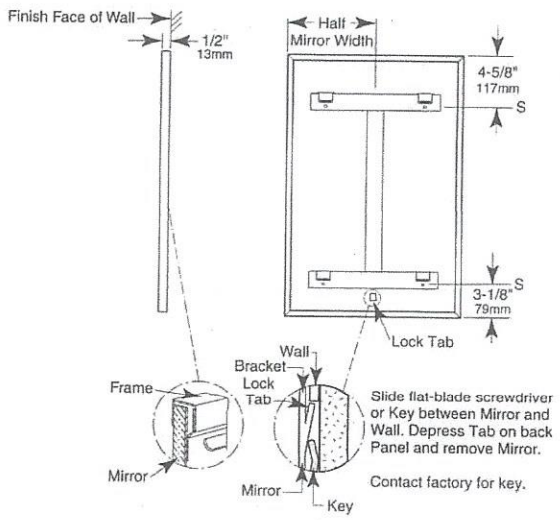


STANDARD B-165 SERIES MIRRORS

MODEL NO.	OVERALL SIZE W	H
B-165 1824	18" (46cm)	24" (61cm)
B-165 1830	18" (46cm)	30" (76cm)
B-165 1836	18" (46cm)	36" (91cm)
B-165 2430	24" (61cm)	30" (76cm)
B-165 2436	24" (61cm)	36" (91cm)
B-165 2448	24" (61cm)	48" (122cm)
B-165 2460	24" (61cm)	60" (152cm)

Lock Tab Design (Rear View)

Figure: 2



STANDARD B-165 SERIES MIRRORS

MODEL NO.	OVERALL SIZE W	H
B-165 4836	48" (122cm)	36" (91cm)

All Other Size Mirrors

Note: Mirrors greater than 30" in width will have multiple hanger brackets with a typical 8" off each edge.

Width	Hanger Pockets
Up to 30" (76cm)	1
Over 30" up to 72" (76 to 183cm)	2
Over 72" up to 96" (183 to 274cm)	3

continued . . .

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MATERIALS:

Frame — Type-430 stainless steel, 1/2" x 1/2" x 3/8" (13 x 13 x 9.5mm) channel with 1/4" (6mm) return at rear for Snap Locking Design; 1/2" x 1/2" x 1/2" (13 x 13 x 13mm) channel for Lock Tab Design, with bright polished finish. One piece frame with 90 degree mitered corners. Galvanized steel back has integral horizontal hanging brackets near the top for hanging the mirror and near the bottom to prevent the bottom of the mirror from pulling away from the wall. Locking devices secure mirror to concealed wall hanger.

Mirror — No. 1 quality, 1/4" (6mm) select float glass: selected for silvering, electrolytically copper-plated by the galvanic process, and guaranteed for 15 years against silver spoilage. Back is protected by full-size, shock-absorbing, water-resistant, nonabrasive, polyethylene padding.

Concealed Wall Hanger — 16 gauge cold roll steel construction. Incorporates upper and lower support members, which engage backplate louvers to keep mirror against wall.

INSTALLATION:

Mount wall hanger on wall with screws (not furnished) at points indicated by an *S*. For plaster or dry wall construction, provide backing to comply with local building codes, then secure wall hanger with screws (not furnished). When providing a concealed backing, allow backing to cover minimum range of mounting hole locations shown on drawing. For other wall surfaces, provide fiber plugs or expansion shields for use with screws (not furnished), or provide 1/8" (3mm) toggle bolts or expansion bolts. Hang mirror on wall hanger with all four backplate louvers engaged behind horizontal wall hanger members. To do this, mirror must be centered in front of the wall hanger horizontally, pressed flat against the wall approximately 1" (25mm) above final position and then lowered into final position.

Snap Locking Design — Locking devices automatically secure mirror to concealed wall hanger when it is lowered into final position (see figure 3). Locking devices may be unlocked by inserting two flat blade screwdrivers behind each side of mirror near the bottom or under the bottom of the mirror and pulling mirror bottom forward and then up.

Lock Tab Design — Locking devices automatically secure mirror to concealed wall hanger when it is lowered into final position (see figure 4). Locking device may be unlocked by sliding a flat-blade screwdriver or Key between mirror and wall at center of mirror and depressing tab on back panel. If key is required, please contact the factory.

Snap Locking Design
(Front View)

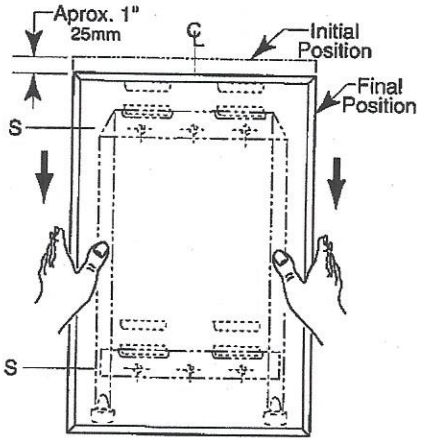

Figure: 3

Lock Tab Design - Up to 30" Width
(Front View)

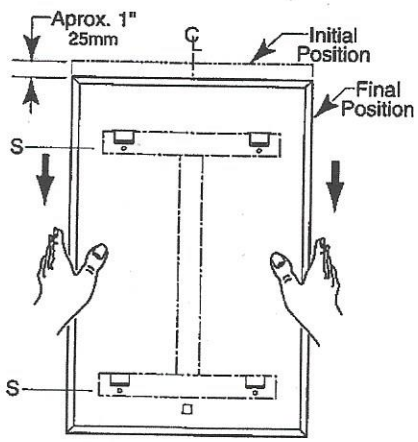

Figure: 4

SPECIFICATION:

Mirror shall have a one-piece type-430 stainless steel channel frame, with 90° mitered corners; all exposed surfaces shall have bright polished finish. Select float glass mirror shall be guaranteed for 15 years against silver spoilage. The back shall be protected by full-size, shock-absorbing, water-resistant, nonabrasive, polyethylene padding. Galvanized steel back shall have integral horizontal hanging brackets located at top and bottom for mounting on concealed wall hanger to prevent the mirror from pulling away from the wall. Locking devices secure mirror to concealed wall hanger. Mirror shall be removable from the wall.

Framed Mirror shall be Model B-165 _____ (insert width and height) of Bobrick Washroom Equipment, Inc., Clifton Park, New York; Jackson, Tennessee; Los Angeles, California; Bobrick Washroom Equipment Company, Scarborough, Ontario; Bobrick Washroom Equipment Pty. Ltd., Australia; and Bobrick Washroom Equipment Limited, United Kingdom.

The illustrations and descriptions herein are applicable to production as of the date of this Technical Data Sheet.
The manufacturer reserves the right to, and does from time to time, make changes and improvements in designs and dimensions.

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SECTION 22 11 13 - FACILITY WATER DISTRIBUTION PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes water-distribution piping and related components outside the building for water service.

B. Utility-furnished products include water meters that will be furnished to the site, ready for installation.

1.3 DEFINITIONS

A. LLDPE: Linear, low-density polyethylene plastic.
B. PA: Polyamide (nylon) plastic.
C. PE: Polyethylene plastic.
D. PP: Polypropylene plastic.
E. PVC: Polyvinyl chloride plastic.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.
B. Shop Drawings: Detail precast concrete vault assemblies and indicate dimensions, method of field assembly, and components.

    1. Wiring Diagrams: Power, signal, and control wiring for alarms.

C. Coordination Drawings: For piping and specialties including relation to other services in same area, drawn to scale. Show piping and specialty sizes and valves, meter and specialty locations, and elevations.
D. Field quality-control test reports.
E. Operation and Maintenance Data: For water valves and specialties to include in emergency, operation, and maintenance manuals.

1.5 QUALITY ASSURANCE

A. Regulatory Requirements:

1. Comply with requirements of utility company supplying water. Include tapping of water mains and backflow prevention.
2. Comply with standards of authorities having jurisdiction for potable-water-service piping, including materials, installation, testing, and disinfection.
3. Comply with standards of authorities having jurisdiction for fire-suppression water-service piping, including materials, hose threads, installation, and testing.

B. Piping materials shall bear label, stamp, or other markings of specified testing agency.
C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
D. Comply with ASTM F 645 for selection, design, and installation of thermoplastic water piping.
E. Comply with FMG's "Approval Guide" or UL's "Fire Protection Equipment Directory" for fire-service-main products.
F. NFPA Compliance: Comply with NFPA 24 for materials, installations, tests, flushing, and valve and hydrant supervision for fire-service-main piping for fire suppression.
G. NSF Compliance:

1. Comply with NSF 14 for plastic potable-water-service piping.
2. Comply with NSF 61 for materials for water-service piping and specialties for domestic water.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Preparation for Transport: Prepare valves, including fire hydrants, according to the following:

1. Ensure that valves are dry and internally protected against rust and corrosion.
2. Protect valves against damage to threaded ends and flange faces.
3. 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. Support off the ground or pavement in watertight enclosures when outdoor storage is necessary.

C. Handling: Use sling to handle valves and fire hydrants if size requires handling by crane or lift. Rig valves to avoid damage to exposed 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 stored piping from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor when storing inside.
F. Protect flanges, fittings, and specialties from moisture and dirt.
G. Store plastic piping protected from direct sunlight. Support to prevent sagging and bending.

1.7 PROJECT CONDITIONS

A. Interruption of Existing Water-Distribution Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary water-distribution service according to requirements indicated:

1. Notify Owner no fewer than two days in advance of proposed interruption of service.
2. Do not proceed with interruption of water-distribution service without Owner's written permission.

1.8 COORDINATION

A. Coordinate connection to water main with utility company. Contractor is responsible for all meter, tap, capacity, or associated fees.

PART 2 - PRODUCTS

2.1 COPPER TUBE AND FITTINGS

A. Soft Copper Tube: ASTM B 88, Type K and ASTM B 88, Type L, water tube, annealed temper.

1. Copper, Solder-Joint Fittings: ASME B16.18, cast-copper-alloy or ASME B16.22, wrought-copper, solder-joint pressure type. Furnish only wrought-copper fittings if indicated.
2. Copper, Pressure-Seal Fittings:
   a. Manufacturers: Subject to compliance with requirements, provide products by the following:

      1) Viega; Plumbing & Heating Systems.

   b. NPS 2 and Smaller: Wrought-copper fitting with EPDM O-ring seal in each end.
   c. NPS 2-1/2 to NPS 4: Bronze fitting with stainless-steel grip ring and EPDM O-ring seal in each end.

B. Hard Copper Tube: ASTM B 88, Type K and ASTM B 88, Type L, water tube, drawn temper.

1. Copper, Solder-Joint Fittings: ASME B16.18, cast-copper-alloy or ASME B16.22, wrought-copper, solder-joint pressure type. Furnish only wrought-copper fittings if indicated.
2. Copper, Pressure-Seal Fittings:

    a. NPS 2 and Smaller: Wrought-copper fitting with EPDM O-ring seal in each end.
    b. NPS 2-1/2 to NPS 4: Bronze fitting with stainless-steel grip ring and EPDM O-ring seal in each end.

C. Bronze Flanges: ASME B16.24, Class 150, with solder-joint end. Furnish Class 300 flanges if required to match piping.
D. Copper Unions: MSS SP-123, cast-copper-alloy, hexagonal-stock body with ball-and-socket, metal-to-metal seating surfaces, and solder-joint or threaded ends.

2.2 DUCTILE-IRON PIPE AND FITTINGS

A. Mechanical-Joint, Ductile-Iron Pipe: AWWA C151, with mechanical-joint bell and plain spigot end unless grooved or flanged ends are indicated.

1. Mechanical-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.
2. Glands, Gaskets, and Bolts: AWWA C111, ductile- or gray-iron glands, rubber gaskets, and steel bolts.

B. Push-on-Joint, Ductile-Iron Pipe: AWWA C151, with push-on-joint bell and plain spigot end unless grooved or flanged ends are indicated.

1. Push-on-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.
2. Gaskets: AWWA C111, rubber.

C. Grooved-Joint, Ductile-Iron Pipe: AWWA C151, with cut, rounded-grooved ends.

1. Grooved-End, Ductile-Iron Pipe Appurtenances:

    a. Grooved-End, Ductile-Iron Fittings: ASTM A 47/A 47M, malleable-iron castings or ASTM A 536, ductile-iron castings with dimensions matching pipe.
    b. Grooved-End, Ductile-Iron-Piping Couplings: AWWA C606, for ductile-iron-pipe dimensions. Include ferrous housing sections, gasket suitable for water, and bolts and nuts.

D. Flanges: ASME 16.1, Class 125, cast iron.

2.3 PVC PIPE AND FITTINGS

A. PVC, Schedule 40 Pipe: ASTM D 1785.

1. PVC, Schedule 40 Socket Fittings: ASTM D 2466.

B. PVC, Schedule 80 Pipe: ASTM D 1785.

1. PVC, Schedule 80 Socket Fittings: ASTM D 2467.
2. PVC, Schedule 80 Threaded Fittings: ASTM D 2464.

C. PVC, AWWA Pipe: AWWA C900, Class 150, with bell end with gasket, and with spigot end.
1. Comply with UL 1285 for fire-service mains if indicated.
2. PVC Fabricated Fittings: AWWA C900, Class 150, with bell-and-spigot or double-bell ends. Include elastomeric gasket in each bell.
3. PVC Molded Fittings: AWWA C907, Class 150, with bell-and-spigot or double-bell ends. Include elastomeric gasket in each bell.
4. Push-on-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.
   a. Gaskets: AWWA C111, rubber.
5. Mechanical-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.
   a. Glands, Gaskets, and Bolts: AWWA C111, ductile- or gray-iron glands, rubber gaskets, and steel bolts.

2.4 JOINING MATERIALS

A. Refer to Division 22 Section "Common Work Results for Plumbing" for commonly used joining materials.
B. Brazing Filler Metals: AWS A5.8, BCuP Series.
C. Bonding Adhesive for Fiberglass Piping: As recommended by fiberglass piping manufacturer.
D. Plastic Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.

2.5 GATE VALVES

A. AWWA, Cast-Iron Gate Valves:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

   a. American AVK Co.; Valves & Fittings Div.
   b. American Cast Iron Pipe Co.; American Flow Control Div.
   c. American Cast Iron Pipe Co.; Waterous Co. Subsidiary.
   d. Crane Co.; Crane Valve Group; Stockham Div.
   e. East Jordan Iron Works, Inc.
   f. McWane, Inc.; Clow Valve Co. Div. (Oskaloosa).
   g. McWane, Inc.; Kennedy Valve Div.
   h. McWane, Inc.; M & H Valve Company Div.
   i. McWane, Inc.; Tyler Pipe Div.; Utilities Div.

j. Mueller Co.; Water Products Div.
k. NIBCO INC.
l. U.S. Pipe and Foundry Company.

2. Nonrising-Stem, Resilient-Seated Gate Valves:

a. Description: Gray- or ductile-iron body and bonnet; with bronze or gray- or ductile-iron gate, resilient seats, bronze stem, and stem nut.

1) Standard: AWWA C509.
2) Minimum Pressure Rating: 200 psig.
3) End Connections: Mechanical joint.
4) Interior Coating: Complying with AWWA C550.

3. OS&Y, Rising-Stem, Resilient-Seated Gate Valves:

a. Description: Cast- or ductile-iron body and bonnet, with bronze or gray- or ductile-iron gate, resilient seats, and bronze stem.

1) Standard: AWWA C509.
2) Minimum Pressure Rating: 200 psig.
3) End Connections: Flanged.

B. UL/FMG, Cast-Iron Gate Valves:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. American Cast Iron Pipe Co.; American Flow Control Div.
b. American Cast Iron Pipe Co.; Waterous Co. Subsidiary.
c. Crane Co.; Crane Valve Group; Stockham Div.
d. McWane, Inc.; Clow Valve Co. Div. (Oskaloosa).
e. McWane, Inc.; Kennedy Valve Div.
f. McWane, Inc.; M & H Valve Company Div.
g. Mueller Co.; Water Products Div.
h. NIBCO INC.
i. U.S. Pipe and Foundry Company.

2. UL/FMG, Nonrising-Stem Gate Valves:

a. Description: Iron body and bonnet with flange for indicator post, bronze seating material, and inside screw.

1) Standards: UL 262 and FMG approved.
2) Minimum Pressure Rating: 175 psig.
3) End Connections: Flanged.

3. OS&Y, Rising-Stem Gate Valves:

a. Description: Iron body and bonnet and bronze seating material.

1) Standards: UL 262 and FMG approved.
2) Minimum Pressure Rating: 175 psig.
3) End Connections: Flanged.

C. Bronze Gate Valves:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Crane Co.; Crane Valve Group; Crane Valves.
b. Crane Co.; Crane Valve Group; Jenkins Valves.
c. Crane Co.; Crane Valve Group; Stockham Div.
d. Hammond Valve.
e. Milwaukee Valve Company.
f. NIBCO INC.
g. Red-White Valve Corporation.

2. OS&Y, Rising-Stem Gate Valves:

a. Description: Bronze body and bonnet and bronze stem.

1) Standards: UL 262 and FMG approved.
2) Minimum Pressure Rating: 175 psig.
3) End Connections: Threaded.

3. Nonrising-Stem Gate Valves:

a. Description: Class 125, Type 1, bronze with solid wedge, threaded ends, and malleable-iron handwheel.

1) Standard: MSS SP-80.

2.6 GATE VALVE ACCESSORIES AND SPECIALTIES

A. Valve Boxes: Comply with AWWA M44 for cast-iron valve boxes. Include top section, adjustable extension of length required for depth of burial of valve, plug with lettering "WATER," and bottom section with base that fits over valve and with a barrel approximately 5 inches in diameter.

1. Operating Wrenches: Steel, tee-handle with one pointed end, stem of length to operate deepest buried valve, and socket matching valve operating nut.

2.7 WATER METERS

A. Water meters will be furnished by the contractor.

2.8 BACKFLOW PREVENTERS

A. Reduced-Pressure-Principle Backflow Preventers:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

    a. Ames Fire & Waterworks; a division of Watts Regulator Co.
    b. Conbraco Industries, Inc.
    c. FEBCO; SPX Valves & Controls.
    d. Flomatic Corporation.
    e. Watts Water Technologies, Inc.
    f. Wilkins; a Zurn company.

2. Standard: AWWA C511.
3. Operation: Continuous-pressure applications.
4. Pressure Loss: 12 psig maximum, through middle 1/3 of flow range.
5. Sizes: See plan.
6. Design Flow Rate: 250 gpm/50 gpm
7. Body: Bronze for NPS 2 and smaller; cast iron with interior lining complying with AWWA C550 or that is FDA approved for NPS 2-1/2 and larger.
8. End Connections: Threaded for NPS 2 and smaller; flanged for NPS 2-1/2 and larger.
9. Configuration: Designed for horizontal, straight through flow.
10. Accessories:

    a. Valves: Ball type with threaded ends on inlet and outlet of NPS 2 and smaller; OS&Y gate type with flanged ends on inlet and outlet of NPS 2-1/2 and larger.
    b. Air-Gap Fitting: ASME A112.1.2, matching backflow preventer connection.

B. Backflow Preventer Test Kits:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

    a. Conbraco Industries, Inc.
    b. FEBCO; SPX Valves & Controls.
    c. Flomatic Corporation.
    d. Watts Water Technologies, Inc.
    e. Wilkins; a Zurn company.

2. Description: Factory calibrated, with gages, fittings, hoses, and carrying case with test-procedure instructions.

2.9 PROTECTIVE ENCLOSURES

A. Freeze-Protection Enclosures:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

    a. Aqua Shield.
    b. BF Products, Inc.
    c. DekoRRa Products.
    d. Dunco Manufacturing, Inc.
    e. G&C Enclosures.
    f. Hot Box, Inc.
    g. HydroCowl, Inc.
    h. Watts Water Technologies, Inc.

2. Description: Insulated enclosure designed to protect aboveground water piping, equipment, or specialties from freezing and damage, with heat source to maintain minimum internal temperature of 40 deg F when external temperatures reach as low as minus 34 deg F.

    a. Standard: ASSE 1060.
    b. Class I: For equipment or devices other than pressure or atmospheric vacuum breakers.
    c. Class I-V: For pressure or atmospheric vacuum breaker equipment or devices. Include drain opening in housing.

        1) Housing: Reinforced-aluminum or fiberglass construction.

            a) Size: Of dimensions indicated, but not less than those required for access and service of protected unit.
            b) Drain opening for units with drain connection.
            c) Access doors with locking devices.
            d) Insulation inside housing.
            e) Anchoring devices for attaching housing to concrete base.

        2) Electric heating cable or heater with self-limiting temperature control.

B. Enclosure Bases:

1. Description: 4-inch minimum thickness precast concrete, of dimensions required to extend at least 6 inches beyond edges of enclosure housings. Include openings for piping.

2.10 FIRE HYDRANTS

A. General: Fire Hydrant type shall be as noted on drawings.Manufacturer and model shall be approved by the utility company and local fire department.

PART 3 - EXECUTION

3.1 EARTHWORK

A. Refer to Division 31 Section "Earth Moving" for excavating, trenching, and backfilling.

3.2 PIPING APPLICATIONS

A. General: Use pipe, fittings, and joining methods for piping systems according to the following applications.
B. Transition couplings and special fittings with pressure ratings at least equal to piping pressure rating may be used, unless otherwise indicated.
C. Do not use flanges or unions for underground piping.
D. Flanges, unions, grooved-end-pipe couplings, and special fittings may be used, instead of joints indicated, on aboveground piping and piping in vaults.

E. Underground water-service piping NPS 3/4 to NPS 3 shall be any of the following:

1. Soft copper tube, ASTM B 88, Type K or ASTM B 88, Type L; wrought-copper, solder-joint fittings; and brazed joints.
2. PVC, Schedule 40 pipe; PVC, Schedule 40 socket fittings; and solvent-cemented joints.

F. Aboveground and Vault Water-Service Piping NPS 3/4 to NPS 3shall be any of the following:

1. Hard copper tube, ASTM B 88, Type K or ASTM B 88, Type L; wrought-copper, solder-joint fittings; and brazed joints.
2. PVC, Schedule 80 pipe; PVC, Schedule 80 socket fittings; and solvent-cemented joints.

3.3 VALVE APPLICATIONS

A. General Application: Use mechanical-joint-end valves for NPS 3 and larger underground installation. Use threaded- or flanged-end valves for installation in vaults. Use UL/FMG, nonrising-stem gate valves for installation with indicator posts. Use corporation valves and curb valves with ends compatible with piping, for NPS 2 and smaller installation.
B. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:

1. Underground Valves, NPS 3 and Larger: AWWA, cast-iron, nonrising-stem, metal, resilient, high-pressure, resilient-seated gate valves with valve box.
2. Underground Valves, NPS 4 and Larger, for Indicator Posts: UL/FMG, cast-iron, nonrising-stem gate valves with indicator post.
3. Use the following for valves in vaults and aboveground:

a. Gate Valves, NPS 2 and Smaller: Bronze, [nonrising] [rising] stem.

b. Gate Valves, NPS 3 and Larger: [AWWA, cast iron, OS&Y rising stem, metal seated] [AWWA, cast iron, OS&Y rising stem, resilient seated] [UL/FMG, cast iron, OS&Y rising stem].

3.4 PIPING SYSTEMS - COMMON REQUIREMENTS

A. See Division 22 Section "Common Work Results for Plumbing" for piping-system common requirements.

3.5 PIPING INSTALLATION

A. Water-Main Connection: Arrange with utility company for tap of size and in location indicated in water main.

B. Install PE pipe according to ASTM D 2774 and ASTM F 645.
C. Install PVC, AWWA pipe according to ASTM F 645 and AWWA M23.

D. Bury piping with depth of cover over top at least 36 inches, with top at least 12 inches below level of maximum frost penetration, and according to the following:

1. Under Driveways: With at least 36 inches cover over top.
2. In Loose Gravelly Soil and Rock: With at least 12 inches additional cover.

E. Install piping by tunneling or jacking, or combination of both, under streets and other obstructions that cannot be disturbed.
F. Extend water-service piping and connect to water-supply source and building-water-piping systems at outside face of building wall in locations and pipe sizes indicated.

1. Terminate water-service piping at building wall until building-water-piping systems are installed. Terminate piping with caps, plugs, or flanges as required for piping material. Make connections to building-water-piping systems when those systems are installed.

G. Sleeves are specified in Division 22 Section "Sleeves and Sleeve Seals for Plumbing Piping."
H. Mechanical sleeve seals are specified in Division 22 Section "Sleeves and Sleeve Seals for Plumbing Piping."

I. Install underground piping with restrained joints at horizontal and vertical changes in direction. Use restrained-joint piping, thrust blocks, anchors, tie-rods and clamps, and other supports.
J. See Division 22 Section "Domestic Water Piping" for potable-water piping inside the building.

3.6 JOINT CONSTRUCTION

A. See Division 22 Section "Common Work Results for Plumbing" for basic piping joint construction.

B. Make pipe joints according to the following:

1. Copper-Tubing, Pressure-Sealed Joints: Use proprietary crimping tool and procedure recommended by copper, pressure-seal-fitting manufacturer.
2. Ductile-Iron Piping, Gasketed Joints for Water-Service Piping: AWWA C600 and AWWA M41.
3. Ductile-Iron Piping, Gasketed Joints for Fire-Service-Main Piping: UL 194.
4. Ductile-Iron Piping, Grooved Joints: Cut-groove pipe. Assemble joints with grooved-end, ductile-iron-piping couplings, gaskets, lubricant, and bolts according to coupling manufacturer's written instructions.
5. PE Piping Insert-Fitting Joints: Use plastic insert fittings and fasteners according to fitting manufacturer's written instructions.
6. PVC Piping Gasketed Joints: Use joining materials according to AWWA C900. Construct joints with elastomeric seals and lubricant according to ASTM D 2774 or ASTM D 3139 and pipe manufacturer's written instructions.

3.7 ANCHORAGE INSTALLATION

A. Anchorage, General: Install water-distribution piping with restrained joints. Anchorages and restrained-joint types that may be used include the following:

1. Concrete thrust blocks.
2. Locking mechanical joints.
3. Set-screw mechanical retainer glands.
4. Bolted flanged joints.
5. Heat-fused joints.
6. Pipe clamps and tie rods.

B. Install anchorages for tees, plugs and caps, bends, crosses, valves, and hydrant branches. Include anchorages for the following piping systems:

1. Gasketed-Joint, Ductile-Iron, Water-Service Piping: According to AWWA C600.
2. Gasketed-Joint, PVC Water-Service Piping: According to AWWA M23.

C. Apply full coat of asphalt or other acceptable corrosion-resistant material to surfaces of installed ferrous anchorage devices.

3.8 VALVE INSTALLATION

A. AWWA Gate Valves: Comply with AWWA C600 and AWWA M44. Install each underground valve with stem pointing up and with valve box.
B. AWWA Valves Other Than Gate Valves: Comply with AWWA C600 and AWWA M44.
C. UL/FMG, Gate Valves: Comply with NFPA 24. Install each underground valve and valves in vaults with stem pointing up and with vertical cast-iron indicator post.
D. UL/FMG, Valves Other Than Gate Valves: Comply with NFPA 24.

3.9 BACKFLOW PREVENTER INSTALLATION

A. Install backflow preventers of type, size, and capacity indicated. Include valves and test cocks. Install according to requirements of plumbing and health department and authorities having jurisdiction.
B. Do not install backflow preventers that have relief drain in vault or in other spaces subject to flooding.
C. Do not install bypass piping around backflow preventers.

D. Support NPS 2-1/2 and larger backflow preventers, valves, and piping near floor and on brick or concrete piers.

3.10 CONCRETE VAULT INSTALLATION

A. Install precast concrete vaults according to ASTM C 891.

3.11 PROTECTIVE ENCLOSURE INSTALLATION

A. Install concrete base level and with top approximately 2 inches above grade.
B. Install protective enclosure over valves and equipment.
C. Anchor protective enclosure to concrete base.

3.12 CONNECTIONS

A. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
B. See Division 22 Section "Common Work Results for Plumbing" for piping connections to valves and equipment.
C. Connect water-distribution piping to downstream end of meter assembly installed by Town of Dallas Water Department.
D. Connect water-distribution piping to interior domestic water piping.
E. Ground equipment according to Division 26 Section "Grounding and Bonding for Electrical Systems."
F. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

3.13 FIELD QUALITY CONTROL

A. Piping Tests: Conduct piping tests before joints are covered and after concrete thrust blocks have hardened sufficiently. Fill pipeline 24 hours before testing and apply test pressure to stabilize system. Use only potable water.

3.14 FIELD QUALITY CONTROL

A. Piping Tests: Each segregated section of pipeline shall be slowly filled with water ensuring that all air is expelled. Extreme care must be taken to ensure that all air is expelled from the pipeline during the filling of pipe with water. The line shall stand full of water for 24 hours prior to testing to allow all air to escape. If necessary, tap the water for 24 hours prior to testing to allow all air to escape. If necessary, tape the main at points of highest elevation so that air can be expelled as the pipe is filled with water. After successful completion of filling and air expulsion, but prior to testing, the corporation stops shall be removed and the taps tightly plugged. Use only potable water.

B. Pressure & Leakage Testing:

1. The contractor shall provide hydrostatic testing of the water line according to AWWA 600-17 and AWWA 605-13. An inspector from the Town of Dallas shall be present at the time of testing. The contractor is responsible for furnish all equipment and supplies needed for the testing and coordinating the time with the inspector.
2. A leakage test shall be conducted concurrently with the pressure test. Leakage is defined as the quantity of the water measured as make-up water (volumetrically in a container or meter) that must be supplied into the newly laid pipeline to maintain pressure within 5psi of the test pressure after the air in the pipeline has been expelled and the pipe filled with water.
3. No pipeline installation shall be accepted by the Authority and/or Engineer if the leakage is greater than:

$$L=\frac{SD\,(P)\,\frac{1}{2}}{148{,}000}$$

Where L is the allowable leakage in gallons per hour, S equals the length of pipe in feet, D is the nominal pipe diameter in inches, and P is the test pressure in psig.

5. Should any test disclose damaged or defective materials or leakage greater that that permitted, the Contractor shall at his own expense, locate and repair and/or replace defective materials. The tests shall be repeated until the leakage is within the permitted allowance and is satisfactory to the Authority and/or Engineer.

C. Prepare reports of testing activities. Provide reports to Engineer and Town of Dallas.

3.15 IDENTIFICATION

A. Install continuous underground detectable warning tape during backfilling of trench for underground water-distribution piping. Locate below finished grade, directly over piping. Underground warning tapes are specified in Division 31 Section "Earth Moving."
B. Permanently attach equipment nameplate or marker indicating plastic water-service piping, on main electrical meter panel. See Division 22 Section "Common Work Results for Plumbing" for identifying devices.

3.16 CLEANING

A. Clean and disinfect water-distribution piping as follows:

1. Purge new water-distribution piping systems and parts of existing systems that have been altered, extended, or repaired before use.
2. Use purging and disinfecting procedure prescribed by authorities having jurisdiction or, if method is not prescribed by authorities having jurisdiction, use procedure described in NFPA 24 for flushing of piping. Flush piping system with clean, potable water until dirty water does not appear at points of outlet.
3. Use purging and disinfecting procedure prescribed by authorities having jurisdiction or, if method is not prescribed by authorities having jurisdiction, use procedure described in AWWA C651 or do as follows:

    a. Fill system or part of system with water/chlorine solution containing at least 50 ppm of chlorine; isolate and allow to stand for 24 hours.
    b. Drain system or part of system of previous solution and refill with water/chlorine solution containing at least 200 ppm of chlorine; isolate and allow to stand for 3 hours.
    c. After standing time, flush system with clean, potable water until no chlorine remains in water coming from system.
    d. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedure if biological examination shows evidence of contamination.

B. The Contractor shall submit bacteriological samples to a state approved lab following the water main disinfection. If the main fails to meet the bacteriological standards purity, the Contractor shall repeat disinfecting and flushing procedure. Contractor to submit Lab reports to the Town of Dallas and the Engineer.
C. The Contractor shall contact the local sewer department to arrange for disposal of the heavily chlorinated water to the sanitary sewer. If a sanitary sewer system is unavailable for disposal of the chlorinated water, an alternative disposal site must be selected.
D. The proposed alternative disposal site to which the chlorinated water is to be discharged shall be inspected and approved by the Engineer. A reducing agent shall be applied to the chlorinated water to be wasted to completely neutralize the chlorine residual remaining in the water. (See Table for neutralizing chemicals.) Where necessary, federal, state and local regulatory agencies should be contacted to determine special provisions for the disposal of heavily chlorinated water.

Pounds of Chemicals Required to Neutralize Various Residual Chlorine Concentrations in 1,000,000 Gallons of water				
Residual Chlorine Concentration (mg/l)	Sulfur Dioxide Bisulfate (SO2)	Sodium Sulfite (NaHSO3)	Sodium Thiosulfate (NaSO3)	Sodium (Na2S2O3.5H20)
1	0.8	1.2	1.4	1.2
2	1.7	2.5	2.9	2.4
10	8.3	12.5	14.6	12.0
50	41.7	62.6	73.0	60.0

E. Prepare reports of purging and disinfecting activities.

END OF SECTION 221113

END OF SECTION 22 11 13

SECTION 22 13 13 - FACILITY SANITARY SEWERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Pipe and fittings.
2. Nonpressure and pressure couplings.
3. Cleanouts.
4. Ductile.

1.3 DEFINITIONS

1.4 SUBMITTALS

A. Field quality-control reports.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Do not store plastic manholes, pipe, and fittings in direct sunlight.
B. Protect pipe, pipe fittings, and seals from dirt and damage.

1.6 PROJECT CONDITIONS

A. Interruption of Existing Sanitary Sewerage Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:

1. Notify Owner no fewer than two days in advance of proposed interruption of service.
2. Do not proceed with interruption of service without Owner's written permission.

PART 2 - PRODUCTS

2.1 HUB-AND-SPIGOT, CAST-IRON SOIL PIPE AND FITTINGS

A. Pipe and Fittings: ASTM A 74, Service class.
B. Gaskets: ASTM C 564, rubber.
C. Calking Materials: ASTM B 29, pure lead and oakum or hemp fiber.

2.2 DUCTILE-IRON, GRAVITY SEWER PIPE AND FITTINGS

A. Pipe: ASTM A 746, for push-on joints.

B. Standard Fittings: AWWA C110, ductile or gray iron, for push-on joints.

C. Compact Fittings: AWWA C153, ductile iron, for push-on joints.
D. Gaskets: AWWA C111, rubber.

2.3 PVC PIPE AND FITTINGS

A. PVC Cellular-Core Sewer Piping:

1. Pipe: ASTM F 891, Sewer and Drain Series, PS 50 minimum stiffness, PVC cellular-core pipe with plain ends for solvent-cemented joints.
2. Fittings: ASTM D 3034, SDR 35, PVC socket-type fittings.

B. PVC Profile Sewer Piping:

1. Pipe: ASTM F 794, PVC profile, gravity sewer pipe with bell-and-spigot ends for gasketed joints.
2. Fittings: ASTM D 3034, PVC with bell ends.
3. Gaskets: ASTM F 477, elastomeric seals.

A. PVC Type PSM Sewer Piping:

1. Pipe: ASTM D 3034, SDR 35 PVC Type PSM sewer pipe with bell-and-spigot ends for gasketed joints.
2. Fittings: ASTM D 3034, PVC with bell ends.
3. Gaskets: ASTM F 477, elastomeric seals.

B. PVC Water-Service Piping:

1. Pipe: ASTM D 1785, Schedule 40 and Schedule 80 PVC, with plain ends for solvent-cemented joints.
2. Fittings: ASTM D 2466, Schedule 40 and ASTM D 2467, Schedule 80 PVC, socket type.

2.4 NONPRESSURE-TYPE TRANSITION COUPLINGS

A. Comply with ASTM C 1173, elastomeric, sleeve-type, reducing or transition coupling, for joining underground nonpressure piping. Include ends of same sizes as piping to be joined and corrosion-resistant-metal tension band and tightening mechanism on each end.

B. Sleeve Materials:

1. For Cast-Iron Soil Pipes: ASTM C 564, rubber.
2. For Concrete Pipes: ASTM C 443, rubber.
3. For Fiberglass Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
4. For Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
5. For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.

C. Unshielded, Flexible Couplings:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Dallas Specialty & Mfg. Co.
b. Fernco Inc.
c. Logan Clay Pipe.
d. Mission Rubber Company; a division of MCP Industries, Inc.
e. NDS.
f. Plastic Oddities; a division of Diverse Corporate Technologies, Inc.

2. Description: Elastomeric sleeve with stainless-steel shear ring and corrosion-resistant-metal tension band and tightening mechanism on each end.

2.5 EXPANSION JOINTS AND DEFLECTION FITTINGS

A. Ductile-Iron, Flexible Expansion Joints:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. EBAA Iron, Inc.
b. Romac Industries, Inc.
c. Star Pipe Products.

2. Description: Compound fitting with combination of flanged and mechanical-joint ends complying with AWWA C110 or AWWA C153. Include two gasketed ball-joint sections and one or more gasketed sleeve sections, rated for 250-psig minimum working pressure and for offset and expansion indicated.

2.6 CLEANOUTS

A. Cast-Iron Cleanouts:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

   a. Josam Company.
   b. MIFAB, Inc.
   c. Smith, Jay R. Mfg. Co.
   d. Tyler Pipe.
   e. Watts Water Technologies, Inc.
   f. Zurn Specification Drainage Operation; Zurn Plumbing Products Group.

2. Description: ASME A112.36.2M, round, gray-iron housing with clamping device and round, secured, scoriated, gray-iron cover. Include gray-iron ferrule with inside calk or spigot connection and countersunk, tapered-thread, brass closure plug.
3. Top-Loading Classification(s): Light Duty and Heavy Duty.
4. Sewer Pipe Fitting and Riser to Cleanout: ASTM A 74, Service class, cast-iron soil pipe and fittings.

B. PVC Cleanouts:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

   a. Canplas LLC.
   b. IPS Corporation.
   c. NDS.
   d. Plastic Oddities; a division of Diverse Corporate Technologies, Inc.
   e. Sioux Chief Manufacturing Company, Inc.
   f. Zurn Light Commercial Products Operation; Zurn Plumbing Products Group.

2. Description: PVC body with PVC threaded plug. Include PVC sewer pipe fitting and riser to cleanout of same material as sewer piping.

PART 3 - EXECUTION

3.1 EARTHWORK

A. Excavating, trenching, and backfilling are specified in Division 31 Section "Earth Moving."

3.2 PIPING INSTALLATION

A. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground sanitary sewer piping. Location and arrangement of piping layout

take into account design considerations. Install piping as indicated, to extent practical. Where specific installation is not indicated, follow piping manufacturer's written instructions.

B. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for using lubricants, cements, and other installation requirements.

C. Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.

D. When installing pipe under streets or other obstructions that cannot be disturbed, use pipe-jacking process of microtunneling.

E. Install gravity-flow, nonpressure, drainage piping according to the following:

1. Install piping pitched down in direction of flow, at minimum slope of 1.04 percent unless otherwise indicated.
2. Install piping with 36-inch minimum cover.
3. Install hub-and-spigot, cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook."
4. Install ductile-iron, gravity sewer piping according to ASTM A 746.
5. Install PVC cellular-core sewer piping according to ASTM D 2321 and ASTM F 1668.
6. Install PVC corrugated sewer piping according to ASTM D 2321 and ASTM F 1668.
7. Install PVC profile sewer piping according to ASTM D 2321 and ASTM F 1668.
8. Install PVC Type PSM sewer piping according to ASTM D 2321 and ASTM F 1668.
9. Install PVC gravity sewer piping according to ASTM D 2321 and ASTM F 1668.

F. Clear interior of piping and manholes of dirt and superfluous material as work progresses. Maintain swab or drag in piping, and pull past each joint as it is completed. Place plug in end of incomplete piping at end of day and when work stops.

3.3 PIPE JOINT CONSTRUCTION

A. Join gravity-flow, nonpressure, drainage piping according to the following:

1. Join hub-and-spigot, cast-iron soil piping with gasket joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for compression joints.
2. Join hub-and-spigot, cast-iron soil piping with calked joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for lead and oakum calked joints.
3. Join ductile-iron, gravity sewer piping according to AWWA C600 for push-on joints.
4. Join PVC cellular-core sewer piping according to ASTM D 2321 and ASTM F 891 for solvent-cemented joints.
5. Join PVC corrugated sewer piping according to ASTM D 2321.
6. Join PVC profile sewer piping according to ASTM D 2321 for elastomeric-seal joints or ASTM F 794 for gasketed joints.
7. Join PVC Type PSM sewer piping according to ASTM D 2321 and ASTM D 3034 for elastomeric-seal joints or ASTM D 3034 for elastomeric-gasket joints.
8. Join PVC gravity sewer piping according to ASTM D 2321 and ASTM D 3034 for elastomeric-seal joints or ASTM D 3034 for elastomeric-gasket joints.

9. Join dissimilar pipe materials with nonpressure-type, flexible couplings.

B. Pipe couplings, expansion joints, and deflection fittings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.

1. Use nonpressure flexible couplings where required to join gravity-flow, nonpressure sewer piping unless otherwise indicated.

a. Unshielded flexible couplings for pipes of same or slightly different OD.
b. Unshielded, increaser/reducer-pattern, flexible couplings for pipes with different OD.
c. Ring-type flexible couplings for piping of different sizes where annular space between smaller piping's OD and larger piping's ID permits installation.

2. Use pressure pipe couplings for force-main joints.

3.4 CLEANOUT INSTALLATION

A. Install cleanouts and riser extensions from sewer pipes to cleanouts at grade. Use cast-iron soil pipe fittings in sewer pipes at branches for cleanouts, and use cast-iron soil pipe for riser extensions to cleanouts. Install piping so cleanouts open in direction of flow in sewer pipe.

1. Use Light-Duty, top-loading classification cleanouts in earth or unpaved foot-traffic areas.
2. Use Heavy-Duty, top-loading classification cleanouts in vehicle-traffic service areas.

B. Set cleanout frames and covers in earth in cast-in-place-concrete block, 12 by 12 by 8 inches deep. Set with tops 1 inch above surrounding grade.
C. Set cleanout frames and covers in concrete pavement and roads with tops flush with pavement surface.

3.5 CONNECTIONS

A. Connect nonpressure, gravity-flow drainage piping to building's sanitary building drains specified in Division 22 Section "Sanitary Waste and Vent Piping."
B. Make connections to existing piping and underground manholes.

1. Use commercially manufactured wye fittings for piping branch connections. Remove section of existing pipe, install wye fitting into existing piping, and encase entire wye fitting plus 6-inch overlap with not less than 6 inches of concrete with 28-day compressive strength of 3000 psi.
2. Make branch connections from side into existing piping, NPS 4 to NPS 20. Remove section of existing pipe, install wye fitting into existing piping, and encase entire wye with not less than 6 inches of concrete with 28-day compressive strength of 3000 psi.
3. Make branch connections from side into existing piping, NPS 21 or larger, or to underground manholes by cutting opening into existing unit large enough to allow 3 inches of concrete to be packed around entering connection. Cut end of connection pipe

passing through pipe or structure wall to conform to shape of and be flush with inside wall unless otherwise indicated. On outside of pipe or manhole wall, encase entering connection in 6 inches of concrete for minimum length of 12 inches to provide additional support of collar from connection to undisturbed ground.

a. Use concrete that will attain a minimum 28-day compressive strength of 3000 psi unless otherwise indicated.
b. Use epoxy-bonding compound as interface between new and existing concrete and piping materials.

4. Protect existing piping and manholes to prevent concrete or debris from entering while making tap connections. Remove debris or other extraneous material that may accumulate.

3.6 IDENTIFICATION

A. Materials and their installation are specified in Division 31 Section "Earth Moving." Arrange for installation of green warning tapes directly over piping and at outside edges of underground manholes.

1. Use warning tape or detectable warning tape over ferrous piping.
2. Use detectable warning tape over nonferrous piping and over edges of underground manholes.

3.7 FIELD QUALITY CONTROL

A. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place, and again at completion of Project.

1. Submit separate report for each system inspection.
2. Defects requiring correction include the following:

a. Alignment: Less than full diameter of inside of pipe is visible between structures.
b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.
c. Damage: Crushed, broken, cracked, or otherwise damaged piping.
d. Infiltration: Water leakage into piping.
e. Exfiltration: Water leakage from or around piping.

3. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.
4. Reinspect and repeat procedure until results are satisfactory.

B. Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.

1. Do not enclose, cover, or put into service before inspection and approval.
2. Test completed piping systems according to requirements of authorities having jurisdiction.

3. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours' advance notice.
4. Submit separate report for each test.
5. Hydrostatic Tests: Test sanitary sewerage according to requirements of authorities having jurisdiction and the following:

    a. Fill sewer piping with water. Test with pressure of at least 10-foot head of water, and maintain such pressure without leakage for at least 15 minutes.
    b. Close openings in system and fill with water.
    c. Purge air and refill with water.
    d. Disconnect water supply.
    e. Test and inspect joints for leaks.

6. Air Tests: Test sanitary sewerage according to requirements of authorities having jurisdiction, UNI-B-6, and the following:

    a. Option: Test plastic gravity sewer piping according to ASTM F 1417.
    b. Option: Test concrete gravity sewer piping according to ASTM C 924.

C. Leaks and loss in test pressure constitute defects that must be repaired.
D. Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.

3.8 CLEANING

A. Clean dirt and superfluous material from interior of piping. Flush with potable water.

END OF SECTION 22 13 13

31 10 00 - SITE CLEARING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Protecting existing vegetation to remain.
2. Removing existing vegetation.
3. Clearing and grubbing.
4. Removing above- and below-grade site improvements.
5. Disconnecting, capping or sealing, removing site utilities, abandoning site utilities in place.
6. Temporary erosion and sedimentation control.
7. Proper removal of noted manmade structures.

B. Related Requirements:

1. Section 024119 "Selective Clearing" for selective features.

1.3 DEFINITIONS

A. Subsoil: Soil beneath the level of subgrade; soil beneath the topsoil layers of a naturally occurring soil profile, typified by less than 1 percent organic matter and few soil organisms.

B. Surface Soil: Soil that is present at the top layer of the existing soil profile. In undisturbed areas, surface soil is typically called "topsoil," but in previously disturbed areas such as urban environments, the surface soil can be subsoil.

C. Topsoil: Top layer of the soil profile consisting of existing surface topsoil or existing in-place surface soil; the zone where plant roots grow. Also known as “root zone material.”

D. Plant-Protection Zone: Area surrounding individual trees, groups of trees, shrubs, or other vegetation to be protected during construction and indicated on Drawings.

E. Tree-Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction and as indicated on Drawings.

F. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

1.4 MATERIAL OWNERSHIP

A. Except for materials indicated to be stockpiled or otherwise remain Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.

1.5 INFORMATIONAL SUBMITTALS

A. Existing Conditions: Documentation of existing trees and plantings, adjoining construction, and site improvements that establishes preconstruction conditions that might be misconstrued as damage caused by site clearing.

1. Use sufficiently detailed photographs or video recordings.
2. Include plans and notations to indicate specific wounds and damage conditions of each tree or other plant designated to remain.

1.6 FIELD CONDITIONS

A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.

B. Improvements on Adjoining Property: Authority for performing site clearing indicated on property adjoining Owner's property will be obtained by Owner before award of Contract.

1. Do not proceed with work on adjoining property until directed by Architect.

C. Salvageable Improvements: Carefully remove items indicated to be salvaged and store on Owner's premises where indicated.

D. Utility Locator Service: Notify North Carolina 811 for area where Project is located before site clearing. Private locates also required.

E. Do not commence site clearing operations until temporary erosion- and sedimentation-control and plant-protection measures are in place, commensurate with tasks desired.

F. Tree- and Plant-Protection Zones: Protect according to requirements in Section 015639 "Temporary Tree and Plant Protection."

G. Soil Stripping, Handling, and Stockpiling: Perform only when the soil is dry or slightly moist.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect and maintain benchmarks and survey control points from disturbance during construction.

B. Verify that trees, shrubs, and other vegetation to remain or to be relocated have been flagged and that protection zones have been identified and enclosed according to requirements in Section 015639 "Temporary Tree and Plant Protection."

C. Protect existing site improvements to remain from damage during construction.

1. Restore damaged improvements to their original condition, as acceptable to Owner.

3.2 TEMPORARY EROSION AND SEDIMENTATION CONTROL

A. Provide temporary erosion- and sedimentation-control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings and requirements of authorities having jurisdiction.

B. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.

C. Inspect, maintain, and repair erosion- and sedimentation-control measures during construction until permanent vegetation has been established.

D. Remove erosion and sedimentation controls, and restore and stabilize areas disturbed during removal.

3.3 TREE AND PLANT PROTECTION

A. Protect trees and plants remaining on-site according to requirements in Section 015639 "Temporary Tree and Plant Protection."

B. Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations according to requirements in Section 015639 "Temporary Tree and Plant Protection."

C. Clearly mark Buffer Zone boundary. No activity to take place in these areas. Errant trash or debris, including limbs and vegetation, removed during clearing to be disposed of properly, not in buffer.

3.4 EXISTING UTILITIES

A. Interrupting Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others, unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:

1. Notify Owner not less than two days in advance of proposed utility interruptions.
2. Do not proceed with utility interruptions without Owner's written permission.

B. Excavate for and remove underground utilities indicated to be removed.

3.5 CLEARING AND GRUBBING

A. Remove obstructions, trees, shrubs, and other vegetation to permit installation of new construction.

1. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.
2. Grind down stumps and remove roots larger than 2 inches in diameter, obstructions, and debris to a depth of 18 inches below exposed subgrade (as applicable). Obviously in areas where elevation will change, stumps and roots are to be removed.
3. Use only hand methods or air spade for grubbing within protection zones.

4. Chip removed tree branches and dispose of off-site.

B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.

1. Place fill material in horizontal layers not exceeding a loose depth of 8 inches, and compact each layer to a density equal to adjacent original ground.

3.6 TOPSOIL STRIPPING

A. Remove sod and grass before stripping topsoil.

B. Strip topsoil to depth of up to 6 inches in a manner to prevent intermingling with underlying subsoil or other waste materials.

1. Remove subsoil and non-soil materials from topsoil, including clay lumps, gravel, and other objects larger than 2 inches in diameter; trash, debris, weeds, roots, and other waste materials. This may require screening.

C. Stockpile topsoil from edge of excavations without intermixing with subsoil or other materials. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust and erosion by water.

1. Limit height of topsoil stockpiles to reasonable preapproved sizes and location.
2. Do not stockpile topsoil within protection zones.
3. Dispose of surplus topsoil. Surplus topsoil is that which exceeds quantity indicated to be stockpiled or reused. This is only to be done near end of grading operation.
4. Stockpile surplus topsoil to allow for respreading deeper topsoil.

3.7 SITE IMPROVEMENTS

A. Remove existing above- and below-grade improvements as indicated and necessary to facilitate new construction.
B. Remove slabs, paving, curbs, gutters, and aggregate base as indicated.

3.8 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property. Maintain records.

A. Burning of tree, shrub, vegetation, and other waste and debris is prohibited without permission of Owner and City permit. The contractor shall make arrangements to legally dispose of them off Owner's property. Maintain records.

B. Separate recyclable materials produced during site clearing from other non-recyclable materials. Store or stockpile without intermixing with other materials, and transport them to recycling facilities. Do not interfere with other Project work.

END OF SECTION 31 10 00

31 20 00 - EARTH MOVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Subbase course for concrete walks and pavements.
2. Subbase course and base course for asphalt paving.
3. Excavating and backfilling trenches for utilities and pits for buried utility structures.
4. Excavating for removal of existing utilities.

B. Related Requirements:

1. Section 311000 "Site Clearing" for site stripping, grubbing, stripping topsoil, and removal of above- and below-grade improvements and utilities.
2. Section 312319 "Dewatering" for lowering and disposing of ground water during construction.
3. Section 329200 "Turf and Grasses" for finish grading in turf and grass areas, including preparing and placing planting soil for turf areas.

1.3 UNIT PRICES

A. Rock Measurement: Volume of rock to be removed, measured in original position, but not to exceed the following: Note: Unit prices for rock excavation include replacement with approved materials. No payment will be made for unsuitable material excavation removed prior to measurement by the owner or his representative.

1. 24 inches outside of concrete forms other than at footings.
2. 12 inches outside of concrete forms at footings.
3. 6 inches outside of minimum required dimensions of concrete cast against grade.
4. Outside dimensions of concrete walls indicated to be cast against rock without forms or exterior waterproofing treatments.
5. 6 inches beneath bottom of concrete slabs-on-grade.
6. 6 inches beneath pipe in trenches, and the greater of 24 inches wider than pipe or 42 inches wide.

1.4 DEFINITIONS

A. Backfill: Soil material or controlled low-strength material used to fill an excavation.

1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
2. Final Backfill: Backfill placed over initial backfill to fill a trench.

B. Base Course: Aggregate layer placed between the subbase course and hot-mix asphalt paving.
C. Bedding Course: Aggregate layer placed over the excavated subgrade in a trench before laying pipe.
D. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.

E. Drainage Course: Aggregate layer supporting the slab-on-grade that also minimizes upward capillary flow of pore water.
F. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.

1. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Designer. Unauthorized excavation, as well as remedial work directed by Designer, shall be without additional compensation.
2. Excavation, trench, or otherwise expressly called out shall be unclassified.
3. Trench rock, mass rock, unsuitable material (as determined by the designer) are excluded and shall be paid by unit price and 3rd party confirmed quantity.

G. Fill: Soil materials used to raise existing grades.

H. Rock: Rock material in beds, ledges, unstratified masses, conglomerate deposits, and boulders of rock material that exceed 1 cu. yd. for bulk excavation or 3/4 cu. yd. for footing, trench, and pit excavation that cannot be removed by rock-excavating equipment equivalent to the following in size and performance ratings, without systematic drilling, ram hammering, ripping, or blasting, when permitted:

1. Equipment for Footing, Trench, and Pit Excavation: Late-model, track-mounted hydraulic excavator; equipped with a 42-inch-maximum-width, short-tip-radius rock bucket; rated at not less than 138-hp flywheel power with bucket-curling force of not less than 28,700 lbf and stick-crowd force of not less than 18,400 lbf with extra-long reach boom.
2. Equipment for Bulk Excavation: Late-model, track-mounted loader; rated at not less than 230-hp flywheel power and developing a minimum of 47,992-lbf breakout force with a general-purpose bare bucket.

I. Rock: Rock material in beds, ledges, un-stratified masses, conglomerate deposits, and boulders of rock material 3/4 cu. yd. or more in volume that exceed a standard penetration resistance of 100 blows/2 inches when tested by a geotechnical testing agency, according to ASTM D 1586.
J. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.
K. Subbase Course: Aggregate layer placed between the subgrade and base course for hot-mix asphalt pavement, or aggregate layer placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.
L. Subgrade: Uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase, drainage fill, drainage course, or topsoil materials.

M. Utilities: On-site underground pipes, conduits, ducts, and cables as well as underground services within buildings.

1.5 PREINSTALLATION MEETINGS

A. Pre-installation Conference: Conduct pre-excavation conference at Project site.

1. Review methods and procedures related to earthmoving, including, but not limited to, the following:

a. Personnel and equipment needed to make progress and avoid delays.
b. Coordination of Work with utility locator service.
c. Coordination of Work and equipment movement with the locations of tree- and plant-protection zones.
d. Extent of trenching by hand or with air spade.
e. Field quality control.

1.6 ACTION SUBMITTALS

A. Product Data: For each type of the following manufactured products required:

1. Geogrid.
2. Warning tapes (all types – literature and sample)

B. Samples for Verification: For the following products, in sizes indicated below:

1. Geogrid: 12 by 12 inches.
2. Warning Tape: 12 inches long; of each color.

1.7 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified testing agency.

B. Material Test Reports: For each on-site soil material proposed for fill and backfill as follows. Coordinated by Contractor and scheduled with Owner, 3rd party Geotech who shall submit to Designer with recommendations.

1. Classification according to ASTM D 2487.
2. Laboratory compaction curve according to ASTM D 698.

C. Pre-excavation Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including finish surfaces that might be misconstrued as damage caused by earth-moving operations. Submit before earth moving begins.

1.8 QUALITY ASSURANCE

A. Geogrid Testing Agency Qualifications: Qualified according to ASTM E 329 and ASTM D 3740 for testing indicated.

1.9 FIELD CONDITIONS

A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during earth-moving operations.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.

B. Improvements on Adjoining Property: Authority for performing earth moving indicated on property adjoining Owner's property will be obtained by Owner before award of Contract.

1. Do not proceed with work on adjoining property until directed by Designer.

C. Utility Locator Service: Notify "Call Before You Dig" "One Call" for area where Project is located before beginning earth-moving operations. Private locater service is responsibility of Contractor.

D. Do not commence earth-moving operations until temporary site fencing and erosion- and sedimentation-control measures specified in Section 015000 "Temporary Facilities and Controls" and Section 311000 "Site Clearing" are in place.

E. The following practices are prohibited within protection zones:

1. Storage of construction materials, debris, or excavated material.
2. Parking vehicles or equipment.
3. Foot traffic.
4. Erection of sheds or structures.
5. Impoundment of water.
6. Excavation or other digging unless otherwise indicated.
7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.

F. Do not direct vehicle or equipment exhaust towards protection zones.

G. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations. ALSO Contractor to be thoroughly familiar with Geotech report, including assessment of onsite soils and to be familiar with local practices relating to decision when to use marginal local material, as well as techniques and engineered enhancements.

B. Satisfactory Soils: Soil Classification Groups GW, GP, GM, SW, SP, and SM according to ASTM D 2487, or a combination of these groups; free of rock or gravel larger than 3 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.

1. Liquid Limit: 50.
2. Plasticity Index: 20.

C. Unsatisfactory Soils*: Soil Classification Groups GC, SC, CL, ML, OL, CH, MH, OH, and PT according to ASTM D 2487, or a combination of these groups. (*Some of these soils may be considered marginal or seasonably acceptable depending on factors determined by the geotech, i.e. moisture.)

1. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.

D. Subbase Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940/D 2940M; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve.

E. Base Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 294/D 2940M 0; with at least 95 percent passing a 1-1/2-inch sieve and not more than 8 percent passing a No. 200 sieve.

F. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940/D 2940M; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve.

G. Bedding Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940/D 2940M; except with 100 percent passing a 1-inch sieve and not more than 8 percent passing a No. 200 sieve.

H. Drainage Course: Narrowly graded mixture of washed crushed stone, or crushed or uncrushed gravel; ASTM D 448; coarse-aggregate grading Size 57; with 100 percent passing a 1-1/2-inch sieve and zero to 5 percent passing a No. 8 sieve.

I. Filter Material: Narrowly graded mixture of natural or crushed gravel, or crushed stone and natural sand; ASTM D 448; coarse-aggregate grading Size 67; with 100 percent passing a 1-inch sieve and zero to 5 percent passing a No. 4 sieve.

J. Sand: ASTM C 33/C 33M; fine aggregate.

K. Impervious Fill: Clayey gravel and sand mixture capable of compacting to a dense state.

2.2 GEOGRID

A. Subsurface Geogrid: Integrally formed biaxial geogrid, manufactured for base reinforcement and subgrade improvement applications, made from polypropylene; complying with ASTM D4759-02 and the following, measured per test methods referenced:

1. Index Properties:
   a. Aperture Dimensions: 1”.
   b. Minimum Rib Thickness: 0.03”.
   c. Tensile Strength @ 2% Strain: 280 lbf; ASTM D6637-01.
   d. Tensile Strength @ 5% Strain: 580 lbf; ASTM D6637-01.
   e. Ultimate Tensile Strength: 850 lbf; ASTM D6637-01.

2. Junction Efficiency: 93%; GRI-GG2-05.
3. Flexural Stiffness: 750,000; ASTM D5732-01.
4. Aperture Stability: 0.32 deg.

5. Manufactures shall be:
   a. SYNTEC – Biaxial Geogrid, SBX 11 (Type 1) Minimum Rib Thickness: 0.03".
   b. BaseGrid Geogrids – Biaxial Geogrid, BaseGrid 11
   c. Tensar - Biaxial Geogrid, Tensar BX1200
   d. Or Approved Equal.

2.3 ACCESSORIES

A. Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, 6 inches wide and 4 mils thick. Install continuous inscribed plastic underground warning tape during back-filling of trench for underground utility piping. Locate 8 to 12 inches above the proposed pipe, directly over piping. Warning Tape shall be continuously inscribed with a description of the utility; colored as follows:

1. Red: Electric.
2. Yellow: Gas, oil, steam, and dangerous materials.
3. Orange: Telephone and other communications.
4. Blue: Water systems.
5. Green: Sewer systems.

B. Detectable Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches wide and 4 mils thick. Installed continuously inscribed plastic underground detectable waring tape, with metallic core encased in a protective jacket for corrosion protection. Detectable warning tape shall be detectable by metal detector when tape is buried up to 30 inches deep, install tape during back-filling of trench for underground utility piping. Locate detectable warning tape 24-30 inches below finished grade, directly over piping; colored as follows:

1. Red: Electric.
2. Yellow: Gas, oil, steam, and dangerous materials.
3. Orange: Telephone and other communications.
4. Blue: Water systems.
5. Green: Sewer systems.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth-moving operations.
B. Protect and maintain erosion and sedimentation controls during earth-moving operations.
C. Protect subgrades and foundation soils from freezing temperatures and frost. Remove temporary protection before placing subsequent materials.

3.2 DEWATERING

A. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.

B. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.

1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.

3.3 EXPLOSIVES

A. Explosives: **Do Not Use Explosives**.
B. Explosives: Obtain written permission from Owner and authorities having jurisdiction before bringing explosives to Project site or using explosives on Project site.

1. Perform blasting without damaging adjacent structures, property, or site improvements.
2. Perform blasting without weakening the bearing capacity of rock subgrade and with the least-practicable disturbance to rock to remain.

3.4 EXCAVATION, GENERAL

A. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered *(see 3.4B). Unclassified excavated materials may include ripable rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for ripable rock excavation or removal of obstructions.
B. Classified Excavation: There is Classified Excavation for mass rock, trench rock, and unsuitable soils.

3.5 EXCAVATION FOR STRUCTURES

A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch. If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.

1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.
2. Pile Foundations: Stop excavations 6 to 12 inches above bottom of pile cap before piles are placed. After piles have been driven, remove loose and displaced material. Excavate to final grade, leaving solid base to receive concrete pile caps.
3. Excavation for Underground Tanks, Basins, and Mechanical or Electrical Utility Structures: Excavate to elevations and dimensions indicated within a tolerance of plus or minus 1 inch. Do not disturb bottom of excavations intended as bearing surfaces.

B. Excavations at Edges of Tree- and Plant-Protection Zones:

1. Excavate by hand or with an air spade to indicated lines, cross sections, elevations, and subgrades. If excavating by hand, use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tear, or pulls roots.
2. Cut (use a saw and cut cleanly) and protect roots (recover with soil).

3.6 EXCAVATION FOR WALKS AND PAVEMENTS

A. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.

3.7 EXCAVATION FOR UTILITY TRENCHES

A. Excavate trenches to indicated gradients, lines, depths, and elevations.

1. Beyond building perimeter, excavate trenches to allow installation top of pipe below frost line.

B. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit unless otherwise indicated.

1. Clearance: 12 inches each side of pipe or conduit.

C. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.

1. For pipes and conduit less than 6 inches in nominal diameter, hand-excavate trench bottoms and support pipe and conduit on an undisturbed subgrade.
2. For pipes and conduit 6 inches or larger in nominal diameter, shape bottom of trench to support bottom 90 degrees of pipe or conduit circumference. Fill depressions with tamped sand backfill.
3. For flat-bottomed, multiple-duct conduit units, hand-excavate trench bottoms and support conduit on an undisturbed subgrade.
4. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.

D. Trench Bottoms: Excavate trenches 4 inches deeper than bottom of pipe and conduit elevations to allow for bedding course. Hand-excavate deeper for bells of pipe.

1. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.

E. Trenches in Tree- and Plant-Protection Zones:

1. Hand-excavate to indicated lines, cross sections, elevations, and subgrades. Use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.
2. Do not cut main lateral roots or taproots; cut only smaller roots that interfere with installation of utilities.
3. Cut and protect roots.

3.8 SUBGRADE INSPECTION

A. Notify Designer when excavations have reached required subgrade.

B. If Designer determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.

C. Proof-roll subgrade below building and pavements slabs with a pneumatic-tired and loaded 10-wheel, tandem-axle dump truck weighing not less than 15 tons to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.

1. Completely proof-roll subgrade in one direction, repeating proof-rolling in direction perpendicular to first direction. Limit vehicle speed to 3 mph.
2. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Designer, and replace with compacted backfill or fill as directed.

D. Authorized additional excavation and replacement material will be paid for according to Contract provisions for unit prices.

E. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Designer, without additional compensation.

3.9 UNAUTHORIZED EXCAVATION

A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill, with 28-day compressive strength of 2500 psi, may be used when approved by Designer.

1. Fill unauthorized excavations under other construction, pipe, or conduit as directed by Designer.

3.10 STORAGE OF SOIL MATERIALS

A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.

1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.
2. Do not comingle strippings, grubbed and duff material, and excavated material from below the surface.

3.11 BACKFILL

A. Place and compact backfill in excavations promptly, but not before completing the following:

1. Construction below finish grade including, where applicable, subdrainage, dampproofing, waterproofing, and perimeter insulation.
2. Surveying locations of underground utilities for Record Documents.
3. Testing and inspecting underground utilities.
4. Removing concrete formwork.
5. Removing trash and debris.
6. Removing temporary shoring, bracing, and sheeting.
7. Installing permanent or temporary horizontal bracing on horizontally supported walls.

8. Installation of detection and warning tape. If depth of utility is ≤ 48”, a combination detection/warning tape may be used at 30” depth. Otherwise, warning tape at 1’ above top of pipe and detection tape at 30” below surface.

B. Place backfill on subgrades free of mud, frost, snow, or ice.

3.12 UTILITY TRENCH BACKFILL

A. Place backfill on subgrades free of mud, frost, snow, or ice.
B. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.

C. Trenches under Footings: Backfill trenches excavated under footings and within 18 inches of bottom of footings with satisfactory soil; fill with concrete to elevation of bottom of footings. Concrete is specified in Section 033000 "Cast-in-Place Concrete."
D. Trenches under Roadways: Provide 4-inch- thick, concrete-base slab support for piping or conduit less than 30 inches below surface of roadways. After installing and testing, completely encase piping or conduit in a minimum of 4 inches of concrete before backfilling or placing roadway subbase course. Concrete is specified in Section 033000 "Cast-in-Place Concrete."
E. Backfill voids with satisfactory soil while removing shoring and bracing.
F. Initial Backfill:

1. Soil Backfill: Place and compact initial backfill of subbase material, free of particles larger than 1 inch in any dimension, to a height of 12 inches over the pipe or conduit.

   a. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.

2. Controlled Low-Strength Material: Place initial backfill of controlled low-strength material to a height of 12 inches over the pipe or conduit. Coordinate backfilling with utilities testing.

G. Final Backfill:

1. Soil Backfill: Place and compact final backfill of satisfactory soil to final subgrade elevation.
2. Controlled Low-Strength Material: Place final backfill of controlled low-strength material to final subgrade elevation.

H. Warning Tape/Detectable Tape: Install warning tape directly above utilities, 30 (≤ 12”) inches below finished grade, except 6 inches below subgrade under pavements and slabs.

3.13 SOIL FILL

A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.

B. Place and compact fill material in layers to required elevations as follows:

1. Under grass and planted areas, use satisfactory soil material.
2. Under walks and pavements, use satisfactory soil material.
3. Under steps and ramps, use engineered fill.
4. Under building slabs, use engineered fill.
5. Under footings and foundations, use engineered fill.

C. Place soil fill on subgrades free of mud, frost, snow, or ice.

3.14 SOIL MOISTURE CONTROL

A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content.

1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
2. Remove and replace, or scarify and air dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

3.15 COMPACTION OF SOIL BACKFILLS AND FILLS

A. Place backfill and fill soil materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment and not more than 4 inches in loose depth for material compacted by hand-operated tampers.

B. Place backfill and fill soil materials evenly on all sides of structures to required elevations and uniformly along the full length of each structure.

A. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D 698:

1. Under structures, building slabs, steps, and pavements remove and replace existing unsuitable and undocumented fill within the above-mentioned structure footprint. Scarify and recompact all fill in these areas to within 24” of subgrade to 98% Standard Proctor maximum density as determined by ASTM D698. Compact each layer of backfill or fill within the upper 24” to 98% Standard Proctor maximum density as determined by ASTM D698. Verify field density determined by ASTM D1556, with at east one test per 2,000 square feet per layer. Coordinate with Structural Engineer, plan and specifications.
2. Compact aggregate base course material to 100% Standard Proctor .
3. Under walkways, scarify and recompact top 12 inches below subgrade and compact each layer of backfill or fill soil material at 95% Standard Proctor.
4. Under turf or unpaved areas, scarify and recompact top 12 inches below subgrade and compact each layer of backfill or fill soil material at 88% Standard Proctor.
5. For utility trenches, compact each layer of initial and final backfill soil material at 95% Standard Proctor.

3.16 GRADING

A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.

1. Provide a smooth transition between adjacent existing grades and new grades.
2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.

B. Site Rough Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to elevations required to achieve indicated finish elevations, within the following subgrade tolerances:

1. Turf or Unpaved Areas: Plus or minus 1 inch.
2. Walks: Plus or minus 1 inch.
3. Pavements: Plus or minus 1/2 inch.
4. Athletic Fields: Plus or minus 1/2 inch.

C. Grading inside Building Lines: Finish subgrade to a tolerance of 1/2 inch when tested with a 10-foot straightedge.

3.17 SUBBASE AND BASE COURSES UNDER PAVEMENTS AND WALKS

A. Place subbase course and base course on subgrades free of mud, frost, snow, or ice.
B. On prepared subgrade, place subbase course and base course under pavements and walks as follows:

1. Install separation geotextile on prepared subgrade according to manufacturer's written instructions, overlapping sides and ends.
2. Place base course material over subbase course under hot-mix asphalt pavement.
3. Shape subbase course and base course to required crown elevations and cross-slope grades.
4. Place subbase course and base course 6 inches or less in compacted thickness in a single layer.
5. Place subbase course and base course that exceeds 6 inches in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches thick or less than 3 inches thick.
6. Compact subbase course and base course at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D 698.

C. Pavement Shoulders: Place shoulders along edges of subbase course and base course to prevent lateral movement. Construct shoulders, at least 12 inches wide, of satisfactory soil materials and compact simultaneously with each subbase and base layer to not less than 95 percent of maximum dry unit weight according to ASTM D 698.

3.18 DRAINAGE COURSE UNDER CONCRETE SLABS-ON-GRADE

A. Place drainage course on subgrades free of mud, frost, snow, or ice.

B. On prepared subgrade, place and compact drainage course under cast-in-place concrete slabs-on-grade as follows:

1. Install subdrainage geotextile on prepared subgrade according to manufacturer's written instructions, overlapping sides and ends.
2. Place drainage course 6 inches or less in compacted thickness in a single layer.
3. Place drainage course that exceeds 6 inches in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches thick or less than 3 inches thick.
4. Compact each layer of drainage course to required cross sections and thicknesses to not less than 95 percent of maximum dry unit weight according to ASTM D 698.

3.19 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:

1. Determine prior to placement of fill that site has been prepared in compliance with requirements.
2. Determine that fill material classification and maximum lift thickness comply with requirements.
3. Determine, during placement and compaction, that in-place density of compacted fill complies with requirements.

B. Testing Agency: Owner will engage a qualified geotechnical engineering testing agency to perform tests and inspections.

C. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earth moving only after test results for previously completed work comply with requirements.

D. Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2937, and ASTM D 6938, as applicable. Tests will be performed at the following locations and frequencies:

1. Paved and Building Slab Areas: At subgrade and at each compacted fill and backfill layer, at least one test for every 2,000 sq. ft. or less of paved area or building slab but in no case fewer than three tests.
2. Foundation Wall Backfill: At each compacted backfill layer, at least one test for every 100 feet or less of wall length but no fewer than two tests.
3. Trench Backfill: At each compacted initial and final backfill layer, at least one test for every 150 feet or less of trench length but no fewer than two tests.

E. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil materials to depth required; recompact and retest until specified compaction is obtained.

F. As Built all proposed ponds (Storm Water, Water Quality, BMP) and structures for all permanent storm water pond facilities.

1. Field document proposed grading (ground shots/proposed topography) for all ponds to extend beyond top of bank/dam plus 30 LF. Documents shall provide true field conditions of the entire pond and highlighting the top of pond, dam section, bottom of

pond, water volume capacity and completed storm piping/structures according to authorities having jurisdiction.

2. Replace leaking embankments and piping using new materials and repeat testing until leakage is within allowances specified.
3. Field as built record document with ground shots to establish proposed grading/ topography for all permanent ponds including all structures at the pond.
4. Coordinate with Section 33 41 00 “Storm Drainage”, for additional information.
5. As Built: Sealed survey required prior to acceptance indicating vertical and horizontal locations of the entire storm system.

   As Built; Contractor shall provide a field verify record documented conditions of the proposed constructed pond conditions. 'As-Built' Record Document(s). Record Documents shall be signed and sealed by a Professional Registered SC Land Surveyor for the storm system including all permanent storm/water quality ponds (stormwater and water quality systems). 'As-Built' documents shall accurately document the field verified constructed system of the entire system including finish grade ground shots, proposed topography, structures, ancillary structures, pipes, pipe inverts & rims, FES, fittings, material & sizes, stormwater pond/stormwater bmp (pipes and proposed pond grading ie constructed pond), etc. including material and both vertical/horizontal identifications.

   As-Built Document shall be submitted to the Owner/Owners Project Representative for review and Final Approval/Acceptance prior to request for Substantial Completion. If As-Built material is in conflict, represents deficiencies or unacceptable to the Owner and the proposed storm system design. The contractor shall make the field corrections necessary to bring the constructed system in compliance with the Bid Documents per Base Bid requirement. These modifications shall be completed within the time frame of the Base Contract/Substantial Completion schedule.

3.20 PROTECTION

A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.

B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.

   1. Scarify or remove and replace soil material to depth as directed by Designer; reshape and recompact.

C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.

   1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.21 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Remove surplus satisfactory soil and waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property.

B. Transport surplus satisfactory soil to designated storage areas on Owner's property. Stockpile or spread soil as directed by Designer.

1. Remove waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property.

END OF SECTION 31 20 00

31 20 20 – EROSION CONTROL

PART 1 – GENERAL

1.1 Related Documents

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

1.2 Summary

A. This Section includes soil erosion and sedimentation control shall be provided by the Contractor for all areas of the site that are graded or disturbed by any construction operations and elsewhere as indicated on Drawings or specified herein. Erosion control shall be as specified herein and as may be required by actual conditions and governing authorities.

B. The Contractor shall have full responsibility for the construction and maintenance of erosion control and sedimentation control facilities as shown on the Drawings and as specified herein.

C. The Contractor shall provide permanent or temporary ground cover as soon as possible, within 7 working days after disturbing any areas of the site with slopes and not over 14 working days after completion of the rough grading of any specific area. Contractor responsible for monitoring, reporting, and record keeping as dictated by administrative statute relating to erosion control.

D. Related Sections: The following Sections contain requirements that relate to this Section

1. Site Clearing
2. Earth Moving
3. Drainage
4. Turf and Grasses

E. Product Handling

1. Deliver seed, fertilizer, and other packaged materials in unopened original packages with labels legible and intact. Seed packages shall bear a guaranteed analysis by a recognized authority.
2. On-site storage of materials shall be kept to a minimum. Wet or damaged seed or other material shall be removed from the project site immediately.

PART 2 – PRODUCTS

2.1 Materials:

A. Lime:

1. Ground Dolomitic limestone not less than 85% total carbonates and magnesium, ground so that 50% passes 100 mesh sieve and 90% 20 mesh sieve. Coarser material will be acceptable provided the specified rates of application are increased proportionately on the basis of quantities passing No. 100 mesh sieve.

B. Commercial Fertilizer:

1. A complete plant food containing nitrogen, phosphoric acid and potash in percentages as recommended by the State Department of Agriculture based on analysis of topsoil and soil required herein.
2. Conforming to applicable State fertilizer laws; with availability of plant nutrients conforming to standards of A.O.A.C. uniform in composition, dry, free flowing.

C. Superphosphate:
   1. Granular, dry, free flowing normal superphosphate (18-20% P.O.); deliver in original bags.

D. Seed:
   1. Fresh seed guaranteed 95% pure with a minimum germination rate of 85% within one year of test.
   2. P.L.S. (Purity x Germination)/100
   3. Tolerances shall be those tabulated in USDA Bulletin No. 480.
   4. Variety of grass for temporary grassing shall conform to requirements of Section 02930.

E. Mulch:
   1. Threshed straw of oats, wheat, or rye; fee from seed or obnoxious weeds; or clean hay.

F. Matting: Erosion Control Matting:
   1. 70% Straw Fiber (.35 lbs/sq. yrd.) 30% Coconut Fiber (0.15 lbs/sq. yrd.)
   2. Netting on Both Sides - Leno Woven, 100% biodegradable organic jute fiber, Top Side 9.3 lbs./1000 sq. ft. , Bottom Side 7.7 lbs./1000 sq. ft.

3.	Thickness	0.25 in,	ASTM D 6525
4.	Resiliency	86%,	ECTC Guidelines
5.	Water Absorbency	311%,	ASTM D1117
6.	Light Penetration	7.6%,	ASTM D 6567
7.	Tensile Strength (MD)	201.6 lbs/ft,	ASTM D 6818
8.	Elongation (MD)	13.4%,	ASTM D 6818
9.	Tensile Strength (TD)	164.4 lbs/ft,	ASTM D 6818
10.	Elongation (TD)	14.2%,	ASTM D 6818

G. Wire Staples:
   1. 16 gauge, 8" U-shaped steel staples.

H. Gravel for Stone Filters:
   1. Crushed stone so that all stone will pass a 1-1/2" mesh screen and be retained on ¾" mesh screen.

I. Silt Filter:
   1. Engineering fabric should meet the following performance criteria:
      a. Tensile strength of 90 lbs and not more than 50% elongation according to ASTM D 4632.
      b. Mullen burst strength of 190 psi according to ASTM D 3786.
      c. Trapezoidal tear strength of 35 lbs according to ASTM D 4533.
      d. Puncture strength of 55 lbs according to ASTM D 4833.
      e. UV resistance after 500 hours of 70% strength according to ASTM D 4355.
      f. Sieve opening size of 70% (AOS) according to ASTM D 4751.
      g. Permittivity of 2.0 sec-1 according to ASTM D 4491.
      h. Flow rate of 150 gal/min/sf according to ASTM D 4491.
      i. Fabric shall be non woven polypropylene geotextile.

J. Rip Rap:
   1. Provide rip rap of size and class indicated, where indicated on the Drawings and as approved by the Architect.
   2. Rip Rap Apron with Non Woven Geotextile Fabric
      Geotextile Fabric shall meet the following performance criteria:
      a. Fabric shall be approved non woven polypropylene geotextile, per SCDOT.
      b. Elongation (MD & CD) ≥ 50% according to ASTM D 4632.
      c. Grab Strength (MD & CD) 205 lbs. according to ASTM D 4632.
      d. Tear Strength (MD & CD) 80 lbs. according to ASTM D 4533.
      e. Puncture Strength 440 lbs. according to ASTM D 6241.

f. Permittivity of 0.20 sec-1 (MARV dose not apply) according to ASTM D 4491.
g. Apparent Opening Size #60, (US Sieve No. per AASHTO M92) according to ASTM D 4751.
h. UV Stability (Retained Strength, after 500 hours of exposure) 50% according to ASTM D 4355.

PART 3 – EXECUTION

3.1 General:
A. Existing Structures and Facilities:
1. Existing structures, facilities, and water courses shall be protected from sedimentation.
2. The Contractor shall be responsible for the construction of necessary measures, and all costs shall be at the expense of the Contractor.
3. Items to be protected from sedimentation deposits shall include, but are not limited to, all down stream property, natural waterways, streams, lakes and ponds, catch basins, drainage ditches, road gutters, and natural buffer zones.
4. Control measures such as the erection of silt fences, barriers, dams, or other structures shall begin prior to any land disturbing activity. Additional measures shall be constructed as required during the construction.
5. All facilities installed shall be maintained continuously during construction until the disturbed areas are stabilized.
6. Project shall <u>not</u> be final accepted until SCDHEC and/or City of Rock hill has issued a final inspection report indicating site is established <u>AND</u> all measures are thusly removed, and/or made to be in their permanent state.

3.2 Protective Measures:
A. Protective measures shall conform to all State and Local requirements.
B. The following measures are listed as guide for the protection of existing structures and facilities, and shall be included in the Contractor's expense where applicable. Design and construction of the measures shall be in accordance with all applicable laws, codes, ordinances, rules, and regulations.
C. Silt Check Fence:
1. Filter fabric fence shall be a minimum of 32" in width and shall have a minimum of 6 line wires with 12" stay spaces.
2. Woven filter fabric to be used where silt fence is to remain for a period of more than 30 days.
3. Steel posts be 5'-0" in height and be of the self-fastener angle steel type.
4. Prefabricated silt fence is not allowed.
5. Wash Stone shall be used to bury skirt when silt fence is used adjacent to a channel, creek, or pond.
6. Turn silt fence up slope at ends.
7. Fabric use with wire mesh may use 8' center posts.
8. Silt fencing shall comply with details on drawings.
D. Berms and Diversion Ditches: These shall be graded channels with a supporting ridge on the lower side constructed across a sloping land surface. Diversion ditches and berms shall be planted in vegetative cover as soon as completed.
E. Mulching shall be used to prevent erosion and to hold soil and seed in place during the establishment of vegetation. Matting shall be used also where seeding may be easily eroded or disturbed.
F. Matting: Matting shall be used for temporary stabilization during the establishment of seeded cover on areas such as grassed ditches, channels, long slopes, and steep banks.

G. Build Berm, Pits, and Gravel Filter as shown on Drawings. Maintain as long as possible during construction to keep erosion and sedimentation to a minimum. When it is necessary to remove berm, pits, and gravel, return area to required profiles and condition.
H. Temporary Drainage Inlet Protection: provide temporary drainage inlet protection where indicated on Drawings and as approved by the Architect.
I. Other Measures: Other methods of protecting existing structures and facilities, such as vegetative filter strips, diversions, rip-rap, baffle boards, and ditch checks used for reduction of sediment movement and erosion, may be used at the option of the Contractor when approved by the appropriate State or local authorities.

3.3 Stabilization:
A. Permanently protect stabilized areas prior to the removal of protective devices.
B. After the final establishment of permanent stabilization, remove temporary sediment control measures. Re-spread accumulated sediments as specified.
C. Permanently stabilize all areas disturbed by the removal and re-spreading operations immediately.

3.4 Temporary Seeding:
A. Variety of seed, rate of application, and time for use of specific variety shall comply with requirements of Section 02930 and plan detail.
B. Prepare soil by light disking to establish approximate permanent grade.
C. Remove roots, debris, and stones. After rough grading has been completed, and before topsoil is spread, apply soil conditioning materials as follows:

Material	Application Rate (lbs. Per 1000 sq. ft.)
Lime	100 (Apply from October through May)
Fertilizer	20 (10-10-10)
Superphosphate	15

D. Thoroughly scarify ground to a depth of 6". Mix materials thoroughly with rototiller in 2 directions at right angles.
E. Where requested, apply topsoil. Rake topsoil to a uniform grade so that all areas will drain properly. Compact lightly with a cultipacker before distributing grass seed.
F. Sow seed evenly with a mechanical spreader at the rate required for the specific variety in Section 02930. Roll with a cultipacker to cover seed, and water with a fine spray. Method of seeding and rate may be varied at discretion of Contractor on his own responsibility to establish a smooth, uniformly grassed area.

3.5 Mulching And Matting:
A. Apply mulch or matting to retain soil and grass. Coordinate with drawings as required.
B. Mulch areas by spreading a light cover of straw mulch over seeded area at the rate of not less than 85 lbs. per 1000 sq. ft.

END OF SECTION 31 20 20

31 23 19 - DEWATERING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes construction dewatering.
B. Related Requirements:

1. Section 312000 "Earth Moving" for excavating, backfilling, site grading, and controlling surface-water runoff and ponding.

1.3 SUBMITTALS

A. Shop Drawings: For dewatering system, prepared by or under the supervision of a qualified professional engineer.
   1. Show arrangement, locations, and details of wells and well points; locations of risers, headers, filters, pumps, power units, and discharge lines; and means of discharge, control of sediment, and disposal of water.
   2. Include layouts of piezometers and flow-measuring devices for monitoring performance of dewatering system.
   3. Include written plan for dewatering operations including sequence of well and well-point placement coordinated with excavation shoring and bracings and control procedures to be adopted if dewatering problems arise.
B. Delegated-Design Submittal: For dewatering system indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation
C. Qualification Data: For Installer
D. Field quality-control reports.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer that has specialized in design of dewatering systems and dewatering work.
B. Regulatory Requirements: Comply with governing EPA notification regulations before beginning dewatering. Comply with hauling and disposal regulations of authorities having jurisdiction.
C. Preinstallation Conference: Conduct conference at Project site.

   1. Review methods and procedures related to dewatering including, but not limited to, the following:

a. Inspection and discussion of condition of site to be dewatered including coordination with temporary erosion control measures and temporary controls and protections.
b. Geotechnical report.
c. Proposed site clearing and excavations.
d. Existing utilities and subsurface conditions.
e. Coordination for interruption, shutoff, capping, and continuation of utility services.
f. Construction schedule. Verify availability of Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
g. Testing and monitoring of dewatering system.

1.5 FIELD CONDITIONS

A. Project-Site Information: A geotechnical report has been prepared for this Project and is available for information only. The opinions expressed in this report are those of a geotechnical engineer and represent interpretations of subsoil conditions, tests, and results of analyses conducted by a geotechnical engineer. Owner is not responsible for interpretations or conclusions drawn from this data.

1. Make additional test borings and conduct other exploratory operations necessary for dewatering according to the performance requirements.

B. Survey Work: Engage a qualified land surveyor or professional engineer to survey adjacent existing buildings, structures, and site improvements; establish exact elevations at fixed points to act as benchmarks. Clearly identify benchmarks and record existing elevations.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Dewatering Performance: Design, furnish, install, test, operate, monitor, and maintain dewatering system of sufficient scope, size, and capacity to control hydrostatic pressures and to lower, control, remove, and dispose of ground water and permit excavation and construction to proceed on dry, stable subgrades.

1. Design dewatering system, including comprehensive engineering analysis by a qualified professional engineer.
2. Continuously monitor and maintain dewatering operations to ensure erosion control, stability of excavations and constructed slopes, prevention of flooding in excavation, and prevention of damage to subgrades and permanent structures.
3. Prevent surface water from entering excavations by grading, dikes, or other means.
4. Accomplish dewatering without damaging existing buildings, structures, and site improvements adjacent to excavation.
5. Remove dewatering system when no longer required for construction.

B. Regulatory Requirements: Comply with governing EPA notification regulations before beginning dewatering. Comply with water- and debris-disposal regulations of authorities having jurisdiction.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by dewatering operations.

1. Prevent surface water and subsurface or ground water from entering excavations, from ponding on prepared subgrades, and from flooding site or surrounding area.
2. Protect subgrades and foundation soils from softening and damage by rain or water accumulation.

B. Install dewatering system to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.

C. Provide temporary grading to facilitate dewatering and control of surface water.
D. Protect and maintain temporary erosion and sedimentation controls, which are specified in Section 311000 "Site Clearing," Section 3120200 "Erosion Control," during dewatering operations.

3.2 INSTALLATION

A. Install dewatering system utilizing wells, well points, or similar methods complete with pump equipment, standby power and pumps, filter material gradation, valves, appurtenances, water disposal, and surface-water controls.

1. Space well points or wells at intervals required to provide sufficient dewatering.
2. Use filters or other means to prevent pumping of fine sands or silts from the subsurface.

B. Place dewatering system into operation to lower water to specified levels before excavating below ground-water level.
C. Provide sumps, sedimentation tanks, and other flow-control devices as required by authorities having jurisdiction.
D. Provide standby equipment on-site, installed and available for immediate operation, to maintain dewatering on continuous basis if any part of system becomes inadequate or fails.

3.3 OPERATION

A. Operate system continuously until drains, sewers, and structures have been constructed and fill materials have been placed or until dewatering is no longer required.
B. Operate system to lower and control ground water to permit excavation, construction of structures, and placement of fill materials on dry subgrades. Drain water-bearing strata above and below bottom of foundations, drains, sewers, and other excavations.

1. Do not permit open-sump pumping that leads to loss of fines, soil piping, subgrade softening, and slope instability.
2. Reduce hydrostatic head in water-bearing strata below subgrade elevations of foundations, drains, sewers, and other excavations.
3. Maintain piezometric water level a minimum of 24 inches below bottom of excavation.

C. Dispose of water removed by dewatering in a manner that avoids endangering public health, property, and portions of work under construction or completed. Dispose of water and sediment in a manner that avoids inconvenience to others.

D. Remove dewatering system from Project site on completion of dewatering. Plug or fill well holes with sand or cut off and cap wells a minimum of 36 inches below overlying construction.

3.4 FIELD QUALITY CONTROL

A. Observation Wells: Provide observation wells or piezometers, take measurements, and maintain at least the minimum number indicated; additional observation wells may be required by authorities having jurisdiction.

1. Observe and record daily elevation of ground water and piezometric water levels in observation wells.
2. Repair or replace, within 24 hours, observation wells that become inactive, damaged, or destroyed. In areas where observation wells are not functioning properly, suspend construction activities until reliable observations can be made. Add or remove water from observation-well risers to demonstrate that observation wells are functioning properly.
3. Fill observation wells, remove piezometers, and fill holes when dewatering is completed.

B. Survey-Work Benchmarks: Resurvey benchmarks regularly during dewatering and maintain an accurate log of surveyed elevations for comparison with original elevations. Promptly notify Architect if changes in elevations occur or if cracks, sags, or other damage is evident in adjacent construction.

C. Provide continual observation to ensure that subsurface soils are not being removed by the dewatering operation.

3.5 PROTECTION

A. Protect and maintain dewatering system during dewatering operations.

B. Promptly repair damages to adjacent facilities caused by dewatering.

END OF SECTION 31 23 19

32 12 16 - ASPHALT PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Hot-mix asphalt patching.
2. Hot-mix asphalt paving.
3. Hot-mix asphalt overlay.
4. Asphalt traffic-calming devices.
5. Asphalt surface treatments.

B. Related Requirements:

1. Section 024119 "Selective Demolition" for demolition and removal of existing asphalt pavement.
2. Section 312000 "Earth Moving" for subgrade preparation, fill material, unbound-aggregate subbase and base courses, and aggregate pavement shoulders.
3. Section 321373 "Concrete Paving Joint Sealants" for joint sealants and fillers at pavement terminations.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site to comply with requirements of Division 1 Section "Project Management and Coordination" Review methods and procedures related to asphalt paving including, but not limited to, the following:

1. Review proposed sources of paving materials, including capabilities and location of plant that will manufacture hot-mix asphalt (by submittal prior to meeting).
2. Review condition of substrate and preparatory work performed by other trades (proof roll prior to scheduled conference).
3. Review requirements for protecting paving work, including restriction of traffic (and parking) during installation period and for remainder of construction period.
4. Review and finalize construction schedule for paving and related work. Verify availability of materials, paving Installer's personnel, and equipment required to execute the Work without delays.
5. Review inspection and testing requirements, governing regulations, and proposed installation procedures.
6. Review forecasted weather conditions and procedures for coping with unfavorable conditions.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include technical data and tested physical and performance properties.
2. Job-Mix Designs: Certification, by authorities having jurisdiction, of approval of each job mix proposed for the Work.
3. Job-Mix Designs: For each job mix proposed for the Work.
4. Coursing plan (which direction and how asphalt will be applied)

B. Samples for Verification: For the following product, in manufacturer's standard sizes unless otherwise indicated. (where applicable). Previous examples of existing paving as chosen by Benesch may be viewed in place to demonstrate expectation of finished product.

1.5 INFORMATIONAL SUBMITTALS

A. Retain "Material Certificates" Paragraph below to require submittal of material certificates from manufacturers. Retain option if permitting use of recycled materials, which is standard practice.
B. Material Certificates: For each paving material.

C. Material Test Reports: For each paving material, by a qualified testing agency. (PE (NC) reg.)

D. Field quality-control reports.

1.6 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 company experienced in manufacturing hot-mix asphalt similar to that indicated for this Project and with a record of successful in-service performance.

1. Asphalt Plant Certification

a. Plants used for the preparation of bituminous mixtures shall conform to all requirements of NCDOT Standard Specifications.
b. All asphalt plants shall be currently certified by the NC Department of Transportation for preparation of bituminous concrete pavement mixes as specified herein.

C. Testing Agency Qualifications: Demonstrate to Engineer's satisfaction, conforming to ASTM D 3666. The independent testing agency shall have the experience and capability to satisfactorily conduct the testing indicated without delaying the Work.

D. Regulatory Requirements: Conform to applicable standards of authorities having jurisdiction for asphalt paving work on public property.
E. ALL CERTIFICATIONS MUST BE CURRENT!

1.7 FIELD CONDITIONS

A. Environmental Limitations: Do not apply asphalt materials if subgrade is wet or excessively damp, if rain is imminent or expected before time required for adequate cure, or if the following conditions are not met:

1. Prime Coat: Minimum surface temperature of 60 deg F.
2. Tack Coat: Minimum surface temperature of 60 deg F.
3. Slurry Coat: Comply with weather limitations in ASTM D 3910.
4. Asphalt Base Course: Minimum surface temperature of 45 deg F and rising at time of placement.
5. Asphalt Surface Course: Minimum surface temperature of 60 deg F at time of placement.

PART 2 - PRODUCTS

2.1 AGGREGATES

A. General: Use materials and gradations that have performed satisfactorily in previous installations.

B. Coarse Aggregate: ASTM D 692/D 692M, sound; angular crushed stone, crushed gravel, or cured, crushed blast-furnace slag.

C. Fine Aggregate: ASTM D 1073, sharp-edged natural sand or sand prepared from stone, gravel, cured blast-furnace slag, or combinations thereof.

1. For hot-mix asphalt, limit natural sand to a maximum of 20 percent by weight of the total aggregate mass.

D. Mineral Filler: ASTM D 242/D 242M, rock or slag dust, hydraulic cement, or other inert material.

2.2 ASPHALT MATERIALS

A. Asphalt Binder: AASHTO M 320, PG 64-22.

B. Asphalt Cement: ASTM D 3381/D 3381M for viscosity-graded material.

C. Cutback Prime Coat: ASTM D 2027, medium-curing cutback asphalt, MC-30 or MC-70.

D. Emulsified Asphalt Prime Coat: ASTM D 977 emulsified asphalt, or ASTM D 2397 cationic emulsified asphalt, slow setting, diluted in water, of suitable grade and consistency for application.

E. Tack Coat: ASTM D 977 emulsified asphalt, or ASTM D 2397 cationic emulsified asphalt, slow setting, diluted in water, of suitable grade and consistency for application.

F. Fog Seal: 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.

G. Water: Potable.

H. Undersealing Asphalt: ASTM D 3141/D 3141M; pumping consistency.

2.3 AUXILIARY MATERIALS

A. Recycled Materials for Hot-Mix Asphalt Mixes: Reclaimed asphalt pavement; reclaimed, unbound-aggregate base material; and recycled tires from sources and gradations that have performed satisfactorily in previous installations, equal to performance of required hot-mix asphalt paving produced from all new materials.

B. Herbicide: Commercial chemical for weed control, registered by the EPA, and not classified as "restricted use" for locations and conditions of application. Provide in granular, liquid, or wettable powder form.

C. Sand: ASTM D 1073, Grade No. 2 or No. 3.

D. Paving Geotextile: AASHTO M 288 paving fabric; nonwoven polypropylene; resistant to chemical attack, rot, and mildew; and specifically designed for paving applications.

E. Joint Sealant: ASTM D 6690, Type I, hot-applied, single-component, polymer-modified bituminous sealant.
F. GEOGRID – Tensar BX 1200 or equal
G. No more than 20% RAP permitted in mix design without a custom asphalt design based on proposed materials.

2.4 MIXES

A. Hot-Mix Asphalt: Dense-graded, hot-laid, hot-mix asphalt plant mixes approved by authorities having jurisdiction; designed according to procedures in AI MS-2, "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.
2. Surface Course: Comply with SCDOT. Refer to drawings for type.
3. Base Course: Comply with SCDOT. Refer to drawings for type.

B. Emulsified-Asphalt Slurry: ASTM D 3910, Type 1.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that subgrade is dry and in suitable condition to begin paving.

B. Proof-roll subgrade below pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.

1. Completely proof-roll subgrade in one direction, repeating proof-rolling in direction perpendicular to first direction. Limit vehicle speed to 3 mph.
2. Proof roll with a loaded 10-wheel, tandem-axle dump truck weighing not less than 15 tons.
3. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Architect, and replace with compacted backfill, install geogrid, or fill as directed.

3.2 PATCHING

A. Asphalt Pavement: Saw cut perimeter of patch and excavate existing pavement section to sound base. Excavate rectangular or trapezoidal patches, extending 12 inches into perimeter of adjacent sound pavement, unless otherwise indicated. Cut excavation faces vertically. Remove excavated material. Recompact existing unbound-aggregate base course to form new subgrade.

B. Portland Cement Concrete Pavement: Break cracked slabs and roll as required to reseat concrete pieces firmly.

1. Pump hot undersealing asphalt under rocking slab until slab is stabilized or, if necessary, crack slab into pieces and roll to reseat pieces firmly.
2. Remove disintegrated or badly cracked pavement. Excavate rectangular or trapezoidal patches, extending into perimeter of adjacent sound pavement, unless otherwise indicated. Cut excavation faces vertically. Recompact existing unbound-aggregate base course to form new subgrade.

C. Tack Coat: Before placing patch material, apply tack coat uniformly to vertical asphalt surfaces abutting the patch. Apply at a rate of 0.05 to 0.15 gal./sq. yd..

1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.

D. Placing Patch Material: Fill excavated pavement areas with hot-mix asphalt base mix for full thickness of patch and, while still hot, compact flush with adjacent surface.

E. Placing Patch Material: Partially fill excavated pavements with hot-mix asphalt base mix and, while still hot, compact. Cover asphalt base course with compacted, hot-mix surface layer finished flush with adjacent surfaces.

3.3 REPAIRS

A. Leveling Course: Install and compact leveling course consisting of 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.

B. Crack and Joint Filling: Remove existing joint filler material from cracks or joints to a depth of 1/4 inch.

1. Clean cracks and joints in existing hot-mix asphalt pavement.

2. Use emulsified-asphalt slurry to seal cracks and joints less than 1/4 inch wide. Fill flush with surface of existing pavement and remove excess.
3. Use hot-applied joint sealant to seal cracks and joints more than 1/4 inch wide. Fill flush with surface of existing pavement and remove excess.

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.

B. Herbicide Treatment: Apply herbicide according to manufacturer's recommended rates and written application instructions. Apply to dry, prepared subgrade or surface of compacted-aggregate base before applying paving materials.

1. Mix herbicide with prime coat if formulated by manufacturer for that purpose.

C. Emulsified Asphalt Prime Coat: Apply uniformly over surface of compacted unbound-aggregate base course at a rate of 0.10 to 0.30 gal./sq. yd. per inch depth. Apply enough material to penetrate and seal, but not flood, surface. Allow prime coat to cure.

1. If prime coat is not entirely absorbed within 24 hours after application, spread sand over surface to blot excess asphalt. Use enough sand to prevent pickup under traffic. Remove loose sand by sweeping before pavement is placed and after volatiles have evaporated.
2. Protect primed substrate from damage until ready to receive paving.
3. Shall only be utilized when stone base will be allowed to sit for prolonged period and in climate weather is predicted.

D. Tack Coat: Apply uniformly to surfaces of existing pavement at a rate of 0.05 to 0.15 gal./sq. yd.
1. Material to be used shall be CRS1.
2. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
3. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.

3.5 PLACING HOT-MIX ASPHALT

A. Machine place hot-mix asphalt on prepared surface, spread uniformly, and strike off. Place asphalt mix by hand in 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. Place hot-mix asphalt base course in number of lifts and thicknesses indicated.
2. Place hot-mix asphalt surface course in single lift.
3. Spread mix at a minimum temperature of 250 deg F.
4. Begin applying mix along centerline of crown for crowned sections and on high side of one-way slopes unless otherwise indicated.
5. 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 unless 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. Overlap mix placement about 1 to 1-1/2 inches from strip to strip to ensure proper compaction of mix along longitudinal joints.
2. Complete a section of asphalt base course 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.

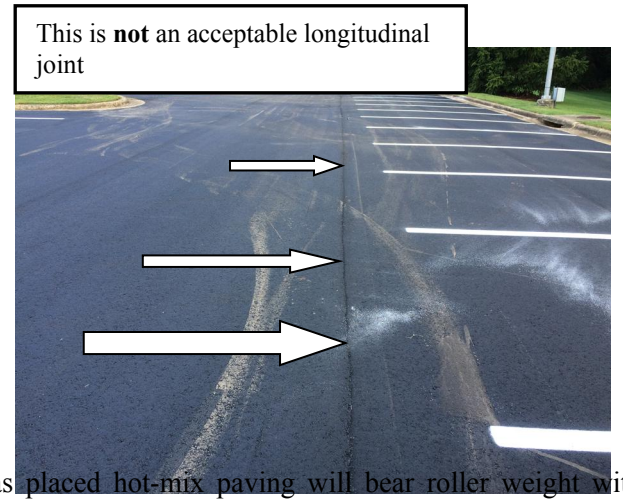
3.6 JOINTS

A. Construct joints to ensure a 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 to joints.
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 at each point where paver ends a day's work and resumes work at a subsequent time. Construct these joints using either "bulkhead" or "papered" method according to AI MS-22, for both "Ending a Lane" and "Resumption of Paving Operations."
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.

B. Joints shall be consistently smooth and even in appearance and shall be sealed similarly to the center of paving courses with little or no visible aggregate exposed. Example of an acceptable joint and a joint that is not acceptable:

This **is** an acceptable longitudinal joint



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 with vibratory-plate compactors in areas inaccessible to rollers.

1. Complete compaction before mix temperature cools to 185 deg F.

B. Breakdown Rolling: Complete breakdown or initial rolling immediately after rolling joints and outside edge. Examine surface immediately after breakdown rolling for indicated crown, grade, and smoothness. Correct laydown and rolling operations to comply with requirements.

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 the following density:

1. Average Density: 96 percent of reference laboratory density according to ASTM D 6927, but not less than 94 percent or greater than 100 percent.
2. Average Density: 92 percent of reference maximum theoretical density according to ASTM D 2041, but not less than 90 percent or greater than 96 percent.

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 asphalt is still hot; compact thoroughly. Surfaces shall be smooth.

F. Repairs: Remove paved areas that are defective or contaminated with foreign materials 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 ASPHALT TRAFFIC-CALMING DEVICES

A. Construct hot-mix asphalt speed bumps, humps, and tables over compacted pavement surfaces. Apply a tack coat unless pavement surface is still tacky and free from dust. Spread mix at a minimum temperature of 250 deg F.

1. Tack Coat Application: Apply uniformly to surfaces of existing pavement at a rate of 0.05 to 0.15 gal./sq. yd.
2. Asphalt Mix: Same as pavement surface-course mix.
3. Before installation, mill pavement that will be in contact with bottom of traffic-calming device. Mill to a depth of 1 inch from top of pavement to a clean, rough profile.

B. Place and compact hot-mix asphalt to cross section indicated, by machine or by hand in wood or metal forms. Tamp hand-placed materials and screed to smooth finish. Remove forms after hot-mix asphalt has cooled.

3.9 INSTALLATION TOLERANCES

A. Pavement Thickness: Compact each course to produce the thickness indicated within the following tolerances:

1. Base Course: Plus or minus 1/2 inch.
2. Surface Course: Plus 1/4 inch, no minus.

B. Pavement 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.
4. Visually inspection of asphalt shall be smooth, sealed with very little to no visible aggregate exposed on surface.

C. Asphalt Traffic-Calming Devices: Compact and form asphalt to produce the contour indicated and within a tolerance of plus or minus 1/8 inch of height indicated above pavement surface.

3.10 SURFACE TREATMENTS

A. Fog Seals: Apply fog seal at a rate of 0.10 to 0.15 gal./sq. yd. to existing asphalt pavement and allow to cure. With fine sand, lightly dust areas receiving excess fog seal.

B. Slurry Seals: Apply slurry coat in a uniform thickness according to ASTM D 3910 and allow to cure.

1. Roll slurry seal to remove ridges and provide a uniform, smooth surface.

3.11 FIELD QUALITY CONTROL

A. Thickness: In-place compacted thickness of hot-mix asphalt courses will be determined according to ASTM D 3549.
B. Surface Smoothness: Finished surface of each hot-mix asphalt course will be tested for compliance with smoothness tolerances.

C. Asphalt Traffic-Calming Devices: Finished height of traffic-calming devices above pavement will be measured for compliance with tolerances.

D. In-Place Density: Testing agency will take samples of uncompacted paving mixtures and compacted pavement according to ASTM D 979.

1. Reference maximum theoretical density will be determined by averaging results from four samples of hot-mix asphalt-paving mixture delivered daily to site, prepared according to ASTM D 2041, and compacted according to job-mix specifications.
2. In-place density of compacted pavement will be determined by testing core samples according to ASTM D 1188 or ASTM D 2726.

a. One core sample will be taken for every 1000 sq. yd. or less of installed pavement, with no fewer than three cores 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.

E. Replace and compact hot-mix asphalt where core tests were taken.
F. Remove and replace or install additional hot-mix asphalt where test results or measurements indicate that it does not comply with specified requirements. Owner/Owner's Representative/Designer shall review and give directive on course of action to follow.
G. The contractor shall provide certified test results for paving density to the Owner/Owner's Representative/Designer.
H. Where the designer and owner deem it necessary, due to failure of end product (paving) to successfully meet previous testing requirements, the contractor shall provide additional certified testing results at the contractor's expense.
I. The owner may at his/her election utilize a third party testing firm to verify any and all results. The cost of this verification shall be borne by the owner and is not to be confused with Item I., nor H., where cost belongs to the contractor.

3.12 WASTE HANDLING

A. General: Handle asphalt-paving waste according to approved waste management plan required in Section 017419 "Construction Waste Management and Disposal."

END OF SECTION 32 12 16

32 13 13 - CONCRETE PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes exterior cement concrete pavement for the following:
   1. Parking lots (where applicable).
   2. Curbs and gutters.
   3. Walkways.
   4. Slabs (if applicable).

B. Related Sections include the following:

   1. Section 31 20 00 "Earth Moving" for subgrade preparation, grading, and subbase course.
   2. Section 32 13 73 "Concrete Paving Joint Sealants" for joint sealants of joints in concrete pavement and at isolation joints of concrete pavement with adjacent construction.

1.3 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, fly ash and other pozzolans, and ground granulated blast-furnace slag.

1.4 SUBMITTALS

A. Product Data: For each type of manufactured material and product indicated.
B. Design Mixtures: For each concrete pavement mixture. Include alternate mixture designs when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

C. Qualification Data: For testing agency.

D. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated, based on comprehensive testing of current materials:

   1. Aggregates. Include service record data indicating absence of deleterious expansion of concrete due to alkali-aggregate reactivity.

E. Material Certificates: Signed by manufacturers certifying that each of the following materials complies with requirements:

1. Cementitious materials.
2. Steel reinforcement and reinforcement accessories.
3. Fiber reinforcement.
4. Admixtures.
5. Curing compounds.
6. Applied finish materials.
7. Bonding agent or epoxy adhesive.
8. Joint fillers.

F. Field quality-control test reports.

G. Minutes of preinstallation conference.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Manufacturer of ready-mixed concrete products who complies with ASTM C 94/C 94M requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

B. Testing Agency Qualifications: An independent agency qualified according to ASTM C 1077 and ASTM E 329 for testing indicated, as documented according to ASTM E 548.

1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-01 or an equivalent certification program.

C. ACI Publications: Comply with ACI 301, "Specification for Structural Concrete," unless modified by requirements in the Contract Documents.

D. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.

E. Mockups: Cast mockups of full-size sections of concrete pavement to demonstrate typical joints, surface finish, texture, color, and standard of workmanship.

1. Build mockups in the location and of the size indicated or, if not indicated, as directed by Architect.
2. Notify Architect seven days in advance of dates and times when mockups will be constructed.
3. Obtain Architect's approval of mockups before starting construction.
4. Maintain approved mockups during construction in an undisturbed condition as a standard for judging the completed pavement.
5. Demolish and remove approved mockups from the site when directed by Architect.
6. Approved mockups may become part of the completed Work if undisturbed at time of Beneficial Occupancy.

F. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1. Before submitting design mixtures, review concrete pavement mixture design and examine procedures for ensuring quality of concrete materials and concrete pavement construction practices. Require representatives, including the following, of each entity directly concerned with concrete pavement, to attend conference:

    a. Contractor's superintendent.
    b. Independent testing agency responsible for concrete design mixtures.
    c. Ready-mix concrete producer.
    d. Concrete pavement subcontractor.

1.6 PROJECT CONDITIONS

A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

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

2.2 FORMS

A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, smooth exposed surfaces.

    1. Use flexible or curved forms for curves with a radius 100 feet or less.
    2. Use forms free from warp and of sufficient strength when staked to hold the specified alignment during concrete placing and finishing operations.

B. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

2.3 STEEL REINFORCEMENT

A. Plain-Steel Welded Wire Reinforcement: ASTM A 185, fabricated from as-drawn steel wire into flat sheets.
B. Deformed-Steel Welded Wire Reinforcement: ASTM A 497, flat sheet.
C. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420); deformed.

D. Joint Dowel Bars: Plain steel bars, ASTM A 615/A 615M, Grade 60 (Grade 420). Cut bars true to length with ends square and free of burrs.

E. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars, welded wire reinforcement, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete of greater compressive strength than concrete, and as follows:

1. Equip wire bar supports with sand plates or horizontal runners where base material will not support chair legs.

2.4 CONCRETE MATERIALS

A. Cementitious Material: Use one of the following cementitious materials, of the same type, brand, and source throughout the Project:

1. Portland Cement: ASTM C 150, Type I gray. Supplement with the following:

a. Fly Ash: ASTM C 618, Class F.

B. Normal-Weight Aggregates: ASTM C 33, Class 4S coarse aggregate, uniformly graded. Provide aggregates from a single source with documented service record data of at least 10 years' satisfactory service in similar pavement applications and service conditions using similar aggregates and cementitious materials.

1. Maximum Coarse-Aggregate Size: 3/4 inch nominal.
2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
3. Do not use fine or coarse aggregates that contain substances that cause spalling.
4. Local aggregates not complying with ASTM C 33 that have been shown to produce concrete of adequate strength and durability by special tests or actual service may be used when acceptable to Architect.

C. Water: ASTM C 94/C 94M.

D. Air-Entraining Admixture: ASTM C 260.

E. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and to contain not more than 0.1 percent water-soluble chloride ions by mass of cementitious material.

1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
2. Retarding Admixture: ASTM C 494/C 494M, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

2.5 FIBER REINFORCEMENT

A. Synthetic Fiber: Monofilament or fibrillated polypropylene fibers engineered and designed for use in concrete pavement, complying with ASTM C 1116, Type III, 1/2 to 1-1/2 inches long.

1. Products:

a. Monofilament Fibers:

1) Axim Concrete Technologies; Fibrasol IIP.
2) Euclid Chemical Company (The); Fiberstrand 100.
3) FORTA Corporation; Forta Mono.
4) Grace, W. R. & Co.--Conn.; Grace MicroFiber.
5) Metalcrete Industries; Polystrand 1000.
6) SI Concrete Systems; Fibermix Stealth.
7) Or product equal to the above.

b. Fibrillated Fibers:

1) Axim Concrete Technologies; Fibrasol F.
2) FORTA Corporation; Forta.
3) Euclid Chemical Company (The); Fiberstrand F.
4) Grace, W. R. & Co.--Conn.; Grace Fibers.
5) SI Concrete Systems; Fibermesh.
6) Or product equal to the above.

2.6 CURING MATERIALS

A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. dry.
B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
C. Water: Potable.

D. Evaporation Retarder: Waterborne, monomolecular film forming; manufactured for application to fresh concrete.

1. Products:

a. Axim Concrete Technologies; Cimfilm.
b. Burke by Edeco; BurkeFilm.
c. ChemMasters; Spray-Film.
d. Conspec Marketing & Manufacturing Co., Inc.; Aquafilm.
e. Dayton Superior Corporation; Sure Film.
f. Euclid Chemical Company (The); Eucobar.
g. Kaufman Products, Inc.; Vapor Aid.
h. Lambert Corporation; Lambco Skin.
i. L&M Construction Chemicals, Inc.; E-Con.
j. MBT Protection and Repair, ChemRex Inc.; Confilm.
k. Meadows, W. R., Inc.; Sealtight Evapre.
l. Metalcrete Industries; Waterhold.

m. Nox-Crete Products Group, Kinsman Corporation; Monofilm.
n. Sika Corporation, Inc.; SikaFilm.
o. Symons Corporation; Finishing Aid.
p. Vexcon Chemicals, Inc.; Certi-Vex EnvioAssist.
q. Or product equal to the above.

E. Clear Waterborne Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B.

1. Products:

a. Anti-Hydro International, Inc.; AH Curing Compound #2 DR WB.
b. Burke by Edoko; Aqua Resin Cure.
c. ChemMasters; Safe-Cure Clear.
d. Conspec Marketing & Manufacturing Co., Inc.; W.B. Resin Cure.
e. Dayton Superior Corporation; Day Chem Rez Cure (J-11-W).
f. Euclid Chemical Company (The); Kurez DR VOX.
g. Kaufman Products, Inc.; Thinfilm 420.
h. Lambert Corporation; Aqua Kure-Clear.
i. L&M Construction Chemicals, Inc.; L&M Cure R.
j. Meadows, W. R., Inc.; 1100 Clear.
k. Nox-Crete Products Group, Kinsman Corporation; Resin Cure E.
l. Symons Corporation; Resi-Chem Clear.
m. Tamms Industries Inc.; Horncure WB 30.
n. Unitex; Hydro Cure 309.
o. Vexcon Chemicals, Inc.; Certi-Vex Enviocure 100.
p. Or product equal to the above.

F. White Waterborne Membrane-Forming Curing Compound: ASTM C 309, Type 2, Class B.

1. Products:

a. Anti-Hydro International, Inc.; AH Curing Compound #2 WP WB.
b. Burke by Edoco; Resin Emulsion White.
c. ChemMasters; Safe-Cure 2000.
d. Conspec Marketing & Manufacturing Co., Inc.; W.B. Resin Cure.
e. Dayton Superior Corporation; Day-Chem White Pigmented Cure (J-10-W).
f. Euclid Chemical Company (The); Kurez VOX White Pigmented.
g. Kaufman Products, Inc.; Thinfilm 450.
h. Lambert Corporation; Aqua Kure-White.
i. L&M Construction Chemicals, Inc.; L&M Cure R-2.
j. Meadows, W. R., Inc.; 1200-White.
k. Symons Corporation; Resi-Chem White.
l. Tamms Industries, Inc.; Horncure 200-W.
m. Unitex; Hydro White.
n. Vexcon Chemicals, Inc.; Certi-Vex Enviocure White 100.
o. Or product equal to the above.

2.7 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber.

B. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

2.8 PAVEMENT MARKINGS

A. Pavement-Marking Paint: Alkyd-resin type, lead and chromate free, ready mixed, complying with FS TT-P-115, Type I or AASHTO M 248, Type N.

2.9 CONCRETE MIXTURES

A. Prepare design mixtures, proportioned according to ACI 301, for each type and strength of normal-weight concrete determined by either laboratory trial mixes or field experience.

1. Use a qualified independent testing agency for preparing and reporting proposed concrete mixture designs for the trial batch method.

B. Proportion mixtures to provide normal-weight concrete with the following properties:

1. Compressive Strength (28 Days): 3000 psi (20.7 MPa). (Varies – see plans)
2. Maximum Water-Cementitious Materials Ratio at Point of Placement: 0.50.
3. Slump Limit: 4 inches (100 mm), plus or minus 1 inch.

C. Add air-entraining admixture at manufacturer's prescribed rate to result in normal-weight concrete at point of placement having an air content as follows:
1. Air Content: 6 percent plus or minus 1.5 percent for 3/4-inch nominal maximum aggregate size

D. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.

E. Chemical Admixtures: Use admixtures according to manufacturer's written instructions.

1. Use water-reducing admixture, high-range, water-reducing admixture, high-range, water-reducing and retarding admixture, plasticizing and retarding admixture in concrete, as required, for placement and workability.
2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.

F. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement according to ACI 301 requirements.

1. Fly Ash or Pozzolan: 25 percent.
2. Ground Granulated Blast-Furnace Slag: 50 percent.
3. Combined Fly Ash or Pozzolan, and Ground Granulated Blast-Furnace Slag: 50 percent, with fly ash or pozzolan not exceeding 25 percent.

G. Synthetic Fiber: Uniformly disperse in concrete mix at manufacturer's recommended rate, but not less than 1.0 lb/cu. yd..

2.10 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Furnish batch certificates for each batch discharged and used in the Work.

1. 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; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine exposed subgrades and subbase surfaces for compliance with requirements for dimensional, grading, and elevation tolerances.

B. Proof-roll prepared subbase surface below concrete pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding.

1. Completely proof-roll subbase in one direction and repeat in perpendicular direction. Limit vehicle speed to 3 mph.
2. Proof-roll with a loaded 10-wheel tandem-axle dump truck weighing not less than 15 tons.
3. Subbase with soft spots and areas of pumping or rutting exceeding depth of 1/4 inch require correction according to requirements in Division 31 Section "Earth Moving."

C. Proceed with concrete pavement operations only after nonconforming conditions have been corrected and subgrade is ready to receive pavement.

3.2 PREPARATION

A. Remove loose material from compacted subbase surface immediately before placing concrete.
B. Check completed formwork and screeds for grade and alignment to following tolerances:
1. Top of Forms: Not more than 1/8 inch in 10 feet.
2. Vertical Face on Longitudinal Axis: Not more than ¼ inch in 10 feet.

3.3 EDGE FORMS AND SCREED CONSTRUCTION

A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides for pavement to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.
B. Check completed formwork and screeds for grade and alignment to following tolerances:
1. Top of Forms: Not more than 1/8 inch in 10 feet.
2. Vertical Face on Longitudinal Axis: Not more than ¼ inch in 10 feet.

C. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

3.4 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
B. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.
C. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.
D. Install welded wire reinforcement 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. *Welded wire reinforcement is required in ALL flatwork, such as slabs, sidewalks, etc. See plans.

3.5 JOINTS

A. General: Form construction, isolation, and contraction joints and tool edgings true to line with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline, unless otherwise indicated.

1. When joining existing pavement, place transverse joints to align with previously placed joints, unless otherwise indicated.

B. Construction Joints: Set construction joints at side and end terminations of pavement and at locations where pavement operations are stopped for more than one-half hour unless pavement terminates at isolation joints.

1. Continue steel reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of pavement strips, unless otherwise indicated.
2. Provide tie bars at sides of pavement strips where indicated.
3. Butt Joints: Use bonding agent at joint locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
4. Keyed Joints: Provide preformed keyway-section forms or bulkhead forms with keys, unless otherwise indicated. Embed keys at least 1-1/2 inches into concrete.
5. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt-coat one-half of dowel length to prevent concrete bonding to one side of joint.

C. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, walks, other fixed objects, and where indicated.

1. Locate expansion joints at intervals of 50 feet, unless otherwise indicated.
2. Extend joint fillers full width and depth of joint.
3. Terminate joint filler not less than 1/2 inch or more than 1 inch below finished surface if joint sealant is indicated.

4. Place top of joint filler flush with finished concrete surface if joint sealant is not indicated.
5. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.
6. Protect top edge of joint filler during concrete placement with metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.

D. Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness, as follows to match jointing of existing adjacent concrete pavement:

1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint with grooving tool to a 1/4-inch radius. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover marks on concrete surfaces.
2. Doweled Contraction Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint.
3. Sawed Joints: Minimum 3/4 inch deep x 1/4 inch wide all allowed.

E. Edging: Tool edges of pavement, gutters, curbs, and joints in concrete after initial floating with an edging tool to a 1/4-inch radius. Repeat tooling of edges after applying surface finishes. Eliminate tool marks on concrete surfaces.

3.6 CONCRETE PLACEMENT

A. Inspection: Before placing concrete, inspect and complete formwork installation, steel reinforcement, and items to be embedded or cast in. Notify other trades to permit installation of their work.
B. Remove snow, ice, or frost from subbase surface and reinforcement before placing concrete. Do not place concrete on frozen surfaces.
C. Moisten subbase to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.
D. Comply with ACI 301 requirements for measuring, mixing, transporting, and placing concrete.

E. Do not add water to concrete during delivery or at Project site.
F. Do not add water to fresh concrete after testing.
G. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.
H. Consolidate concrete according to ACI 301 by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping.

1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand spreading and consolidation. Consolidate with care to prevent dislocating reinforcement, dowels, and joint devices.

I. Place concrete in two operations; strike off initial pour for entire width of placement and to the required depth below finish surface. Lay welded wire fabric or fabricated bar mats immediately in final position. Place top layer of concrete, strike off, and screed.

1. Remove and replace concrete that has been placed for more than 15 minutes without being covered by top layer, or use bonding agent if approved by Architect.

J. Screed pavement surfaces with a straightedge and strike off.

K. Commence initial floating using bull floats or darbies to impart an open textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.

L. Curbs and Gutters: When automatic machine placement is used for curb and gutter placement, submit revised mix design and laboratory test results that meet or exceed requirements. Produce curbs and gutters to required cross section, lines, grades, finish, and jointing as specified for formed concrete. If results are not approved, remove and replace with formed concrete.

M. Slip-Form Pavers: When automatic machine placement is used for pavement, submit revised mix design and laboratory test results that meet or exceed requirements. Produce pavement to required thickness, lines, grades, finish, and jointing as required for formed pavement.

1. Compact subbase and prepare subgrade of sufficient width to prevent displacement of paver machine during operations.

N. When adjoining pavement lanes are placed in separate pours, do not operate equipment on concrete until pavement has attained 85 percent of its 28-day compressive strength.

O. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1. 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.
2. Do not use frozen materials or materials containing ice or snow.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mix designs.

P. Hot-Weather Placement: Comply with ACI 301 and as follows when hot-weather conditions exist:

1. Cool ingredients before mixing to maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water 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.

2. Cover steel reinforcement with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

3.7 FLOAT FINISHING

A. General: Do not add water to concrete surfaces during finishing operations.

B. Float Finish: Begin the second floating operation when bleed-water sheen has disappeared and concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats, or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture.

1. Burlap Finish: Drag a seamless strip of damp burlap across float-finished concrete, perpendicular to line of traffic, to provide a uniform, gritty texture.
2. Medium-to-Fine-Textured Broom Finish: Draw a soft bristle broom across float-finished concrete surface perpendicular to line of traffic to provide a uniform, fine-line texture.

3. Medium-to-Coarse-Textured Broom Finish: Provide a coarse finish by striating float-finished concrete surface 1/16 to 1/8 inch deep with a stiff-bristled broom, perpendicular to line of traffic.

4. Final Tooling: Toll edges of paving, gutters, curbs, and joints formed in fresh concrete with a jointing tool to the following radius. Repeat tooling of edges and joints after applying surface finishes. Eliminate tool marks on concrete surfaces.
   a. Radius: 1/4 inch.

3.8 CONCRETE PROTECTION AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

B. Comply with ACI 306.1 for cold-weather protection.

C. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

D. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.

E. Curing Methods: Cure concrete by moisture curing, moisture-retaining-cover curing, curing compound, or a combination of these as follows:

1. Moist Curing: Keep surfaces continuously moist for not less than seven days with the following materials:

    a. Water.
    b. Continuous water-fog spray.
    c. Absorptive cover, water saturated and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.

2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 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 Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period. Splotchy, inconsistent splash/spray patterns of compound with not be accepted.

3.9 PAVEMENT TOLERANCES

A. Comply with tolerances of ACI 117 and as follows:

1. Elevation: 1/4 inch.
2. Thickness: Plus 3/8 inch, minus 1/4 inch.
3. Surface: Gap below 10-foot- long, unleveled straightedge not to exceed 1/4 inch. (assuming no ponded water)
4. Lateral Alignment and Spacing of Tie Bars and Dowels: 1 inch.
5. Vertical Alignment of Tie Bars and Dowels: 1/4 inch.
6. Alignment of Tie-Bar End Relative to Line Perpendicular to Pavement Edge: 1/2 inch.
7. Alignment of Dowel-Bar End Relative to Line Perpendicular to Pavement Edge: Length of dowel 1/4 inch per 12 inches.
8. Joint Spacing: 3 inches.
9. Contraction Joint Depth: Plus 1/4 inch, no minus.
10. Joint Width: Plus 1/8 inch, no minus.
11. Contractor will be required to remove and replace sidewalk constructed without positive drainage (i.e. bird baths) at contractor’s expense.

3.10 PAVEMENT MARKING

A. Do not apply pavement-marking paint until layout, colors, and placement have been verified with Architect.
B. Allow concrete pavement to cure for 28 days and be dry before starting pavement marking, except as indicted by paint manufacturer.
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.

3.11 FIELD QUALITY CONTROL

A. Testing Agency: Contractor will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports. Cost for the work will be billed against the geotechnical testing allowance with approval from the Architect.

B. Testing Services: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:

1. Testing Frequency: Testing will be conducted randomly as directed by Architect.
2. Slump: ASTM C 143/C 143M; testing will be conducted randomly as directed by Architect.
3. Air Content: ASTM C 231, pressure method; testing will be conducted randomly as directed by Architect.
4. Concrete Temperature: ASTM C 1064; testing will be conducted randomly as directed by Architect.
5. Compression Test Specimens: ASTM C 31/C 31M; cast and laboratory cure one set of three standard cylinder specimens for each composite sample.
6. Compressive-Strength Tests: ASTM C 39/C 39M; test 1 specimen at 7 days and 2 specimens at 28 days.

    a. A compressive-strength test shall be the average compressive strength from 2 specimens obtained from same composite sample and tested at 28 days.

C. Strength of each concrete mix will be satisfactory if average of any 3 consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.

D. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.

E. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.

F. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Additional testing and inspecting, at Contractor’s expense, will be performed to determine compliance of replaced and additional work with specified requirements.

G. Remove and replace concrete pavement where test results indicate that it does not comply with specified requirements.

3.12 REPAIRS AND PROTECTION

A. Concrete that cracks after placement (during the care of the contractor) will be replaced prior to Beneficial Occupancy.
B. Remove and replace concrete pavement that is broken, cracked, damaged, or defective or that does not comply with requirements in this Section.
C. Drill test cores, where directed by Architect, when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory pavement areas with Portland cement concrete bonded to pavement with epoxy adhesive.
D. Protect concrete from damage. Exclude traffic from pavement for at least 14 days after placement. When construction traffic is permitted, maintain pavement as clean as possible by removing surface stains and spillage of materials as they occur.
E. Protection from damage: The Contractor shall adequately and fully protect all parts of the work against damage until completed and accepted by the Owner for maintenance. Damages shall be properly repaired by the Contractor at no additional expense to the Owner.
F. Temporary barricades: Throughout the duration of the Contract, the Contractor shall provide temporary barricades, conforming with the latest edition of U.S. Department of Transportation's "Manual on Uniform Traffic Control Devices for Streets and Highways," properly lighted, to keep traffic off the current portion of the work.
G. Protection of adjacent surfaces: The Contractor shall protect exposed surfaces to the work from physical damage resulting from construction activities, and from becoming stained during application of paving materials. The Contractor shall clean, repair, or replace, as required, surfaces damaged during the course of the work at no additional expense to the Owner.
H. Protection from graffiti: Newly poured concrete roads, streets, curbs, or sidewalks shall be protected AND guarded from graffiti from passersby until the concrete has sufficiently cured to resist such molestation. Failure to prevent graffiti, or other such vandalism, shall result in the new concrete having to be removed and replaced. This requirement shall mandate the Contractor to take the necessary steps in preventing such incidents including, but not limited, to guarding the project after normal working hours.
I. Maintain concrete pavement free of stains, discoloration, dirt, and other foreign material. Sweep concrete pavement not more than two days before date scheduled for Substantial Completion inspections.

END OF SECTION 32 13 13

32 13 73 - CONCRETE PAVING JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Cold-applied joint sealants.
2. Hot-applied joint sealants.

B. Related Sections:

1. Division 32 Section "Asphalt Paving" for constructing joints between concrete and asphalt pavement.
2. Division 32 Section "Concrete Paving" for constructing joints in concrete pavement.

1.3 PRECONSTRUCTION TESTING

A. Preconstruction Compatibility and Adhesion Testing: Submit to joint-sealant manufacturers, for testing indicated below, Samples of materials that will contact or affect joint sealants.

1. Use manufacturer's standard test method to determine whether priming and other specific joint-preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
2. Submit no fewer than eight pieces of each type of material, including joint substrates, shims, joint-sealant backings, secondary seals, and miscellaneous materials.
3. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
4. For materials failing tests, obtain joint-sealant manufacturer's written instructions for corrective measures including use of specially formulated primers.
5. **Testing will not be required if joint-sealant manufacturers submit joint-preparation data that are based on previous testing, not older than 24 months, of sealant products for compatibility with and adhesion to joint substrates and other materials matching those submitted.**

1.4 SUBMITTALS

A. Product Data: For each joint-sealant product indicated.

B. Samples for Verification: For each kind and color of joint sealant required, provide Samples with joint sealants in 1/2-inch- wide joints formed between two 6-inch- long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.
C. Pavement-Joint-Sealant Schedule: Include the following information:

1. Joint-sealant application, joint location, and designation.
2. Joint-sealant manufacturer and product name.
3. Joint-sealant formulation.
4. Joint-sealant color, where applicable.

D. Qualification Data: For qualified Installer.

E. Product Certificates: For each type of joint sealant and accessory, from manufacturer.
F. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for joint sealants.

G. Preconstruction Compatibility and Adhesion Test Reports: From joint-sealant manufacturer, indicating the following:

1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility with and adhesion to joint sealants.
2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
B. Source Limitations: Obtain each type of joint sealant from single source from single manufacturer.
C. Product Testing: Test joint sealants using a qualified testing agency.

1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.

D. Preinstallation Conference: Conduct conference at Project site.

1.6 PROJECT CONDITIONS

A. Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
2. When joint substrates are wet.

3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Compatibility: Provide joint sealants, backing materials, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer based on testing and field experience.

B. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.2 COLD-APPLIED JOINT SEALANTS

A. Single-Component, Self-Leveling, Silicone Joint Sealant for Concrete: ASTM D 5893, Type SL.

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

a. Crafco Inc., an ERGON company; RoadSaver Silicone SL.
b. Dow Corning Corporation; 890-SL.
c. Pecora Corporation; 300 SL.

2.3 HOT-APPLIED JOINT SEALANTS

A. Hot-Applied, Single-Component Joint Sealant for Concrete: ASTM D 3406.

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

a. Crafco Inc., an ERGON company; Superseal 444/777.
b. W.R. Meadows Sealtight; #1190
c. Designer approved equal.

2.4 JOINT-SEALANT BACKER MATERIALS

A. General: Provide joint-sealant backer materials that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by joint-sealant manufacturer based on field experience and laboratory testing.

B. Round Backer Rods for Cold- and Hot-Applied Joint Sealants: ASTM D 5249, Type 1, of diameter and density required to control sealant depth and prevent bottom-side adhesion of sealant.

C. Round Backer Rods for Cold-Applied Joint Sealants: ASTM D 5249, Type 3, of diameter and density required to control joint-sealant depth and prevent bottom-side adhesion of sealant.

D. Backer Strips for Cold- and Hot-Applied Joint Sealants: ASTM D 5249; Type 2; of thickness and width required to control joint-sealant depth, prevent bottom-side adhesion of sealant, and fill remainder of joint opening under sealant.

2.5 PRIMERS

A. Primers: Product recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions.

B. Joint Priming: Prime joint substrates where indicated or where recommended in writing by joint-sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Ensure joints are reasonably consistent depth and thickness prior to installing sealant, and straight!

3.3 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated unless more stringent requirements apply.

B. Joint-Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Install joint-sealant backings of kind indicated to support joint sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of joint-sealant backings.
2. Do not stretch, twist, puncture, or tear joint-sealant backings.
3. Remove absorbent joint-sealant backings that have become wet before sealant application and replace them with dry materials.

D. Install joint sealants using proven techniques that comply with the following and at the same time backings are installed:

1. Place joint sealants so they directly contact and fully wet joint substrates.
2. Completely fill recesses in each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

E. Tooling of Nonsag Joint Sealants: Immediately after joint-sealant application and before skinning or curing begins, tool sealants according to the following requirements to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint:

1. Remove excess joint sealant from surfaces adjacent to joints.
2. Use tooling agents that are approved in writing by joint-sealant manufacturer and that do not discolor sealants or adjacent surfaces.

F. Provide joint configuration to comply with joint-sealant manufacturer's written instructions unless otherwise indicated.

3.4 CLEANING

A. Clean off excess joint sealant or sealant smears adjacent to joints as the Work progresses, by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.5 PROTECTION

A. Protect joint sealants, during and after curing period, from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately and replace with joint sealant so installations in repaired areas are indistinguishable from the original work.

3.6 PAVEMENT-JOINT-SEALANT SCHEDULE

A. Joint-Sealant Application: Joints within cement concrete pavement.

1. Joint Location:

a. Expansion and isolation joints in cast-in-place concrete pavement.
b. Contraction joints in cast-in-place concrete slabs.
c. Other joints as indicated.

2. Silicone Joint Sealant for Concrete: Single component, self-leveling.
3. Hot-Applied Joint Sealant for Concrete: Single component.
4. Joint-Sealant Color: As selected by Architect from manufacturer's full range.

END OF SECTION 32 13 73

32 17 23 - PAVEMENT MARKINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes painted markings applied to asphalt and concrete pavement.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site. **This conference shall be a part of pre-construction for paving.**

1. Review methods and procedures related to marking pavement including, but not limited to, the following:

    a. Pavement aging period before application of pavement markings.
    b. Review requirements for protecting pavement markings, including restriction of traffic during installation period.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include technical data and tested physical and performance properties.

B. Shop Drawings: For pavement markings.

1. Indicate and confirm pavement markings, colors, lane separations, defined parking spaces, and dimensions to adjacent work (Contractor may use details and plan as basis).
2. Indicate, with international symbol of accessibility, spaces allocated for people with disabilities.

C. Samples: For each exposed product and for each color and texture specified; on rigid backing, 8 inches square.

1.5 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with materials, workmanship, and other applicable requirements of NCDOT for pavement-marking work.

1.6 FIELD CONDITIONS

A. Environmental Limitations: Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature of 40 deg F for alkyd materials, and not exceeding 95 deg F.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Benjamin Moore & Co.
2. Color Wheel Paints & Coatings.
3. Columbia Paint & Coatings.
4. Conco Paints.
5. Coronado Paint; Benjamin Moore Company.
6. Diamond Vogel Paints.
7. Ennis Traffic Safety Solutions, Inc.
8. General Paint.
9. McCormick Paints.
10. Miller Paint Co.
11. Parker Paint; Comex Group.
12. PPG Industries.
13. Rohm and Haas Company.
14. Scott Paint.
15. Sherwin-Williams Company (The).

2.2 PAVEMENT-MARKING PAINT

A. Pavement-Marking Paint: Alkyd-resin type, lead and chromate free, ready mixed, complying with AASHTO M 248, Type N; colors complying with FS TT-P-1952.

1. Color: White, Yellow, Blue, Green (Specify).

B. Pavement-Marking Paint: MPI #32, alkyd traffic-marking paint.

1. Color: White, Yellow, Blue, Green..

C. Pavement-Marking Paint: Latex, waterborne emulsion, lead and chromate free, ready mixed, complying with FS TT-P-1952, Type II, with drying time of less than 45 minutes.

1. Color: White, Yellow, Blue.

D. Pavement-Marking Paint: MPI #97, latex traffic-marking paint.

1. Color: White, Yellow, Blue.

E. Glass Beads: AASHTO M 247, Type 1 made of 100 percent recycled glass.

1. Roundness: Minimum 75 percent true spheres by weight.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that pavement is dry and in suitable condition to begin pavement marking according to manufacturer's written instructions.
B. Proceed with pavement marking only after unsatisfactory conditions have been corrected.

3.2 PAVEMENT MARKING

A. Do not apply pavement-marking paint until layout, colors, and placement have been verified with Architect.

B. Allow paving to age for a minimum of 2 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.

1. Apply graphic symbols and lettering with paint-resistant, die-cut stencils, firmly secured to pavement. Mask an extended area beyond edges of each stencil to prevent paint application beyond the stencil. Apply paint so that it cannot run beneath the stencil.
2. Broadcast glass beads uniformly into wet markings at a rate of 6 lb/gal..

3.3 PROTECTING AND CLEANING

A. Protect pavement markings from damage and wear during remainder of construction period.
B. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 32 17 23

32 92 00 - TURF AND GRASSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Seeding.
2. Hydroseeding.
3. Sodding.
4. Turf renovation.
5. Erosion-control material(s).

B. Related Sections:

1. Section 31 10 00 "Site Clearing" for topsoil stripping and stockpiling.
2. Section 31 20 00 "Earth Moving" for excavation, filling and backfilling, and rough grading.
3. Section 32 93 00 "Plants".

1.3 DEFINITIONS

A. Finish Grade: Elevation of finished surface of planting soil.
B. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. This includes insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. It also includes substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.
C. Pests: Living organisms that occur where they are not desired or that cause damage to plants, animals, or people. These include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.
D. Planting Soil: Also known as root zone material; standardized topsoil; existing, native surface topsoil; existing, modified in-place surface soil; imported topsoil; or manufactured topsoil that is modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.
E. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or top surface of a fill or backfill before planting soil is placed.
F. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.

G. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil, but in disturbed areas such as urban environments, the surface soil can be subsoil.

1.4 SUBMITTALS

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

1. Pesticides and Herbicides: Include product label and manufacturer's application instructions specific to this Project.

B. Certification of Grass Seed: From seed vendor for each grass-seed monostand or mixture stating the botanical and common name, percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production and date of packaging.

1. Certification of each seed mixture for. Include identification of source and name and telephone number of suppliers.

C. Product Certificates: For soil amendments and fertilizers, from manufacturer.

D. Material Test Reports: For existing native surface topsoil (if contractor elects to modify root zone material with amendments instead of a manufactured root zone material mix).

1.5 QUALITY ASSURANCE

A. Soil-Testing Laboratory Qualifications: An independent laboratory or university laboratory, recognized by the State Department of Agriculture, with the experience and capability to conduct the testing indicated and that specializes in types of tests to be performed.

B. Soil Analysis: For each unamended soil type, furnish soil analysis and a written report by a qualified soil-testing laboratory stating percentages of organic matter; gradation of sand, silt, and clay content; cation exchange capacity; deleterious material; pH; and mineral and plant-nutrient content of the soil.

1. Testing methods and written recommendations shall comply with USDA's Handbook No. 60.
2. The soil-testing laboratory shall oversee soil sampling, with depth, location, and number of samples to be taken per instructions from Architect. A minimum of three representative samples shall be taken from varied locations for each soil to be used or amended for planting purposes.
3. Report suitability of tested soil for turf growth.

a. Based on the test results, recommendations for soil treatments and soil amendments to be incorporated. Recommendations in weight per 1000 sq. ft. (92.9 sq. m) or volume per cu. yd. (0.76 cu. m) for nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce satisfactory planting soil suitable for healthy, viable plants.
b. Report presence of problem salts, minerals, or heavy metals, including aluminum, arsenic, barium, cadmium, chromium, cobalt, lead, lithium, and vanadium. If such

problem materials are present, provide additional recommendations for corrective action.

c. Other amendments, such as sand or organic mulch, may be required to provide proper root zone material.

C. Pre installation Conference: Conduct conference at Project site.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Seed and Other Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of conformance with state and federal laws, as applicable.

B. Bulk Materials:

1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
3. Accompany each delivery of bulk fertilizers, lime, and soil amendments with appropriate certificates.

1.7 PROJECT CONDITIONS

A. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions.

1.8 MAINTENANCE SERVICE

A. Initial Turf Maintenance Service: Provide full maintenance by skilled employees of landscape Installer. Maintain as required in Part 3. Begin maintenance immediately after each area is planted and continue until acceptable turf is established but for not less than the following periods:

1. Seeded Turf: Until turf is sufficiently established at Beneficial Occupancy.

a. If turf is not established by end of growing season, contractor care may be required into the next growing season by the contractor at the designer’s discretion and will continue until such time as grass is permanently established as vigorous and viable stand (as also determined by designer).

PART 2 - PRODUCTS

2.1 SEED

A. Grass Seed: Fresh, clean, dry, new-crop seed.

B. Seed Species: State-certified seed of grass species as follows:

1. Sun and Partial Shade: Proportioned by weight as follows:

    a. 35 percent blend of two drought resistant Tall Fescues variety (Rebel, Rebel II, or equal). Submit.
    b. 60 percent Common Bermuda (Drought resistant variety)
    c. 5 percent Annual Ryegrass

2. Pollinator Meadow:

    a. Seed: Fresh, clean, dry, new-crop seeds complying with AOSA's "Journal of Seed Technology; Rules for Testing Seeds" for purity and germination tolerances. Seed shall be delivered to the site in sealed standard size containers, showing weight, analysis, name of vendor and germination test. Seed which has become wet, moldy, or otherwise damaged will not be accepted. Final seed mixes to be coordinated with the Architect and Owner.
    b. Sources/Seed Mixes:
        1) Garrett Wildflower Seed Farm (www.garrettseed.com), 919.989.3031
            a) Pollinator Mix (10-12 species) – Recommended Planting Time: February – November, Seeding Rate: 20 lbs./acre
            b) Southeastern Wildflower Mix (10-12 species) – Recommended Planting Time: February – November, Seeding Rate: 20lbs/acre.
        2) Mellow Marsh Farm (www.mellowmarshfarm), 919.989.3031
            a) MMF Pollinator Mix (10-12 species) – Recommended Planting Time: March-May, September-November, Seeding Rate: 18 lbs./acre
            b) MMF Native Grass Mix (7-8 species) – Recommended Planting Time: March-May, September-November, Seeding Rate: 20-25 lbs/acre.

3. Shade Tolerant Meadow:

    a. Seed: Fresh, clean, dry, new-crop seeds complying with AOSA's "Journal of Seed Technology; Rules for Testing Seeds" for purity and germination tolerances. Seed shall be delivered to the site in sealed standard size containers, showing weight, analysis, name of vendor and germination test. Seed which has become wet, moldy, or otherwise damaged will not be accepted. Final seed mixes to be coordinated with the Architect and Owner.
    b. Sources/Seed Mixes:
        1) Mellow Marsh Farm (www.mellowmarshfarm.com), 919.989.3031
            a) MMF Pollinator Shade Mix, Seeding rate: 20-25 lbs/acre.
            b) MMF Shade Mix, Seeding rate: 20-25 lbs/acre.

2.2 INORGANIC SOIL AMENDMENTS

A. Lime: ASTM C 602, agricultural liming material containing a minimum of 80 percent calcium carbonate equivalent and as follows:

1. Class: T, with a minimum of 99 percent passing through No. 8 (2.36-mm) sieve and a minimum of 75 percent passing through No. 60 (0.25-mm) sieve.
2. Provide lime in form of ground dolomitic limestone.

2.3 ORGANIC SOIL AMENDMENTS

A. Compost: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through sieve; soluble salt content of 5 to 10 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:

1. Organic Matter Content: 50 to 60 percent of dry weight.
2. Feedstock: Agricultural, food, or industrial residuals; biosolids; yard trimmings; or source-separated or compostable mixed solid waste.

B. Manure: Well-rotted, unleached, stable or cattle manure containing not more than 25 percent by volume of straw, sawdust, or other bedding materials; free of toxic substances, stones, sticks, soil, weed seed, and material harmful to plant growth.

2.4 FERTILIZERS

A. Bonemeal: Commercial, raw or steamed, finely ground; a minimum of 4 percent nitrogen and 20 percent phosphoric acid.

B. Superphosphate: Commercial, phosphate mixture, soluble; a minimum of 20 percent available phosphoric acid.

C. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:

1. Composition: 1 lb/1000 sq. ft. (0.45 kg/92.9 sq. m) of actual nitrogen, 4 percent phosphorous, and 2 percent potassium, by weight minimum or as required by soil testing laboratory.

D. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:

1. Composition: 20 percent nitrogen, 10 percent phosphorous, and 10 percent potassium, by weight minimum or as required by soil testing laboratory.

2.5 PLANTING SOILS

A. Planting Soil: (Contractor may elect to amend on site root zone material or provide approved amended manufactured soil from offsite. Submit data and sample). Existing, native surface root zone material formed under natural conditions with the decomposed, organic layer retained during excavation process. Verify suitability of native surface topsoil to produce viable planting soil. Clean soil of roots, plants, sod, stones, clay lumps, and other extraneous materials harmful to plant growth.

1. Supplement with imported topsoil when quantities are insufficient.

2. Mix existing, native surface topsoil with the following soil amendments and fertilizers in the following min. quantities to produce planting soil:

   a. Ratio of Loose Compost to Topsoil by Volume: 1:20.
   b. Weight of Lime per 1000 Sq. Ft. (92.9 Sq. m):
   c. Weight of Superphosphate per 1000 Sq. Ft. (92.9 Sq. m): 30 lbs.
   d. Weight of Commercial Fertilizer per 1000 Sq. Ft. (92.9 Sq. m): 6 lbs.
   e. Weight of Slow-Release Fertilizer per 1000 Sq. Ft. (92.9 Sq. m): 4 lbs.

2.6 MULCHES

A. Straw Mulch: Provide air-dry, clean, mildew- and seed-free, salt hay or threshed straw of wheat, rye, oats, or barley.

B. Fiber Mulch: Biodegradable, dyed-wood, cellulose-fiber mulch; nontoxic and free of plant-growth or germination inhibitors; with a maximum moisture content of 15 percent and a pH range of 4.5 to 6.5.

C. Nonasphaltic Tackifier: Colloidal tackifier recommended by fiber-mulch manufacturer for slurry application; nontoxic and free of plant-growth or germination inhibitors.

2.7 PESTICIDES

A. General: Pesticide, registered and approved by EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.
B. Pre-Emergent Herbicide (Selective and Non-Selective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.
C. Post-Emergent Herbicide (Selective and Non-Selective): Effective for controlling weed growth that has already germinated.

2.8 EROSION-CONTROL MATERIALS

A. Erosion-Control Blankets: Unless otherwise specified, biodegradable wood excelsior, straw, or coconut-fiber mat enclosed in a photodegradable plastic mesh. Include manufacturer's recommended steel wire staples, 6 inches (150 mm) long. Submit for approval.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to be planted for compliance with requirements and other conditions affecting performance.

   1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel,

paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.

2. Do not mix or place soils and soil amendments in frozen, wet, or muddy conditions.
3. Suspend soil spreading, grading, and tilling operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
4. Uniformly moisten excessively dry soil that is not workable and which is too dusty.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

C. If contamination by foreign or deleterious material, including gravel, or liquid is present in soil within a planting area, remove the soil and contamination as directed by Architect and replace with new planting soil.

3.2 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities, trees, shrubs, and plantings from damage caused by planting operations.

1. Protect adjacent and adjoining areas from hydroseeding and hydromulching overspray.
2. Protect grade stakes set by others until directed to remove them.

B. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

3.3 TURF AREA PREPARATION

A. Limit turf subgrade preparation to areas to be planted.

B. Newly Graded Subgrades: Loosen subgrade to a minimum depth of 6 inches (200 mm). Remove stones larger than 3/4 inch in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.

1. Apply superphosphate fertilizer directly to subgrade before loosening.
2. Spread soil, apply soil amendments and fertilizer on surface, and thoroughly blend planting soil.

    a. Delay mixing fertilizer with planting soil if planting will not proceed within a few days.
    b. Mix lime with dry soil before mixing fertilizer.

3. Spread planting soil to a depth of 6 inches (200 mm) but not less than required to meet finish grades after light rolling and natural settlement. Do not spread if planting soil or subgrade is frozen, muddy, or excessively wet.

    a. Spread approximately 1/2 the thickness of planting soil over loosened subgrade. Mix thoroughly into top 4 inches (100 mm) of subgrade. Spread remainder of planting soil.
    b. Reduce elevation of planting soil to allow for soil thickness of sod.

C. Unchanged Subgrades: If turf is to be planted in areas unaltered or undisturbed by excavating, grading, or surface-soil stripping operations, prepare surface soil as follows:

1. Remove existing grass, vegetation, and turf. Do not mix into surface soil.
2. Loosen surface soil to a depth of at least 4 inches (200 mm). Apply soil amendments and fertilizers according to planting soil mix proportions and mix thoroughly into top 4 inches (150 mm) of soil. Till soil to a homogeneous mixture of fine texture.

    a. Apply superphosphate fertilizer directly to surface soil before loosening.

3. Remove stones larger than 3/4 inch (25 mm) in any dimension and sticks, roots, trash, and other extraneous matter.
4. Legally dispose of waste material, including grass, vegetation, and turf, off Owner's property.

D. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Grade to within plus or minus 1/2 inch (13 mm) of finish elevation. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit finish grading to areas that can be planted in the immediate future.

E. Moisten prepared area before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

F. Before planting, obtain Architect's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

3.4 PREPARATION FOR EROSION-CONTROL MATERIALS

A. Prepare area as specified in "Turf Area Preparation" Article.

B. For erosion-control blanket or mesh, install from top of slope, working downward, and as recommended by material manufacturer for site conditions. Fasten as recommended by material manufacturer.

C. Moisten prepared area before planting if surface is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

3.5 SEEDING

A. Sow seed with spreader or seeding machine. Do not broadcast or drop seed when wind velocity exceeds 5 mph (8 km/h). Evenly distribute seed by sowing equal quantities in two directions at right angles to each other.

1. Do not use wet seed or seed that is moldy or otherwise damaged.
2. Do not seed against existing trees. Limit extent of seed to outside edge of planting saucer.

B. Sow seed at a total rate of 8 lb/1,000 sq. ft..

C. Rake seed lightly into top 1/8 inch (3 mm) of soil, roll lightly, and water with fine spray.

D. Protect seeded areas with slopes exceeding 1:3 with erosion-control blankets installed and stapled according to manufacturer's written instructions.

3.6 HYDROSEEDING

A. Hydroseeding: Mix specified seed, fertilizer, and fiber mulch in water, using equipment specifically designed for hydroseed application. Continue mixing until uniformly blended into homogeneous slurry suitable for hydraulic application.

1. Mix slurry with fiber-mulch manufacturer's recommended tackifier.
2. Apply slurry uniformly to all areas to be seeded in a one-step process. Apply slurry at a rate so that mulch component is deposited at not less than 1500-lb/acre (15.6-kg/92.9 sq. m) dry weight, and seed component is deposited at not less than the specified seed-sowing rate.

3.7 TURF RENOVATION

A. Renovate existing turf.
B. Remove sod and vegetation from diseased or unsatisfactory turf areas; do not bury in soil.
C. Remove topsoil containing foreign materials such as oil drippings, fuel spills, stones, gravel, and other construction materials resulting from Contractor's operations, and replace with new planting soil.
D. Mow, dethatch, core aerate, and rake existing turf.
E. Remove weeds before seeding. Where weeds are extensive, apply selective herbicides as required. Do not use pre-emergence herbicides.
F. Remove waste and foreign materials, including weeds, soil cores, grass, vegetation, and turf, and legally dispose of them off Owner's property.
G. Till stripped, bare, and compacted areas thoroughly to a soil depth of 6 inches (150 mm).
H. Apply soil amendments and initial fertilizers required for establishing new turf and mix thoroughly into top 6 inches of existing soil. Install new planting soil to fill low spots and meet finish grades.

I. Apply seed and protect with straw mulch as required for new turf.
J. Water newly planted areas and keep moist until new turf is established.

3.8 TURF MAINTENANCE

A. Maintain and establish turf by watering, fertilizing, weeding, mowing, trimming, replanting, and performing other operations as required to establish healthy, viable turf. Roll, regrade, and replant bare or eroded areas and re-mulch to produce a uniformly smooth turf.

1. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace materials and turf damaged or lost in areas of subsidence.
2. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch and anchor as required to prevent displacement.

3. Apply treatments as required to keep turf and soil free of pests and pathogens or disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards.

B. Watering: Install and maintain temporary piping, hoses, and turf-watering equipment to convey water from sources and to keep turf uniformly moist to a depth of 4 inches (100 mm).

1. Schedule watering to prevent wilting, puddling, erosion, and displacement of seed or mulch. Lay out temporary watering system to avoid walking over muddy or newly planted areas.
2. Water turf with fine spray at a minimum rate of 1 inch (25 mm) per week unless rainfall precipitation is adequate.

C. Mow turf as soon as top growth is tall enough to cut. Repeat mowing to maintain specified height without cutting more than 1/3 of grass height. Remove no more than 1/3 of grass-leaf growth in initial or subsequent mowings. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet. Schedule initial and subsequent mowings to maintain the following grass height:

1. Mow fescue blend grasses to a height of 3 to 3 1/2 inches.

D. Turf Post Fertilization: Apply fertilizer after initial mowing and when grass is dry.

1. Use fertilizer that will provide actual nitrogen of at least 1 lb/1000 sq. ft. (0.45 kg/92.9 sq. m) to turf area.

3.9 SATISFACTORY TURF

A. Turf installations shall meet the following criteria as determined by Architect:

1. Satisfactory Seeded Turf: At Substantial Completion review, a healthy, dense, uniform, close stand of grass free of debris has been established, free of weeds and surface irregularities, with coverage exceeding 95 percent over any 10 sq. ft. (0.92 sq. m) and bare spots not exceeding 4 by 4 inches.
2. Gravel and rocks are not visible in the turf.
3. If turf is not established by end of growing season, additional contractor care will be required into the next growing season at no additional cost to the project. Final determination will be made by the designer and will continue until such time as grass is permanently established as vigorous and viable stand (as also determined by the designer).

B. Use specified materials to reestablish turf that does not comply with requirements and continue maintenance until turf is satisfactory.

3.10 PESTICIDE APPLICATION

A. Apply pesticides and other chemical products and biological control agents in accordance with requirements of authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.

B. Post-Emergent Herbicides (Selective and Non-Selective): Apply only as necessary to treat already-germinated weeds and in accordance with manufacturer's written recommendations.

3.11 CLEANUP AND PROTECTION

A. Promptly remove soil and debris created by turf work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.
B. Erect temporary fencing or barricades and warning signs as required to protect newly planted areas from traffic. Maintain fencing and barricades throughout initial maintenance period and remove after plantings are established.
C. Remove nondegradable erosion-control measures after grass establishment period.

END OF SECTION 32 92 00

32 93 00 – PLANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Plants.
2. Planting soils.

B. Related Sections:

1. Section 31 10 00 "Site Clearing" for protection of existing trees and plantings, topsoil stripping and stockpiling, and site clearing.
2. Section 31 20 00 "Earth Moving" for excavation, filling, and rough grading and for subsurface aggregate drainage and drainage backfill materials.
3. Section 32 92 00 "Turf and Grasses" for turf (lawn) and meadow planting, hydroseeding, and erosion-control materials.

1.3 DEFINITIONS

A. Backfill: The earth used to replace or the act of replacing earth in an excavation.

B. Balled and Burlapped Stock: Plants dug with firm, natural balls of earth in which they were grown, with ball size not less than diameter and depth recommended by ANSI Z60.1 for type and size of plant required; wrapped with burlap, tied, rigidly supported, and drum laced with twine with the root flare visible at the surface of the ball as recommended by ANSI Z60.1.

C. Container-Grown Stock: Healthy, vigorous, well-rooted plants grown in a container, with a well-established root system reaching sides of container and maintaining a firm ball when removed from container. Container shall be rigid enough to hold ball shape and protect root mass during shipping and be sized according to ANSI Z60.1 for type and size of plant required.

D. Duff Layer: The surface layer of native topsoil that is composed of mostly decayed leaves, twigs, and detritus.

E. Finish Grade: Elevation of finished surface of planting soil.

F. Manufactured Topsoil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.

G. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. This includes insecticides, miticides, herbicides, fungicides, rodenticides, and

molluscicides. It also includes substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.

H. Pests: Living organisms that occur where they are not desired, or that cause damage to plants, animals, or people. These include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.

I. Planting Area: Areas to be planted.

J. Planting Soil: Standardized topsoil; existing, native surface topsoil; existing, in-place surface soil; imported topsoil; or manufactured topsoil that is modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.

K. Plant; Plants; Plant Material: These terms refer to vegetation in general, including trees, shrubs, vines, ground covers, ornamental grasses, bulbs, corms, tubers, or herbaceous vegetation.

L. Root Flare: Also called "trunk flare." The area at the base of the plant's stem or trunk where the stem or trunk broadens to form roots; the area of transition between the root system and the stem or trunk.

M. Stem Girdling Roots: Roots that encircle the stems (trunks) of trees below the soil surface.

N. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.

O. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.

P. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil; but in disturbed areas such as urban environments, the surface soil can be subsoil.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated, <u>including soils</u>.

1. Plant Materials: Include quantities, sizes, quality, and sources for plant materials.
2. Pesticides and Herbicides: Include product label and manufacturer's application instructions specific to the Project.
3. Plant Photographs: Include color photographs in digital format of each required species and size of plant material as it will be furnished to the Project. Take photographs from an angle depicting true size and condition of the typical plant to be furnished. Include a scale rod or other measuring device in each photograph. For species where more than 20 plants are required, include a minimum of three photographs showing the average plant, the best quality plant, and the worst quality plant to be furnished. Identify each photograph with the full scientific name of the plant, plant size, and name of the growing nursery.
    a. Plants <u>must</u> be in situ from source <u>and</u> representative of all units delivered to site <u>or</u>
    b. Designer may elect to inspect tagged material at nursery.

B. Qualification Data: For qualified landscape Installer. Include list of similar projects completed by Installer demonstrating Installer's capabilities and experience. Include project names, addresses, and year completed, and include names and addresses of owners' contact persons.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A qualified landscape Installer whose work has resulted in successful establishment of plants.

1. Professional Membership: Installer shall be a member in good standing of either the Professional Landcare Network or the American Nursery and Landscape Association and shall be a registered SC Landscape Contractor (provide license number).
2. Experience: Five years' experience in landscape installation in addition to requirements in Division 01 Section "Quality Requirements."
3. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.
4. Personnel Certifications: Installer's field supervisor shall have certification in one of the following categories from the Professional Landcare Network:

    a. Certified Landscape Technician - Exterior, with installation, maintenance specialty area(s), designated CLT-Exterior.
    b. Certified Ornamental Landscape Professional, designated COLP.

5. Pesticide Applicator: State licensed, commercial (provide number and designations).

B. Soil-Testing Laboratory Qualifications: An independent or university laboratory, recognized by the State Department of Agriculture, with the experience and capability to conduct the testing indicated and that specializes in types of tests to be performed.

C. Soil Analysis: For each unamended soil type, furnish soil analysis and a written report by a qualified soil-testing laboratory stating percentages of organic matter; gradation of sand, silt, and clay content; cation exchange capacity; sodium absorption ratio; deleterious material; pH; and mineral and plant-nutrient content of the soil.

1. Testing methods and written recommendations shall comply with USDA's Handbook No. 60.
2. The soil-testing laboratory shall oversee soil sampling; with depth, location, and number of samples to be taken per instructions from Architect. A minimum of three representative samples shall be taken from varied locations for each soil to be used or amended for planting purposes.
3. Report suitability of tested soil for plant growth.

    a. Based upon the test results, state recommendations for soil treatments and soil amendments to be incorporated. State recommendations in weight per 1000 sq. ft. (92.9 sq. m) or volume per cu. yd. (0.76 cu. m) for nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce satisfactory planting soil suitable for healthy, viable plants.
    b. Report presence of problem salts, minerals, or heavy metals, including aluminum, arsenic, barium, cadmium, chromium, cobalt, lead, lithium, and vanadium. If such problem materials are present, provide additional recommendations for corrective action.

D. Provide quality, size, genus, species, and variety of plants indicated, complying with applicable requirements in ANSI Z60.1.

1. Selection of plants purchased under allowances will be made by Architect, who will tag plants at their place of growth before they are prepared for transplanting.

E. Measurements: Measure according to ANSI Z60.1. Do not prune to obtain required sizes.

1. Trees and Shrubs: Measure with branches and trunks or canes in their normal position. Take height measurements from or near the top of the root flare for field-grown stock and container grown stock. Measure main body of tree or shrub for height and spread; do not measure branches or roots tip to tip. Take caliper measurements 6 inches (150 mm) above the root flare for trees up to 4-inch (100-mm) caliper size, and 12 inches (300 mm) above the root flare for larger sizes.
2. Other Plants: Measure with stems, petioles, and foliage in their normal position.

F. Plant Material Observation: Architect may observe plant material either at place of growth or at site before planting for compliance with requirements for genus, species, variety, cultivar, size, and quality. Architect retains right to observe trees and shrubs further for size and condition of balls and root systems, pests, disease symptoms, injuries, and latent defects and to reject unsatisfactory or defective material at any time during progress of work. Remove rejected trees or shrubs immediately from Project site.

1. Notify Architect of sources of planting materials seven days in advance of delivery to site.

G. Preinstallation Conference: Conduct conference at Project site.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of conformance with state and federal laws if applicable.

B. Bulk Materials:

1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
3. Accompany each delivery of bulk fertilizers and soil amendments with appropriate certificates.

C. Do not prune trees and shrubs before delivery. Protect bark, branches, and root systems from sun scald, drying, wind burn, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie trees or shrubs in such a manner as to destroy their natural shape. Provide protective covering of plants during shipping and delivery. Do not drop plants during delivery and handling.

D. Handle planting stock by root ball.

E. Store bulbs, corms, and tubers in a dry place at 60 to 65 deg F (16 to 18 deg C) until planting.

F. Deliver plants after preparations for planting have been completed, and install immediately. If planting is delayed more than six hours after delivery, set plants and trees in their appropriate aspect (sun, filtered sun, or shade), protect from weather and mechanical damage, and keep roots moist.

1. Set balled stock on ground and cover ball with soil, peat moss, sawdust, or other acceptable material.
2. Do not remove container-grown stock from containers before time of planting.
3. Water root systems of plants stored on-site deeply and thoroughly with a fine-mist spray. Water as often as necessary to maintain root systems in a moist, but not overly-wet condition.
4. Plants to be installed within 72 hours of delivery to site.

1.7 PROJECT CONDITIONS

A. Field Measurements: Verify actual grade elevations, service and utility locations, irrigation system components, and dimensions of plantings and construction contiguous with new plantings by field measurements before proceeding with planting work.

B. Interruption of Existing Services or Utilities: Do not interrupt services or utilities to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary services or utilities according to requirements indicated:

1. Notify Architect and Owner no fewer than seven days in advance of proposed interruption of each service or utility.
2. Do not proceed with interruption of services or utilities without Architect's and Owner's written permission.

C. Planting Restrictions: Plant during one of the following periods. Coordinate planting periods with maintenance periods to provide required maintenance from date of Substantial Completion.

D. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions and warranty requirements.

E. Coordination with Turf Areas (Lawns): Plant trees, shrubs, and other plants after finish grades are established and before planting turf areas unless otherwise indicated.

1. When planting trees, shrubs, and other plants after planting turf areas, protect turf areas, and promptly repair damage caused by planting operations.

1.8 WARRANTY

A. Special Warranty: Installer agrees to repair or replace plantings and accessories that fail in materials, workmanship, or growth within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Death and unsatisfactory growth, eg. damage or shock and “die back,” except for defects resulting from abuse, must be demonstrated by contractor or acknowledged by owner, lack of adequate maintenance, or neglect by Owner, or incidents that are beyond Contractor's control as deemed appropriate by designer.
b. Structural failures including plantings falling or blowing over.

2. Warranty Periods from Date of Substantial Completion:

a. Trees, Shrubs, Vines, and Ornamental Grasses: 12 months.
b. Ground Covers, Biennials, Perennials, and Other Plants: 12 months.

3. Include the following remedial actions as a minimum:

a. Immediately remove dead plants and replace unless required to plant in the succeeding planting season.
b. Replace plants that are more than 25 percent dead or in an unhealthy condition at end of warranty period.
c. A limit of one replacement of each plant will be required except for losses or replacements due to failure to comply with requirements.
d. Provide extended warranty for period equal to original warranty period, for replaced plant material.

1.9 MAINTENANCE SERVICE

A. Initial Maintenance Service for Trees and Shrubs: Provide maintenance by skilled employees of landscape Installer. Maintain as required in Part 3. Begin maintenance immediately after plants are installed and continue until Beneficial Occupancy (acceptance of landscape).

B. Initial Maintenance Service for Ground Cover and Other Plants: Provide maintenance by skilled employees of landscape Installer. Maintain as required in Part 3. Begin maintenance immediately after plants are installed and continue until Beneficial Occupancy (acceptance of landscape).

PART 2 - PRODUCTS

2.1 PLANT MATERIAL

A. General: Furnish nursery-grown plants true to genus, species, variety, cultivar, stem form, shearing, and other features indicated in Plant Schedule or Plant Legend shown on Drawings and complying with ANSI Z60.1; and with healthy root systems developed by transplanting or root pruning. Provide well-shaped, fully branched, healthy, vigorous stock, densely foliated when in leaf and free of disease, pests, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement.

1. Trees with damaged, crooked, or multiple leaders; tight vertical branches where bark is squeezed between two branches or between branch and trunk ("included bark"); crossing trunks; cut-off limbs more than 3/4 inch (19 mm) in diameter; or with stem girdling roots will be rejected.

2. Collected Stock: Do not use plants harvested from the wild, from native stands, from an established landscape planting, or not grown in a nursery unless otherwise indicated.

B. Provide plants of sizes, grades, and ball or container sizes complying with ANSI Z60.1 for types and form of plants required. Plants of a larger size may be used if acceptable to Architect, with a proportionate increase in size of roots or balls.

C. Root-Ball Depth: Furnish trees and shrubs with root balls measured from top of root ball, which shall begin at root flare according to ANSI Z60.1. Root flare shall be visible before planting.

D. Labeling: Label at least one plant of each variety, size, and caliper with a securely attached, waterproof tag bearing legible designation of common name and full scientific name, including genus and species. Include nomenclature for hybrid, variety, or cultivar, if applicable for the plant as shown on Drawings.

E. If formal arrangements or consecutive order of plants is shown on Drawings, select stock for uniform height and spread, and number the labels to assure symmetry in planting.

F. Annuals and Biennials: Provide healthy, disease-free plants of species and variety shown or listed, with well-established root systems reaching to sides of the container to maintain a firm ball, but not with excessive root growth encircling the container. Provide only plants that are acclimated to outdoor conditions before delivery and that are in bud but not yet in bloom.

2.2 ORGANIC SOIL AMENDMENTS

A. Compost: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through **1/2-inch (13-mm)** sieve; soluble salt content of 5 to 10 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:

1. Organic Matter Content: 50 percent of dry weight.
2. Feedstock: Agricultural, food, or industrial residuals; biosolids; yard trimmings; or source-separated or compostable mixed solid waste.

B. Sphagnum Peat: Partially decomposed sphagnum peat moss, finely divided or granular texture, with a pH range of 3.4 to 4.8.

C. Wood Derivatives: Decomposed, nitrogen-treated sawdust, ground bark, or wood waste; of uniform texture and free of chips, stones, sticks, soil, or toxic materials.

D. Manure: Well-rotted, unleached, stable or cattle manure containing not more than 25 percent by volume of straw, sawdust, or other bedding materials; free of toxic substances, stones, sticks, soil, weed seed, debris, and material harmful to plant growth.

2.3 FERTILIZERS

A. Bonemeal: Commercial, raw or steamed, finely ground; a minimum of 4 percent nitrogen and 20 percent phosphoric acid.

B. Superphosphate: Commercial, phosphate mixture, soluble; a minimum of 20 percent available phosphoric acid.

C. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:

1. Composition: 1 lb/1000 sq. ft. (0.45 kg/92.9 sq. m) of actual nitrogen, 4 percent phosphorous, and 2 percent potassium, by weight.
2. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.

D. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:

1. Composition: 20 percent nitrogen, 10 percent phosphorous, and 10 percent potassium, by weight.
2. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.

2.4 PLANTING SOILS

A. Planting Soil: ASTM D 5268 topsoil, with pH range of 5.5 to 7, a minimum of 4 percent organic material content; free of stones 1/2 inch (12.5 mm) or larger in any dimension and other extraneous materials harmful to plant growth. Mix ASTM D 5268 topsoil with the following soil amendments and fertilizers in the following quantities to produce planting soil:

1. Ratio of Loose Compost to Topsoil by Volume: 1:3 or 33%.
2. Ratio of Loose Sphagnum Peat to Topsoil by Volume: 33%.
3. Weight of Superphosphate per 1000 Sq. Ft. (92.9 Sq. m): 30%.
4. Weight of Commercial Fertilizer per 1000 Sq. Ft. (92.9 Sq. m): per loose directions.

2.5 MULCHES

A. Compost Mulch: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through 1-inch (25-mm) sieve; soluble salt content of 2 to 5 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:

1. Double hammered shredded, composted hardwood mulch.

2.6 PESTICIDES

A. General: Pesticide registered and approved by EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.

B. Pre-Emergent Herbicide (Selective and Non-Selective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.

C. Post-Emergent Herbicide (Selective and Non-Selective): Effective for controlling weed growth that has already germinated.

2.7 MISCELLANEOUS PRODUCTS

A. Wood Pressure-Preservative Treatment: AWPA C2, with waterborne preservative for soil and freshwater use, acceptable to authorities having jurisdiction, and containing no arsenic; including ammoniacal copper arsenate, ammoniacal copper zinc arsenate, and chromated copper arsenate.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to receive plants for compliance with requirements and conditions affecting installation and performance.

1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
2. Do not mix or place soils and soil amendments in frozen, wet, or muddy conditions.
3. Suspend soil spreading, grading, and tilling operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
4. Uniformly moisten excessively dry soil that is not workable and which is too dusty.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

C. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by Architect and replace with new planting soil.

3.2 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities and turf areas and existing plants from damage caused by planting operations.

B. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

C. Lay out individual tree and shrub locations and areas for multiple plantings. Stake locations, outline areas, adjust locations when requested, and obtain Architect's acceptance of layout before excavating or planting. Make minor adjustments as required.

D. Lay out plants at locations directed by Architect. Stake locations of individual trees and shrubs and outline areas for multiple plantings.

3.3 PLANTING AREA ESTABLISHMENT

A. Loosen subgrade of planting areas to a minimum depth of 6 inches (150 mm). Remove stones larger than 1 inch (25 mm) in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.

1. Apply superphosphate fertilizer directly to subgrade before loosening.
2. Spread topsoil, apply soil amendments and fertilizer on surface, and thoroughly blend planting soil.

    a. Delay mixing fertilizer with planting soil if planting will not proceed within a few days.

3. Spread planting soil to a depth of 6 inches (150 mm) but not less than required to meet finish grades after natural settlement. Do not spread if planting soil or subgrade is frozen, muddy, or excessively wet.

    a. Spread approximately one-half the thickness of planting soil over loosened subgrade. Mix thoroughly into top 4 inches (100 mm) of subgrade. Spread remainder of planting soil.

B. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.

C. Before planting, obtain Architect's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

3.4 EXCAVATION FOR TREES AND SHRUBS

A. Planting Pits and Trenches: Excavate circular planting pits with sides sloping inward at a 45-degree angle. Excavations with vertical sides are not acceptable. Trim perimeter of bottom leaving center area of bottom raised slightly to support root ball and assist in drainage away from center. Do not further disturb base. Ensure that root ball will sit on undisturbed base soil to prevent settling. Scarify sides of planting pit smeared or smoothed during excavation.

1. Excavate approximately three times as wide as ball diameter for balled and burlapped container-grown stock.
2. Excavate at least 12 inches (300 mm) wider than root spread and deep enough to accommodate vertical roots for bare-root stock.
3. Do not excavate deeper than depth of the root ball, measured from the root flare to the bottom of the root ball.
4. If area under the plant was initially dug too deep, add soil to raise it to the correct level and thoroughly tamp the added soil to prevent settling.
5. Maintain required angles of repose of adjacent materials as shown on the Drawings. Do not excavate subgrades of adjacent paving, structures, hardscapes, or other new or existing improvements.
6. Maintain supervision of excavations during working hours.
7. Keep excavations covered or otherwise protected after working hours.
8. If drain tile is shown on Drawings or required under planting areas, excavate to top of porous backfill over tile.
9. For tree islands in parking lot: Remove all soil within island to a depth of 3 feet, replace excavated soil with clean topsoil.

B. Subsoil and topsoil removed from excavations may be used as planting soil, if properly amended.

C. Obstructions: Notify Architect if unexpected rock or obstructions detrimental to trees or shrubs are encountered in excavations.

1. Hardpan Layer: Drill 6-inch- (150-mm-) diameter holes, 24 inches (600 mm) apart, into free-draining strata or to a depth of 10 feet (3 m), whichever is less, and backfill with free-draining material.

D. Drainage: Notify Architect if subsoil conditions evidence unexpected water seepage or retention in tree or shrub planting pits.

E. Fill excavations with water and allow to percolate away before positioning trees and shrubs.

3.5 TREE, SHRUB, AND VINE PLANTING

A. Before planting, verify that root flare is visible at top of root ball according to ANSI Z60.1. If root flare is not visible, remove soil in a level manner from the root ball to where the top-most root emerges from the trunk. After soil removal to expose the root flare, verify that root ball still meets size requirements.

B. Remove stem girdling roots and kinked roots. Remove injured roots by cutting cleanly; do not break.

C. Set balled and burlapped stock plumb and in center of planting pit or trench with root flare 1 inch (25 mm) above adjacent finish grades.

1. Use planting soil Insert drawing designation for backfill.
2. After placing some backfill around root ball to stabilize plant, carefully cut and remove burlap, rope, and wire baskets from tops of root balls and from sides, but do not remove from under root balls. Remove pallets, if any, before setting. Do not use planting stock if root ball is cracked or broken before or during planting operation.
3. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
4. Continue backfilling process. Water again after placing and tamping final layer of soil.

D. Set container-grown stock plumb and in center of planting pit or trench with root flare 1 inch (25 mm) above adjacent finish grades.

1. Use planting soil for backfill.
2. Carefully remove root ball from container without damaging root ball or plant.
3. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
4. Continue backfilling process. Water again after placing and tamping final layer of soil.

E. When planting on slopes, set the plant so the root flare on the uphill side is flush with the surrounding soil on the slope; the edge of the root ball on the downhill side will be above the surrounding soil. Apply enough soil to cover the downhill side of the root ball.

F. NOTE: Staking recommended although decision is contractor's to make. Blown over trees and damaged root balls belong to contractor during warranty. See detail.

3.6 MECHANIZED TREE SPADE PLANTING

A. Trees may be planted with an approved mechanized tree spade at the designated locations. Do not use tree spade to move trees larger than the maximum size allowed for a similar field-grown, balled-and-burlapped root-ball diameter according to ANSI Z60.1, or larger than the manufacturer's maximum size recommendation for the tree spade being used, whichever is smaller.

B. When extracting the tree, center the trunk within the tree spade and move tree with a solid ball of earth.

C. Cut exposed roots cleanly during transplanting operations.

D. Use the same tree spade to excavate the planting hole as was used to extract and transport the tree.

E. Plant trees as shown on Drawings, following procedures in "Tree, Shrub, and Vine Planting" Article.

F. Where possible, orient the tree in the same direction as in its original location.

3.7 GROUND COVER AND PLANT PLANTING

A. Set out and space ground cover and plants other than trees, shrubs, and vines as indicated in even rows with triangular spacing.

B. Use planting soil for backfill.

C. Dig holes large enough to allow spreading of roots.

D. For rooted cutting plants supplied in flats, plant each in a manner that will minimally disturb the root system but to a depth not less than two nodes.

E. Work soil around roots to eliminate air pockets and leave a slight saucer indentation around plants to hold water.

F. Water thoroughly after planting, taking care not to cover plant crowns with wet soil.

G. Protect plants from hot sun and wind; remove protection if plants show evidence of recovery from transplanting shock.

3.8 PLANTING AREA MULCHING

A. Mulch backfilled surfaces of planting areas and other areas indicated.

3.9 PLANT MAINTENANCE

A. Maintain plantings by pruning, cultivating, watering, weeding, fertilizing, mulching, restoring planting saucers, adjusting and repairing tree-stabilization devices, resetting to proper grades or

vertical position, and performing other operations as required to establish healthy, viable plantings. Spray or treat as required to keep trees and shrubs free of insects and disease.

B. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace mulch materials damaged or lost in areas of subsidence.

C. Apply treatments as required to keep plant materials, planted areas, and soils free of pests and pathogens or disease. Use integrated past management practices whenever possible to minimize the use of pesticides and reduce hazards. Treatments include physical controls such as hosing off foliage, mechanical controls such as traps, and biological control agents.

3.10 PESTICIDE APPLICATION

A. Apply pesticides and other chemical products and biological control agents in accordance with authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.

B. Pre-Emergent Herbicides (Selective and Non-Selective): Apply to tree, shrub, and ground-cover areas in accordance with manufacturer's written recommendations. Do not apply to seeded areas.

C. Post-Emergent Herbicides (Selective and Non-Selective): Apply only as necessary to treat already-germinated weeds and in accordance with manufacturer's written recommendations.

3.11 CLEANUP AND PROTECTION

A. During planting, keep adjacent paving and construction clean and work area in an orderly condition.

B. Protect plants from damage due to landscape operations and operations of other contractors and trades. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged plantings.

C. After installation and before Substantial Completion, remove nursery tags, nursery stakes, tie tape, labels, wire, burlap, and other debris from plant material, planting areas, and Project site.

3.12 DISPOSAL

A. Remove surplus soil and waste material including excess subsoil, unsuitable soil, trash, and debris and legally dispose of them off Owner's property.

END OF SECTION 32 93 00

SECTION 33 05 00 - COMMON WORK RESULTS FOR UTILITIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Piping joining materials.
2. Transition fittings.
3. Dielectric fittings.
4. Sleeves.
5. Identification devices.
6. Grout.
7. Flowable fill.
8. Piped utility demolition.
9. Piping system common requirements.
10. Equipment installation common requirements.
11. Painting.
12. Concrete bases.
13. Metal supports and anchorages.

B. This Section includes utility piping and related components outside the building.

1.3 DEFINITIONS

A. Exposed Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions.
B. Concealed Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.
C. ABS: Acrylonitrile-butadiene-styrene plastic.
D. CPVC: Chlorinated polyvinyl chloride plastic.
E. PE: Polyethylene plastic.
F. PVC: Polyvinyl chloride plastic.

1.4 SUBMITTALS

A. Product Data: For the following:

1. Dielectric fittings.
2. Identification devices.

B. Welding certificates.

1.5 QUALITY ASSURANCE

A. Steel Support Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
B. Steel Piping Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."

1. Comply with provisions in ASME B31 Series, "Code for Pressure Piping."
2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.

C. Comply with ASME A13.1 for lettering size, length of color field, colors, and viewing angles of identification devices.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver pipes and tubes 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.
B. Store plastic pipes protected from direct sunlight. Support to prevent sagging and bending.

1.7 COORDINATION

A. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.
B. Coordinate installation of identifying devices after completing covering and painting if devices are applied to surfaces.
C. Coordinate size and location of concrete bases. Formwork, reinforcement, and concrete requirements are specified in Division 03.

PART 2 - PRODUCTS

2.1 PIPING JOINING MATERIALS

A. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.

1. ASME B16.21, nonmetallic, flat, asbestos free, 1/8-inch (3.2-mm) maximum thickness, unless otherwise indicated.

a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.

2. AWWA C110, rubber, flat face, 1/8 inch (3.2 mm) thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.

B. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.
C. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.
D. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.
E. Brazing Filler Metals: AWS A5.8, BCuP Series, copper-phosphorus alloys for general-duty brazing, unless otherwise indicated; and AWS A5.8, BAg1, silver alloy for refrigerant piping, unless otherwise indicated.
F. Welding Filler Metals: Comply with AWS D10.12/D10.12M for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.
G. Solvent Cements for Joining Plastic Piping:

1. ABS Piping: ASTM D 2235.
2. CPVC Piping: ASTM F 493.
3. PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.
4. PVC to ABS Piping Transition: ASTM D 3138.

H. Fiberglass Pipe Adhesive: As furnished or recommended by pipe manufacturer.

2.2 TRANSITION FITTINGS

A. Transition Fittings, General: Same size as, and with pressure rating at least equal to and with ends compatible with, piping to be joined.
B. Transition Couplings NPS 1-1/2 (DN 40) and Smaller:

1. Underground Piping: Manufactured piping coupling or specified piping system fitting.
2. Aboveground Piping: Specified piping system fitting.

C. AWWA Transition Couplings NPS 2 (DN 50) and Larger:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

   a. Cascade Waterworks Mfg. Co.
   b. Dresser, Inc.; DMD Div.
   c. Ford Meter Box Company, Inc. (The); Pipe Products Div.
   d. JCM Industries.
   e. Smith-Blair, Inc.
   f. Viking Johnson.

2. Description: AWWA C219, metal sleeve-type coupling for underground pressure piping.

2.3 SLEEVES

A. Mechanical sleeve seals for pipe penetrations are specified in Division 22 Section "Common Work Results for Plumbing."
B. Galvanized-Steel Sheet Sleeves: 0.0239-inch (0.6-mm) minimum thickness; round tube closed with welded longitudinal joint.
C. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized, plain ends.

D. Cast-Iron Sleeves: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.

E. Molded PVC Sleeves: Permanent, with nailing flange for attaching to wooden forms.
F. PVC Pipe Sleeves: ASTM D 1785, Schedule 40.
G. Molded PE Sleeves: Reusable, PE, tapered-cup shaped, and smooth outer surface with nailing flange for attaching to wooden forms.

2.4 IDENTIFICATION DEVICES

A. Plastic Tape: Manufacturer's standard color-coded, pressure-sensitive, self-adhesive vinyl tape, at least 3 mils (0.08 mm) thick.

1. Width: 1-1/2 inches (40 mm) on pipes with OD, including insulation, less than 6 inches (150 mm); 2-1/2 inches (65 mm) for larger pipes.
2. Color: Comply with ASME A13.1, unless otherwise indicated.

2.5 GROUT

A. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.

1. Characteristics: Post hardening, volume adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
2. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.
3. Packaging: Premixed and factory packaged.

2.6 FLOWABLE FILL

A. Description: Low-strength-concrete, flowable-slurry mix.

1. Cement: ASTM C 150, Type I, portland.
2. Density: 115- to 145-lb/cu. ft. (1840- to 2325-kg/cu. m).
3. Aggregates: ASTM C 33, natural sand, fine and crushed gravel or stone, coarse.
4. Aggregates: ASTM C 33, natural sand, fine.
5. Admixture: ASTM C 618, fly-ash mineral.
6. Water: Comply with ASTM C 94/C 94M.
7. Strength: 100 to 200 psig (690 to 1380 kPa) at 28 days.

PART 3 - EXECUTION

3.1 PIPED UTILITY DEMOLITION

A. Refer to Division 01 Section "Cutting and Patching" and Division 02 Section "Selective Structure Demolition" for general demolition requirements and procedures.
B. Disconnect, demolish, and remove piped utility systems, equipment, and components indicated to be removed.

1. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
2. Piping to Be Abandoned in Place: Drain piping. Fill abandoned piping with flowable fill, and cap or plug piping with same or compatible piping material.
3. Equipment to Be Removed: Disconnect and cap services and remove equipment.
4. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make operational.
5. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.

C. If pipe, insulation, or equipment to remain is damaged in appearance or is unserviceable, remove damaged or unserviceable portions and replace with new products of equal capacity and quality.

3.2 PIPING INSTALLATION

A. Install piping according to the following requirements and Division 33 Sections specifying piping systems.
B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction

loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on the Coordination Drawings.

C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
D. Install piping to permit valve servicing.
E. Install piping at indicated slopes.
F. Install piping free of sags and bends.
G. Install fittings for changes in direction and branch connections.
H. Select system components with pressure rating equal to or greater than system operating pressure.

I. Sleeves are not required for core-drilled holes.

J. Permanent sleeves are not required for holes formed by removable PE sleeves.

3.3 PIPING JOINT CONSTRUCTION

A. Join pipe and fittings according to the following requirements and Division 33 Sections specifying piping systems.
B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
D. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

    1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
    2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

E. Welded Joints: Construct joints according to AWS D10.12/D10.12M, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.
F. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.
G. Grooved Joints: Assemble joints with grooved-end pipe coupling with coupling housing, gasket, lubricant, and bolts according to coupling and fitting manufacturer's written instructions.

H. Soldered Joints: Apply ASTM B 813 water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy (0.20 percent maximum lead content) complying with ASTM B 32.

I. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.

J. Pressure-Sealed Joints: Assemble joints for plain-end copper tube and mechanical pressure seal fitting with proprietary crimping tool to according to fitting manufacturer's written instructions.

K. Plastic Piping Solvent-Cemented Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:

1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
2. ABS Piping: Join according to ASTM D 2235 and ASTM D 2661 appendixes.
3. CPVC Piping: Join according to ASTM D 2846/D 2846M Appendix.
4. PVC Pressure Piping: Join schedule number ASTM D 1785, PVC pipe and PVC socket fittings according to ASTM D 2672. Join other-than-schedule-number PVC pipe and socket fittings according to ASTM D 2855.
5. PVC Nonpressure Piping: Join according to ASTM D 2855.
6. PVC to ABS Nonpressure Transition Fittings: Join according to ASTM D 3138 Appendix.

L. Plastic Pressure Piping Gasketed Joints: Join according to ASTM D 3139.

M. Plastic Nonpressure Piping Gasketed Joints: Join according to ASTM D 3212.

N. Plastic Piping Heat-Fusion Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join according to ASTM D 2657.

1. Plain-End PE Pipe and Fittings: Use butt fusion.
2. Plain-End PE Pipe and Socket Fittings: Use socket fusion.

O. Bonded Joints: Prepare pipe ends and fittings, apply adhesive, and join according to pipe manufacturer's written instructions.

3.4 PIPING CONNECTIONS

A. Make connections according to the following, unless otherwise indicated:

1. Install unions, in piping NPS 2 (DN 50) and smaller, adjacent to each valve and at final connection to each piece of equipment.
2. Install flanges, in piping NPS 2-1/2 (DN 65) and larger, adjacent to flanged valves and at final connection to each piece of equipment.
3. Install dielectric fittings at connections of dissimilar metal pipes.

3.5 EQUIPMENT INSTALLATION

A. Install equipment level and plumb, unless otherwise indicated.

B. Install equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference with other installations. Extend grease fittings to an accessible location.
C. Install equipment to allow right of way to piping systems installed at required slope.

3.6 PAINTING

A. Painting of piped utility systems, equipment, and components is specified in Division 09 painting Sections.
B. Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

3.7 IDENTIFICATION

A. Piping Systems: Install pipe markers on each system. Include arrows showing normal direction of flow.

1. Stenciled Markers: According to ASME A13.1.
2. Plastic markers, with application systems. Install on insulation segment if required for hot noninsulated piping.
3. Locate pipe markers on exposed piping according to the following:

    a. Near each valve and control device.
    b. Near each branch, excluding short takeoffs for equipment and terminal units. Mark each pipe at branch if flow pattern is not obvious.
    c. Near locations where pipes pass through walls or floors or enter inaccessible enclosures.
    d. At manholes and similar access points that permit view of concealed piping.
    e. Near major equipment items and other points of origination and termination.

B. Equipment: Install engraved plastic-laminate sign or equipment marker on or near each major item of equipment.

1. Lettering Size: Minimum 1/4 inch (6.4 mm) high for name of unit if viewing distance is less than 24 inches (610 mm), 1/2 inch (13 mm) high for distances up to 72 inches (1800 mm), and proportionately larger lettering for greater distances. Provide secondary lettering two-thirds to three-fourths of size of principal lettering.
2. Text of Signs: Provide name of identified unit. Include text to distinguish among multiple units, inform user of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations.

C. Adjusting: Relocate identifying devices that become visually blocked by work of this or other Divisions.

3.8 CONCRETE BASES

A. Concrete Bases: Anchor equipment to concrete base according to equipment manufacturer's written instructions and according to seismic codes at Project.

1. Construct concrete bases of dimensions indicated, but not less than 4 inches (100 mm) larger in both directions than supported unit.
2. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch (450-mm) centers around the full perimeter of base.
3. Install epoxy-coated anchor bolts for supported equipment that extend through concrete base, and anchor into structural concrete floor.
4. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
5. Install anchor bolts to elevations required for proper attachment to supported equipment.
6. Install anchor bolts according to anchor-bolt manufacturer's written instructions.
7. Use 3000-psi (20.7-MPa), 28-day compressive-strength concrete and reinforcement as specified in Division 03 Section "Cast-in-Place Concrete".

3.9 ERECTION OF METAL SUPPORTS AND ANCHORAGES

A. Refer to Division 05 Section "Metal Fabrications" for structural steel.
B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor piped utility materials and equipment.
C. Field Welding: Comply with AWS D1.1/D1.1M.

3.10 GROUTING

A. Mix and install grout for equipment base bearing surfaces, pump and other equipment base plates, and anchors.
B. Clean surfaces that will come into contact with grout.
C. Provide forms as required for placement of grout.
D. Avoid air entrapment during placement of grout.
E. Place grout, completely filling equipment bases.
F. Place grout on concrete bases and provide smooth bearing surface for equipment.
G. Place grout around anchors.
H. Cure placed grout.

END OF SECTION 33 05 00

33 41 00 - STORM UTILITY DRAINAGE PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes drainage systems outside the building. Systems include the following:
   1. Storm drainage pipe and fittings.
   2. Catch Basins
   3. Curb Inlets
   4. Pipe Outlets
   5. Plastic Clean outs.
   6. Manholes
   7. Storm water detention structures
   8. Concrete

B. Related Sections: The following Sections contain requirements that relate to this Section.
   1. Division 31 Section “Earth Moving” for excavation and backfilling.
   2. Division 3 Section "Cast-in-Place Concrete" for cast-in-place concrete structures.

1.3 DEFINITIONS

A. Drainage Piping: System of sewer pipe, fittings, and appurtenances for gravity flow of storm drainage.
B. RCP: Reinforced Concrete Pipe
C. PVC: Polyvinyl chloride plastic
D. HDPE: High Density Polyethylene Pipe

1.4 PERFORMANCE REQUIREMENTS

A. A.Gravity-Flow, Non-pressure, Drainage-Piping Pressure Ratings: 10-foot head of water (30kPa) Pipe joints shall be at least silt tight, unless otherwise specified.

1.5 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.
B. Product Data: For each type of product indicated.
C. Shop Drawings: For the Following:
   1. Piping, Manholes, Catch Basins, Storm Water Inlets, and Storm Water Detention Structures: Include plans, elevations, sections, details, frames, covers, and grates.

D. Coordination Drawings: Show pipe sizes, locations, and elevations. Show other piping in same trench and clearances from storm drainage system piping. Indicate interface and spatial relationship between manholes, piping, and proximate structures.
E. Reports and calculations for design mixes for each class of cast-in-place concrete.
F. Inspection and test reports specified in the "Field Quality Control" Article.

1.6 QUALITY ASSURANCE

A. Environmental Agency Compliance: Comply with regulations pertaining to storm drainage systems.
B. Utility Compliance: Comply with regulations pertaining to storm drainage systems. Include standards of water and other utilities where appropriate.
C. Product Options: Drawings indicate sizes, profiles, connections, and dimensional requirements of system components and are based on specific manufacturer types indicated. Other manufacturers' products with equal performance characteristics may be considered. Refer to Division 1 Section "Product Substitutions Prior to Bid."

1.7 DELIVERY, STORAGE, AND HANDLING

A. Do not store plastic structures in direct sunlight.
B. Do not store plastic pipe or fittings in direct sunlight.
C. Protect pipe, pipe fittings, and seals from dirt and damage.
D. Handle precast concrete manholes and other structures according to manufacturer's rigging instructions.

1.8 PROJECT CONDITIONS

A. Site Information: Perform site survey, research public utility records, and verify existing utility locations.
B. Locate existing structures and piping to be closed and abandoned.
C. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
    1. Notify Architect not less than two days in advance of proposed utility interruptions.
    2. Do not proceed with utility interruptions without Architect's written permission.

1.9 PROJECT RECORD DOCUMENTS

A. Contractor shall be responsible for preparing and submitting “As-Built” drawings by a registered South Carolina Surveyor for all storm water piping systems in the project area including work installed for this contract and existing storm water piping system.

1.10 SEQUENCING AND SCHEDULING

A. Coordinate with other utility work.

PART 2 - PRODUCTS

2.1 PIPES AND FITTINGS

A. Reinforced-Concrete Pipe and Fittings: ASTM C 76, Class III, Wall B, for gasketed joints.
   1. Gaskets: Butyl mastic compression joints.
   2. Watertight – Gravity Joints: Watertight O-Ring Gasket pipe joints.

B. PVC Pipe and fittings: According to the following:
   1. PVC pipe and fittings, NPS 10 and smaller: ASTM D 3034, SDR 35, for solvent-cemented or gasketed joints. PVC Shall be allowed only where indicated on plans.

C. Corrugated HDPE Drainage Tubing and Fittings: AASHTO M 294, TYPE S, with smooth waterway for coupling joints.
   1. Soiltight Couplings: AASHTO M 294, corrugated, matching tube and fittings to form soiltight joints.
   2. Silttight Couplings: HDPE sleeve with ASTM D 1056, Type 2, Class A, Grade 2 gasket material that mates with tube and fittings to form siltight joints.

2.2 MANHOLES

A. Heavy-Traffic Precast Circular Concrete Manholes: ASTM C 913; designed according to ASTM C 890 for A-16, heavy-traffic, structural loading; of depth, shape, and dimensions indicated, with provision for rubber gasketed joints. Concrete manholes used in vehicular travel ways shall have pipe penetrations and gasket connections fabricated in the factory, see SCDOT standard details for additional information. All openings around pipe shall be securely mortared in and watertight. Adhere to all SCDOT Specifications.
   1. Ballast: Increase thickness of one or more precast concrete sections or add concrete to structure, as required to prevent flotation.
   2. Gaskets: Joint sealants shall meet the requirements of AASHTO M198, type B.
   3. Grade Rings: Include two or three reinforced-concrete rings of 6 to 9-inch total thickness, that match 24-inch-diameter frame and cover. Grade rings to be used to raise grate to grade. Brick or block may be substituted to raise grate to grade.
   4. Steps: Manufactured from deformed, 1/2-inch steel reinforcement rod complying with ASTM A 615 and encased in polypropylene complying with ASTM D 4101. Include pattern designed to prevent lateral slippage off step. Cast or anchor into sidewalls with steps at 12 To 16-inch intervals. Omit steps for manholes less than 36 inches deep.
   5. Base Section: 6-inch minimum thickness for floor slab and 5-inch minimum thickness for walls and base riser section, and separate base slab or base section with integral floor.
   6. Riser Sections: 5-inch minimum thickness, and lengths to provide depth indicated.
   7. Top Section: Eccentric-cone type unless concentric-cone or flat-slab-top type is indicated, and top of cone of size that matches grade rings.
   8. Joint Sealant: ASTM C 990, bitumen or butyl rubber.
   9. All manhole openings shall be installed to minimize surface water intrusion through the lid and positioned not to impede mowing. In grassed areas, the opening shall be at or above surrounding grade with a continuous gradual slope down from the opening to accommodate a 72” mowing deck. In paved areas, the opening shall be 1” above the surrounding grade with a continuous gradual slope down from the opening; maximum slope is 1/3” per foot.

10. Outside of manhole shall be coated with bituminous material, to prevent infiltration, prior to placing in ground. Section joints shall be coated once placed in final position prior to backfill.
11. Entire manhole structure shall be rated for continuous vehicle traffic loading per South Carolina Department of Transportation (SCDOT) standards.
12. Smooth channels shall be made at the manhole invert to convey storm water through manholes. These channels shall be made using grout that has been shaped and formed. The space between the grout channel and the manhole walls shall be filled with grout that is shaped to promote drainage back into the channel. The use of brick is allowed in constructing this grout shelf but is not allowed elsewhere in manhole construction.

Manhole Diameter	Diameter of Largest Pipe	Min. Required
4’ Manhole	18”	-
5’ Manhole	30”	21”
6’ Manhole	-	36”

B. Manhole Frames and Covers: ASTM A 536, Grade 60-40-18, ductile-iron castings designed for heavy-duty service. Include 24-inch (610-mm) ID by 7 to 9-inch (178- to 229-mm) riser with 4-inch (100-mm) minimum width flange, and 26-inch (660-mm-) diameter cover. Include indented top design with lettering "STORM SEWER" or ‘SANITARY SEWER’ cast into cover. Ring and cover shall comply with local standards and construction details.

2.3 CATCH BASIN/DROP INLET/STORM STRUCTURES

A. Heavy-Traffic, Precast Concrete Storm Structures: ASTM C 913, precast, reinforced concrete; designed according to ASTM C 890 for A-16, heavy-traffic, structural loading; of depth, shape, and dimensions indicated, with provision for rubber gasketed joints. Adhere to all NCDOT Specifications.
1. Gaskets: Joint sealant shall meet requirements of AASHTO M198, type B.
2. Grade Brick: Use 2 or 3 courses of concrete brick to raise the grate to grade. Mortar joints between brick to be 3/8 to 5/8” thick. Both brick faces to be mortared in and water tight.
3. Riser Sections: 5-inch minimum thickness and lengths to provide depth indicated.
4. Joint Sealant: ASTM C 990, bitumen or butyl rubber.
5. Gaskets: Joint sealant shall meet requirements of AASHTO M198, type B.
6. Steps: Manufactured from deformed, 1/2-inch steel reinforcement rod complying with ASTM A 615/A 615M and encased in polypropylene complying with ASTM D 4101. Include pattern designed to prevent lateral slippage off step. Cast or anchor into sidewalls with steps at 12 to 16 inch intervals. Omit steps for manholes less than 36 inches deep.
7. Storm structure inverts/cut out shall be cast into the pre-cast structures from the manufacture’s facility as an integral process of pre-casting the structures. Otherwise, they may be skillfully saw cut into the structures on site. Do not hammer/break to create cut outs. Maintain the integrity of the structure. Any blemished, errors or compromises to the structures shall be the contractor’s responsibility to remove and replace.
8. A maximum gap from pipe to inside edge of invert/cut out opening shall be +2”. All openings around the pipes shall be securely mortared in and watertight. Maintain a minimum of 5” from pipe invert/cut out to inside edge of the storm structure wall.
9. Size boxes accordingly to connect piping to side/end panels storm boxes, do not cut corners of boxes. Storm Structure Wall Thickness 6” minimum (full width), Width/Length Dimension 30” minimum. Waffle Boxes **are not permitted**. Precast concrete boxes with full thickness and reinforcement rated at NCDOT H-20-44 are

required, see NCDOT standard details for minimum requirements. Ratio of pipe diameter to storm box size & dimension are subject to NCDOT standard details.

B. Frames and Grates: ASTM A48, Grade 30, ductile iron designed for heavy-duty service. Provide grate and frame conforming to jurisdictional requirements and as indicated on drawings.

2.4 STORMWATER INLETS

A. Combination Inlets: Made with vertical curb and horizontal gutter openings, of materials and dimensions according to utility standards. Include heavy-duty frames and grates.
B. Frames and Grates: Heavy-duty frames and grates according to utility standards.
C. Storm water inlet grates shall be ADA compliant and bicycle-safe. “Bicycle-safe” means that bicyclists can ride “smoothly” and safely over the grates when traveling across the grates from any direction at attainable speeds. Grates where bicycle tires “drop-in” or “get stuck” are not considered safe.

2.5 SPECIAL PIPE COUPLINGS AND FITTINGS

A. Gasket-Type Pipe Couplings: Rubber or elastomeric compression gasket, made to match the outside diameter of smaller pipe and inside diameter or hub of adjoining larger pipe, for non-pressure joints.
   1. Gaskets for Concrete Pipe: Butyl Mastic
   2. Gaskets for Plastic Pipe: ASTM F 477, elastomeric seal.
   3. Gaskets for Dissimilar Pipes: Compatible with pipe materials being joined.

2.6 OUTFALLS

A. Performed, reinforced concrete flared end sections.
B. Riprap: Broken stone, irregular size and shape, graded stone according to NSSGA's "Quarried Stone for Erosion and Sediment Control."
   1. class as indicated on drawings.

2.7 CONCRETE

A. General: Cast-in-place concrete according to ACI 318, ACI 350R, and the following:
   1. Cement: ASTM C 150, Type II.
   2. Fine Aggregate: ASTM C 33, sand.
   3. Coarse Aggregate: ASTM C 33, crushed gravel.
   4. Water: Potable.

B. Portland Cement Design Mix: 4000 psi (27.6 MPa) minimum, or as indicated, with 0.45 maximum water-cementitious ratio.
   1. Reinforcement Fabric: ASTM A 185, steel, welded wire fabric, plain.
   2. Reinforcement Bars: ASTM A 615, Grade 60, deformed steel.

C. Structure Channels and Benches: Factory or field formed from concrete. Portland cement design mix, 4000 psi minimum, with 0.45 maximum water-cementitious ratio.
   1. Include channels and benches in manholes.

a. Channels: Concrete invert, formed to same width as connected piping, with height of vertical sides to three-fourths of pipe diameter. Form curved channels with smooth, uniform radius and slope.
   1) Invert Slope: As indicated.
b. Benches: Concrete, sloped to drain into channel.
   1) Slope: 8 percent.

2. Include channels in catch basins.
   a. Channels: Concrete invert, formed to same width as connected piping, with height of vertical sides to three-fourths of pipe diameter. Form curved channels with smooth, uniform radius and slope.
      1) Invert Slope: As indicated.

D. Ballast and Pipe Supports: Portland cement design mix, 3000 minimum, with 0.58 maximum water-cementitious ratio.
   1. Reinforcement Fabric: ASTM A 185, steel, welded wire fabric, plain.
   2. Reinforcement Bars: ASTM A 615, Grade 60, deformed steel.

2.8 CLEANOUTS

A. PVC Cleanouts: PVC body with PVC threaded plug. Include PVC sewer pipe fitting and riser to clean out of same material as sewer piping.

2.9 MANUFACTURERS

A. 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:
   1. Gray-Iron Backwater Valves, Cleanouts, and Drains:
      a. Josam Co.
      b. BarryCraft
      c. McWane, Inc.; Tyler Pipe; Wade Div.
      d. MIFAB
      e. Smith: Jay R. Smith Mfg. Co.
      f. Watts Industries, Inc.: Ancon Drain Div.
      g. Watts Industries, Inc. Enpoco, Inc. Div.
      h. Zurn Specification Drainage Operation; Zurn Plumbing Products Group.
   2. PVC Backwater Valves and Cleanouts:
      a. Canplas, Inc.
      b. IPS Corp.
      c. NDS, Inc.
      d. Plastic Oddities, Inc.
      e. Sioux Chief Manufacturing Co., Inc.
   3. Stormwater Drainage Systems, Inc.
      a. Advanced Drainage Systems, Inc.
      b. Cultec, Inc.
      c. Hancor, Inc.
      d. Infiltrator Systems, Inc.
      e. PSA, Inc.
      f. Poly Drain #610 wire trash bucket.
   4. Plastic Cleanouts:
      a. Canplas LLC.
      b. IPS Corporation.
      c. NDS Inc.

d. Plastic Oddities; a division of Diverse Corporate Technologies, Inc.
e. Sioux Chief Manufacturing Company, Inc.
f. Zurn Light Commercial Products Operation; Zurn Plumbing Products Group.

Description: PVC body with PVC threaded plug. Include PVC sewer pipe fitting and riser to clean out of same material as sewer piping.

2.10 STORM WATER DETENTION STRUCTURES

A. See drawings for materials.

2.11 ACCESSORIES

A. Warning Tape: See Section 31 20 00 “Earthwork”, Part 2.3 for additional information.
B. Detectable Warning Tape: See Section 31 20 00 “Earthwork”, Part 2.3 for additional information.

PART 3 - EXECUTION

3.1 EARTH MOVING

A. Excavating, trenching, and backfilling are specified in Division 31 Section "Earth Moving."

3.2 IDENTIFICATION

A. Materials and their installation are specified in Division 31 Section "Earth Moving." Arrange for installation of warning tape and magnetic detectable warning tapes directly over piping and at outside edges of underground structures. Burry warning tape at 8-10” above pipe/detectable tape 24-30” below finish grade or 12” below subgrade of pavements. See Section 31 20 00 Earthwork for more information.

1. Use warning tapes or detectable warning tape over ferrous piping.
2. Use detectable warning tape over nonferrous piping and over edges of underground structures.

3.3 DRAINAGE PIPING APPLICATIONS

A. General: Include watertight, or silttight joints.
B. Refer to Part 2 of this Section for detailed specifications for pipe and fitting products listed below. Use pipe, fittings, and joining methods according to the following applications.
C. Pipe Sizes 15 to 36 Inches: Reinforced-concrete sewer pipe and fittings; Buytl mastic joints.
D. Pipe Sizes: 4 to 10 Inches: As indicated on plan.

3.4 INSTALLATION, GENERAL

A. General Locations and Arrangements: Drawings (plans and details) indicate the general location and arrangement of underground sewerage and drainage systems piping. Location and arrangement of piping layout take into account many design considerations. Install piping as indicated, to extent practical.

B. Install piping beginning at low point of systems, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's recommendations for use of lubricants, cements, and other installation requirements. Maintain swab or drag in line and pull past each joint as it is completed.

C. Use manholes for changes in direction, except where fittings are indicated. Use fittings for branch connections, except where direct tap into existing sewer is indicated. Use proper size increasers, reducers, and couplings, where different sizes or materials of pipes and fittings are connected. Reduction of the size of piping in the direction of flow is prohibited.

D. Install gravity-flow, non-pressure drainage piping according to the following:
   1. Install piping pitched down in direction of flow, at minimum slope as indicated on drawings.
   2. Install reinforced-concrete sewer piping according to ASTM C 1479 and ACPA's "Concrete Pipe Installation Manual."
   3. Install HDPE sewer piping according to ASTM D2321 and manufacturer’s written instructions.

E. Extend drainage piping and connect to building's storm drains, of sizes and in locations indicated. Terminate piping as indicated.

F. Install drainage piping pitched down in direction of flow, at slope indicated.

G. Use proper size increasers, reducers, and couplings, where different sizes or materials of pipes and fittings are connected.

H. Access to the Work shall be along public rights of way or easements indicated on the Plans. Any encroachment upon private property shall not be permitted unless the Contractor secures specific authorization from the individual property owners concerned. All properties used for access, storage, construction, etc. shall be left in “as good” condition.

I. Contractor shall contact U-LO-CO at 1-800-632-4949 for location and flagging of utilities at least forty-eight (48) hours prior to start of excavations. See “Earthwork” specifications for additional utility locating requirements.

J. Contractor shall be fully responsible for damage and repair, or replacement of any existing utility caused by construction operations.

K. All pipe, precast concrete manhole, drainage structures, grates; fittings shall be carefully handled to avoid damage and shall be inspected by the Architect or his representative prior to installation, preferably while suspended over the trench.

L. The Contractor shall install temporary watertight plugs in incomplete manholes or sewer lines prior to leaving the job site for any extended period of time. At a minimum, the pipes or manholes shall be plugged at the end of each workday.

M. Install pipe to slopes noted on drawings in the storm schedule. The maximum allowable slope variation is 1:1000 (0.1’ per 100’). All storm piping shall be installed to have positive drainage (.50% min.).

N. Clean interior of pipe and structures of dirt and other material as work progresses.

O. Plug ends of pipe of uncompleted work at the end of the day for non-active lines.

3.5 STORM PIPE BEDDING

A. RCP – Lay gravity storm sewer lines with Category I, II or III bedding as per Design Data 40 by American Concrete Pipe Association. Compaction per Design Date 40, Type 3 installation.

Class IA, IB and II per ASTM D321 may also be used. Class IA and IB must be used in wet conditions. Bedding material shall be placed on trench bottom 4-inch minimum depth. Haunching material to be Category I, II, or III, compaction per Type 3 Installation. Initial backfill from the top of the haunching material up to 12 inches above pipe top consisting of select finely divided earth, hand placed and compacted before placing the remaining backfill.

3.6 PIPE JOINT CONSTRUCTION AND INSTALLATION

A. General: Join and install pipe and fittings according to the following.
B. Install with top surfaces of components, except piping, flush with final finished surface.
C. Concrete Pipe and Fittings: Install according to ACPA "Concrete Pipe Handbook." Use the following seals:
   1. Round Pipe and Fittings: Butyl Mastic Joint
D. Polyvinyl Chloride (PVC) Plastic Pipe and Fittings: As follows:
   1. Join solvent-cement-joint pipe and fittings with solvent cement according to ASTM D 2855 and ASTM F 402.
   2. Join pipe and gasketed fittings with elastomeric seals according to ASTM D 2321.
   3. Join profile sewer pipe and ribbed drainpipe and gasketed fittings with elastomeric seals according to ASTM D 2321 and manufacturer's written instruction.
   4. Install according to ASTM D 2321.
E. System Piping Joints: Make joints using system manufacturer's couplings, except where otherwise specified.
F. Join piping made of different materials or dimensions with couplings made for this application. Use couplings that are compatible with and fit both systems' materials and dimensions.

3.7 STORM DRAINAGE INLET AND OUTFALL INSTALLATION

A. Construct riprap of broken stone, as indicated.
B. Install outlets that spill onto grade, with flared end sections that match pipe, where indicated.

3.8 MANHOLE INSTALLATION

A. General: Install manholes, complete with appurtenances and accessories indicated.
B. Form continuous concrete channels and benches between inlets and outlet.
C. Set tops of frames and covers flush with finished surface of manholes that occur in pavements. Set tops 3 inches above finished surface elsewhere, unless otherwise indicated.
D. Install precast concrete manhole sections with gaskets according to ASTM C 891.
E. Construct cast-in-place manholes as indicated.

3.9 CATCH-BASIN INSTALLATION

A. Construct catch basins to sizes and shapes indicated.
B. Set frames and grates to elevations indicated.

3.10 CONCRETE PLACEMENT

A. Place cast-in-place concrete according to ACI 318, ACI 350R, and as indicated.

3.11 TAP CONNECTIONS

A. Make connections to existing piping and underground structures so finished work conforms as nearly as practical to requirements specified for new work.

B. Use commercially manufactured wye fittings for piping branch connections. Remove section of existing pipe, install wye fitting into existing piping, and encase entire wye fitting plus 6-inch overlap, with not less than 6 inches of 3000-psi, 28-day, compressive-strength concrete. Tap shall be made by local utility company, fee paid by contractor.

C. Protect existing piping and structures to prevent concrete or debris from entering while making tap connections. Remove debris or other extraneous material that may accumulate.

3.12 CLEANOUT INSTALLATION

A. Install cleanouts and riser extension from sewer pipe to cleanout at grade. Use cast-iron soil pipe fittings in sewer pipes at branches for cleanouts and cast-iron soil pipe for riser extensions to cleanouts. Install piping so cleanouts open in direction of flow in sewer pipe.

B. Set cleanout frames and covers in earth in cast-in-place concrete block, 18 by 18 by 12 inches deep. Set with tops 1/2 inch above surrounding earth grade.

C. Set cleanout frames and covers in concrete pavement with tops flush with pavement surface.

3.13 FIELD QUALITY CONTROL

A. Clear interior of piping and structures of dirt and superfluous material as the work progresses. Maintain swab or drag in piping and pull past each joint as it is completed.
   1. In large, accessible piping, brushes and brooms may be used for cleaning.
   2. Place plug in end of incomplete piping at end of day and whenever work stops.
   3. Flush piping between manholes and other structures, if required by authorities having jurisdiction, to remove collected debris.

B. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place, and again at completion of the Project.
   1. Submit separate reports for each system inspection including existing downstream networks which the project is directly tying into. Existing downstream networks should be inspected by camera with revolutions at each joint. Submit recorded videos for review and approval.
   2. Defects requiring correction include the following:
      a. Alignment: Less than full diameter of inside of pipe is visual between structures.
      b. Deflection: Flexible piping with deflection that prevents passage of a ball or cylinder of a size not less than 92.5 percent of piping diameter.
      c. Crushed, broken, cracked, or otherwise damaged piping.
      d. Infiltration: Water leakage into piping.
      e. Exfiltration: Water leakage from or around piping.
   3. Replace defective piping using new materials and repeat inspections until defects are within allowances specified.
   4. Reinspect and repeat the procedure until results are satisfactory.

C. Test new piping systems and parts of existing systems that have been altered, extended, or repaired for leaks and defects.
   1. Do not enclose, cover, or put into service before inspection and approval.
   2. Test completed piping systems according to authorities having jurisdiction.

3. Schedule tests, and their inspections by authorities having jurisdiction, with at least 24 hours' advance notice.
4. Submit separate reports for each test.
5. Replace leaking piping using new materials and repeat testing until leakage is within allowances specified.
6. As Built: Sealed survey required prior to acceptance indicating vertical and horizontal locations of the entire system.

   Contractor shall provide a field verify record documented conditions 'As-Built' Record Document(s). Record Documents shall be signed and sealed by a Professional Registered SC Land Surveyor for the entire storm system including all permanent storm ponds (stormwater and water quality systems). 'As-Built' documents shall accurately document the field verified constructed system of the entire system including material & size of all pipes, structures, ancillary structures, pipes, pipe inverts & rims, FES, fittings stormwater pond/stormwater bmp (pipes, structures, ground shots/proposed pond grading ie), etc including both vertical / horizontal identifications.

   As-Built Document shall be submitted to the Owner/Owners Project Representative for review and Final Approval/Acceptance prior to request for Substantial Completion. If As-Built material is in conflict, represents deficiencies or unacceptable to the Owner and the proposed storm system design. The contractor shall make the field corrections necessary to bring the constructed system in compliance with the Bid Documents per Base Bid requirement. These modifications shall be completed within the time frame of the Base Contract/Substantial Completion schedule.

D. HDPE Performance Assurance:
   1. Upon completion of final backfill, all lines shall be checked for deflection by pulling a nine-point mandrel through the line or by taking diameter measurements (a minimum of 4 measurements space equal distance apart at each location) at completion of final backfill and again at 11 months after installation. If diameter measurements are taken in lieu of pulling a mandrel, each pipe shall be measured at the joint and a distance of 1/3 the length from each end. Maximum allowable deflection shall be 5 percent. If any pipeline fails to pass the deflection test, the pipe shall be removed and replaced with new pipe at no expense to the Owner within the next 30 days. The new pipe shall be retested at completion of final backfill and 11 months. Contractor to perform testing with Owner’s representative present. Re-rounding of installed pipe shall not be allowed.

3.14 CLEANING

A. Clean interior of piping of dirt and superfluous materials. Flush with potable water.
B. Downstream drainage networks which the project is tying directly into shall be cleaned to the point where they daylight into open channels.

END OF SECTON 33 41 00