

September 22nd, 2023

ADDENDUM NO. 1

PROJECT: **FORMER WHEELS SKATING CENTER UPFIT – CITY OF DURHAM**

FROM: DTW ARCHITECTS & PLANNERS, LTD.
3333 Durham Chapel Hill Blvd, Suite D100
DURHAM, NC 277078
Phone: 919.317.4020 Fax: 919.317.4023 Email: info@dtwarch.com

TO: PRIME BIDDERS

This addendum containing the following additions, clarifications, and/or changes, is issued prior to receipt of bids and does hereby become part of the original Contract Documents dated September 1, 2023 and supersedes the original documents in case of conflict. Acknowledge receipt of this Addendum in the space provided on the Bid Form. Failure to do so will result in the disqualification of the corresponding bid.

This addendum consists of:

- 02 Sheets – Addendum Index and Questions
- 80 Sheets – Changes to Specifications (8 ½ x 11)
- 03 Sheets – Pre-bid Meeting Notes (8 ½ x 11)
- 03 Sheets – Changes to Architectural Drawings (24 x 36)
- 07 Sheets – Changes to Site/Civil Drawings (24x36)
- 03 Sheets – Changes to PME Drawings (24 x 36)

1) CHANGES TO SPECIFICATIONS (8-1/2 X 11)

- a) Delete and replace the following site specification sections:
 - i) 311000 – Site Clearing
 - ii) 312000 – Earth Moving
 - iii) 312500 – Erosion & Sediment Controls
 - iv) 321216 – Asphalt Paving
 - v) 321313 – Concrete Paving
 - vi) 329000 – Planting
 - vii) 331000 – Site Water Utilities
 - viii) 333000 – Site Sanitary Sewer Utilities
 - ix) 334000 – Site Storm Drainage Utilities

- b) Section 096800 – Carpeting
 - i) Delete entire section 2-01 Wall Carpet – Carpet “B” and add the following:
 - “2-02 Wall Carpet – Carpet “B”
 - A) Carpet shall be equal to Metrowall II by Shaw Floors with the following specifications:
 - a. Broadloom
 - b. Solution Dyed
 - c. Construction: 3.5 mm rib wall covering
 - d. 50% polypropylene / 50% PET Polyester
 - e. Passes NFPA-265 Corner burn test
 - f. Passes UBC 8-2 tunnel test
 - g. Class A rating for ASTM E-84
 - h. Manufacture must have 28+ standard colors

- c) Section 104400 Fire Protection – Section 1-02 - Delete “Extinguishers are furnished and installed by Owner.” Extinguishers are to be furnished and installed by GC per later section.

ADD1-1

d) Add the following specification section: 125200 – Seating

2) PRE-BID MEETING NOTES (8-1/2 X 11)

a) See attached Pre-Bid Conference Notes

3) CHANGES TO ARCHITECTURAL DRAWINGS (24 X 36)

a) The following Architectural sheets are revised: A1, A6, A7

4) CHANGES TO PME DRAWINGS (24 X 36)

a) The following PME sheets are revised: E0.3, E1.0, E2.1

5) CHANGES TO SITE/CIVIL DRAWINGS (24 X 36)

a) Replace the following site/civil sheets: C1.0, C2.0, C3.0, C4.0, C4.0, C6.2, C7.2

6) QUESTIONS

a) Question: Please clarify the areas to receive epoxy flooring and base.

i) *Answer: See attached revised architectural drawings.*

b) Question: Will the new sprinkler escutcheons fit the old sprinkler pipe?

i) *Answer: Please note that the old escutcheons are to be saved and reinstalled on the old sprinkler heads. New sprinkler heads will receive new escutcheons.*

c) Question: Is there a hazardous materials report for the building?

i) *Answer: No, there is not a report. The GC should report any hazardous materials found during demolition to the owner for testing and removal by the owner.*

d) Question: Does any of the existing FRP stay?

i) *Answer: No, the existing FRP shall be removed and new FPR installed as indicated in the revised finish schedule on A7.*

e) Question: Looks like the front canopy got hit between the Pre-Bid and the second site visit. What do you want to do about the damage.

i) *Answer: GC shall include an allowance of \$10,000 to repair the existing awning canopy. Repair shall include replacement of several aluminum canopy frames, replacement of metal roofing, replacement of blocking, replacement of bent conduit and replacement of awning fabric skirting.*

f) Question: Who will pay the building plan review fees?

i) *Answer: After discussion with the owner, **ALL** plan review fees shall be included in the base bid. This includes, but is not limited to, reviews by the City/County Inspections Department, review by the County Health Department (kitchen) and review by Cross Connection Control. Several other review and inspections fees are required in Durham. All bidding contractors are encouraged to make inquiries with the City of Durham departments that may review this project at any time during the construction process. Contractors shall also review Section 014126 for additional direction concerning review and inspection fees.*

g) Question: Concerning the site, will a traditional construction entrance suffice instead of the track out mat system called on scope?

i) *Answer: If you have ever worked in Durham you know that what is on the approved site plans **MUST** be adhered to during construction. Please review all revised site drawings and specifications. Deviation is not permitted.*

h) Question: Will the contractors be allowed to use the existing power and water in the building?

i) *Answer: Yes, the contractors will be allowed to use the existing power and water in the building?*

i) Question: Does the GC need to provide temporary toilets?

i) *Answer: Yes, the GC shall provide temporary toilet for the use of all workers during the project.*

j) Question: Will the owner provide a budget?

i) *Answer: No, the owner will not provide a budget at this time.*



GENERAL SERVICES

CITY OF DURHAM

Pre-Bid Meeting Notes

Former Wheels Skating Center Upfit

September 13, 2023 at 11:00 a.m.

Attendees:

Shauna Parker	City of Durham – General Services	shauna.parker@durhamnc.gov
Rich Hahn	City of Durham – Parks and Recreation	rich.hahn@durhamnc.gov
Nathan Rivers	City of Durham – Finance Department	nathan.rivers@durhamnc.gov
Paul Young	DTW Architects and Planners, Ltd	pyoung@dtwarch.com
Dennis Hayes, PE	Edmondson Engineers, P.A.	dennis@edmpa.com
Nelson Ragan	Edmondson Engineers, P.A.	nelson@edmpa.com
Austin Riccio	Bar Construction Co., Inc.	bids@barconstruction.com
Daniell Daniels	Central Builders Inc. of Mebane	bids@centralbuildersinc.com
Parin Bodiwala	CMC Building, Inc.	parin@cmcbuildinginc.com
Kevin Hartzog	C.T. Wilson Construction Co., Inc.	kevin@ctwilson.com
David Williams	Focus Design Builders, Inc.	dwilliams@focusdesignbuilders.com
Justin Jackson	G&G Builders of Wendell	justin@ggbuildersnc.com
Charles Keller	Harrod & Associates Constructors, Inc.	estimating@harrodandassoc.com
Bert Long	H.G. Reynolds Co., Inc.	blong@hgreynolds.net
Kyle Upchurch	H.M. Kern Corp.	kupchurch@hmkern.com
Brad Bishop	Pinam Construction, Inc.	brad@pinamdevelopment.com
Hal Stroud	Pinam Construction, Inc.	hstroud@pinamconstruction.com
Tim Cothran	Riggs-Harrod Builders, Inc.	tcothran@riggsharrod.com
Joshua Reeder	Salisbury & Moore Construction	Joshua.reeder@salisburymoore.com
Mike Brewer	Salisbury & Moore Construction	mike@salisburymoore.com
Jeffrey Kafer	Sanford Contractors, Inc.	jkafer@sanfordcontractors.com
Wyatt Stevens	Scotia Construction, Inc.	wyatt@scotiaconstructioninc.com
Brent Garlington	Trend Construction, Inc.	bgarlington@trendinc.biz
Royce Laws	Devine Construction Group, Inc.	roycelaws@gmail.com
Jonathan Mergun	Safe Enviroclean	safeenviroclean@gmail.com
Chad Vaughan	Vaughan Electric Co., Inc.	sdvaughaniv@veco-nc.com
Chip Vaughan	Vaughan Electric Co., Inc.	cvaughan3@veco-nc.com
James Cobb	Alloy Group	jcobb@alloygroup.com
Jeffrey Jones	J&S Heating & Air	jeff@jsheatair.com
Anita Brack	Floor Chem, Inc.	floorchem@aol.com
Sheri & Jamie Lord	Tripheon	sherilord@tripheon.com

Additional Distribution:

Sidney Anderson	City of Durham – Finance Department	Sidney.Anderson@durhamnc.gov
Fred Doolittle	DTW Architects and Planners, Ltd	fdoolittle@dtwarch.com
Charles Crawl, PE	Edmondson Engineers, P.A.	charles@edmpa.com
Darrin Hester	Edmondson Engineers, P.A.	darrin@edmpa.com
Renato Sanchez	Edmondson Engineers, P.A.	renato.sanchez@edmpa.com
Brian Ross, PE	Ross Linden Engineers, PC	brian@rosslinden.com
Rachel Watson	CLH Design, P.A.	rwatson@clhdesignpa.com
Lindsey Bute, AIA	Bute, PLLC	lindsey@butepllc.com



DISCUSSION:

1) Introductions, Roles and Responsibilities – GSD Project Manager

2) UBE Goals – Finance Representative, Nathan Rivers

11% MUBE

7% WUBE

UBE Construction Forms – E-101 (UBE Participation on Base Bid)

UBE Construction Forms – E-102 (UBE Participation on Bid Alternate)

3) Project Overview – Architect (Paul Young-DTW Architects and Planners, Ltd.)

This project includes, but is not limited to the following:

Base Bid: Accessibility, code, life safety and risk deficiency correction, maintenance and operations, aesthetic and concessionaire upgrades. The Project includes five (5) Alternates:

- Alternate G1: Install roof coating system.
- Alternate G2: Install fall protection system.
- Alternate G3: Install acoustical panels.
- Alternate G4: Install roof access ladder.
- Alternate G5: Provide and install picnic tables and booths.

4) Anticipated Sequence of Construction – Designer

- Contract review and approval: TBD
- Notice to Proceed: Upon Issuance of a Building Permit from Inspections Dept.
(Anticipated NTP Date: December 15, 2023)
- Commencement of Contract: Upon Owner’s Notice to Proceed
- Substantial Completion: 240 Calendar Days from NTP
- Final Completion: 60 Calendar Days from SC Certificate

5) Project Schedule – GSD Project Manager

The project completion shall be **Two Hundred Forty (240) calendar days** from the issuance of the Notice to Proceed to the Contractor. The Owner will expect the Contractor to meet the completion dates as set forth in that schedule.

Liquidated damages in the amount of **\$ 1,500.00** for each day that expires after the Contract Time until Substantial Completion. After Substantial Completion, if the Contractor shall neglect, refuse, or fail to complete the remaining Work within 60 days of Substantial Completion or any proper extension thereof granted by the City, the Contractor shall pay the City **\$750.00** for each day that expires after the time specified for final completion and readiness for Final Payment until the Work is completed and ready for Final Payment.

6) Required Bid Forms – GSD Project Manager, Shauna Parker – General Services Department

Bid Form

Non-Collusion Affidavit

Contractor Safety Record Information

Contractor Workforce Diversity Questionnaire

Bid Bond

UBE Construction Forms – E-101 (UBE Participation on Base Bid)

UBE Construction Forms – E-102 (UBE Participation on Bid Alternate)

7) Bid Due Date/Time – GSD Project Manager

Bids Due at 2:00 PM, Wednesday, October 11, 2023

Deliver your bids to General Services Dept., 2011 Fay St, Durham 27704,

attn: Shauna Parker, Sr. Construction Project Manager

Questions must be submitted in writing, due **5:00 PM, Monday, September 25, 2023.**

8) Questions/Other Items

i) See Addendum #1 write up.

SECTION 125200: SEATING

PART 1: GENERAL

1-01: Reference to Other Documents: The General Conditions, Supplementary Conditions and Division 1 contain requirements relevant to work covered by this section.

1-02: Work Included: This section includes labor, materials, equipment and related services required to furnish and install bar stools as scheduled and specified herein.

1-03: Substitutions: For purposes of establishing type and quality of materials required for work included in this section, manufacturer's names and brand names are used. Equal products of other manufacturers will be considered, if requests for substitutions are accompanied by supporting technical literature, samples, drawings and performance data for comparative evaluation 10 days prior to receipt of Bids.

1-04: Submittals: Submit shop drawings showing equipment construction, mounting, overall dimensions, clearances, finishes and method of operation. Provide 2 copies minimum of printed instructions for cleaning and maintenance on O & Ms.

PART 2: PRODUCTS

2-01: General

- a) Bar Stools shall be equal to the following:
 - a. "Diner Counter Stool – Flat" Item # 6050-300 as sold by barstoolsandchairs.com
 - b. 24" seat height
 - c. Chrome finished column and bell
 - d. Seat color to be "Cracked Ice Red" vinyl (Architect to verify before ordering)
 - e. Type C floor attachment (concrete floor attachment)
 - f. Seat Diameter: 14.5"

PART 3: EXECUTION

Stools shall be shipped to site and stored by General Contractor in a place that will not adversely affect equipment. Architect shall advise GC of mounting location before installation.

END OF SECTION

SECTION 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.
- B. Standards set forth by the North Carolina Department of Environmental Quality (NCDEQ) Division of Energy, Mineral and Land Resources.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Removal of trees and other vegetation.
 - 2. Clearing and grubbing.
 - 3. Removing above-grade improvements.
 - 4. Removing below-grade improvements.
- B. Related Sections:
 - 1. Division 31 Section "Earth Moving".
 - 2. Division 31 Section "Erosion Controls".

1.3 PROJECT CONDITIONS

- A. Traffic: Conduct site-clearing operations to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities. Do not close or obstruct streets, walks, or other occupied or used facilities without permission from authorities having jurisdiction.
- B. Protection of Existing Improvements: Provide protections necessary to prevent damage to existing improvements indicated to remain in place.
 - 1. Protect improvements on adjoining properties and on Owner's property.
 - 2. Restore damaged improvements to their original condition, as acceptable to property owners.
 - 3. All erosion control measures shall be in place prior to commencement of clearing operations.
- C. Protection of Existing Trees and Vegetation: Protect existing trees and other vegetation indicated to remain in place against unnecessary cutting, breaking or skinning of roots, skinning or bruising of bark, smothering of trees by stockpiling construction materials or excavated materials within drip line, excess foot or vehicular traffic, or parking of vehicles within drip line. Provide temporary guards to protect trees and vegetation to be left standing.
 - 1. Water trees and other vegetation to remain within limits of contract work as required to maintain their health during course of construction operations.
 - 2. Provide protection for roots over 1-1/2 inch (38 mm) in diameter that are cut during construction operations. Coat cut faces with an emulsified asphalt or other acceptable coating formulated to use on damaged plant tissues. Temporarily cover exposed roots with wet burlap to prevent roots from drying out; cover with earth as soon as possible.
 - 3. Repair or replace trees and vegetation indicated to remain that are damaged by construction operations in a manner acceptable to Engineer. Employ a licensed arborist to repair damage to trees and shrubs.
 - 4. Replace trees that cannot be repaired and restored to full-growth status, as determined by arborist.

- D. Salvageable Improvements: Carefully remove items indicated to be salvaged and store on Owner's premises where indicated or directed.

1.4 EXISTING SERVICES

- A. General: Indicated locations are approximate; determine exact locations before commencing Work.
- B. Arrange and pay for disconnecting, removing, capping, and plugging utility services. Notify affected utility companies in advance and obtain approval before starting this Work.
- C. Place markers to indicate location of disconnected services. Identify service lines and capping locations on Project Record Documents.

1.5 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- B. Standards: Comply with ANSI/ASSP A10.6 and NFPA 241.

PART 2 – PRODUCTS

None Used.

PART 3 – EXECUTION

3.1 SITE CLEARING

- A. General: Remove trees, shrubs, grass, and other vegetation, improvements, or obstructions, as required, to permit installation of new construction. Remove similar items elsewhere on site or premises as specifically indicated. Removal includes digging out and off-site removal of stumps and roots.
 - 1. Cut minor roots and branches of trees indicated to remain in a clean and careful manner where such roots and branches obstruct installation of new construction.
 - 2. Existing trees within clearing limits may be chipped and stockpiled on-site but shall NOT be used as landscaping mulch or fill.
- B. Clearing and Grubbing: Clear site of trees, shrubs, and other vegetation, except for those indicated to be left standing.
 - 1. Completely remove stumps, roots, and other debris protruding through ground surface.
 - 2. Use only hand methods for grubbing inside drip line of trees indicated to remain.
 - 3. Fill depressions caused by clearing and grubbing operations with satisfactory soil material, unless further excavation or earthwork is indicated.
 - a. Place fill material in horizontal layers not exceeding 6 inches (150 mm) loose depth, and thoroughly compact each layer to a density equal to adjacent original ground.
- C. Topsoil Stripping: Strip and stockpile existing topsoil within construction limits for re-spreading. Should the Contractor elect to remove topsoil from the site, suitable topsoil from off-site sources shall be provided for re-spreading at no cost to the Owner.
 - 1. Remove sod and grass before stripping topsoil.
 - 2. Strip topsoil to whatever depths are encountered in a manner to prevent intermingling with underlying subsoil or other waste materials. All surface topsoil, regardless of thickness encountered, shall not be considered Unsuitable Soil.

3. Remove subsoil and non-soil materials from topsoil, including trash, debris, weeds, roots, and other waste materials.
4. Stockpile topsoil materials within construction limits and away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust.
5. Do not stockpile topsoil within tree protection zones.
6. Dispose of excess topsoil off-site.

D. Removal of Improvements: Remove existing above-grade and below-grade improvements as indicated and as necessary to facilitate new construction.

1. Abandonment or removal of certain underground pipe or conduits may be indicated on mechanical or electrical drawings and is included under work of related Division 22 Sections. Removing abandoned underground piping or conduits interfering with construction is included under this section.

3.2 DEMOLITION PREPARATION

A. Conduct demolition operations and remove debris 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 governing regulations or as shown on the drawings.

B. Conduct demolition operations to prevent injury to people and damage to adjacent buildings and facilities to remain. Ensure safe passage of people around selective site demolition area.

1. Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction or as shown on the plans.
2. Protect existing site improvements, appurtenances, and landscaping to remain.
3. Erect a plainly visible fence around drip line of individual trees or around perimeter drip line of groups of trees to remain.
4. Provide temporary weather protection, during interval between demolition and removal of existing construction, on exterior surfaces and new construction to ensure that no water leakage or damage occurs to structure or interior areas.

C. Provide and maintain exterior shoring, bracing, or structural support to preserve stability and prevent movement, settlement, or collapse of building to be selectively demolished.

1. Strengthen or add new supports when required during progress of selective demolition.

D. Protect trees, fences, poles, mailboxes, and all other property unless their removal is authorized. Any property damaged, that is not authorized for removal, shall be restored or replaced to the Owner's satisfaction.

3.3 UTILITY SERVICES

A. Maintain existing utilities indicated to remain in service and protect them against damage during selective site demolition operations.

1. Do not interrupt existing utilities serving occupied or operating facilities, except when authorized in writing by Owner and authorities having jurisdiction. Provide temporary services during interruptions to existing utilities, as acceptable to Owner and to governing authorities.

- a. Provide not less than 72 hours' notice to Owner if shutdown of service is required during changeover.
- B. Utility Requirements: Locate, identify, disconnect, and seal or cap off indicated utility services serving building to be selectively demolished.
 - 1. Arrange to shut off indicated utilities with utility companies.
 - 2. Where utility services are required to be removed, relocated, or abandoned, provide bypass connections to maintain continuity of service to other parts of the building before proceeding with selective demolition.
- C. Utility Requirements: Refer also to Division 15 and 16 Sections for additional requirements for shutting off, disconnecting, removing, and sealing or capping utility services. Do not start selective site demolition work until utility disconnecting and sealing have been completed and verified in writing.
- D. Utility Adjustments and Relocations: Adjust locations, elevations and routes of existing utility lines, poles, guys, vaults, handholes, boxes, and other related appurtenances as required to facilitate new construction. Coordinate adjustments and relocations with utility companies.

3.4 POLLUTION CONTROLS

- A. Use water mist, temporary enclosures, and other suitable methods to limit the spread of dust and dirt. Comply with governing environmental protection regulations.
 - 1. Do not use water when it may damage existing construction or create hazardous or objectionable conditions, such as ice, flooding, and pollution.
- B. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- C. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective site demolition operations. Return adjacent areas to condition existing before start of selective demolition.

3.5 SELECTIVE SITE DEMOLITION

- A. Demolish and remove existing construction only to the extent required by new construction and as indicated on the drawings. Use methods required to complete Work within limitations of governing regulations.
 - 1. Dispose of demolished items and materials promptly. On-site storage or sale of removed items is prohibited.
 - 2. Return elements of construction and surfaces to remain to condition existing before start of selective demolition operations.
 - 3. Comply with all applicable regulations during demolition, handling and disposal of all items indicated to be removed or necessary to be removed to allow construction of new work.
- B. Demolish asphalt, concrete and masonry in small sections. Cut concrete and masonry at junctures with construction to remain, using power-driven masonry saw or hand tools; do not use power-driven impact tools.
- C. Remove sawcut concrete and asphalt, including aggregate base, to a depth of 12-inches below existing, adjacent grade, or as indicated. Provide neat sawcut at limits of pavement removal as indicated.

3.6 PATCHING AND REPAIRS

- A. Promptly patch and repair holes and damaged surfaces caused to adjacent construction by selective site demolition operations.

- B. Where repairs to existing surfaces are required, match previous work as closely as possible.
 - 1. Completely fill holes and depressions in existing masonry walls to remain with an approved masonry patching material, applied according to manufacturer's printed recommendations.
- C. Restore exposed finishes of patched areas and extend finish restoration into adjoining construction to remain in a manner that eliminates evidence of patching and refinishing.

3.7 CLEANING

- A. Keep the site free from debris and hazards and inspect the site at the end of each day for trash. All adjacent roads and drives outside of the construction fencing shall remain in operation during construction and shall remain free of all construction materials and debris.

3.8 DISPOSAL OF WASTE MATERIALS

- A. General: Promptly dispose of demolished materials. Do not allow demolished materials to accumulate on-site.
- B. Burning on Owner's Property: Burning is not permitted on Owner's property.
- C. Removal from Owner's Property: Remove waste materials and unsuitable or excess soils and mulch from Owner's property. Transport demolished materials off Owner's property and legally dispose of them.

END OF SECTION

SECTION 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 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Preparing and grading subgrades for walks, lawn areas, and landscaping.
 - 2. Excavating, filling and backfilling for structures.
 - 3. Base course for walks and pavements.
 - 4. Subsurface drainage backfill for trenches.
 - 5. Excavating and backfilling trenches.
- B. Related Sections: The following Sections contain requirements that relate to this Section.
 - 1. Division 01 Sections for allowances, definitions and procedures.
 - 2. Division 31 Section "Site Clearing" for site stripping, grubbing, topsoil removal, and tree protection.
 - 3. Division 32 Section "Planting" for finish grading, including placing and preparing topsoil for permanent and temporary grass seeding.
 - 4. Division 31 "Erosion and Sediment Controls", for all areas of the site that are graded or disturbed by any construction operations

1.3 UNIT PRICES

- A. Rock Measurement: Volume of rock actually removed, measured in original position, but not to exceed the following:
 - 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. 6 inches beneath bottom of concrete slabs on grade.
 - 5. 6 inches beneath invert elevation of pipe in trenches and 12 inches wider than pipe outside diameter.
 - 6. Additional rock removed beyond the limits outlined above to accommodate trench boxes, other removal methods, compaction equipment or other reasons shall not be included in the payment volume.
 - 7. Any materials paid by Unit Prices to replace excavated rock shall utilize these same measurement limits.
- B. Unsuitable Soil Measurement: Volume of soil actually removed, measured in original position, but not to exceed the limits directed by the Owner's Independent Testing Agency.
 - 1. Additional soil excavated beyond the limits directed by the Owner's Independent Testing Agency; including lay-back of excavation walls, excavation to accommodate trench boxes or other shoring, etc.; shall not be considered Unsuitable Soil.
- C. Replacement Material Measurement: Volume exactly equal to that of the unsuitable soil or rock that was removed, measured in original position.

- D. Unit prices for unsuitable soil and rock removal shall include all work and materials as defined in Division 01 sections.

1.4 DEFINITIONS

- A. Excavation consists of the removal of material encountered to subgrade elevations and the reuse or disposal of materials removed. Refer to the following section for additional definitions of classified excavations.
- B. Subgrade: The uppermost surface of an excavation or the top surface of a fill or backfill immediately below base course, drainage fill, or topsoil materials.
- C. Borrow: Soil material obtained off-site when sufficient approved soil material is not available from excavations.
- D. Surface Course: The top layer of the pavement structure placed on base course or subgrade.
- E. Base Course: Layer placed between the subgrade elevation and asphalt paving courses.
- F. Bedding Course: Layer placed over excavated subgrade in a trench before laying pipe.
- G. Unauthorized excavation consists of removing materials beyond indicated subgrade elevations or dimensions without direction by the Architect. Unauthorized excavation, as well as remedial work directed by the Architect, shall be at the Contractor's expense.
- H. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below ground surface.
- I. Utilities include on-site underground pipes, conduits, ducts, and cables, as well as underground services within building lines.

1.5 EXCAVATION CLASSIFICATIONS

- A. Excavation Classifications: All excavation is classified as General Excavation except for Mass Rock, Trench Rock and Unsuitable Soil Materials as defined in this section.
 - 1. General Excavation: Excavation, removal and/or disposal of pavements and other obstructions visible on surface; underground structures, utilities, and other items indicated to be demolished and/or removed; together with soil, boulders, and other materials encountered that are not classified as rock, unsuitable soil, or unauthorized excavation.
 - a. Intermittent drilling, blasting, or ripping to increase production and not necessary to permit excavation of material encountered will be considered general excavation.
 - b. Soil (regardless of nature) or other debris encountered above proposed subgrade elevations shall be considered general excavation unless determined by the Landscape Architect to meet the definition of rock.
 - c. In-place densification by vibratory rolling of existing soils at exposed subgrades, as described herein, shall be considered General Excavation.
 - 2. Unsuitable Soil Excavation: Removal and disposal of soil materials or other debris encountered below proposed subgrade elevations which is deemed unsuitable to remain in place by the Landscape Architect or Owner's Independent Testing Agency.
 - a. Soil and/or other debris encountered above proposed subgrade elevations shall be considered general excavation.

- b. Soil material which, in the opinion of the Architect or Owner's independent testing agency, can be repaired by scarifying, drying and recompacting or material which is made unsuitable by delay of work, lack of protection or other actions of the Contractor or his Sub-Contractors shall not be considered as unsuitable soil and shall be repaired or replaced by the Contractor at no additional cost to the Owner. Moisture content alone shall not be the determining factor as to the presence of unsuitable soil.
 - c. Any material moved or removed without the measurement by the Owner's independent testing agency and approval by the Architect will be considered as general excavation.
 - d. Surface topsoil, regardless of thickness encountered, shall not be considered unsuitable soil.
 - e. Stones, rocks and boulders not meeting classifications of rock shall not be considered unsuitable soil. Stones, rocks and boulders shall be removed from soil as necessary if soil is to be used as fill or backfill. Removed stones, rocks and boulders shall be removed from the site.
 - f. The unsuitable soil allowances shall be for unsuitable soils only and not for repair of weather related deterioration of subgrade. These Allowances are not for required on-site cut and off-site fill necessary to bring subgrades and grades to elevations shown on drawings. Contractor shall be responsible for proper drying and dewatering procedures, as necessary, as part of his normal operations.
3. Rock Excavation: Removal of rock material in beds, ledges, unstratified masses, conglomerate deposits, and boulders of rock material that exceed 1.0-cu.yd. 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. In the event rock (as defined above) is encountered, the Contractor shall immediately notify the Architect.
- a. Rock excavation equipment: Late-model, track mounted CAT 330 or equivalent hydraulic excavator equipped with a narrow (36" max) bucket with new rock teeth and operating at the highest normal operating RPM. The Contractor shall provide equipment specification and test data verifying that the equipment to be used for demonstration purposes complies with the minimum requirements. The equipment shall be in good repair and in proper working condition. The Owner reserves the right to inspect and approve the equipment to be used for demonstration purposes. Trench rock is defined as material which, after 1 hour of continuous digging using the equipment described above, removes less than 10 cubic yards of material.
4. Classified excavation requirements:
- a. Contractor shall expose and clean the rock material for inspection and measurement by the Architect.
 - b. Do not excavate rock or unsuitable soil until it has been classified and cross-sectioned by the Owner's independent testing agency or Architect. Any material moved or removed without the measurement by the Owner's independent testing agency and approval by the Architect will be considered as General Excavation.
 - c. The Architect shall be the final judge on what is classified as unsuitable or rock excavation.
 - d. The contractor may be required to provide equipment specification data verifying that the above minimum-rated equipment will be used for demonstration purposes. The equipment shall be in good repair and in proper working condition.
 - e. Rippable rock, weathered rock or overburden which is not classified as rock according to the above definitions shall be considered General Excavation.

1.6 SUBMITTALS

- A. General: Submit the following according to the Conditions of the Contract and Division 1 Specification Sections.

- B. Test Reports: In addition to test reports required under field quality control, submit the following:
 - 1. Laboratory analysis of each soil material proposed for fill and backfill from on-site and borrow sources.
 - 2. One optimum moisture-maximum density curve for each soil material.
 - 3. Reports of all laboratory and field tests including evaluations of subgrades and foundation bearing conditions.
 - 4. Reports of Special Inspections.
- C. Blasting plan approved by authorities having jurisdiction if applicable due to on-site rock.
- D. Report of rock or unsuitable soil removal with quantities confirmed in writing by the Architect or Owner's independent testing agency.

1.7 QUALITY ASSURANCE

- A. Codes and Standards: Perform earthwork complying with requirements of authorities having jurisdiction. Any earthwork required for preparation of parking areas and drives shall comply with current NCDOT Standard Specifications as per the North Carolina Construction Manual.
- B. Comply with applicable requirements of NFPA 495--Explosive Materials Code.
- C. Testing and Inspection Service: Owner will employ a qualified independent geotechnical engineering testing agency to classify proposed on-site and borrow soils to verify that soils comply with specified requirements and to perform required field and laboratory testing.
- D. Preinstallation Conference: Conduct conference at Project site to comply with requirements of Division 1
 - 1. Before commencing earthwork, meet with representatives of the governing authorities, Owner, Architect, consultants, Geotechnical Engineer, independent testing agency, and other concerned entities. Review earthwork procedures and responsibilities including testing and inspection procedures and requirements. Notify participants at least 3 working days prior to convening conference. Record discussions and agreements and furnish a copy to each participant.

1.8 PROJECT CONDITIONS

- A. Existing Utilities: Do not interrupt existing utilities serving facilities occupied by the Owner or others except when permitted in writing by the Landscape Architect and then only after acceptable temporary utility services have been provided.
 - 1. Provide a minimum 48-hours' notice to the Landscape Architect and receive written notice to proceed before interrupting any utility.
- B. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies to shutoff services if lines are active.

1.9 PAYMENT

- A. General Excavation: All general excavation to the lines and grades indicated on the drawings including all necessary off-site disposal of excess materials and/or off-site borrow of fill materials shall be included in the base bid.
 - 1. No statement is made or implied that the on-site grading and earthwork indicated on the drawings is balanced.

- B. Unsuitable Soil Material Excavation: Unsuitable soil material excavation will be paid by unit prices included in the Contract Documents.
 - 1. Unused amounts of monies included under allowances shall be credited to the Owner by deduct change order.
- C. Rock Excavation: Rock excavation will be paid by unit prices included in the Contract Documents.
 - 1. Unused amounts of monies included under allowances shall be credited to the Owner by deduct change order.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

- A. General: Provide approved borrow soil materials from off-site when sufficient approved soil materials are not available from excavations.
- B. Satisfactory Soil Materials: ASTM D 2487 soil classification groups GW, GC, GP, GM, ML, CL, SW, SP, SC, and SM; free of rock or gravel larger than 2 inches (50 mm) in any dimension, debris, waste, frozen materials, vegetation and other deleterious matter. Additionally, satisfactory soil for use in structural fill areas shall meet the following:
 - 1. Have a Plasticity Index of 20 or less and a Liquid Limit of 50 or less.
 - 2. Shall have a Standard Proctor Maximum Dry Density of 90-lb/cf or greater.
 - 3. Satisfactory soil materials obtained from off-site borrow sources shall meet all requirements listed above and possess a Standard Proctor Maximum Dry Density of 90-lb/cf or greater, shall contain at least 20% fines, and have a Plasticity Index of less than 20.
- C. Unsatisfactory Soil Materials: ASTM D 2487 soil classification groups MH, CH, OL, OH, and PT. Soils having a Plasticity Index greater than 20 and a Liquid Limit greater than 50 are also unsatisfactory within structural (pavement and building) areas except if placed as specified above.
- D. Unsuitable Soil: Refer to paragraph 1.5 of this Section.
- E. Backfill and Fill Materials: Satisfactory soil materials.

2.2 PROCESSED AGGREGATE MATERIALS

- A. Base Course Material: Type A aggregate base course meeting the requirements of Section 520 of NCDOT "Standard Specifications for Roads and Structures."
- B. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve.
- C. Bedding Material: #57 washed stone.
- D. Drainage Fill: #57 washed stone.
- E. Filtering Material: #57 washed stone.

2.3 ACCESSORIES

- A. Drainage (Filter) Fabric: Nonwoven geotextile, specifically manufactured as a drainage geotextile; made from polyolefins, polyesters, or polyamides; and with the following minimum properties determined according to ASTM D 4759 and referenced standard test methods:
 - 1. Grab Tensile Strength: 110 lbf (490 N); ASTM D 4632.
 - 2. Tear Strength: 40 lbf (178 N); ASTM D 4533.
 - 3. Puncture Resistance: 50 lbf (222 N); ASTM D 4833.
 - 4. Water Flow Rate: 150 gpm per sq. ft. (100 L/s per sq. m); ASTM D 4491.
 - 5. Apparent Opening Size: No. 50 (0.3 mm); ASTM D 4751.

- B. Separation/Stabilization Fabric: Woven geotextile, specifically manufactured for use as a separation and or stabilization geotextile; made from polyolefins, polyesters, or polyamides; and with the following minimum properties determined according to ASTM D 4759 and referenced standard test methods:
 - 1. Grab Tensile Strength: 200 lbf (890 N); ASTM D 4632.
 - 2. Tear Strength: 75 lbf (333 N); ASTM D 4533.
 - 3. Puncture Resistance: 90 lbf (400 N); ASTM D 4833.
 - 4. Water Flow Rate: 4 gpm per sq. ft. (2.7 L/s per sq. m); ASTM D 4491.
 - 5. Apparent Opening Size: No. 30 (0.6 mm); ASTM D 4751.

- C. Biaxial Geogrid: Integrally formed biaxial geogrid, specifically manufactured for use as a base reinforcement for subgrade improvement. Tensar BX1100, Mirafi BXG-110, or approved equal with the following minimum properties determined according to ASTM D 4759 and referenced standard test methods:
 - 1. Aperture Dimensions: 1-in (25-mm) nominal.
 - 2. Minimum Rib Thickness: 0.03-in (0.76-mm) nominal.
 - 3. Tensile Strength @ 2% Strain: 280-lb/ft (4.1 kN/m); ASTM D-6637.
 - 4. Tensile Strength @ 5% Strain: 580-lb/ft (8.5 kN/m); ASTM D-6637.
 - 5. Ultimate Tensile Strength: 850-lb/ft (12.4 kN/m); ASTM D-6637.

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 earthwork operations.
- B. Protect subgrades and foundation soils against freezing temperatures or frost. Provide protective insulating materials as necessary.
- C. Provide 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.
- D. Site Maintenance: The Contractor shall be responsible to take whatever measures are necessary to ensure reasonable accessibility to and on the construction site so that undue delays are avoided under normal weather conditions. These measures shall include, but not be limited to, the following:
 - 1. Maintaining the surface of the soils in a manner to promote drainage runoff and avoid ponding of water, especially prior to predicted rain events.
 - 2. Avoiding operation of temporary water sources or hoses in a manner which will cause unnecessary and repeated wetting of the site.
 - 3. Fill in severely rutted areas which are ponding water during the construction activities or after rain events with drainage fill material to assist drying and allow construction activities to continue.
 - 4. Provide drying of surface soils and soils intended for filling or backfilling as required to promote accelerated drying of those materials.

5. After successful drying efforts or prior to predicted rain events, grade the areas back to a smooth condition to promote drainage runoff.
6. Controlling vehicular traffic, both construction and personal on the site in a manner to prevent undue damage to soils whenever possible and practical.
7. Providing temporary staging areas of crushed stone or other materials around the construction site which will better withstand the weather and traffic and keep the site accessible immediately or shortly after rain events.
8. Provide de-watering equipment for any areas collecting water which may affect construction or soil densities under built areas.
9. Any claims for weather related delays considered shall be considered with particular attention paid to the Contractor's efforts in regard to the above requirements

3.2 DEWATERING

- A. Prevent surface water and subsurface or ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.
- B. Protect subgrades and foundation soils from softening 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.
 2. Install a dewatering system to keep subgrades dry and convey groundwater away from excavations. Maintain until dewatering is no longer required.
- C. Design, furnish, install, test, operate, monitor, and maintain temporary dewatering systems 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. 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 as needed.
 2. Use filters or other means to prevent pumping of fine sands or silts from the subsurface.
 3. 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.
 4. Prevent surface water from entering excavations by grading, dikes, or other means.
 5. Accomplish dewatering without damaging existing buildings, structures, and site improvements adjacent to excavation.
 6. Remove dewatering system when no longer required for construction.
- D. Soft wet soils, if present at the surface, shall be dried and compacted in place by the Contractor and be stable under proofrolling prior to placing fill. Drying shall be accomplished by discing, plowing or other means necessary and shall be included in the Contractor's bid. Site soils are typical of the area and susceptible to loss of strength if they become wet, resulting in softening and rutting during construction. Site soils are extremely moisture sensitive, therefore, the Contractor shall take active and aggressive steps to dry soil materials wet of optimum to maintain construction progress through the work and to maintain access to and around the construction. The Contractor, at his option and cost may remove unstable, wet materials and replace with available fill materials in lieu of accomplishing soil drying procedures.

3.3 EXPLOSIVES

- A. Explosives: Do not use explosives.

3.4 STABILITY OF EXCAVATIONS

- A. Comply with local codes, ordinances, and requirements of authorities having jurisdiction to maintain stable excavations. Contractor is responsible for ensuring all excavation operations and other construction comply with applicable OSHA requirements. Contractor shall provide temporary shoring and bracing as needed to construct the proposed improvements and comply with the above requirements.

3.5 EXCAVATION FOR STRUCTURES

- A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch. Extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.
- B. 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.

3.6 EXCAVATION FOR WALKS AND PAVEMENTS

- A. Excavate surfaces under walks and pavements to indicated cross sections, elevations, and grades.

3.7 EXCAVATION FOR UTILITY TRENCHES

- A. Excavate trenches to indicated slopes, lines, depths, and invert elevations.
 - 1. Beyond building perimeter, excavate trenches to allow installation of top of pipe below frost line.
- B. Excavate trenches to uniform widths to provide a working clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches (300 mm) higher than top of pipe or conduit, unless otherwise indicated.
 - 1. Clearance: As indicated
- 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 stones and sharp objects to avoid point loading.
 - 1. For pipes or conduit less than 6 inches (150 mm) in nominal diameter and flat-bottomed, multiple-duct conduit units, hand-excavate trench bottoms and support pipe and conduit on an undisturbed subgrade.
 - 2. For pipes and conduit 6 inches (150 mm) or larger in nominal diameter, shape bottom of trench to support bottom 90 degrees of pipe circumference. Fill depressions with tamped sand backfill.
 - 3. Where encountering rock or another unyielding bearing surface, carry trench excavation 6 inches (150 mm) below invert elevation to receive bedding course.

3.8 APPROVAL OF SUBGRADE PRIOR TO PLACING FILL OR OTHER IMPROVEMENTS

- A. Notify Architect or Owner's independent testing agency when excavations have reached required subgrade.
- B. After stripping is complete the exposed subgrade shall be proofrolled with a fully loaded dual wheel tandem axle dump truck or similar construction equipment. Four passes shall be made in each orthogonal direction. The proofrolling operation shall be observed by the Architect or Owner's independent testing agency. Should any area fail to tighten up after proofrolling and continue to rut and/or pump, the soil shall be scarified and moistened or aerated and recompacted and/or densified in-place with a vibratory roller. Repeat proofrolling operations.

- C. When Architect or Owner's independent testing agency determines that unforeseen unsuitable soil is present, continue excavation and replace with compacted backfill or fill material as directed.
 - 1. Unforeseen additional excavation and replacement with suitable material approved by the Architect will be considered unsuitable material and will be paid by unit prices included in the Contract Documents. Refer to Division 1 Sections.
- D. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Architect. Install french drains at design subgrade if directed by the Owner's independent testing agency and approved by the Architect.

3.9 UNAUTHORIZED EXCAVATION

- A. Fill unauthorized excavation under foundations or wall footings by extending indicated bottom elevation of concrete foundation or footing to excavation bottom, without altering required top elevation. Lean concrete fill may be used to bring elevations to proper position when acceptable to the Architect.
 - 1. Fill unauthorized excavations under other construction as directed by the Architect or the Owner's independent testing agency.
- B. Where indicated widths of utility trenches are exceeded, provide stronger pipe, or special installation procedures, as required by the Architect.

3.10 STORAGE OF SOIL MATERIALS

- A. Stockpile excavated materials acceptable for backfill and fill soil materials, including acceptable borrow materials. Stockpile soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent wind-blown dust.
 - 1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.11 BACKFILL

- A. Backfill excavations promptly, but not before completing the following:
 - 1. Acceptance of construction below finish grade including, where applicable, damp-proofing, waterproofing, and perimeter insulation.
 - 2. Surveying locations of underground utilities for record documents.
 - 3. Testing, inspecting, and approval of underground utilities.
 - 4. Concrete formwork removal.
 - 5. Removal of trash and debris from excavation.
 - 6. Removal of temporary shoring and bracing, and sheeting.
 - 7. Installing permanent or temporary horizontal bracing on horizontally supported walls.
 - 8. Removal of objectionable materials, including rocks larger than acceptable size, from backfill soils.
- B. Backfill retaining walls with the following additional requirements:
 - 1. Backfill materials shall be moisture conditioned as needed to within 2% of optimum prior to placement and compaction.
 - 2. Materials shall be placed in loose lifts not exceeding 8 inches and shall be compacted to not less than 95% of the standard Proctor maximum dry density.
 - 3. All backfill of segmental retaining walls shall be monitored by the Owner's Independent Testing Agency.

3.12 UTILITY TRENCH BACKFILL

- A. Place and compact bedding course on rock and other unyielding bearing surfaces and to fill unauthorized excavations. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.
- B. Pipe sleeves and concrete backfill trenches that carry below or pass under footings and that are excavated within 18 inches (450 mm) of footings. Place concrete to level of bottom of footings. Contact the Architect or the Owner's independent testing agency to coordinate details, procedures and possible alternatives.
- C. Provide 4 inch (100 mm) thick concrete base slab support for piping or conduit less than 30 inches (750 mm) below surface of roadways. After installation and testing, completely encase piping or conduit in a minimum of 4 inches (100 mm) of concrete before backfilling or placing roadway base course.
- D. Place and compact initial backfill of satisfactory soil material or base course material, free of particles larger than 1 inch (25 mm), to a height of 12 inches (300 mm) over the utility pipe or conduit.
 - 1. Carefully compact material under pipe haunches and bring backfill evenly up on both sides and along the full length of utility piping or conduit to avoid damage or displacement of utility system.
- E. Coordinate backfilling with utilities testing.
- F. Fill voids with approved backfill materials as shoring and bracing, and sheeting is removed.
- G. Place and compact final backfill of satisfactory soil material to final subgrade.
- H. Install detectable warning tape directly above utilities, 12 inches (300 mm) below finished grade, except 6 inches (150 mm) below subgrade under pavements and slabs.

3.13 FILL

- A. Preparation: Remove vegetation, topsoil, debris, wet, frozen, and unsatisfactory soil materials, obstructions, and deleterious materials from ground surface prior to placing fills.
 - 1. Plow, strip or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing surface.
- B. Obtain approval of subgrade as specified prior to placing fill.
- C. Obtain approval of fill materials. Remove all objectionable materials, including stones larger than acceptable size, from fill materials. Large stones may be placed in approved non-structural areas if they are spread evenly, individually and surrounded with properly compacted soil fill to ensure the absence of voids in the fill. Large stone placement in fill shall be monitored by the Owner's Independent Testing Agency.
- D. Place fill material in layers to required subgrade elevations for each location listed below.
 - 1. Under grass, use satisfactory excavated or borrow soil material.
 - 2. Under walks, pavements, buildings and other structural areas use base course material, or satisfactory excavated or borrow soil material.
- E. Following placement of fill the subgrade of building and pavement areas shall be proofrolled as described in the Field Quality Control section. The proofrolling operation shall be observed by the Owner's testing agency. Should any area fail to tighten up after proofrolling and continue to rut and/or pump, the soil shall be scarified and moistened or aerated and recompacted. Repeat proofrolling operations.

3.14 MOISTURE CONTROL

- A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill layer before compaction to within 2 percent of optimum moisture content.
 - 1. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.
 - 2. Remove and replace or scarify and air-dry satisfactory soil material that is too wet to compact to specified density.
 - a. Stockpile or spread and dry removed wet satisfactory soil material.

3.15 COMPACTION

- A. Place backfill and fill materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches (100 mm) in loose depth for material compacted by hand-operated tampers.
- B. Place backfill and fill materials evenly on all sides of structures to required elevations. Place backfill and fill uniformly along the full length of each structure.
- C. Percentage of Maximum Dry Density Requirements: Compact soil to not less than the following percentages of maximum dry density according to ASTM D698 Standard Proctor:
 - 1. Under structures, steps, walks, and pavements:
 - a. Compact each layer of backfill or fill material at 95% of the standard Proctor Density (ASTM D-698).
 - b. Compact each layer of the final 12-in of backfill material in building and pavement areas at 98% of the standard Proctor Density (ASTM D-698).
 - c. Moisture content of the fill during placement shall be kept within +/-2% of optimum.
 - d. Under pavements within NCDOT rights-of-way or new pavement to be constructed to NCDOT standards compact the top 8 inches below pavement subgrade to at least 100% density in accordance with AASHTO T-99 as modified by NCDOT.
 - 2. Under lawn or unpaved areas, compact the top 6 inches below subgrade and each layer of backfill or fill material at 90 percent maximum dry density.
 - 3. Compact each layer of aggregate base material under pavement to 100% density in accordance with AASHTO T-180 as modified by NCDOT or to at least 98% of the nuclear target density as specified in section 520 of the NCDOT Standard Specifications for Roads and Structures.

3.16 GRADING

- A. General: Uniformly grade areas to a smooth surface, free from irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
 - 1. Provide a smooth transition between existing adjacent grades and new grades.
 - 2. Cut out soft spots, fill low spots, and trim high spots to conform to required surface tolerances.
- B. Site Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:
 - 1. Lawn or Unpaved Areas: Plus or minus 1.2 inches (0.10 foot).
 - 2. Walks: Plus or minus 1.2 inches (0.10 foot).
 - 3. Pavements: Plus or minus 1/2 inch (0.05 foot).
- C. Lawn Fine Grading: Finish grade lawn areas to a smooth, even surface with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit fine grading to areas that

can be planted in the immediate future. Remove trash, debris, stones larger than 1 inch in any dimension, and other objects that may interfere with planting or maintenance operations. Remove all glass, wire or other objects of any size which may cause injury. Surfaces shall be top dressed with sterile sand following establishment of grass as necessary to obtain smooth, consistent surface.

3.17 BASE COURSES

- A. Under pavements, walks, place base course material on prepared subgrades.
 - 1. Where indicated, place biaxial geogrid directly on prepared subgrade under all asphalt and concrete pavement without wrinkles or folds. Seams shall be overlapped a minimum of 12-in. Geogrid placement shall be observed by the Owner's Independent Testing Agency prior to covering. Place compacted base course over geogrid and control traffic and operation of equipment over geogrid and base course in accordance with manufacturer's instructions.
 - 2. Compact base courses at optimum moisture content to required grades, lines, cross sections and thickness to not less than 100 percent density in accordance with AASHTO T-180 as modified by NCDOT or to at least 98% of the nuclear target density as specified in section 520 of the NCDOT Standard Specifications for Roads and Structures.
 - 3. Shape base course to required crown elevations and cross-slope grades.
 - 4. When thickness of compacted base course is 6 inches or less, place materials in a single layer.
 - 5. When thickness of compacted base course exceeds 6 inches, place materials in equal layers, with no layer more than 6 inches (150 mm) thick or less than 3 inches (75 mm) thick when compacted.
 - 6. Following compaction testing and within 48 hours prior to the application of asphalt or concrete pavement, the aggregate base course shall be proofrolled with a fully loaded dual wheel tandem axle dump truck or similar construction equipment. Four passes shall be made in each orthogonal direction. The proofrolling operation shall be observed by the Architect or Owner's independent testing agency. Should any area fail to tighten up after proofrolling and continue to rut and/or pump, the base course shall be scarified and moistened or aerated and recompacted. Repeat proofroll testing.
- B. Pavement Shoulders: Place shoulders along edges of base course to prevent lateral movement. Construct shoulders at least 12 inches (300 mm) wide of acceptable soil materials and compact simultaneously with each base course layer.

3.18 FIELD QUALITY CONTROL

- A. Owner's Independent Testing Agency Services: Allow testing agency to evaluate and test each subgrade and each fill or backfill layer. Do not proceed until test results for previously completed work verify compliance with requirements.
 - 1. Perform testing and evaluation of borrow or fill soils for compliance with material specifications of this Section.
 - 2. Perform field in-place density tests according to ASTM D 1556 (sand cone method), ASTM D6938 (nuclear gauge method) or equal as determined by the Owner's independent testing agency.
 - 3. Paved Areas: At subgrade and at each compacted fill, backfill layer, and aggregate base course layer, perform at least one field in-place density test for every 10,000 sq. ft. or less of paved area, but in no case fewer than three tests. Observe proofrolling of finished subgrade and aggregate base course.
 - 4. Trench Backfill: Perform at least one field in-place density test per 2 feet of backfill per 100 linear feet or less of trench outside of limits of buildings, but no fewer than two tests per trench per day.
 - 5. Non-Structural Areas: Field density and moisture content tests shall be performed on the fill and backfill at a rate of at least one test per every 15,000 square feet of area being filled.
- B. When testing agency reports that subgrades, fills, or backfills are below specified density, scarify and moisten or aerate, or remove and replace soil to the depth required, recompact and retest until required

density is obtained. Contractor shall be responsible for all costs associated with re-testing required due to failed compaction.

- C. Proofrolling: Subgrade to receive fill, finish subgrade of building or pavement areas, and aggregate base courses shall be proofrolled with a fully loaded dual wheel tandem axle dump truck or similar construction equipment. Four passes shall be made in each orthogonal direction. The proofrolling operation shall be observed by the Owner's testing agency. Should any area fail to tighten up after proofrolling and continue to rut and/or pump, the soil shall be scarified and moistened or aerated and recompacted. Repeat proofrolling operations.

3.19 SPECIAL INSPECTIONS

- A. Allow Special Inspections and tests to be performed by the Special Inspector or Special Inspection Agency.
- B. Verification and inspection of earthwork construction shall be in accordance with Section 1705 of the North Carolina State Building Code 2018, and as follows:
 - 1. Review laboratory test reports, certificates of compliance, or other data submitted to show compliance with specifications, and conduct field inspections and tests during earthwork operations as necessary to verify compliance with the contract documents.
 - 2. All site stripping and proofrolling operations shall be observed and monitored. Verify suitability of subgrade prior to installation of fill.
 - 3. At footing subgrades, test each soil stratum to verify design bearing capacities. Verification and approval of footing subgrades may be based on a comparison of subgrade with test data. Perform additional testing as necessary.
 - 4. Test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2922, and ASTM D 2937, as applicable. Tests will be performed at the following locations and frequencies:
 - a. Building Slab Areas: At subgrade and at each compacted fill and backfill layer, at least one test for every 2000 sq. ft. or less of building slab, but in no case fewer than three tests.
 - b. Foundation Wall Backfill: At each compacted backfill layer, at least one test for every 50 feet or less of wall length, but no fewer than two tests.
 - c. Trench Backfill in Building Areas: At each compacted initial and final backfill layer, at least one test for every 50 feet or less of trench length, but no fewer than two tests.
- C. Allow Special Inspector 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. When 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.
- E. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.
- F. Additional testing performed to determine compliance of corrected work with specified requirements shall be at Contractor's expense.

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 re-establish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or lose compaction due to subsequent construction operations or weather conditions.
 - 1. Scarify or remove and replace material to depth directed by the Architect or Owner's independent testing agency; reshape and recompact at optimum moisture content to the required density.
- C. Settling: Where settling occurs during the Project correction period, remove finished surfacing, backfill with additional approved material, compact, and reconstruct surfacing.
 - 1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to the greatest extent possible.

3.21 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Disposal: Remove surplus soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off the Owner's property.

END OF SECTION

SECTION 31 25 00 - EROSION & SEDIMENT CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of 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: Soil erosion and sedimentation control for all areas of the site that are graded or disturbed by any construction operations and elsewhere as indicated on the 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 is fully responsible for all applicable permits and approvals for off-site borrow and waste areas.
- C. 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. The Contractor shall at all times provide the operation and maintenance necessary to operate the permitted sediment and erosion controls at optimum efficiency.
- D. The Contractor shall provide permanent or temporary ground cover as soon as possible over disturbed areas of the site and shall provide permanent or temporary ground cover in no more than 14 days after construction activities have permanently or temporarily ceased over the disturbed area. Temporary or permanent ground cover shall be provided on slopes within 7 days after construction activities have permanently or temporarily ceased.
- E. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Division 31 Section "Site Clearing"
 - 2. Division 31 Section "Earth Moving"
 - 3. Division 32 Section "Planting"

1.3 PRODUCT HANDLING

- A. 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.
- B. 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.

1.4 MONITORING AND RECORD KEEPING

- A. Contractor shall abide by all conditions of the General Permit to Discharge Stormwater under the National Pollutant Discharge Elimination System (NPDES), Permit No. NCG010000 (obtain copy from Owner) and the general requirements listed below. NPDES General Permit No. NCG01000 can be viewed at:
https://files.nc.gov/ncdeq/Energy%20Mineral%20and%20Land%20Resources/Stormwater/NCG01000_Final_Permit_2019_04_01.pdf
- B. All sediment and erosion control devices and facilities shall be inspected at least once every seven (7) calendar days and within 24 hours after any storm event of greater than 0.5 inches of rain per 24 hour period.

- C. Stormwater discharges shall be inspected by observation for stormwater discharge characteristics (as listed below) at the above frequency to evaluate the effectiveness of the sediment control facilities, devices or practices. Observations shall be made at all stormwater discharge outfalls and other locations where concentrated stormwater discharges from the site. Observations shall be qualitative, no analytical testing or sampling is required. If any visible off-site sedimentation is leaving the site, corrective action shall be taken to reduce the discharge of sediments.
 - 1. Color.
 - 2. Odor.
 - 3. Clarity.
 - 4. Floating solids.
 - 5. Suspended solids.
 - 6. Foam.
 - 7. Oil sheen.
 - 8. Other obvious indicators of stormwater pollution.
- D. The contractor shall perform and keep records of the above inspections. Visible sedimentation found off the site shall be recorded with a brief explanation as the measures taken to prevent future releases as well as any measures taken to clean up the sediment that has left the site. This record shall be made available to the Owner, Architect and governmental authorities.

PART 2 - PRODUCTS

2.1 SOIL AMENDMENTS AND SEED

- A. Refer to Division 32 Section "Planting".

2.2 MISCELLANEOUS

- A. Gravel for Stone Filters: Washed No. 57 stone or as indicated on the drawings.
- B. Silt Fence Fabric: A synthetic filter fabric or a pervious sheet of polypropylene, nylon, polyester, or polyethylene yarn, which is certified by the manufacturer or supplier as conforming to the following requirements.
 - 1. Tensile Strength (Grab): 90 x 90-lbs. min., ASTM D 4632.
 - 2. Permittivity: 0.05-sec⁻¹ min., ASTM D 4491.
 - 3. Apparent Opening Size: #30 US Sieve (0.60-mm) max., ASTM D 4751.
 - 4. UV Resistance (500-hrs): 70%, ASTM D 4355.
- C. Filter Fabric (for installation under riprap): Woven geotextile fabric, apparent opening size no larger than US Standard Sieve no. 70, min. grab strength of 120-lbs.
- D. Dewatering Silt Bag: Permeable, non-woven geotextile bag manufactured to accept and filter pumped, sediment-laden water from dewatering activities. Silt bag shall be sized as appropriate for the dewatering pump discharge rate and shall be fitted with a fill spout large enough to accommodate the discharge piping of the dewatering pump. Silt bag shall be Dirtbag as manufactured by ACF Environmental, Inc. or approved equal.
- E. Compost Filter Sock: Three-dimensional tubular sediment control device comprised of an organic compost filter media contained in a tubular knitted mesh sock.
 - 1. Filter media shall be mature compost that has been certified by the US Composting Council's Seal of Testing Assurance Program and meeting the following specifications.

- a. pH: 5.0 – 8.5.
 - b. Moisture Content: < 60%.
 - c. Organic Matter: >25%, dry weight.
 - d. Particle Size: 99% passing 2-in sieve, 30-50% passing 3/8-in sieve.
- 2. Filter sock netting shall be 5-mm thick continuous HDPE filament, tubular knitted mesh with 3/8-in openings. Filled sock shall be a minimum of 12-in in diameter.
 - 3. Stakes shall be 2x2-in x 3-ft wooden stakes.

2.3 INLET PROTECTION MEASURES

- A. **Manufactured Inlet Sediment Control Device:** Storm drainage inlet sediment control device shall be manufactured from woven polypropylene geotextile to fit the opening of a catch basin or drop inlet to filter sediment from runoff entering the inlet. The device shall be a High Flow Siltsack as manufactured by ACF Environmental, Inc. or approved equal. Device shall be provided with an integral curb deflector if installed at a catch basin with a vertical opening adjacent to a horizontal grate.
- B. **Floor Drain / Area Drain Sediment Filter Device:** Small size storm drainage inlet sediment control device shall be manufactured from woven polypropylene geotextile to fit into small diameter floor drains to filter sediment from runoff entering the inlet. The device shall be a Round Drain Insert as manufactured by New Pig Corp. or approved equal.

2.4 CHANNEL AND SLOPE MATTING

- A. **Channel Matting:** Erosion Control blankets for installation in channels shall be a machine-produced mat of curled wood fiber (excelsior) or synthetic polypropylene fiber as specified below. The blanket shall be of consistent thickness with the fiber evenly distributed over the entire area of the mat. The blanket shall be covered with a photo degradable plastic netting secured to the fiber mat. Channel liners shall be excelsior mat unless otherwise indicated on the drawings.
 - 1. **Excelsior Mat:**
 - a. **Fiber:** Curled wood excelsior of 80% six inch or longer fiber length with a consistent width of fibers evenly distributed throughout the mat. Mat shall be smolder resistant with no chemical additives.
 - b. **Top and Bottom Netting:** Photo degradable extruded plastic netting with maximum mesh size of $\frac{3}{4}$ " x $\frac{3}{4}$ ".
 - 2. **Wire Staples:** 16 gauge steel wire, with minimum of 3" top and 6" long legs. 1.75 staples per square yard of matting minimum.

2.5 RIPRAP

- A. **Riprap:** Provide riprap of the class and quantity indicated on the Drawings. While no specific gradation is required, the various sizes of the stone shall be equally distributed within the required size range. The size of an individual stone shall be determined by measuring its long dimension. Stone shall meet the requirements of the following table for class and size distribution. No more than 5% of the material furnished can be less than the minimum size specified nor no more than 10% of the material can exceed the maximum size specified.

REQUIRED STONE SIZES - INCHES			
CLASS	MINIMUM	MIDRANGE	MAXIMUM
A	2	4	6
B	5	8	12
1	5	10	17
2	9	14	23

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 downstream 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. Contractor shall remove all erosion control measures at the end of the project at his expense unless otherwise directed by the Owner or his representative.
6. Perform monitoring and record keeping as specified in this section.

3.2 PROTECTIVE MEASURES

A. Protective measures shall conform to all State and Local requirements.

B. Construction and maintenance of sediment and erosion control measures shall be in accordance with all applicable laws, codes, ordinances, rules and regulations.

1. Silt Fence: Hog wire or wire mesh fastened to posts as recommended by the Manufacturer and covered with silt fabric.
2. 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.
3. Mulching: Mulching shall be used to prevent erosion and to hold soil and seed in place during the establishment of vegetation.
4. Matting: Temporary slope and channel matting shall be used for temporary stabilization during the establishment of seeded cover in all grassed ditches, channels, long slopes, and steep banks (6:1 or steeper) and additional areas as indicated on plans. Matting shall be installed on any area on site as needed to provide temporary stabilization whether or not matting is indicated on the plan. Install as indicated or per manufacturer's instructions. The installation of matting may be waived by the Architect if surface stabilization is obtained by other methods within the appropriate and agreed time frames. If adequate stabilization is not obtained, the Contractor shall install matting where required at no additional cost to the Owner.
5. Build Berm, Pits and Gravel Filter as shown on Drawings. Maintain 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.

6. Construction Entrances: Construct all entrances in accordance with plans. Maintain all ingress/egress points to prevent tracking of soil onto the Owner's, public or private roads. Any soil that is tracked onto the roads shall be removed immediately.
7. Riprap: Stone shall be graded so that the smaller stones are uniformly distributed throughout the mass. Stone may be placed by mechanical methods, augmented by hand placing where necessary, provided that when the riprap is completed it forms a properly graded, dense, neat layer of stone.
8. Manufactured Inlet Sediment Control Device: Install device in accordance with manufacturer's instructions and install a curb deflector if appropriate. Inspect device after each rain event and at intervals not exceeding two weeks during construction. Remove, empty, clean, and replace the device as needed during construction. Empty collected sediment in approved, protected location. Remove and dispose of device following full and permanent stabilization of the contributing drainage area.
9. Dewatering Silt Bag: Install silt bag on an undisturbed slope so incoming water flows downhill through the bag without causing erosion. Remove and replace silt bag when device no longer drains efficiently due to accumulated sediment in bag. Empty bag within disturbed limits of the site protected by other sediment control measures.
10. Compost Filter Logs: Stake filter log every 10-ft. Drive stakes through the center of the log and 1-ft into the ground. If sock netting must be joined, fit beginning of the new sock over the end of the old sock, overlapping by 1-2 ft. Fill with compost and stake the joint.
11. 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.

C. Provide the following, at a minimum, to prevent windblown dust.

1. Apply straw mulch and establish temporary or permanent ground cover on exposed soil where work is not being actively performed.
2. Cover or establish vegetative cover on stockpiles.
3. Apply water or other approved dust suppressant as needed to soil surfaces before they become excessively dry.
4. Sweep and collect soil that has been tracked onto paved surfaces.

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. In accordance with the schedule as detailed on the drawings.

3.5 PERMANENT SEEDING

- A. In accordance with the schedule as detailed on the drawings.

3.6 MULCHING AND MATTING

- A. Apply mulch or matting to retain soil and grass.
- B. Mulch areas with slope greater than 5% by spreading a light cover of mulch over seeded area at the rate of not less than 85 lbs. per 1000 sq. ft.

- C. Install temporary matting in all grassed ditches, channels, long slopes, and steep banks (6:1 or steeper) and additional areas indicated on plans or where extra protection from erosion is needed.

END OF SECTION

SECTION 32 12 16 - ASPHALT PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes provisions for hot-mixed asphalt paving over prepared subbase.

1.3 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
- B. Material Certificates signed by material producer and Contractor, certifying that each material item complies with or exceeds specified requirements of NCDOT "Standard Specifications for Roads and Structures".
- C. Job Mix Formula: Provide Geotechnical consultant with two copies of the proposed job mix formula at least ten days prior to beginning work. This formula shall be approved by NCDOT for the type of pavement specified.
- D. Recycled Content: 15% minimum, or as approved by NCDOT except as noted below.

1.4 SITE CONDITIONS

- A. Weather Limitations for Prime and Tack Coats: Apply prime and tack coats only when the surface to be treated is dry and when the atmospheric temperature measured at the location of paving operations away from artificial heat are in compliance with current NCDOT Standard Specifications for Roads and Structures. Do not apply tack coat when weather is foggy or rainy.
- B. Weather Limitations for Asphalt Courses: Apply hot-mixed asphalt surface, intermediate and base courses when surface and air temperatures are in compliance with current NCDOT Standard Specifications for Roads and Structures and when base is dry.
- C. Grade Control: Establish and maintain required lines and elevations.
- D. Traffic Control: Provide traffic control devices, lane closures, positive protection and/or any other warning or positive protection devices necessary for the safety of road users and pedestrians during construction.
 - 1. Traffic control shall be performed in conformance with the latest NCDOT Roadway Standard Drawings and Standard Specifications for Roads and Structures and the Manual on Uniform Traffic Control Devices for Streets and Highways.
 - 2. Sidewalk closures shall be installed as necessary. Pedestrian traffic shall be detoured around these closures and shall be signed appropriately and in accordance with ADA guidelines.
 - 3. Two-way traffic shall be maintained at all times through use of flagmen when necessary.
 - 4. Maintain access for fire-fighting equipment and access to fire hydrants.

1.5 QUALITY ASSURANCE

- A. All materials, construction methods and testing shall comply with the requirements of the latest editions of the North Carolina Department of Transportation (NCDOT) "Standard Specifications for Roads and Structures" and the Asphalt Handbook Manual Series No. 4 (MS-4).

- B. All work within any NCDOT right-of-way shall conform to the provisions and conditions of the NCDOT encroachment agreement(s) and driveway permit(s) and other applicable NCDOT standards and policies. The encroachment agreement(s) and driveway permit(s) are considered part of the project specifications by reference. Copies of the agreement(s) and permit(s) will be provided upon request from the Architect.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Use locally available materials and gradations that comply with the requirements of the NCDOT "Standard Specifications for Roads and Structures" and exhibit a satisfactory record of previous installations.
- B. Aggregate Base Course (ABC): Type A aggregate base course meeting the requirements of the latest version of NCDOT "Standard Specifications for Roads and Structures."
- C. Superpave Asphalt Paving Mix: Superpave base, intermediate and surface asphalt paving mix meeting the requirements of the latest version of NCDOT "Standard Specifications for Roads and Structures." Types as indicated on the drawings.
- D. Tack Coat: Asphalt material meeting the requirement of the latest version of NCDOT "Standard Specifications for Roads and Structures."
- E. Parking Lot 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 for parking lot striping.
 - 2. Color: Yellow for fire lanes and service area striping.

PART 3 - EXECUTION

3.1 SURFACE PREPARATION

- A. General: Remove loose material from compacted subbase surface immediately before applying base courses of asphalt.
- B. Proof-roll prepared subgrade surface as described in Section "Earth Moving" to check for unstable areas and areas requiring additional compaction.
- C. Do not begin paving work until deficient subbase areas have been corrected and are ready to receive paving. Ensure subgrade is graded for proper drainage. Repair as needed to avoid ponding on final pavement surfaces.
- D. Cold mill surfaces of existing pavements in locations and to depths as indicated on the drawings and as follows.
 - 1. At edges of existing pavement to be overlaid: Cold mill surfaces of existing pavements to a minimum depth of 1.5-inches at longitudinal terminus of asphalt overlays for a minimum width of 10 feet (extend terminus milling width to 100-ft on public roads) and at horizontal terminus (including along gutter line of existing curbs adjacent to asphalt overlays) for a minimum width of 6 feet to allow a smooth transition from full-depth thickness of overlay course to existing pavement or gutter surface. Thoroughly remove all loose material from milled surface before placing tack coat.
 - 2. At pavement to be wedge overlaid: Cold mill surfaces of existing pavements to required depths at edges of asphalt wedge sections on public roads for widths needed to allow minimum depth thickness of wedge course. Thoroughly remove all loose material from milled surface before placing tack coat.

3. At butt joint of new asphalt to existing asphalt: Cold mill surfaces of existing pavements to a minimum depth of 1.5-inches for a minimum width of 12-inches along length of new joint to allow new asphalt surface to be keyed-in to the existing pavement. Thoroughly remove all loose material from milled surface before placing tack coat.
- E. Thoroughly remove all dust and loose material from surfaces of that which the tack coat is to be applied along with adjacent surfaces before placing tack coat.
 - F. Apply tack coat to all contact surfaces of milled asphalt, existing asphalt to be overlaid, and surfaces abutting or projecting into hot-mixed asphalt pavement including the vertical face of adjacent concrete gutter. Distribute evenly and thoroughly at a rate of 0.04 to 0.08 gallons per sq. yd. of surface.
 1. Apply only as much tack coat as can be covered during the same day's operation.
 2. Take necessary precautions to limit the tracking and/or accumulation of tack coat material on either existing or newly constructed pavements. Excessive accumulation of tack may require corrective measures.
 3. Apply tack coat material with a distributor spray bar that can be adjusted to uniformly coat the entire surface at the directed rate. Use hand hose attachments only on irregular area and areas inaccessible to the spray bar. Cover these areas uniformly and completely.
 4. Apply tack coat to contact surfaces of gutters, concrete pavements, manholes, vertical faces of old pavements, and all exposed transverse and longitudinal edges of each course before mixture is placed adjacent to such surfaces.
 5. Cover curbs, adjacent concrete, and all other appurtenances to protect them from tracking or splattering tack coat material.
 6. Do not place any asphalt mixture until the tack coat has sufficiently cured.
 - G. Allow to dry until at proper condition to receive paving.
 - H. Exercise care in applying bituminous materials to avoid smearing of adjoining concrete surfaces. Remove and clean damaged surfaces.
 - I. Place aggregate base courses as specified in Section "Earth Moving".

3.2 PATCHING

- A. Hot-Mix Asphalt Pavement: Saw cut perimeter of patch and excavate existing pavement section to sound base. Excavate rectangular or trapezoidal patches, extending 12 inches into adjacent sound pavement, unless otherwise indicated. Cut excavation faces vertically. Remove excavated material. Recompact existing unbound-aggregate base course to form new subgrade.
- B. Tack Coat: Apply uniformly to vertical surfaces abutting or projecting into new, hot-mix asphalt paving 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.
- C. Patching: 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 PLACING MIX

- A. Limitations: Do not produce or place asphalt mixtures during rainy weather, when the subgrade or base course is frozen, or when the moisture on the surface to be paved would prevent proper bond. Comply with all NCDOT weather and temperature limitations.

- B. General: Place hot-mixed asphalt mixture on prepared surface, spread, and strike off. Spread mixture at minimum temperature of 225 deg F. Place areas inaccessible to equipment by hand. Place each course to required grade, cross-section, and compacted thickness.
- C. Paver Placing: Place in strips not less than 10 feet wide, unless otherwise acceptable to Architect. After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips. Complete base course for a section before placing surface course.
- D. Immediately correct surface irregularities in finish course behind paver. Remove excess material forming high spots with shovel or lute.
- E. Joints: Make joints between old and new pavements, or between successive days' work, to ensure continuous bond between adjoining work. Construct joints to have same texture, density, and smoothness as other sections of hot-mixed asphalt course. Clean contact surfaces and apply tack coat.

3.4 ROLLING

- A. General: Begin rolling when mixture will bear roller weight without excessive displacement.
- B. Compact mixture with hot hand tampers or vibrating plate compactors in areas inaccessible to rollers.
- C. Breakdown Rolling: Accomplish breakdown or initial rolling immediately following rolling of joints and outside edge. Check surface after breakdown rolling and repair displaced areas by loosening and filling, if required, with hot material.
- D. Second Rolling: Follow breakdown rolling as soon as possible, while mixture is hot. Continue second rolling until mixture has been evenly compacted.
- E. Finish Rolling: Perform finish rolling while mixture is still warm enough for removal of roller marks. Continue rolling until roller marks are eliminated and course has attained required density. Compact the asphalt to at least the minimum percentage of the maximum specific gravity listed below unless otherwise allowed by NCDOT.
 1. SF-9.5A: 90.0% of Maximum Specific Gravity
 2. S-9.5B/C, I-19.0B/C, B-25.0B/C: 92.0% of Maximum Specific Gravity.
- F. Patching: Remove and replace paving areas mixed with foreign materials and defective areas. Cut out such areas and fill with fresh, hot hot-mixed asphalt. Compact by rolling to specified surface density and 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.

3.5 TRAFFIC MARKINGS

- A. Cleaning: Sweep and clean surface to eliminate loose material and dust.
- B. Materials: Use thermoplastic marking for permanent markings on public streets and stop bars and crosswalks on private drives and parking lots. Use marking paint for parking and fire lane striping and other markings on private drives and parking lots.
- C. Apply traffic paint with mechanical equipment to produce uniform straight edges. Apply at manufacturer's recommended rates to provide minimum 12 to 15 mils dry thickness.
- D. Apply thermoplastic markings using application equipment constructed to assure continuous uniformity in the thickness and width of the thermoplastic pavement marking. Use equipment that provides multiple

width settings ranging from 4 inches to 12 inches and multiple thickness settings to achieve the pavement marking thickness ranging from 0.090 inch to 0.120 inch. Comply with all applicable NCDOT standards.

- E. Remove existing markings as indicated by water blasting.

3.6 FIELD QUALITY CONTROL

- A. General: Testing of asphalt concrete mix and in-place hot-mixed asphalt courses for compliance with requirements for thickness and surface smoothness will be done by Owner's testing laboratory in accordance with Division 1 Section "Quality Control." Repair or remove and replace unacceptable paving as directed by Architect.
 - 1. Owner's Independent Testing Agency will conduct and interpret tests and state in each report whether tested work complies with or deviates from the specified requirements.
- B. Thickness: In-place compacted thickness of each layer of asphalt shall be tested in accordance with ASTM D 3549. Results shall be considered unacceptable if the compacted thickness of any one core sample is greater than 1/2-inch below the thickness specified on the drawings or if the average thickness of all core samples is less than the thickness specified on the drawings.
- C. Surface Smoothness: Test finished surface of each hot-mixed asphalt course for smoothness, using 10 feet straightedge applied parallel with and at right angles to centerline of paved area. Surfaces will not be acceptable if exceeding the following tolerances for smoothness:
 - 1. Base Course Surface: 1/4 inch.
 - 2. Wearing Course Surface: 3/16 inch.
 - 3. Crowned Surfaces: Test with crowned template centered and at right angle to crown. Maximum allowable variance from template is 1/4 inch.
- D. In-Place Density: Testing agency will take samples of uncompacted paving mixtures and compacted pavement according to ASTM D 979 or AASHTO T 168.
 - 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 3 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. Remove and replace or install additional hot-mix asphalt where test results or measurements indicate that it does not comply with specified requirements.
- F. Contractor shall repair all test core holes with full depth asphalt patch.
- G. Perform ponding water tests. Repair areas of pavement that pond water.
- H. Check surface areas at intervals as directed by Architect.

END OF SECTION

SECTION 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 portland cement concrete paving for the following:
 - 1. Curbs and gutters, pavement, walkways, service court, dumpster pads.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Division 31 Section "Earth Moving" for subgrade preparation, grading and subbase course.
 - 2. Division 03 Section "Cast-in-Place Concrete" for general building applications of concrete.
 - 3. Division 07 Section "Sealants and Caulking" for joint fillers and sealants within concrete paving and at joints with adjacent construction.

1.3 SUBMITTALS

- A. General: Submit the following according to the Conditions of the Contract and Division 01 Specification Sections.
- B. Product data for proprietary materials and items, including reinforcement and forming accessories, admixtures, joint systems, curing compounds, dry-shake finish materials, and others if requested by Architect.
- C. Design mixes for each class of concrete. Include percentage of recycled content (20% minimum). Include revised mix proportions when characteristics of materials, project conditions, weather, test results, or other circumstances warrant adjustments.
- D. Scaled plan of proposed construction, expansion and control joint locations in concrete pavement and concrete sidewalk. Submittal of plans for joints in curb and gutter or longitudinal sidewalk 6-feet or less in width is not required.

1.4 QUALITY ASSURANCE

- A. Concrete Standards: Comply with provisions of the following standards, except where more stringent requirements are indicated.
 - 1. American Concrete Institute (ACI) 301, "Specifications for Structural Concrete for Buildings."
 - 2. ACI 318, "Building Code Requirements for Reinforced Concrete."
 - 3. ACI 330R, "Guide for the Design and Construction of Concrete Parking Lots."
 - 4. Concrete Reinforcing Steel Institute (CRSI) "Manual of Standard Practice."
- B. Concrete Manufacturer Qualifications: Manufacturer of ready-mixed concrete products complying with ASTM C 94 requirements for production facilities and equipment.
- C. Concrete Testing Service: Engage a qualified independent testing agency to perform materials evaluation tests and to design concrete mixes.

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. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers 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.
- 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. Reinforcing Bars: ASTM A 615/A 615M, Grade 60; deformed.
- C. Steel Bar Mats: ASTM A 184/A 184M; with ASTM A 615/A 615M, Grade 60, deformed bars; assembled with clips.
- D. Plain Steel Wire: ASTM A 82, as drawn.
- E. Joint Dowel Bars: Plain steel bars, ASTM A 615/A 615M, Grade 60. Cut bars true to length with ends square and free of burrs.
- F. Tie Bars: ASTM A 615/A 615M, Grade 60, deformed.
- G. 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, portland cement, Type I, II, or III.
 - a. Fly Ash: ASTM C 618, Class F. Up to 30% by weight of required cement content, with 1.0-lbs Fly Ash per 1-lb of cement replaced.

- b. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120 with 1-lb slag per 1-lb of cement replaced.
- B. Normal-Weight Aggregates: ASTM C 33, Class 3S 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: 1-1/2 inches nominal.
 - 2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- C. Water: ASTM C 94/C 94M, potable.
- 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 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.
- E. Clear Waterborne Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B.

2.6 RELATED MATERIALS

- A. Expansion and Isolation Joint Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber.
- B. Wheel Stops: Precast, air-entrained concrete; 2500-psi minimum compressive strength; approximately 6 inches high, 9 inches wide, and 84 inches long. Provide chamfered corners and drainage slots on underside and provide holes for dowel-anchoring to substrate.
 - 1. Dowels: Galvanized steel, diameter of $\frac{3}{4}$ inch, minimum length 10 inches.
- C. Slip Resistive Aggregate Finish: Factory-graded, packaged, rustproof, non-glazing, abrasive aggregate of fused aluminum-oxide granules or crushed emery aggregate containing not less than 50 percent aluminum oxide and not less than 25 percent ferric oxide; unaffected by freezing, moisture, and cleaning materials.
- D. Bonding Agent: ASTM C 1059, Acrylic or styrene butadiene.

- E. Epoxy Adhesive: ASTM C 881, two-component material suitable for dry or damp surfaces. Provide material type, grade, and class to suit requirements.

2.7 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): 4000 psi, 3500 psi, or 3000 psi as indicated on the drawings.
 - 2. Maximum Water-Cementitious Materials Ratio at Point of Placement: As specified by NCDOT Standard Specifications for class of concrete indicated.
 - 3. Slump Limit: Maximum 3.5 inches for non-vibrated, maximum 4 inches for vibrated.
- 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: 5-1/2 percent plus or minus 1.5 percent for 1-1/2-inch (38-mm) nominal maximum aggregate size.
 - 2. Air Content: 6 percent plus or minus 1.5 percent for 1-inch (25-mm) nominal maximum aggregate size.
 - 3. Air Content: 6 percent plus or minus 1.5 percent for 3/4-inch (19-mm) nominal maximum aggregate size.
- D. Chemical Admixtures: Use admixtures according to manufacturer's written instructions.
 - 1. Use admixtures 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.
- E. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement according to ACI 301 requirements as follows:
 - 1. Fly Ash: 30 percent.
 - 2. Ground Granulated Blast-Furnace Slag: 50 percent.
 - 3. Combined Fly Ash, and Ground Granulated Blast-Furnace Slag: 50 percent, with fly ash not exceeding 20 percent.
- F. Color Pigment: Add color pigment to concrete mixture according to manufacturer's written instructions and to result in hardened concrete color consistent with approved mockup.

2.8 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M and ASTM C 1116. 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.

- B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Mix concrete materials in appropriate drum-type batch machine mixer.
 - 1. For concrete mixes of 1 cu. yd. or smaller, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released.
 - 2. For concrete mixes larger than 1 cu. yd., increase mixing time by 15 seconds for each additional 1 cu. yd.
 - 3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixing time, quantity, and amount of water added.

2.9 JOINT SEALANTS

- A. Type SL Silicone Sealant for Concrete and Asphalt: Single-component, low modulus, neutral-curing, self-leveling silicone sealant complying with ASTM D 5893 for Type SL.
- B. Round Backer Rod for Cold-Applied Sealants: ASTM D 5249, Type 1, of diameter and density required to control sealant depths and pavement bottom-side adhesion of sealant.

2.10 PAVEMENT MARKINGS

- A. Parking Lot 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 and formulated for concrete surfaces.
 - 1. Color: As indicated on the drawings.

PART 3 - EXECUTION

3.1 SURFACE PREPARATION

- A. Proof-roll prepared subbase surface to check for unstable areas and verify need for additional compaction. Do not begin paving work until such conditions have been corrected and are ready to receive paving. Ensure subgrade is graded for proper drainage. Repair as needed to avoid ponding on final pavement surfaces.
- B. Remove loose material from compacted subbase surface immediately before placing concrete.
- C. Herbicide Treatment: Apply chemical weed control agent in strict compliance with manufacturer's recommended dosages and application instructions. Apply to compacted, dry subbase.
- D. Place aggregate base courses as specified in Division 31 Section "Earth Moving".

3.2 EDGE FORMS AND SCREED CONSTRUCTION

- A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides for paving to required lines, grades, and elevations. Install forms to allow continuous progress of work and so that forms can remain in place at least 24 hours after concrete placement. Set forms to ensure positive drainage and compliance with ADA and Building Code requirements.
- 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 1/4 inch in 10 feet.

- C. Clean forms after each use and coat with form release agent as required to ensure separation from concrete without damage.

3.3 PLACING REINFORCEMENT

- A. General: Comply with Concrete Reinforcing Steel Institute's recommended practice for "Placing Reinforcing Bars" for 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 fabric in lengths as long as practicable at mid depth of concrete. Lap adjoining pieces at least one full mesh and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.

3.4 JOINTS

- A. General: Construct contraction, construction, and isolation joints true to line with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to the centerline, unless indicated otherwise.
 - 1. When joining existing paving, place transverse joints to align with previously placed joints, unless indicated otherwise.
- B. Contraction (Control) Joints: Provide weakened-plane contraction joints, sectioning concrete into areas as indicated below unless shown otherwise on Drawings. Construct contraction joints for a depth equal to at least 1/3 of the concrete thickness, as follows:
 - 1. Tooled Joints: Form contraction joints in fresh concrete by grooving and finishing each edge of joint with a radiused jointer tool.
 - 2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch-wide joints into hardened concrete when cutting action will not tear, abrade, or otherwise damage surface and before development of random contraction cracks.
 - 3. Inserts: Form contraction joints by inserting premolded plastic, hardboard, or fiberboard strips into fresh concrete until top surface of strip is flush with paving surface. Radius each joint edge with a jointer tool. Carefully remove strips or caps of two-piece assemblies after concrete has hardened. Clean groove of loose debris.
 - 4. Spacing:
 - a. Pavement (greater than 4-in thick slabs): Locate contraction joints at 10-ft max. intervals, each way in concrete pavement.
 - b. Sidewalk & Patios (4-in thick slabs): Locate contraction joints at 5-ft max. intervals, each way in concrete sidewalks/patios unless shown otherwise. Locate contraction joints in sidewalks less than 8-ft in width at 5-ft intervals across the walk. Locate contraction joints in sidewalks of 8-ft and greater width at 5-ft intervals across the walk and equally section the walk lengthwise with joints at 5-ft. max. intervals (example: an 8-ft wide walk shall have contraction joints at 5-ft. spacing across the walk and one joint dividing the walk lengthwise into two, equal 4-ft sections.)
 - c. Curbs or Curb & Gutter: Locate contraction joints at 10-ft max. intervals in concrete curbs or concrete curb and gutter.
- C. Construction Joints: Set construction joints at side and end terminations of paving and at locations where paving operations are stopped for more than 1/2 hour, unless paving terminates at isolation joints.

1. Continue reinforcement across construction joints unless indicated otherwise. Do not continue reinforcement through sides of strip paving unless indicated.
 2. Provide tie bars at sides of paving strips where indicated.
 3. Use bonding agent on existing concrete surfaces that will be joined with fresh concrete.
- D. Isolation (expansion) 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. General spacing: Locate additional expansion joints at the following intervals unless indicated otherwise on the drawings.
 - a. Pavement (greater than 4-in thick slabs): None in addition to located specified above.
 - b. Sidewalks (4-in thick slabs): 30-ft each way.
 - c. Curbs or Curb & Gutter: 90-ft spacing.
 2. Extend joint fillers full width and depth of joint 1/2 inch below finished surface where joint sealant is indicated. Place top of joint filler flush with finished concrete surface when no joint sealant is required.
 3. Furnish joint fillers in one-piece lengths for full width being placed wherever possible. Where more than one length is required, lace or clip joint filler sections together.
 4. Protect top edge of joint filler during concrete placement with a metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.
- E. Dowel Joints: Install dowel sleeves and dowels or dowel bar and support assemblies at joints where indicated
1. Use dowel sleeves or lubricate or asphalt-coat one-half of dowel length to prevent concrete bonding to one side of joint.

3.5 CONCRETE PLACEMENT

- A. Inspection: Before placing concrete, inspect and complete formwork installation, reinforcing steel, and items to be embedded or cast in. Notify other trades to permit installation of their work. Ensure forms are set to ensure water will not pond on final surface.
- B. Remove snow, ice, or frost from base surface and reinforcing before placing concrete. Do not place concrete on surfaces that are frozen.
- C. Moisten base to provide a uniform dampened condition at the time concrete is placed. Do not place concrete around manholes or other structures until they are at the required finish elevation and alignment.
- D. Comply with requirements and with ACI 304R for measuring, mixing, transporting, and placing concrete.
- E. 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.
- F. Form and pour concrete pavement with thickened edges along all edges that could be subject to vehicle wheel loads, do not abut a building or wall, or are not doweled to the adjacent pavement or structure.
- G. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
- H. Consolidate concrete by mechanical vibrating equipment supplemented by hand-spading, rodding, or tamping. Use equipment and procedures to consolidate concrete complying with ACI 309R.

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 reinforcing, dowels, and joint devices.
- I. Screed paved surfaces with a straightedge and strike off. Use bull floats or darbies to form a smooth surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces prior to beginning finishing operations.
 - J. 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 portions of bottom layer of concrete that have been placed more than 15 minutes without being covered by top layer or use bonding agent if acceptable to Architect.
 - K. 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 acceptable, remove and replace with formed concrete.
 1. Spill Gutters: Form and install curb and gutter with gutter pans that spill at ¼" per foot slope away from the curb in the following locations. Do not install curb and gutter that will pond water.
 - a. Outside of the Public Right of Way: Provide spill gutter where curb and gutter is located adjacent to pavement surfaces that slope away from curb.
 - b. Within the Public Right of Way: Slope gutter per NCDOT Standard Drawing 846.01.
 - L. Cold-Weather Placement: Comply with provisions of ACI 306R 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 (4 deg C), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F (10 deg C) and not more than 80 deg F (27 deg C) 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 accepted in mix designs.
 - M. Hot-Weather Placement: Place concrete complying with ACI 305R and as specified when hot weather conditions exist.
 1. Cool ingredients before mixing to maintain concrete temperature at time of placement to below 90 deg F (32 deg C). Mixing water may be chilled or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
 2. Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that steel temperature will not exceed the ambient air temperature immediately before embedding in concrete.
 3. Fog spray forms, reinforcing steel, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

3.6 CONCRETE FINISHING

- A. Float Finish: Begin floating when bleed water sheen has disappeared and the 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 within a tolerance of 1/4 inch

in 10 feet as determined by a 10-foot-long straightedge placed anywhere on the surface in any direction. Cut down high spots and fill low spots to ensure positive drainage and eliminate ponding. Refloat surface immediately to a uniform granular texture.

1. Medium-to-Fine-Textured Broom Finish: Draw a soft bristle broom across all site concrete sidewalk and pavement surfaces perpendicular to line of traffic to provide a uniform fine line texture finish.
- B. Final Tooling: Tool edges of paving, gutters, curbs, and joints formed in fresh concrete with a jointing tool to a radius of $\frac{1}{4}$ -inch unless indicated otherwise on the drawings. Repeat tooling of edges and joints after applying surface finishes. Eliminate tool marks on concrete surfaces.
- C. Step Tread Grooves: Tool three (3) parallel grooves along entire top front edge of new concrete stair treads.

3.7 CONCRETE PROTECTION AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with the recommendations of ACI 306R for cold weather protection and ACI 305R for hot weather protection during curing.
- B. Evaporation Control: In hot, dry, and windy weather, protect concrete from rapid moisture loss before and during finishing operations with an evaporation-control material. Apply according to manufacturer's instructions after screeding and bull floating, but before floating.
- C. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.
- D. Curing Methods: Cure concrete by moisture curing, moisture-retaining-cover curing, curing compound, or a combination of these as follows:
 1. Moisture Curing: Keep surfaces continuously moist for not less than 7 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 a 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 directions. Recoat areas subjected to heavy rainfall within 3 hours after initial application. Maintain continuity of coating and repair damage during curing period.

3.8 TRAFFIC MARKINGS

- A. Cleaning: Remove all oil, dust, grease, dirt, loose rust, and other foreign material to ensure adequate adhesion.
- B. Surface Preparation: Surfaces shall be cured, clean, dry and sound. Remove all peeling paint from existing surfaces. Concrete surfaces shall cure minimum 30 days. Concrete sealers or efflorescence of new concrete should be removed by extended weathering, etching or abrasive blasting.

- C. Application Conditions: 50° min., 90° maximum (air, surface, and materials) at least 5° above dew point. Relative humidity 85% maximum.
- D. Tinting: Mix colors per manufacturer's specification. Only mix like paints (do not mix latex with acrylic or interior paints with exterior paints) to achieve required colors.
- E. Apply traffic paint with mechanical equipment to produce uniform straight edges. Apply at manufacturer's recommended rates to provide minimum 12 to 15 mils dry thickness.

3.9 FIELD QUALITY CONTROL TESTING

- A. The Owner shall employ an independent testing and inspection agency to sample materials, perform tests, and submit test reports during concrete placement in accordance with Division 01 Section "Quality Control" and as follows:
 - 1. When total quantity of a given class of concrete is less than 50 cu. yd., Architect may waive strength testing if adequate evidence of satisfactory strength is provided.
 - 2. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, evaluate current operations and provide corrective procedures for protecting and curing the in-place concrete.
- 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: Obtain at least one composite sample for each 100 cu. yd. or fraction thereof of each concrete mixture placed each day.
 - 2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
 - 3. Air Content: ASTM C 231, pressure method; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 - 4. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F and below and when it is 80 deg F and above, and one test for each composite sample.
 - 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 one specimen at seven days and two specimens at 28 days.
 - a. A compressive-strength test shall be the average compressive strength from two specimens obtained from same composite sample and tested at 28 days.
- C. Strength of each concrete mixture will be satisfactory if average of any three 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 one week 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.
- G. Concrete paving will be considered defective if it does not pass tests and inspections.
- H. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.10 REPAIRS AND PROTECTION

- A. Remove and replace concrete paving that is broken, damaged, or defective, or does not meet the requirements of this Section.
- B. 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 paving with epoxy adhesive.
- C. Protect concrete from damage. Exclude traffic from paving for at least 14 days after placement. When construction traffic is permitted, maintain paving as clean as possible by removing surface stains and spillage of materials as they occur.
- D. Maintain concrete paving free of stains, discoloration, dirt, and other foreign material. Sweep concrete paving not more than 2 days prior to date scheduled for Substantial Completion inspections.
- E. Remove and replace concrete paving or curb and gutter that ponds water.

END OF SECTION

SECTION 32 90 00 PLANTING

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. Trees.
2. Shrubs.
3. Seeded lawns, sod and "no-mow" areas.
4. Topsoil and soil amendments.
5. Planter Soil
6. Fertilizers and mulches.
7. Stakes and guys.
8. Landscape edging.
9. Maintenance, guarantees and warranties.

- B. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 31, Section "Site Clearing" for protection of existing trees and planting, topsoil stripping and stockpiling, and site clearing.
2. Division 31, Section "Earth Moving" for excavation, filling, rough grading, and subsurface aggregate drainage and drainage backfill.
3. Division 31 Section "Erosion Controls" soil erosion and sedimentation control.

1.3 INDUSTRY STANDARDS

- A. References: Some products and execution are specified in this Section by reference to published specifications or standards of the following:

The American Society for Testing and Materials (ASTM)
American Association of Nurserymen (AAN)
US Department of Agriculture (USDA)
NC Department of Agriculture (NCDA)
NC Composting Council (NCCC)

- B. Landscape Contractor shall mean a registered "Landscape Contractor" as defined by the NC General Statute 89D (www.nclclb.com). Unless proper credentials and evidence of experience can be supplied to prove equal capabilities, only a Landscape Contractor licensed in the State of NC shall be permitted to perform the work.

1. The Landscape Contractor's performance shall conform to the requirements in the most current edition of the NC Landscape Contractors Manual (NCLCM) as approved by the NC Board of Landscape Contractors. In the event the Landscape Contractor feels there is discrepancy between the NCLCM and the requirements of this Contract that could affect the quality of work; it is the Contractor's responsibility to apprise the Owner and Landscape Architect of the issue.

1.4 SUBMITTALS

- A. General: Submit each item in this Article according to the Conditions of the Contract and Division 01 Specification Sections.
- B. Product certificates signed by manufacturers certifying that their products comply with specified requirements.
 - 1. Manufacturer's certified analysis for standard products.
 - 2. Label data substantiating that plants, trees, shrubs, and planting materials comply with specified requirements.
- C. Certification of grass seed from seed vendor for each grass-seed mixture stating the botanical and common name and 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.
- D. Samples of each of the following:
 - 1 Sample of imported mulch (1) 1-gal. sized bag.
 - 2 Topsoil (1) 1-gal sized bag.
- E. Qualification data for firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, at least fifteen names and address of architects and owners, total years of experience and landscape contractor's license number. If the landscape contractor hires a sub-contractor for seeding operations, the same references shall be required from them also.
- F. Material test reports from qualified independent testing agency indicating and interpreting test results relative to compliance of the following materials with requirements indicated.
 - 1. Analysis of existing topsoil and suitability as a medium for growing specified lawn. Include recommendations of amendments required to make existing topsoil suitable as a growing medium for specified lawn, if required.
 - 2. Analysis of imported topsoil, if required due to unacceptability of existing topsoil to meet acceptable growing medium requirements for lawn.
- G. Planting schedule indicating anticipated dates and locations for each type of planting.
- H. Maintenance instructions recommending procedures to be established by Owner for maintenance of landscaping during an entire year. Submit before expiration of required maintenance periods.
- I. Landscape plant schedule, per Article 1.4, A, C, indicating quantity, botanical name, common name, specified size and vendor source for each individual plant species; including any substitutions. Include all cultivars and varieties for substitutions. Provide vendor source contact information as attachment to schedule.

CLH Design and the Owner reserve the right to reject any substitution requests and may request that the landscape contractor provide additional vendor search information and/or complete documentation to prove a hardship, to confirm reason(s) for substitution or to prove that the material is not available from local and national nurseries.

Refer to section 1.6, C for information regarding the appropriate time to dig trees. It is the Contractor's responsibility to plan ahead of time rather than waiting and checking availability at the time of installation.
- J. All sod shall be from a certified sod producer and be blue tag certified in accordance with NCCIA and AOSCA.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced Installer who has completed landscaping work similar in material, design, and extent to that indicated for this Project and with a record of successful landscape establishment.
 - 1. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on the Project site during times that landscaping is in progress.
- B. Testing Agency Qualifications: To qualify for acceptance, an independent testing agency must demonstrate to Architect's satisfaction, based on evaluation of agency-submitted criteria conforming to ASTM E 699, that it has the experience and capability to satisfactorily conduct the testing indicated without delaying the Work.
- C. Provide quality, size, genus, species, and variety of trees and shrubs indicated, complying with applicable requirements of ANSI Z60.1 "American Standard for Nursery Stock."
 - 1. Contractor shall show proof of cultivar authenticity to Landscape Architect. When cultivars are specified, standard species will not be acceptable.
- D. Topsoil Analysis: Furnish a soil analysis made by a qualified independent soil-testing agency stating percentages of organic matter, inorganic matter (silt, clay, and sand), deleterious material, pH, and mineral and plant-nutrient content of topsoil.
 - 1. Report suitability of on-site topsoil for growth of applicable planting material. State recommended quantities of nitrogen, phosphorus, and potash nutrients and any limestone, aluminum sulfate, or other soil amendments to be added to produce a satisfactory topsoil at no additional cost to owner.
- E. Measurements: Measure trees and shrubs according to ANSI Z60.1 with branches and trunks or canes in their normal position. Do not prune to obtain required sizes. Take caliper measurements 6 inches (150 mm) above ground for trees up to 4-inch (100-mm) caliper size, and 12 inches (300 mm) above ground for larger sizes. Measure main body of tree or shrub for height and spread; do not measure branches or roots tip-to-tip.

When size ranges are given, 50 % of plant material shall be at the larger size.
- F. Preinstallation Conference: Conduct conference at Project site to comply with requirements of Division 01 Section "Project Meetings."

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Packaged Materials: Deliver packaged materials in containers showing weight, analysis, and name of manufacturer. Protect materials from deterioration during delivery and while stored at site.
- B. Seed: Deliver seed in original sealed, labeled, and undamaged containers.
- C. Trees and Shrubs: Deliver freshly dug trees and shrubs. Do not prune before delivery, except as approved by Landscape Architect. Protect bark, branches, and root systems from sun scald, drying, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie trees or shrubs in such a manner as to destroy natural shape. Provide protective covering during delivery. Do not drop trees and shrubs during delivery. For trees which cannot be dug in the summer, Contractor shall have trees pre-dug and heeled-in at the nursery where they are grown until planting. Contractor shall be responsible for ensuring that the trees have been adequately watered and cared for at the nursery prior to delivery. No substitutions will be allowed for trees which cannot be "summer-dug".

- D. Handle balled and burlap stock by the root ball.
- E. Deliver trees, shrubs, and ground covers after preparations for planting have been completed and install immediately. If planting is delayed more than 6 hours after delivery, set planting materials in shade, protect from weather and mechanical damage, and keep roots moist.

PLANT MATERIAL SHALL NOT BE DELIVERED TO THE SITE MORE THAN 72 HOURS BEFORE PLANTING TAKES PLACE. THE LANDSCAPE ARCHITECT RESERVES THE RIGHT TO REJECT ALL MATERIAL NOT PLANTED WITHIN THAT TIME PERIOD UNLESS THE LANDSCAPE CONTRACTOR MAKES HEELING-IN AND IRRIGATION PROVISIONS WITHIN 24 HOURS OF PLANT DELIVERY.

- 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 trees and shrubs stored on site with a fine-mist spray. Water as often as necessary to maintain root systems in a moist condition.

1.7 PROJECT CONDITIONS

- A. Utilities: Determine location of above grade and underground utilities and perform work in a manner which will avoid damage. Hand excavate, as required. Maintain grade stakes until removal is mutually agreed upon by parties concerned.
- B. Excavation: When conditions detrimental to plant growth are encountered, such as rubble fill, adverse drainage conditions, or obstructions, notify Landscape Architect before planting.

1.8 COORDINATION AND SCHEDULING

- A. Coordinate installation of planting materials during normal planting seasons for each type of plant material required.

Planting Season: The normal season for planting balled and burlap material is November 15 through March 15. The normal season for planting container grown material is September 15 through April 15. After notification to proceed, planting operations shall be conducted under favorable weather conditions during the normal planting season. The Landscape Contractor shall make provisions for watering the material on an as-needed basis and as frequently as is required to ensure that plant material thrives.

The General Contractor shall coordinate the planting schedule with the Landscape Contractor to avoid any summer digging and planting.

The Landscape Architect shall be notified and must approve of any schedule changes which may require summer planting. THE CONTRACTOR SHALL NOT BE COMPENSATED FOR ADDITIONAL WATERING COSTS FOR PLANTINGS WHICH ARE INSTALLED IN THE SUMMER.

- B. Temporary Seeding: In accordance with the schedule as detailed on the drawings.
 - 1. In the event the Landscape Contractor is required to establish a temporary seeding cover due to the construction schedule, the Landscape Contractor is not relieved from providing the specified permanent seed mixture.
 - 2. The Landscape Contractor is responsible for eradicating any temporary seed cover by means of mowing, thatching and using an herbicide approved by the Owner's representative at the manufacturer's recommended rate.

1.9 GRASS ESTABLISHMENT SCHEDULE

- A. Refer to the Supplementary Conditions for Final Completion dates of grassed areas of the site.
- B. Definitions:
 - 1. Final Complete seeded or sprigged grass: A healthy, dense, weed free stand of the specified species of grass with 95% grass coverage as evaluated on a per square yard sample basis.
 - 2. Final Complete sodded grass: An installed and rolled healthy sod, free of weeds and dead spots.
- C. Complete Site: A complete installation of grass sod and/or stand of grass, germinated from seed or sprigs, on the complete site shall be established by the following date:
 - 1. Complete Site (Seed, Sprig or Sod) Final Completion: *See Final Completion Date noted in contract documents.* Due to seasonal restrictions the specified date shall not be extended. Extension to the Contract Time will not change this date.

1.10 WARRANTY

- A. General Warranty: The 12-month warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.
- B. 12-Month Warranty: Contractor is responsible for general maintenance and care for trees, shrubs, ground covers and ornamental grasses during 12-month warranty period, in addition to general maintenance specified in this Article. Additional maintenance during 12-month warranty period for lawn, grass and sod is not required once areas have met 95% coverage, have met final acceptance and the Owner has assumed mowing/maintenance of these areas. Contractor 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; except for defects resulting from abuse or incidents that are beyond Contractor's control.
 - b. Structural failures including plantings falling or blowing over.
 - 2. Warranty Periods from Date of Final Completion:
 - a. Trees, Shrubs, Ground Covers, Ornamental Grasses: 12 months.
 - b. Lawn, grass and sod (herbicide and fertilizer): 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.
 - 4. Areas seeded or sodded that are bare and not established at the end of the warranty period shall be re-seeded or re-sodded at no additional cost to the Owner.

5. Contractor is responsible for applying weed control herbicide and fertilizers during warranty period.

1.11 TREE AND SHRUB MAINTENANCE

- A. Maintain trees and shrubs by pruning, cultivating, watering, weeding, fertilizing, restoring planting saucers, tightening and repairing stakes and guy supports, and resetting to proper grades or vertical position, as required to establish healthy, viable plantings. Spray as required to keep trees and shrubs free of insects and disease. The presence of significant insects or disease at the end of the 12-month warranty period shall be grounds for rejection of material. Restore or replace damaged tree wrappings. Maintain trees and shrubs until end of the 12-month warranty period.

1.12 LAWN/GRASS MAINTENANCE

- A. Begin maintenance of lawns and other grassed areas immediately after each area is planted and continue until acceptable lawn is established and accepted by the Owner, but for not less than the following periods:

1. Seeded Lawns/Grass and Naturalized Seed Areas: **Final Completion.**

- a. When full maintenance period has not elapsed before end of planting/growing season, or if lawn is not fully established at that time (95% coverage as established on a per square yard sample basis), continue maintenance during next planting season until 95% coverage is established.

2. Sodded Lawns/Grass: **Final Completion.**

- a. Sodded areas will be accepted at final inspection if –

1. Sodded areas are properly established.
2. Sod is free of bare and dead spots and without weeds.
3. Sodded areas have been mowed a minimum of twice.

- B. Maintain and establish lawns by watering, fertilizing, weeding, mowing, trimming, replanting, and other operations. Roll, regrade, and replant bare or eroded areas and re-mulch to produce a uniformly smooth lawn.

- C. Watering: Provide and maintain temporary piping, hoses, and lawn-watering equipment to convey water from sources and to keep lawns uniformly moist to a depth of 4 inches (100 mm). Following the date of project Final Completion, water shall be provided by contractor own water source (water truck, gator bag, etc.).

1. Supplement natural precipitation to provide a net rate of one inch of water per week or as required to maintain lawn in a thriving condition.
2. Watering shall conform to the time, volume and frequency recommendations of applicable governmental water conservation regulations.
3. Irrigate at minimum rate of once per day for two full weeks following date of seeding or sod installation.
4. Irrigate at minimum of once per week for remainder of maintenance period.

- D. Mow lawns as soon as there is enough top growth to cut with mower set at specified height for principal species planted. Repeat mowing as required to maintain specified height without cutting more than 40 percent of the grass height at any mowing. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet.

- E. Postfertilization: Apply fertilizer to lawn after first mowing and when grass is dry. Apply only from August through October.

1. Use fertilizer that will provide actual nitrogen of at least 1 lb per 1000 sq. ft. (0.5 kg per 100 sq. m) of lawn area or as required to maintain lawn in a thriving condition. A minimum of 50% of the nitrogen shall be in a slow release form.

PART 2 - PRODUCTS

2.1 TREE AND SHRUB MATERIAL

- A. General: Furnish nursery-grown trees and shrubs conforming to ANSI Z60.1, with healthy root systems developed by transplanting or root pruning. Provide well-shaped, fully branched, healthy, vigorous stock free of disease, insects, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement, including trunks which are not straight on single stem trees.
- B. The natural stem/root collar of balled and burlap materials shall be found within two inches of the nursery maintained soil line. Trees shall not be accepted which have been grown too deeply or too high in the soil profile.
- C. Grade: Provide trees and shrubs of sizes and grades conforming to ANSI Z60.1 for type of trees and shrubs required. Trees and shrubs of a larger size may be used if acceptable to Landscape Architect, with a proportionate increase in size of roots or balls.
- D. Label one tree and shrub in each plant grouping with securely attached, waterproof tag bearing legible designation of botanical and common name. Proof of cultivar shall be required on all species for which a cultivar is designated.
- E. Label at least 1 tree and 1 shrub of each variety and caliper with a securely attached, waterproof tag bearing legible designation of botanical and common name.
- F. Imported Fire Ant Control: All plants shall be accompanied by a certificate stating: "certified under all applicable state and federal quarantine." Contact Landscape Architect for inspection of all plant materials for the presence of imported fire ants. The presence of fire ants shall be cause for rejection of plant material.

2.2 SHADE AND FLOWERING TREES

- A. Shade Trees: Single-stem trees with straight trunk, free of basal sprouts, well-balanced crown, and intact leader, of height and caliper indicated, conforming to ANSI Z60.1 for type of trees required. Grounds for rejection may include, but not limited to: improper branch density or distribution, "v" crotches, including bark, undesirable multiple leaders, leaders that have been topped or headed back, prevalent suckering or epicormic sprouting. Trees which have evidence of unevenly distributed, girdling or suckering roots may be rejected.
 1. Branching Height: 1/2 of tree height.
- B. Small Trees: Small upright or spreading type, branched or pruned naturally according to species and type, and with relationship of caliper, height, and branching recommended by ANSI Z60.1, and stem form as specified in the Plant List on the drawings. Good structure shall be especially critical for trees. Grounds for rejection may include, but not limited to: improper branch density or distribution, "v" crotches, including bark, undesirable multiple leaders, leaders that have been topped or headed back, prevalent suckering or epicormic sprouting. Trees which have evidence of unevenly distributed, girdling or suckering roots may be rejected.
- C. Provide balled and burlap trees unless noted otherwise on the drawings. Plants designated "B&B" in the plant list shall be balled and burlap. They shall be nursery grown and freshly dug. They shall be dug with firm, natural balls of earth of sufficient diameter and depth to encompass the fibrous and feeding root

system necessary for full recovery of the plant. Balls shall be firmly wrapped with untreated biodegradable burlap and bound with twine, cord, or wire mesh basket. Plants shall not be accepted if the ball is dry, deformed or broken before or during the planting operations.

2.3 DECIDUOUS SHRUBS

- A. Form and Size: Deciduous shrubs with not less than the minimum number of canes required by and measured according to ANSI Z60.1 for type, shape, and height of shrub.
- B. Provide container grown shrubs unless noted otherwise on the drawings.

2.4 CONIFEROUS EVERGREENS

- A. Form and Size: Specimen-quality, exceptionally heavy, tightly knit, symmetrically shaped coniferous evergreens.
- B. Provide balled and burlap coniferous evergreens.
 - 1. Container-grown coniferous evergreens will be acceptable in lieu of balled and burlap coniferous evergreens subject to meeting ANSI Z60.1 limitations for container stock and provided they are equal in quality and size to balled and burlap material.

2.5 BROADLEAF EVERGREENS

- A. Form and Size: Normal-quality, well-balanced, broadleaf evergreens, of type, height, spread, and shape required, conforming to ANSI Z60.1.
- B. Provide balled and burlap broadleaf evergreens.
 - 1. Container-grown broadleaf evergreens will be acceptable in lieu of balled and burlap broadleaf evergreens subject to meeting ANSI Z60.1 limitations for container stock and provided they are equal in quality and size to balled and burlap material.

2.6 GRASS/LAWN MATERIALS

- A. Grass Seed: Fresh, clean, dry, new-crop seed complying with the Association of Official Seed Analysts' "Rules for Testing Seeds" for purity and germination tolerances.
 - 1. Seed Mixture: Provide seed of grass species and varieties as specified in the plans and/or specifications.
 - 2. Sod shall be as indicated on the plans and detail drawings. Provide machine cut, strongly rooted, certified turf grass sod, not less than two years old, free from weeds and undesirable native grasses and stripped not more than 24 hours before laying. Sod pad size shall be uniform thickness of 5/8", plus or minus 1/4", measured at the time of cutting and excluding top growth and thatch.

2.7 TOPSOIL

- A. Topsoil: ASTM D 5268, pH range of 5.5 to 7, 4 percent organic material minimum, free of stones 1 inch (25 mm) or larger in any dimension, and other extraneous materials harmful to plant growth. Sticks, roots, and clay clumps shall be removed from topsoil prior to spreading.
 - 1. Topsoil Source: Reuse surface soil stripped and stockpiled on the site if adequate quantities exist. Verify suitability of surface soil to produce topsoil meeting requirements and amend when necessary. Screen topsoil of roots, plants, sods, stones greater than 1/2" diameter in general lawn areas and planting beds, clay lumps, and other extraneous materials harmful to plant growth.

Screen topsoil prior to planting. If inadequate quantities of topsoil exist on-site contractor will be required to import pre-screened topsoil. A minimum depth of 3 inches shall be required.

2.8 SOIL AMENDMENTS

- A. Lime: ASTM C 602, Class T, agricultural limestone containing a minimum 80 percent calcium carbonate equivalent, with a minimum 99 percent passing a No. 8 (2.36 mm) sieve and a minimum 75 percent passing a No. 60 (250 micrometer) sieve.
 - 1. Provide lime in the form of dolomitic limestone.
- B. Organic Compost: Organic compost of neutral character, decomposed, stable and weed-free meeting the US Composting Council standards.
- C. Perlite: Horticultural perlite, soil amendment grade.
- D. Peat Humus: Finely divided or granular texture, with a pH range of 6 to 7.5, composed of partially decomposed moss peat (other than sphagnum), peat humus, or reed-sedge peat.
- E. Peat Humus: For acid-tolerant trees and shrubs, provide moss peat, with a pH range of 3.2 to 4.5, coarse fibrous texture, medium-divided sphagnum moss peat or reed-sedge peat.
- F. Sawdust or Ground-Bark Humus: Decomposed, nitrogen-treated, of uniform texture, free of chips, stones, sticks, soil, or toxic materials.
 - 1. When site treated, mix with at least 0.15 lb (2.4 kg) of ammonium nitrate or 0.25 lb (4 kg) of ammonium sulfate per cu. ft. (cu. m) of loose sawdust or ground bark.
- G. Manure: Well-rotted, un-leached 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.
- H. Herbicides: EPA registered and approved, of type recommended by manufacturer.
- I. Water: Potable.
- J. Mycorrhizae: Applied to planting hole backfill or planting bed solid. Product shall be formulated for the moisture regime of the particular planting location (low, medium, high) contain a broad spectrum of mycorrhizae species, an organic bi-stimulant (2-2-2 preferred) and a water holding gel (low moisture locations only). Apply per manufacturer's recommendations.

2.9 FERTILIZER

- A. Bonemeal: Commercial, raw, finely ground; minimum of 4 percent nitrogen and 20 percent phosphoric acid.
- B. Superphosphate: Commercial, phosphate mixture, soluble; 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-form, phosphorous, and potassium in the following composition:
 - 1. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing agency and as needed to maintain plant material and lawns in a thriving condition.

- D. Slow-Release Fertilizer: Granular fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:
 - 1. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing agency and as needed to maintain plant material and lawns in thriving condition.

2.10 MULCHES

- A. Organic Mulch: Organic mulch, free from deleterious materials and suitable as a top dressing of trees and shrubs, consisting of the following:
 - 1. Triple Shredded Hardwood Mulch: At least 80% hardwoods with moisture content of 30% or less, that can pass through a maximum screen size of 1 5/8". Raw material shall contain no yard waste, construction debris, or any other extraneous material.
 - a. Depth: 3" (after compaction)
 - b. Refer to plans for location.

2.11 EROSION-CONTROL MATERIALS

- A. Blankets: 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.
- B. Fiber Mesh: Biodegradable twisted jute or spun-coir mesh, 0.92 lb per sq. yd. (0.5 kg per sq. m) minimum, with 50 to 65 percent open area. Include manufacturer's recommended steel wire staples, 6 inches (150 mm) long.

2.12 STAKES AND GUYS

- A. Upright and Guy Stakes: Rough-sawn, sound, new hardwood, redwood, or pressure-preservative-treated softwood, free of knots, holes, cross grain, and other defects, 2 by 2 inches (50 by 50 mm) by length indicated, pointed at one end.
- B. Use flexible Arbor tape or equivalent 3/4" woven belt synthetic fabric strap installed per manufacturer's specifications. Color: Green.
- C. Flags: Standard surveyor's plastic flagging tape, pink, 6 inches (150 mm) long.
NOTE: Clearly mark all guy wires with flagging for visibility, especially near recreation and pedestrian areas.

2.13 LANDSCAPE EDGINGS

- A. "V" Ditch: A 4-inch deep trench by 6 inches width around all planting beds. Except where beds are adjacent to naturally wooded areas due to the possible damage to existing tree roots. Use care around existing tree roots in and around all planting beds. Do not cut existing tree roots to form the "V" ditch, work around them wherever possible.

2.14 MISCELLANEOUS MATERIALS

- A. Anti-desiccant: Water-insoluble emulsion, permeable moisture retarder, film forming, for trees and shrubs. Deliver in original, sealed, and fully labeled containers and mix according to manufacturer's instructions. Apply as per nursery's recommendations. It should be applied prior to plant transport from the nursery where it is dug, if in full leaf.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas to receive landscaping for compliance with requirements and for conditions affecting performance of work of this Section. Do not proceed with installation until unsatisfactory conditions have been corrected. Do not seed the site until the Landscape Architect has reviewed the final grades.

3.2 PREPARATION

- A. Lay out individual tree and shrub locations and areas for multiple plantings. Entire areas for multiple plantings shall be chiseled to a depth of 12 inches and tilled and amended to a depth of 8 inches with the same soil mixture as is required for planting backfill material. Stake locations, outline areas, and secure Landscape Architect's acceptance before the start of planting work. Make minor adjustments as may be required.

3.3 PLANTING SOIL PREPARATION

- A. Before mixing, clean topsoil of roots, plants, sods, stones, clay lumps, and other extraneous materials harmful to plant growth.
- B. Mix soil amendments and fertilizers with topsoil at rates indicated. Delay mixing fertilizer if planting does not follow placing of planting soil within a few days.
- C. For tree pit or trench backfill, mix planting soil before backfilling and stockpile at site.
- D. For planting beds, mix planting soil prior to planting.
 - 1. Mix lime with dry soil prior to mixing fertilizer. Prevent lime for lawn plantings from contacting roots of acid-tolerant plants.
- E. Do not attempt soil preparation of plant installation when soils are frozen, wet, in poor tilth or otherwise unsuitable for planting.

3.4 LAWN PLANTING PREPARATION

- A. Limit subgrade preparation to areas that will be planted in the immediate future.
- B. Loosen subgrade to a minimum depth of 8 inches. Remove stones larger than 1/2 inch (19 mm) in any dimension and sticks, roots, rubbish, and other extraneous materials. Remove excess gravel which will inhibit lawn establishment and survival.
- C. Spread topsoil to depth required to meet thickness, grades, and elevations shown, after light rolling and natural settlement. Do not spread if planting soil or subgrade is frozen.
 - 1. Place approximately 1/2 the thickness of topsoil required. Work into top of loosened subgrade to create a transition layer and then place remainder of the topsoil.
- D. Preparation of Unchanged Grades: Where lawns are to be planted in areas unaltered or undisturbed by excavating, grading, or surface soil stripping operations, prepare soil as follows:
 - 1. Remove and dispose of existing grass, vegetation, and turf. Do not turn over into soil being prepared for lawns.
 - 2. Till surface soil to a depth indicated on soil test report, but at a minimum of 6 inches (150 mm). Apply required soil amendments and initial fertilizers and mix thoroughly into top 4 inches (100

- mm) of soil. Trim high areas and fill in depressions. Till soil to a homogenous mixture of fine texture.
 - 3. Clean surface soil of roots, plants, sods, stones, clay lumps, and other extraneous materials harmful to plant growth.
 - 4. Remove waste material, including grass, vegetation, and turf, and legally dispose of it off the Owner's property.
- E. Grade lawn and grass areas to a smooth, even surface with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit fine grading to areas that can be planted in the immediate future. Remove trash, debris, stones larger than 1 inch in any dimension and other objects that may interfere with planting or maintenance operations. Remove all glass, wire or other objects of any size which may cause injury.
 - F. Moisten prepared lawn areas before planting when soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.
 - G. Restore prepared areas if eroded or otherwise disturbed after fine grading and before planting.
 - H. Contact Owner and Landscape Architect for review and approval of seedbed preparation and seeding methods prior to and during seeding operations.

3.5 EXCAVATION FOR TREES AND SHRUBS

- A. Pits and Trenches: Excavate with vertical sides and with bottom of excavation slightly raised at center to assist drainage. Loosen hard subsoil in bottom of excavation. Refer to planting details.
 - 1. Place tree in pit by lifting and carrying the tree by its ball (never lift by branches or trunk) and then lowering it into the pit. Set the tree straight, plumb and in the center of the pit with the most desirable side of the tree facing the prominent view (sidewalk, building, street, etc.).
 - 2. Determine the elevation of the root flare and ensure that it is planted at or slightly above finished grade. This may require that the tree be set higher than the grade in the nursery. If the root flare is less than 2-inches below the soil level of the root ball, plant the tree at the appropriate level above the grade, so the flare is even with the grade. If the flare is more than 2-inches at the center of the root ball above the grade, the tree shall be rejected.
- B. Obstructions: Notify Landscape Architect if unexpected rock or obstructions detrimental to trees or shrubs are encountered in excavations.
- C. Drainage: Notify Landscape Architect if subsoil conditions evidence unexpected water seepage or retention in tree or shrub pits.
- D. Fill excavations with water and allow to percolate out, before placing setting layer and positioning trees and shrubs.

3.6 PLANTING TREES AND SHRUBS

- A. Set balled and burlap stock plumb and in center of pit or trench with top of ball raised above adjacent finish grades as indicated.
 - 1. Place stock on setting layer of compacted planting soil.
 - 2. Remove burlap from tops of balls and partially from sides, but do not remove from under balls. Remove the top 2/3's of the wire baskets. Remove pallets, if any, before setting. Do not use planting stock if ball is cracked or broken before or during planting operation.
 - 3. Place backfill around ball in layers, tamping to settle backfill and eliminate voids and air pockets. When pit is approximately 1/2 backfilled, water thoroughly before placing remainder of backfill.

Repeat watering until no more is absorbed. Water again after placing and tamping final layer of backfill.

- B. Set container-grown stock plumb and in center of pit or trench with top of ball raised above adjacent finish grades as indicated.
 - 1. Carefully remove containers so as not to damage root balls.
 - 2. The root ball shall be loosened to alleviate matted or encircling roots. Roots shall be spread out evenly in an outward, radial fashion.
 - 3. Place stock on setting layer of compacted planting soil.
 - 4. Place backfill around ball in layers, tamping to settle backfill and eliminate voids and air pockets. When pit is approximately 1/2 backfilled, water thoroughly before placing remainder of backfill. Repeat watering until no more is absorbed. Water again after placing and tamping final layer of backfill.
- C. Dish and tamp top of backfill to form a 3-inch- (75-mm-) high mound around the rim of the pit. Do not cover top of root ball with backfill.
- D. Wrap trees of 2-inch (50-mm) caliper and larger with trunk-wrap tape if the species is susceptible to sun or wind scorch. Start at base of trunk and spiral cover trunk to height of first branches. Overlap wrap, exposing half the width, and securely attach without causing girdling. Inspect tree trunks for injury, improper pruning, and insect infestation and take corrective measures required before wrapping. Do not wrap the trees at the base to discourage insect infestation.

3.7 TREE AND SHRUB PRUNING

- A. Prune, thin, and shape trees and shrubs as directed by Landscape Architect.
- B. Only minimal pruning should be necessary at time of planting since plant material shall conform to the specified standards for quality. All pruning performed by the Contractor shall conform to the standards of the current ANSI A300, American National Standard for tree care operations. Under no circumstances shall the Contractor cut or prune leaders or remove more than 1/3 of the top without permission of the Landscape Architect. Prune to remove dead wood, crossovers, split or broken branches. Do not shorten, trim or clip branches solely for appearance purposes unless directed to by the Landscape Architect.

3.8 TREE AND SHRUB GUYING AND STAKING

- A. Upright Staking and Tying: Stake trees of 2- through 5-inch (50- through 125-mm) caliper. Stake trees of less than 2-inch (50-mm) caliper only as required to prevent wind tip-out. Use a minimum of 2 stakes of length required to penetrate at least 18 inches (450 mm) below bottom of backfilled excavation and to extend at least 72 inches (1800 mm) above grade. Set vertical stakes and space to avoid penetrating balls or root masses. Support trees with 2 strands of flexible Arbor tape or equivalent 3/4" woven belt synthetic fabric strap at contact points with tree trunk. Allow enough slack to avoid rigid restraint of tree. Flag heavily in recreation areas or any places where children are likely to be.

3.9 MULCHING

- A. Mulch backfilled surfaces of pits, trenches, planted areas, and other areas indicated.
- B. Organic Mulch: Apply the following average thickness of organic mulch and finish level with adjacent finish grades. Do not place mulch against trunks or stems. Refer to section 2.10 for additional information.
 - 1. Thickness: 4 inches (mulch depth shall be 3" after compaction and settling).

NOTE: Mulch shall NOT be from on-site chipping operations (unless specifically indicated in plans and specifications).

3.10 SEEDING NEW LAWNS

- A. Sow seed with a spreader or a seeding machine. Do not broadcast or drop seed when wind exceeds 5 mph (8 km/h). Evenly distribute seed by sowing equal quantities in 2 directions at right angles to each other.
 - 1. Do not use wet seed or seed that is moldy or otherwise damaged in transit or storage.
- B. Sow seed at the rates required to achieve 95% coverage prior to Final completion as determined on a per square yard basis.
- C. Rake seed lightly into top 1/8 inch (3 mm) of topsoil, roll lightly, and water with fine spray. Remove surface rocks of greater than 1" diameter.
- D. Protect seeded slopes 6:1 (H:V) and steeper against erosion with erosion-control blankets installed and stapled according to manufacturer's recommendations.
- E. Protect seeded areas with slopes flatter than 6:1 against erosion by spreading straw mulch after completion of seeding operations. Spread uniformly at a minimum rate of 2 tons per acre (45 kg per 100 sq. m) to form a continuous blanket 1-1/2 inches (38 mm) loose depth over seeded areas. Spread by hand, blower, or other suitable equipment. Tack with liquid asphalt tack (9 gals/1,000 SF) or non-asphaltic tackifier.
- F. If seeding occurs in summer months, protect seeded areas against hot, dry weather or drying winds by applying peat mulch within 24 hours after completion of seeding operations. Soak and scatter uniformly to a depth of 3/16 inch (4.8 mm) thick and roll to a smooth surface.

3.11 HYDROSEEDING NEW LAWNS

- A. Hydroseeding: Mix specified seed, fertilizer, and fiber mulch in water, using equipment specifically designed for hydroseed application. Continue mixing until uniformly blended into homogenous slurry suitable for hydraulic application.
 - 1. Mix slurry with non-asphaltic tackifier.
 - 2. Apply slurry uniformly to all areas to be seeded in a 2-step process. Apply first slurry application at the minimum rate of 500 lb per acre (5.5 kg per 100 sq. m) dry weight but not less than the rate required to obtain specified seed-sowing rate. Apply slurry cover coat of fiber mulch at a rate of 1000 lb per acre (11 kg per 100 sq. m).

3.12 RECONDITIONING LAWNS

- A. Recondition existing lawn areas damaged by Contractor's operations, including storage of materials or equipment and movement of vehicles. Also recondition lawn areas where settlement or washouts occur or where minor regrading is required.
- B. Remove sod and vegetation from diseased or unsatisfactory lawn areas; do not bury into soil. Remove topsoil containing foreign materials resulting from Contractor's operations, including oil drippings, fuel spills, stone, gravel, and other construction materials, and replace with new topsoil.
- C. Where repairable lawn remains, as determined by the Owner, mow, dethatch, core aerate, and rake heavily and deeply. Remove weeds before seeding. Where weeds are extensive, apply selective herbicides as required. Do not use pre-emergence herbicides.

- D. Remove waste and foreign materials, including weeds, soil cores, grass, vegetation, and turf, and legally dispose of it off the Owner's property.
- E. Till stripped, bare, compacted or otherwise unrepairable areas thoroughly to a depth of 8 inches.
- F. Apply required soil amendments and initial fertilizers and mix thoroughly into top 4 inches (100 mm) of soil. Provide new planting soil as required to fill low spots and meet new finish grades.
- G. Apply seed and protect with straw mulch as required for new lawns.
- H. Water newly planted areas and keep moist until new grass is established.

3.13 SODDING NEW LAWNS

- A. Lay sod to form solid, uniform mass with tightly fitted joints. "Butt" ends and sides of sod strips. Do not overlap sod strips. Stagger strips to offset joints in adjacent courses. Lay sod strips across slopes and perpendicular to drainage flow. Tamp or roll lightly to ensure contact with subgrade.
- B. Secure with pegs or staples at spacing recommended by the sod grower and supplier and as approved by the Landscape Architect and Owner. If pegs or staples are used for athletic fields, they shall be removed upon full establishment prior to final acceptance.
- C. Water sod with fine spray immediately after planting. Water daily during first two weeks of establishment to maintain soil to depth of 4".
- D. At no time shall sodded turf be allowed to grow over 3 inches in height. Throughout this period, the target mowing height shall be 1.5 inches. At no time shall more than 50% of the turf height be removed in any three-day period by mowing or other maintenance activity.
- E. Sodded turf shall be fertilized according to the monthly application rates recommended in Carolina Lawns for the utilized grass or at reduced rate if instructed by the Landscape Architect.
- F. Weed control shall be provided as necessary to prevent the establishment or proliferation of a weed species and to achieve acceptable turf at time of initial Acceptance.
- G. Remove all poly mesh netting prior to placement and dispose of off-site.

3.14 INSTALLATION OF EDGINGS

- A. "V" Ditches: Clearly delineate planting beds, and sign locations with a 4-inch deep by 6-inch wide ditch. Lines shall be smooth. A minimum five-foot wide lawn strip shall be provided between planting beds and paved surfaces where shown on the drawings.

3.15 INSTALLATION OF MISCELLANEOUS MATERIALS

- A. Apply anti-desiccant using power spray to provide an adequate film over trunks, branches, stems, twigs, and foliage.
 - 1. When deciduous trees or shrubs are moved in full-leaf, spray with anti-desiccant at nursery before moving and again 2 weeks after planting.

3.16 INSPECTION AND ACCEPTANCE

- A. When landscape work is completed, including maintenance, Architect will, upon written request, make a final inspection to determine acceptability.

- B. At time of inspection for initial Acceptance, turf shall have been freshly mowed within the last 48 hours. Turf shall be healthy, of uniform color and exhibiting signs of good growth. A minimum of 95% of the specified seeding area shall be covered in established turf possessing both stolens (i.e. runners) and rhizomes. There shall be no bare areas greater than 4 sq. ft. or 1.5 ft. in any dimension. Seedling plants not having reached tiller stage (i.e. runner producing) shall be considered bare area. Turf shall be 100% free of noxious and perennial weeds and relatively free of annual weeds.
- C. At time of inspection for initial Acceptance, sodded and sprigged turf shall have been freshly mowed within the last 48 hours. Turf shall be healthy, of uniform color and exhibiting good growth. A minimum of 100% of the specified turf area shall be covered in sod that has been installed for a minimum six weeks. Turf shall be 100% free of all weeds.
- D. When inspected landscape work does not comply with requirements, replace rejected work and continue specified maintenance until re-inspected by Architect and found to be acceptable. Remove rejected plants and materials promptly from project site.

3.17 CLEANUP AND PROTECTION

- A. During landscaping, keep pavements clean and work area in an orderly condition.
- B. Protect landscaping from damage due to landscape operations, operations by other contractors and trades, and trespassers. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged landscape work as directed.

3.18 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Disposal: Remove surplus soil and waste material, including excess subsoil, unsuitable soil, trash, and debris, and legally dispose of it off the Owner's property unless an agreement is made with the Owner otherwise.

3.19 FIELD QUALITY CONTROL

- A. Owner's Independent Testing Agency Services: Allow testing agency to evaluate and test each subgrade and each fill or backfill layer. Do not proceed until test results for previously completed work verify compliance with requirements.

END OF SECTION

SECTION 33 10 00 – SITE WATER UTILITIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes water systems piping for potable water service and fire protection service outside the building.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Division 15 Sections for water distribution systems inside building.

1.3 SYSTEM PERFORMANCE REQUIREMENTS

- A. Minimum Working Pressure Ratings: Except where otherwise indicated, the following are minimum pressure requirements for water system piping.
 - 1. Underground Piping: 150 psig.
 - 2. Underground Piping, Downstream of Fire Department Connections: 200 psig.

1.4 SUBMITTALS

- A. General: Submit the following according to Conditions of the Contract and Division 1 Specification Sections.
- B. Product data, including pressure rating, rated capacity, and settings of selected models for the following:
 - 1. Valves.
 - 2. Fire hydrants and fire department connections.
 - 3. Identification materials and devices.
 - 4. Pipe and Fittings.
- C. Shop drawings for precast concrete pits. Include frames and covers. Include drains when indicated.
- D. Shop drawings for cast-in-place concrete valve and meter pits. Include frames and covers. Include drains when indicated.
- E. Record drawings at Project closeout of installed water system piping and products according to Division 1 Section "Project Closeout."
- F. As-Built Survey of installed water system piping and products as specified in "Quality Assurance" Article below.
- G. Test reports specified in "Field Quality Control" Article in Part 3.

1.5 QUALITY ASSURANCE

- A. All materials, construction methods and testing shall comply with the requirements of the City of Durham.

- B. Provide listing/approval stamp, label, or other marking on equipment made to specified standards.
- C. Listing and Labeling: Provide equipment and accessories that are listed and labeled.
 - 1. The Terms "Listed" and "Labeled": As defined in "National Electrical Code," Article 100.
 - 2. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" (NRTL) as defined in OSHA Regulation 1910.7.
- D. Product Options: Water systems specialties and accessories are based on specific types, manufacturers, and models indicated. Components by other manufacturers but having equal performance characteristics may be considered, provided deviations in dimensions, operation, and other characteristics do not change design concept or intended performance as judged by Architect. The burden of proof of equality of products and approval of City of Durham is on Contractor. Refer to Division 1 Section "Product Substitutions."
- E. All work within any NCDOT right-of-way shall conform to the requirements of the current version of the NCDOT's Policies and Procedures for Accommodating Utilities on Highway Rights of Way, the provisions and conditions of the encroachment agreement(s), and other applicable NCDOT standards and policies. The encroachment agreement(s) are considered part of the project specifications by reference. Copies of the agreement(s) will be provided upon request from the Architect.
- F. As-Built Survey / Record drawings at Project closeout of installed water system piping and products. As-built survey shall be signed and seal by a NC Professional Land Surveyor and shall include the following:
 - 1. All fire hydrant water valve sizes and locations with no less than two primary reference dimensions from permanent above grade features.
 - 2. Locations of bacteriological sampling points.
 - 3. Pipe materials and sizes.
 - 4. Other water system components such as meters, backflow preventers, etc.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Preparation for Transport: Prepare valves, including fire hydrants, for shipping as follows:
 - 1. Ensure that valves are dry and internally protected against rust and corrosion.
 - 2. Protect valves against damage to threaded ends, flange faces, and weld ends.
 - 3. Set valves in best position for handling. Set valves closed to prevent rattling.
- B. Storage: Use the following precautions for valves, including fire hydrants, during storage:
 - 1. Do not remove end protectors unless necessary for inspection; then reinstall for storage.
 - 2. Protect valves from weather. Store valves indoors and maintain temperature higher than ambient dew point temperature. Support valves off ground or pavement in watertight enclosures when outdoor storage is necessary.
- C. Handling: Use sling to handle valves and fire hydrants whose size requires handling by crane or lift. Rig valves to avoid damage to exposed valve parts. Do not use handwheels or stems as lifting or rigging points.
- D. Deliver 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.
- E. Protect stored pipes and tubes from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor when storing inside.
- F. Protect flanges, fittings, and piping specialties from moisture and dirt.

- G. Store plastic pipes protected from direct sunlight. Support to prevent sagging and bending.

1.7 PROJECT CONDITIONS

- A. Perform site survey, research public utility records, and verify existing utility locations. Contact utility-locating service for area where Project is located.
- B. Verify that water system piping may be installed in compliance with original design and referenced standards.
- C. Site Information: Reports on subsurface condition investigations made during the design of the Project are available for informational purposes only; data in reports are not intended as representations or warranties of accuracy or continuity of conditions (between soil borings). Owner assumes no responsibility for interpretations or conclusions drawn from this information.

1.8 SEQUENCING AND SCHEDULING

- A. Coordinate inspections and connection to water main with the authorities having jurisdiction (City of Durham). Obtain all necessary permits for pavement cuts, line taps, etc. from the authorities having jurisdiction. Conduct pre-installation meeting with inspectors and notify architect immediately of conflicts with drawings or specifications.
- B. Coordinate with pipe materials, sizes, entry locations, and pressure requirements of building fire protection and building water distribution systems piping.
- C. Coordinate with other utility work.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Refer to the published City of Durham Pre-Approved Material/Product List. Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work are specified herein. Products by other manufacturers having equal performance characteristics may be considered, however approval must be acquired by the Contractor from the City of Durham.

2.2 PIPES AND TUBES

- A. Ductile-Iron Pipe: AWWA C150 and C151, Pressure Class 350.
 - 1. Lining: AWWA C104, cement mortar, seal coated.
 - 2. Gaskets, Glands, and Bolts and Nuts: AWWA C111.
 - 3. Push-On-Joint-Type Pipe: AWWA C111, rubber gaskets.
 - 4. Mechanical-Joint-Type Pipe: AWWA C111, rubber gaskets, ductile- or cast-iron glands, and steel bolts and nuts.
 - 5. Coating: AWWA C151, bituminous coating.
- B. Copper Tube: ASTM B 88, Type K, seamless water tube, annealed temper. All copper pipe shall be NSF Listed for potable use.

2.3 PIPE AND TUBE FITTINGS

- A. Ductile-Iron and Cast-Iron Pipe Fittings: AWWA C110, ductile-iron or cast-iron, 250-psig minimum pressure rating; or AWWA C153, ductile-iron compact fittings, 350-psig pressure rating.

1. Lining: AWWA C104, cement mortar.
2. Gaskets: AWWA C111, rubber.
3. Joints: AWWA C111, mechanical joint, all bell.
4. Coating: AWWA C151, bituminous coating.

2.4 VALVES

- A. Nonrising Stem Gate Valves 3 Inches and Larger: AWWA C509, resilient seated; bronze stem, cast-iron or ductile-iron body and bonnet, stem nut, 200-psig working pressure, mechanical joint ends.
- B. Post Indicator Valves: NRS, UL 262, FM approved, iron body and bonnet with flange for indicator post, bronze seating material, inside screw, 175-psig working pressure, mechanical joint ends.
- C. Rising Stem Gate Valves 3 Inches and Larger for installation in vaults or other enclosure: AWWA C509, resilient seated; OS&Y, bronze stem, cast-iron or ductile-iron body and bonnet, stem nut, 200-psig working pressure, flanged ends.
- D. Valve Boxes: Cast-iron box having top section and cover with lettering "WATER," bottom section with base of size to fit over valve and barrel approximately 5 inches in diameter, and adjustable cast-iron extension of length required for depth of bury of valve.
 1. Provide a steel tee-handle operating wrench with each valve box. Wrench shall have tee handle with one pointed end, stem of length to operate valve, and socket-fitting valve-operating nut.
- E. Indicator Posts: UL 789, FM-approved, vertical type, cast-iron body with operating wrench, extension rod, and adjustable cast-iron barrel of length required for depth of bury of valve. Post indicator valves (PIVs) on fire protection systems shall be equipped with a supervisory switch.

2.5 FIRE DEPARTMENT CONNECTIONS

- A. Fire Department Connections – Backflow-Mounted Option: 5-in x 4-in with 30-deg turndown, 5-in Storz connection inlet, 4-in female NPS outlet, lead-free. Include cap and chain; fixed (no swivel) connection. Connect to fire backflow preventer piping with 4-in flanged piping, including a wafer check valve as shown on the drawings. Provide round escutcheon plate marked "AUTO SPRKLR" where pipe penetrates backflow enclosure wall. Provide 1-in, ¼ (quarter) turn valve tapped into FDC pipe.
- B. Fire Department Connections – Free-Standing Option: 5-in x 4-in with 30-deg turndown, 5-in Storz connection inlet, 4-in female NPS outlet, lead-free. Include cap and chain; fixed (no swivel) connection. Connect to galvanized steel elbow and FDC pipe; and round sidewalk escutcheon plate marked "AUTO SPRKLR". Provide 1-in, ¼ (quarter) turn valve tapped into FDC pipe at 12-in above finish grade. Furnish a wafer check valve within an accessible vault between the FDC and the fire line.
- B. Wafer Check Valve: UL Listed/FM Approved, ductile iron body, bronze clapper and seat ring, 'O' ring seals, stainless spring closure, with ½" ball drip valve below seat to allow valve to drain water from FDC.
- C. Signage:
 1. Backflow-Mounted Option: All-weather sign or decal with white background with min. 6" red lettering, marked FDC, mounted on the backflow preventer enclosure as directed by fire official.
 2. Free-Standing Option: Approx. 18"x10", steel, white background with min. 6" red lettering, marked FDC, mounted on a galvanized steel pole with concrete footing. Mounting height to bottom of sign: 5-ft. min.

2.6 BACKFLOW PREVENTERS

- A. General: As listed as approved by City of Durham.

- B. Reduced Pressure (RP or RPZ) Backflow Preventers – ¾” thru 2” : ASSE 1013, AWWA C511, CSA B64 Certified and USC Foundation for Cross Connection Control and Hydraulic Research approved with full port, resilient seated ball valve shut-off valves and ball valve test cocks. Include 2 spring loaded, center stem guided check valves and one hydraulically dependednt differential relief valve.
- C. Reduced Pressure Detector Assembly (RPDA) Backflow Preventers – 2-1/2” thru 10” : ASSE 1047, USC Foundation for Cross Connection Control and Hydraulic Research approved, FM approved and UL listed, with OS&Y gate valves on inlet and outlet, and strainer on inlet. Include test cocks and pressure-differential relief valve with ASME A112.1.2 air gap fitting located between 2 positive-seating check valves and test cocks, and bypass with diplacement-type water meter, valves, and reduced pressure backflow preventer, for continuous-pressure application. Assembly shall be of a compact design utilizing a flow orientation of inlet flow vertical up, outlet flow vertical down at the direct outlet of the gate valves. Wilkins Model 475DA or approved equal. Gate valves on backflow preventers on fire protection systems shall be equipped with supervisiory switches.

2.7 ANCHORAGES

- A. Clamps, Straps, and Washers: ASTM A 506, steel.
- B. Rods: ASTM A 575, steel.
- C. Rod Couplings: ASTM A 197, malleable iron.
- D. Bolts: ASTM A 307, steel.
- E. Cast-Iron Washers: ASTM A 126, gray iron.
- F. Concrete Reaction Backing: Portland cement concrete mix, 3000 psi.
 - 1. Cement: ASTM C 150, Type I.
 - 2. Fine Aggregate: ASTM C 33, sand.
 - 3. Coarse Aggregate: ASTM C 33, crushed gravel.
 - 4. Water: Potable.

2.8 IDENTIFICATION

- A. Metallic-Lined Plastic Underground Warning Tapes: Polyethylene plastic tape with metallic core, 6 inches wide by 4 mils thick, solid blue in color with continuously printed caption in black letters "CAUTION - WATER LINE BURIED BELOW."

2.9 PROTECTIVE ENCLOSURES

- A. General: Manufactured, weather-resistant enclosure designed to protect aboveground water piping equipment or specialties. Enclosures shall be sized as required for access and service of protected unit. Enclosures for compact design backflow preventors shall be no larger than 64”(L)x60”(W)x60”(H) Enclosures shall be as manufactured by Hot Box or approved equal.
 - 1. Housing: Reinforced-aluminum or reinforced-fiberglass construction. Color to be selected by Owner from full standard color selections.
 - 2. Drain opening: Sized to alleviate a full release by the backflow preventer.
 - 3. Access doors with locking device.
 - 4. Insulation inside housing.
 - 5. Electric heater with self-limiting temperature control (for 2-1/2” or larger backflow preventers) or plug-connected pipe heating cable (for 2” and smaller backflow preventors) and connection to power supply. Heating equipment shall be designed and furnished by the enclosure manufacturer.

6. Concrete base slab: 4 inch thick of dimensions required to extend at least 6 inches beyond edges of housing. Provide PVC sleeves through base slab for water piping to prevent contact between concrete and piping.
7. Anchoring devices to attach housing to base with stainless steel mouting hardware.

PART 3 - EXECUTION

3.1 GENERAL

- A. All construction shall conform to the requirements of the City of Durham and the NCDOT as applicable in addition to the requirements state herein.

3.2 EARTHWORK

- A. Excavation, trenching, and backfilling are specified in Division 2 Section "Earthwork."

3.3 SERVICE ENTRANCE PIPING

- A. Extend water system piping and connect to water supply source and building water distribution and fire protection systems at 5-feet outside face of the building wall in locations and pipe sizes indicated.
 1. Terminate water system piping at 5-feet outside building wall until building water systems are installed. Terminate piping with caps, plugs, or flanges as required for piping material. Make connections to building water systems when those systems are installed.
- B. Install restrained joints for buried piping within 60 inches of building. Use restrained-joint pipe and fittings, thrust blocks, anchors, tie-rods and clamps, and other supports at vertical and horizontal offsets.

3.4 JOINT CONSTRUCTION

- A. Ductile-Iron Piping Gasketed Joints: Construct joints according to AWWA C600.
- B. Flanged Joints: Align flanges and install gaskets. Assemble joints by sequencing bolt tightening. Use lubricant on bolt threads.

3.5 PIPING SYSTEMS - COMMON REQUIREMENTS

- A. General Locations and Arrangements: Drawings 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 except where deviations to layout are approved on coordination drawings.
- B. Install piping at indicated slope.
- C. Install components having pressure rating equal to or greater than system operating pressure.
- D. Install piping free of sags and bends.
- E. Locate groups of pipes parallel to each other, spaced to permit valve servicing.
- F. Install fittings for changes in direction and branch connections.
- G. Piping Connections: Except as otherwise indicated, make piping connections as specified below.
 1. Install unions, in piping 2 inches and smaller, adjacent to each valve and at final connection to each piece of equipment having 2-inch or smaller threaded pipe connection.

2. Install flanges, in piping 2-1/2 inches and larger, adjacent to flanged valves and at final connection to each piece of equipment having flanged pipe connection.
3. Install dielectric fittings to connect piping of dissimilar metals.

3.6 PIPING INSTALLATION

- A. Water Main Connection: Tap water main with size and in location as indicated according to requirements of water utility.
 1. Install tapping sleeve and tapping valve according to manufacturer's installation instructions.
 2. Install tapping sleeve on pipe to be tapped. Position flanged outlet for gate valve.
 3. Install gate valve onto tapping sleeve. Comply with AWWA C600. Install valve with stem pointing up and with cast-iron valve box.
 4. Use tapping machine compatible with valve and tapping sleeve; cut hole in main. Remove tapping machine and connect water service piping.
 5. Install service clamps and corporation stops in size, quantity, and arrangement required by utility company standards and according to manufacturer's installation instructions.
 6. Install service clamps on pipe to be tapped. Position outlet for corporation stop.
 7. Install corporation stops into service clamps. Install valve with stem pointing up and with cast-iron valve box.
 8. Install curb stop in service piping with head pointing up and with cast-iron service box.
 9. Install manifold for multiple taps in water main.
 10. Use drilling machine compatible with service clamp and corporate stop. Drill hole in main. Remove drilling machine and connect water service piping.
- B. Comply with requirements of NFPA 24 for materials and installation.
- C. Install ductile-iron pipe and ductile-iron and cast-iron fittings according to AWWA C600.
- D. Install copper tube and wrought-copper fittings according to CDA No. 404/0 "Copper Tube Handbook."
- E. Bury piping at minimum depth of 48 inches below finished grade and not less than 18 inches below average local frost depth.
- F. Tunneling: Install pipe under streets or other obstructions that cannot be disturbed by tunneling, jacking, or a combination of both.
- G. Shoring or bracing of pits, trenches and other excavations shall be in accordance with the requirements of NCDOT and OSHA.
- H. The subgrade at the bottom of the trench shall be shaped to secure uniform support throughout the length of the pipe. A space shall be excavated under the bell of each pipe to provide space to relieve bearing pressure on the bell and provide room to adequately make the joint.
- I. Open ends of pipe shall be plugged with a standard plug or cap at all times when pipe laying is not in progress. Trench water shall not be permitted to enter pipe.
- J. Backfill material shall be free from stones greater than 4-inches in diameter, construction material debris, frozen material, organic matter, or unstable material. Backfill materials shall be placed in loose lifts of 8-inches or less in depth. All backfill shall be compacted to not less than 95% of the standard Proctor maximum dry density except the final foot beneath pavement or slab areas where this requirement shall be increased to 98% of the standard Proctor maximum dry density.
- K. Install and test fire protection piping and appurtenances in accordance with the specific requirements of the City of Durham and applicable NFPA requirements.

3.7 ANCHORAGE INSTALLATION

- A. Anchorages: 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 Piping: According to AWWA C600.
 - 2. Fire Service Piping: According to NFPA 24.
- B. Apply full coat of asphalt or other acceptable corrosion-retarding material to surfaces of installed ferrous anchorage devices.

3.8 BACKFLOW PREVENTER INSTALLATION

- A. Install backflow preventers of type, size, and capacity indicated. Include valves and test cocks. Install according to plumbing and health department authorities having jurisdiction.
- B. Do not install bypass around backflow preventer.
- C. Do not install reduced-pressure-principle-type in pit.
- D. Support backflow preventers, valves, and piping on 3000-psi minimum, portland-cement-mix concrete piers.

3.9 FIRE DEPARTMENT CONNECTION INSTALLATION

- A. Install fire department connections in locations indicated in accordance with NFPA 14 and 24.
- B. Install wafer check valve with ball drip valve at each fire department connection. Install concrete or cast iron vault set on #57 washed stone at wafer check valve.
- C. Orient nozzle of FDC toward vehicle travel way.
- D. Install signage out of pedestrian and vehicle travel ways near FDC. Front of sign to face primary vehicle travel way.

3.10 ALARM DEVICE INSTALLATION

- A. Comply with NFPA 24 for devices and methods of valve supervision.
- B. Supervisory Switches: Supervise valves in open position.
 - 1. Valves: Grind away portion of exposed valve stem. Bolt switch, with plunger in stem depression, to OS&Y gate-valve yoke.
 - 2. Indicator Posts: Drill and thread hole in upper-barrel section at target plate. Install switch, with toggle against target plate, on barrel of indicator post.
- C. Connect alarm devices to building fire alarm system. Wiring and fire-alarm devices are specified in Division 22.

3.11 IDENTIFICATION INSTALLATION

- A. Install continuous plastic underground warning tape during back-filling of trench for underground water service piping. Locate 6 inches to 8 inches below finished grade, directly over piping.
- B. Attach nonmetallic piping label permanently to main electrical meter panel.

3.12 FIELD QUALITY CONTROL

- A. All testing and disinfecting of water systems shall be in accordance with the City of Durham, Public Works Department Engineering Division Construction Specifications.
- B. Piping Tests: Water mains shall be tested in the following general sequence:
 - 1. "Pigging" main (mains less than 16-in diameter);
 - 2. Flush the main;
 - 3. Perform hydrostatic tests;
 - 4. Introduce the appropriate amount of chlorine by tapping the main;
 - 5. Hold chlorine solution in main;
 - 6. Flush the main;
 - 7. Sample and perform bacteriological tests;
- C. All tests shall be performed under the observation of a City of Durham.
- D. Only potable water shall be used.
- E. Hydrostatic Tests: Test at not less than 1-1/2 times working pressure for 2 hours.
 - 1. After completion of pipeline installation, including backfill, but prior to final connection to existing system, conduct, in presence of City's Engineer or Inspector, concurrent hydrostatic pressure and leakage tests in accordance with AWWA C600 Installation of Ductile-Iron Mains and Their Appurtenances and the following (this standard not applicable to PVC pipe):
 - a. Contractor to provide properly calibrated equipment required to perform leakage and hydrostatic pressure tests.
 - b. The pump and meter will be connected at the point of lowest elevation of the test section. The meter shall be provided by the City of Durham.
 - c. The test section of not more than 2,000 feet will be filled in accordance with the specifications. The City of Dur 2. Failure of the water main to comply with the above acceptable leakage rate, shall require the contractor to replace any defective materials to insure a watertight installation. After any inadequacies have been corrected, the leakage rate shall again be tested. The test shall be repeated until that portion of the main is brought into compliance with the permissible leakage rate.
 - d. After a section of pipeline has been properly laid between valves and all end of pipe joints properly blocked. However, before any pipeline may be loaded for testing, 3/4" taps shall be made by the use of tapping machines manufactured by Hays Manufacturing, Erie, Pennsylvania, or equivalent. The location of such taps shall be at all high points, dead ends, etc., for the expulsion of air. Additional taps shall be made for flushing the main. Location of all taps shall be subject to the approval of the Engineer and/or Inspector.
 - e. All pipelines shall be filled either through an existing valve or through taps. Special care must be exercised in loading lines to prevent damage. All valve operation shall be done by the City personnel.
 - f. Fill section to be tested with water slowly, in accordance with instructions from the City's Engineer and/or Inspector, expelling air from piping at high points.
 - g. Close air vents and corporation cocks after air is expelled. Raise pressure to specified test pressure.
 - h. Fire hydrants are to be pressure tested with the main. All mainline hydrants shall remain fully open during pressure tests. However, in accordance with AWWA C600, the test shall be against the main valve in the hydrant.
 - i. Slowly bring piping to test pressure and allow system to stabilize prior to conducting leakage test. Do not open or close valves at differential pressures above rated pressure.
 - j. Conduct hydrostatic test for at least two-hour duration.

- k. Test Pressure: Not less than 1.5 times the stated working pressure, 200 psi, or 50 psi in excess of maximum static pressure, measured at the lowest elevation along the test section and corrected to the elevation of the test gauge, whichever is greater.
- l. Examine exposed piping, fittings, valves, hydrants, and joints carefully during hydrostatic pressure test. Repair or replace damaged or defective pipe, fittings, valves, hydrants, or joints discovered, following pressure test.
- m. When testing against existing closed metal-seated valves, an additional allowance per closed valve of 0.0078 gal/hr/in of nominal valve size shall be allowed.
- n. Testing allowance: Testing allowance shall be defined as the maximum quantity of makeup water that is added into a pipeline undergoing hydrostatic pressure testing, or any valved section thereof, in order to maintain pressure within +/- 5 psi of the specified test pressure (after the pipeline has been filled with water and the air has been expelled [Note: the testing allowance may not be reasonable if the pressure boundary of the test section includes appurtenances subjected to pressures above their rated working pressures because of possible leakage by those appurtenances]). No pipeline installation will be approved when leakage is greater than that shown in Table 4A of AWWA C600 (excerpted from AWWA C600-10, Section 5.2 Table 4A and shown at the end of this specification) or if the quantity of makeup water is greater than that determined by the following formula:

$$L = (SD\sqrt{P})/148,000$$
 - L = testing allowance (makeup water), in gallons per hour
 - S = length of pipe tested, in feet
 - D = nominal diameter of pipe, in inches
 - P = average test pressure during hydrostatic test, in psi (gauge)
- o. No pipeline installation will be approved when pressure varies by more than 5 psi at completion of hydrostatic pressure test.
- p. When leakage exceeds specified acceptable rate, locate source and make repairs. Repeat test until specified leakage requirements are met.
- q. At conclusion of tests, remove corporation cocks and plug resulting piping openings.
- r. Bell joint clamps are not acceptable in repairing any leaks.

F. Disinfection & Bacteriologic Testing:

- 1. Disinfection and Bacteriologic Testing shall comply with ANSI/AWWA C-651, Disinfecting Water Mains. The contractor shall disinfect water mains and accessories in accordance with the procedures outlined in the City of Durham Public Works Department Engineering Division Construction Specifications. Bacteriological testing shall comply with Section 5 of AWWA C651. All samples shall be tested for bacteriological (chemical and physical) quality in accordance the Standard Methods for the Examination of Water and Wastewater; and shall show the absence of both background growth and coliform organisms and the presence of chlorine residual. The lines shall not be placed in service or pressure tested until a negative bacteriological report has been received
- 2. All additions or replacements to the water system, including fire lines and backflow prevention devices, shall be chlorinated prior to being placed into service. Such chlorination shall be performed under the observation of a City of Durham Inspector.
- 3. Pipe subjected to contaminating materials shall be treated as directed by the Engineer. Should such treatment fail to cleanse the pipe, replacement shall be required. The Owner and Engineer shall bear no portion of any cost sustained by the contractor in meeting this specification.
- 4. Chlorination of a completed line shall be carried out after completing the pressure test and in the following manner:
 - a. An approved flushing plan is required.
 - b. City will furnish necessary water for these operations. The contractor shall be responsible for loading, hauling, discharging of water, and dechlorinating device.
 - c. Provisions for sampling may be the points designated for flushing. Arrangements must be made to provide sampling at the ground surface. The contractor is responsible for

furnishing all material and construction sampling points and for taking the samples. Temporary pipes used for sampling shall be composed of sections of vertical pipe terminating into a 90-degree horizontal bend and nipple at least 18 inches above ground level. All sampling pipe shall be copper or brass. It may be difficult to obtain passing samples from outlets other than those listed above. Tubing used for sampling shall terminate horizontally with the ground, at least 18 inches above ground level. Restrictions: a) An approved backflow prevention device must be connected to the fill water source; b) Samples shall not be taken from a hose; c) Tests cannot be accepted from fire hydrants nozzles unless approved by the City's Engineer or Inspector and then only when a sampling tube has been installed on one of the hose nozzles; d) Samples cannot be collected if any type of precipitation is falling.

- d. The contractor will introduce into the water main a chlorine solution as specified in Section 4 of the AWWA Standard C651. The chlorine solution should be injected into the test section of main nearest an existing water main.
- e. Contact Time: Maintain disinfectant in system for 24 hours.
- f. The chlorine concentration shall not drop below 20 ppm within a minimum period of 24 hours. Sometime after the 24-hour period expires, the City's inspector will check the chlorine concentration to confirm that it has not dropped below 20 ppm.
- g. Upon completion of retention period required for disinfection, flush pipeline until chlorine concentration in water leaving pipeline is less than 4ppm for consumption purposes but greater than or equal to 0.2 ppm free chlorine for testing purposes; use City of Durham potable water for flushing. If the chlorine concentration is not within these limits, the Contractor must flush and rechlorinate the water line and resample at a later date. If the chlorine concentration is within limits, the City Chemist will collect samples from the new main and from an approved/control water main in the distribution system, as previously noted.
- h. The Contractor will prepare a Sampling Log, including a sketch of the sampling points, as specified by the City. A chain of custody shall accompany the samples. 1. Samples will be taken by the City's Chemist to determine if the pipeline has been properly and sufficiently sterilized before any pipeline may be placed in service. 2. The samples shall be taken in standard sterilized bacteria sample bottlers marked with the sample location. 3. The City's Engineer and/or Inspector must be notified at least fifteen(15) hours prior to that time when the line will be ready for the residual test. 4. Samples can only be taken Monday through Thursday no later than 1:00 PM. Chlorine injected on Friday yielding a 48-hour contact time will be reviewed and approved on a case by case basis. 5. Test results cannot be read until 48 hours after sample has been run by lab.
- i. Results of the analyses shall be furnished to the Contractor and City representative directly from the City with the project name and the testing location(s) referenced on each result.
- j. Passing Test: The test shall be completed in accordance with AWWA Specification C651. A minimum of two (2) consecutive, negative samples taken twenty-four hours apart shall be attained and approved by the City Laboratory. If laboratory results indicate the presence of coliform bacteria, the samples are unsatisfactory. If laboratory results indicate background growth masking the detection of coliform bacteria, the sample will be considered unsatisfactory. Re-sterilization may be necessary if previous tests prove unsatisfactory.
- k. Upon the system passing, replace permanent system devices removed for disinfection.

G. Backflow Prevention Device Certification.

- 1. All new backflow prevention devices shall be tested and certified by an inspector approved by the City of Durham prior to operation of the water system. Performance, coordination and submittal of documentation of the testing and certification shall be the responsibility of the Contractor.

H. Contractor shall be responsible for ensuring all waterlines are fully flushed and free of all deleterious matter prior to connecting to the building plumbing system.

END OF SECTION

SECTION 33 30 00 – SITE SANITARY SEWER UTILITIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes sewerage systems outside the building.
- B. Related Sections: The following Sections contain requirements that relate to this Section.
 - 1. Division 03 Section "Cast-in-Place Concrete" for cast-in-place concrete structures.
 - 2. Division 22 sections for sanitary sewer systems inside the building.

1.3 DEFINITIONS

- A. Sewerage Piping: System of sewer pipe, fittings, and appurtenances for gravity flow of sanitary sewage.

1.4 PERFORMANCE REQUIREMENTS

- A. Gravity-Flow, Nonpressure-Piping Pressure Ratings: At least equal to system test pressure.

1.5 SUBMITTALS

- A. General: Submit each item in this Article according to the Conditions of the Contract and Division 01 Specification Sections.
- B. Product data for the following:
 - 1. Cleanouts.
 - 2. Pipe and fittings.
 - 3. Couplings.
- C. Inspection and test reports specified in the "Field Quality Control" Article.
- D. Record drawings at Project closeout of installed sewer system piping and structures according to Division 01 Section - Project Record Drawings.
- E. As-Built surveys in hard copy and AutoCad drawing file format of installed utilities including locations, invert and top elevations of manholes; materials, sizes, lengths and slopes of sanitary sewers; and any deviation from the original construction drawings. As-built surveys shall be signed and sealed by a NC Professional Land Surveyor.

1.6 QUALITY ASSURANCE

- A. Environmental Agency Compliance: Comply with regulations pertaining to sanitary sewerage systems.
- B. Utility Compliance: Comply with regulations pertaining to sanitary sewerage systems. Include standards of water and other utilities where appropriate. All materials, construction methods and testing shall comply with the requirements of the City of Durham.

- 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 01 Section "Product Substitutions."

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 existing utilities serving facilities occupied by the Owner or others except when permitted under the following conditions and then only after arranging to provide acceptable temporary utility services.
 - 1. Notify Architect not less than 48 hours in advance of proposed utility interruptions.
 - 2. Do not proceed with utility interruptions without receiving Architect's written permission.

1.9 SEQUENCING AND SCHEDULING

- A. Coordinate sanitary sewerage system connections to utility company's sanitary sewer.
- B. Coordinate combined sanitary sewerage and storm drainage system connections to utility company's combined sewer.
- C. Coordinate sanitary sewerage system connections to existing on-site sanitary sewer.
- D. Coordinate with interior building drainage systems.
- E. Coordinate with other utility work.

PART 2 - PRODUCTS

2.1 PIPES AND FITTINGS

- A. Ductile-Iron Pipe and Fittings: ANSI/AWWA C150/A21.50, ANSI/AWWA C151/A21.51, Class 50 minimum, for mechanical or push-on joints per ANSI A21.11. Pipe shall be designed for an 8-foot minimum cover and a Type 1 laying condition (Fig. 1 of ANSI A21.50).
 - 1. Standard-Pattern, Ductile-Iron and Cast-Iron Fittings: ANSI/AWWA C110/A21.10, for push-on joints. ANSI/AWWA C111/A21.11 for mechanical joints.
 - 2. Compact-Pattern, Ductile-Iron Fittings: ANSI/AWWA C153/A21.53, for push-on joints.
 - 3. Pipe and Fitting Coatings: ANSI/AWWA C104/A21.1, cement mortar lining and asphaltic-material seal coat, minimum 1-mil thickness.
 - 4. Gaskets: ANSI/AWWA C111/A21.11, rubber.

- B. Polyvinyl Chloride (PVC) Gravity Sewer Service Pipe and Fittings: PVC service pipe shall be 4-in or 6-in, schedule 40 or greater supplied in minimum 18-ft lengths. Schedule 40 PVC pipe shall be manufactured with a cell classification of 12454 in conformance with ASTM D1784. Schedule 40 pipes shall be manufactured to dimensional tolerances as specified in ASTM D1785 and rated for service conditions up to temperatures of 140-degrees Fahrenheit. The pipe may be joined by solvent weld in conformance with ASTM D2564

2.2 SPECIAL PIPE COUPLINGS AND FITTINGS

- A. Sleeve-Type Pipe Couplings: Rubber or elastomeric sleeve and band assembly fabricated to match outside diameters of pipes to be joined, for nonpressure joints.
 - 1. Sleeves for Cast-Iron Soil Pipe: ASTM C 564, rubber.
 - 3. Sleeves for Plastic Pipe: ASTM F 477, elastomeric seal.
 - 4. Sleeves for Dissimilar Pipes: Compatible with pipe materials being joined.
 - 5. Bands: Stainless steel, at least one at each pipe insert.

2.3 CLEANOUTS

- A. Description: ASME A112.36.2M, round, cast-iron housing with clamping device and round, secured, scoriated, cast-iron cover. Include cast-iron ferrule with inside calk or spigot connection and countersunk, tapered-thread, brass closure plug. Use units with Heavy-Duty top-loading classifications.
- B. Sewer Pipe Fitting and Riser to Cleanout: Sch 40 PVC.

PART 3 - EXECUTION

3.1 EARTHWORK

- 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 green warning tapes directly over piping and at outside edges of underground structures.
 - 1. Use detectable warning tape over nonferrous piping and over edges of underground structures.

3.3 INSTALLATION, GENERAL

- A. General Locations and Arrangements: Drawings (plans and details) indicate the general location and arrangement of underground sewerage 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.
- D. 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.

- E. Install gravity-flow-systems piping at constant slope between points and elevations indicated. Install straight piping runs at constant slope, not less than that specified, where slope is not indicated.
- F. Extend sewerage piping and connect to building's sanitary drains, of sizes and in locations indicated. Terminate piping as indicated.
- G. Install sewerage piping pitched down in direction of flow, at minimum and cover as indicated.
- H. Tunneling: Install pipe under streets or other obstructions, that cannot be disturbed, by tunneling, jacking, or a combination of both.
- I. Pipe Bedding: Trench bedding shall be Class "D" for ductile iron pipe, Class "B" for PVC SDR-35, and Class "C" for PVC Sch-40, all as specified in Division 31 Section "Earth Moving."

3.4 PIPE JOINT CONSTRUCTION AND INSTALLATION

- A. General: Join and install pipe and fittings according to the following.
- B. Ductile-Iron Pipe with Ductile-Iron or Cast-Iron Fittings: With push-on-joint, rubber gaskets according to AWWA C600.
- C. Polyvinyl Chloride (PVC) Plastic Pipe and Fittings: Installation of PVC pipe shall follow the recommendations of ASTM D-2321 "Underground Installation of Thermoplastic Pipe for Sewers and other Gravity-Flow Applications".

3.5 CONCRETE PLACEMENT

- A. Place cast-in-place concrete according to ACI 318, ACI 350R, and as indicated.

3.6 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 a cast-in-place concrete block, 18 by 18 by 12 inches deep. Set tops flush with surrounding earth grade.
- C. Set cleanouts in paved areas within cast iron protector boxes with tops flush with surface of paving.

3.7 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. The test shall be conducted by flashing a light between manholes or by such other devices to allow adequate visual inspection.
 - 1. Submit separate reports for each system inspection.

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 mandrel of a size not less than 95 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 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 in accordance with the standards and specifications of the City of Durham Public Works Department.
1. Do not enclose, cover, or put into service before inspection and approval.
 2. Test completed piping systems according to the City of Durham Standard Specifications.
 3. Schedule tests, and their inspections by the City of Durham, with at least 24 hours' advance notice.
 4. Submit separate reports for each test.
 5. Contractor shall provide all necessary equipment to perform all tests.
 6. Leaks and loss in test pressure constitute defects that must be repaired.
 7. Replace leaking piping using new materials and repeat testing until leakage is within allowances required.

END OF SECTION

SECTION 33 40 00 - SITE STORM DRAINAGE UTILITIES

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 site drainage systems outside the building. Systems include the following:
 - 1. Storm drainage.
 - 2. Foundation drainage connections outside of building.
 - 3. Roof drainage connections outside of building.
- B. Related Sections: The following Sections contain requirements that relate to this Section.
 - 1. Division 31 Section "Earth Moving."
 - 2. Division 31 Section "Sediment and Erosion Controls."
 - 3. Division 3 Section "Cast-In-Place Concrete."

1.3 DEFINITIONS

- A. Drainage Piping: System of pipe, fittings, and appurtenances for gravity flow of storm drainage.

1.4 SUBMITTALS

- A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.
- B. As-Built Survey / Record drawings of installed drainage system piping, cleanouts and basins. Survey shall be submitted as soon as possible and at least 30-days prior to the project's substantial completion and prior to plant installation in wetlands and other similar devices.

1.5 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.
- 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 "Products."
- D. Perform As-Built Survey of installed drainage system piping and basins and all stormwater management devices (ponds, wetlands, bio-retention areas). As-built survey shall be signed and seal by a NC Professional Land Surveyor and shall include the following:
 - 1. All inlet, cleanouts, junction box and manhole locations with no less than two primary reference dimensions from permanent above grade features.
 - 2. As-built rims and inverts noted.
 - 3. Pipe materials and sizes, plus slopes and distances between structures.
 - 4. As-built dimensions for installed riprap dissipater pads.

1.6 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.

1.7 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 existing utilities serving facilities occupied by the Owner or others except when permitted under the following conditions and then only after arranging to provide acceptable temporary utility services.
 - 1. Notify Architect not less than 48 hours in advance of proposed utility interruptions.
 - 2. Do not proceed with utility interruptions without receiving Architect's written permission.

1.8 SEQUENCING AND SCHEDULING

- A. Coordinate storm drainage system connections to utility company's storm sewer.
- B. Coordinate storm drainage system connections to existing on-site storm sewer.
- C. Coordinate with interior building drainage systems.
- D. Coordinate with other utility work.

PART 2 - PRODUCTS

2.1 PIPES AND FITTINGS

- A. General: Refer to plans for specific pipe material applications.
- B. Ductile-Iron Pipe: ANSI/AWWA C150/A21.50 and C151/A21.51, minimum pressure class 250.
 - 1. Lining: AWWA C104, cement mortar, coal tar epoxy lined.
 - 2. Gaskets, Glands, and Bolts and Nuts: AWWA C111.
 - 3. Push-On-Joint-Type Pipe: AWWA C111, rubber gaskets.
 - 4. Coating: AWWA C151, bituminous coating.
- C. Polyvinyl Chloride (PVC) Sewer Pipe and Fittings: ASTM D-1785, SCH 40 PVC for solvent-cemented or gasketed joints.
 - 1. Primer: ASTM F 656.
 - 2. Solvent Cement: ASTM D 2564.
 - 3. Gaskets: ASTM F 477, elastomeric seal.

2.2 SPECIAL PIPE COUPLINGS AND FITTINGS

- A. Connection from roof downspout to underground storm pipe.

1. Vertical stainless-steel downspout adapter with sch. 40 PVC pipe outlet sized to fit over downspout and underground piping. Adapter shall have a self-cleaning debris trap consisting of a hinged cover and removable debris screen. Powder-coat color to be selected by Architect from manufacturer's full range of colors. As manufactured by Piedmont Pipe Construction.

2.3 CLEANOUTS

- A. Description: ASME A112.36.2M, round, cast-iron housing with clamping device and round, secured, scoriated, cast-iron cover. Include cast-iron ferrule with inside calk or spigot connection and countersunk, tapered-thread, brass closure plug. Cleanout shall be rated for "heavy duty" top-loading classifications.

1. Cleanout Box: Cleanouts located in paved areas subject to vehicular traffic shall be protected by an 8-in diameter, ductile-iron cleanout box. 'STORM' marking shall be cast into the lid.

2.4 CONCRETE

- A. General: Cast-in-place concrete according to ACI 318, ACI 350R, and the following:

1. Cement: ASTM C 150, Type I, 3,000-psi.
2. Fine Aggregate: ASTM C 33, sand.
3. Coarse Aggregate: ASTM C 33, crushed gravel.
4. Water: Potable.

- B. Structures: Portland-cement design mix, 4000 psi minimum, with 0.45 maximum water-cement ratio.

1. Reinforcement Fabric: ASTM A 185, steel, welded wire fabric, plain.
2. Reinforcement Bars: ASTM A 615, Grade 60, deformed steel.

PART 3 - EXECUTION

3.1 EARTHWORK

- A. Excavating, trenching, and backfilling are specified in Division 31 Section "Earth Moving."

3.2 SPECIAL PIPE COUPLING AND FITTING APPLICATIONS

- A. Special Pipe Couplings: Use where indicated and where required to join piping and no other appropriate method is specified. Do not use instead of specified joining methods.

3.3 INSTALLATION, GENERAL

- A. General Locations and Arrangements: Drawings (plans and details) indicate the general location and arrangement of underground drainage systems piping. Location and arrangement of piping layout take into account many design considerations. Install piping as indicated, to extent practical. Refer to drawings for material and structure types for specific applications.

1. Orient grates of drainage structures in paved areas to align with general pattern of pavement joints and scoring.

- 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 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. Extend drainage piping and connect to building's storm drains, of sizes and in locations indicated. Terminate piping as indicated.
- E. Install drainage piping pitched down in direction of flow, at minimum slope of 1 percent and 36-inch minimum cover, except where otherwise indicated.
- F. 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 drain pipe and gasketed fittings with elastomeric seals according to ASTM D 2321 and manufacturer's written instruction.
 - 4. Install according to ASTM D 2321.
- G. 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.

3.4 CLEANOUT INSTALLATION

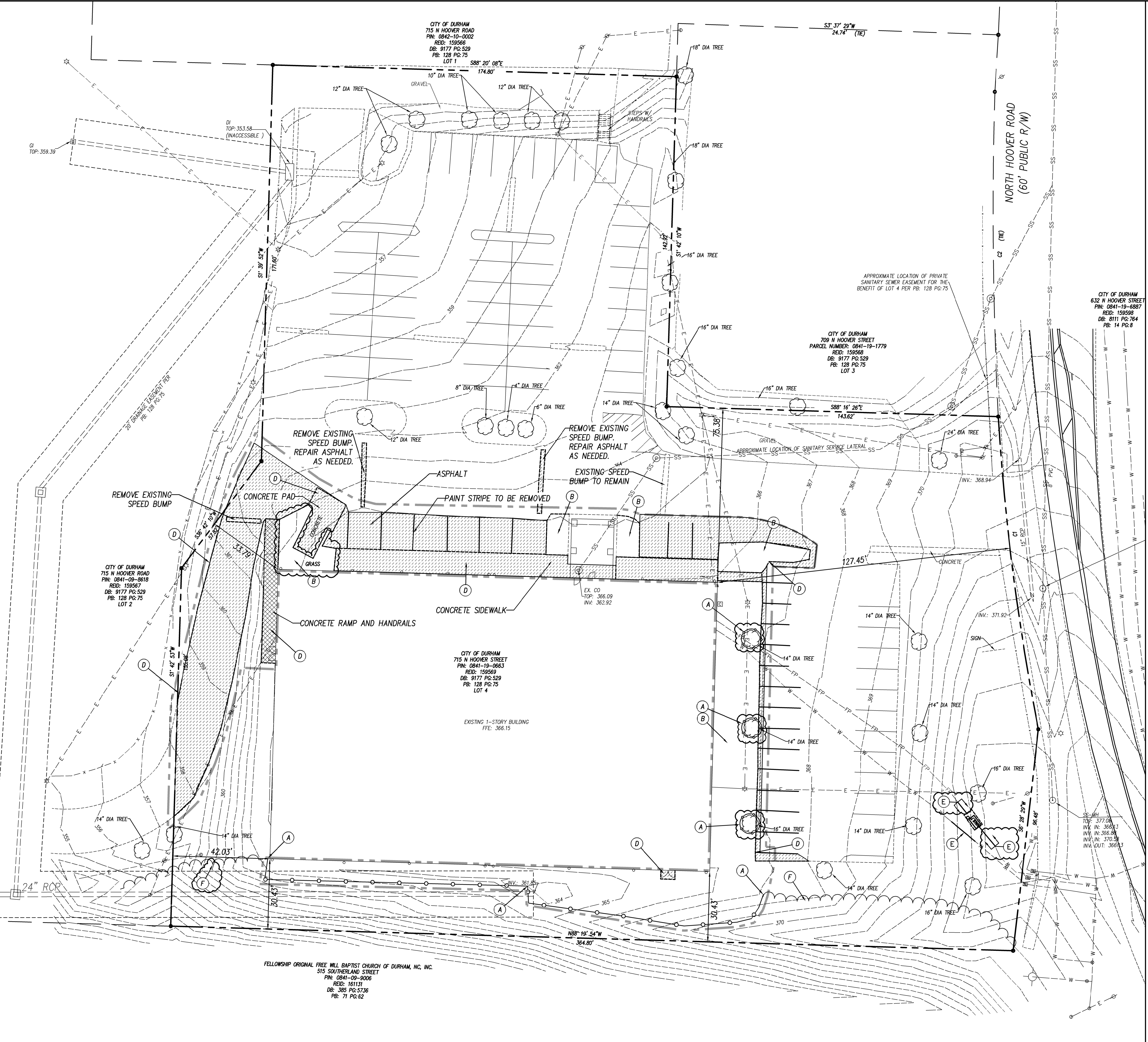
- A. Install cleanouts and riser extension from sewer pipe to cleanout at grade. Install piping so cleanouts open in direction of flow in sewer pipe.
- B. In Paved Areas: Cleanouts shall be installed within a protective cleanout box set flush with surface of paving.
- C. In Non-Paved Areas: Set cleanout tops 1 inch above surrounding earth grade.

3.5 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.
 - 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 procedure until results are satisfactory.

END OF SECTION

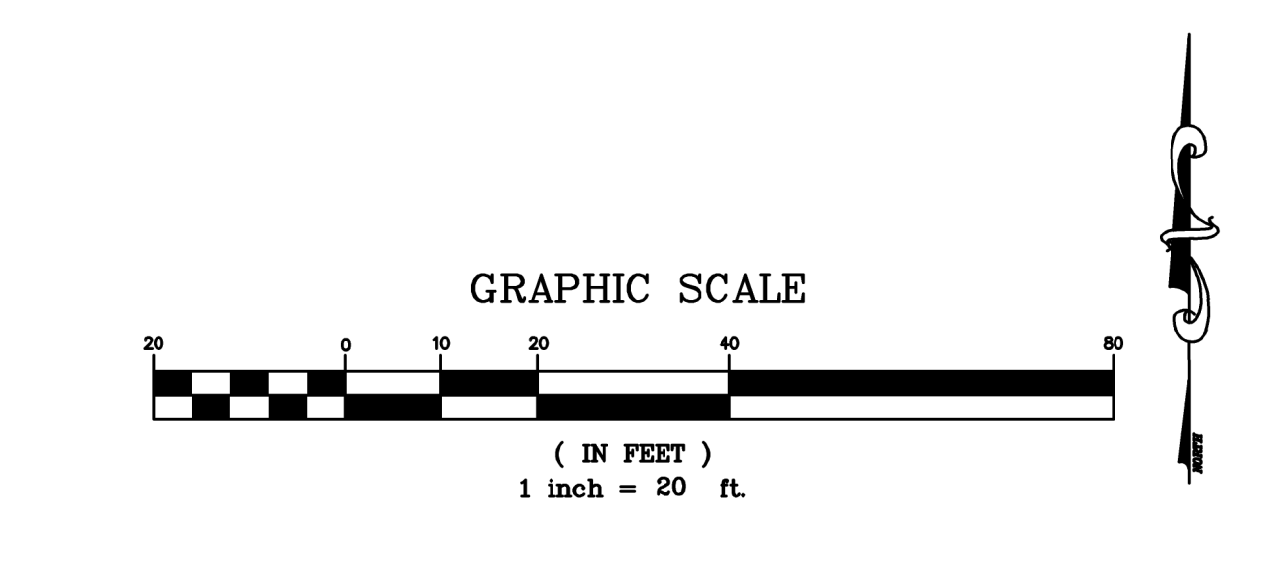


LEGEND

STRUCTURES/UTILITIES TO BE REMOVED		STRUCTURES/UTILITIES TO REMAIN	
OVERHEAD ELECTRICAL	---E---	OVERHEAD ELECTRICAL	---E---
UNDERGROUND ELECTRICAL	---UE---	UNDERGROUND ELECTRICAL	---UE---
FIRE PROTECTION	---FP---	FIRE PROTECTION	---FP---
GAS	---G---	GAS	---G---
SANITARY SEWER	---SS---	SANITARY SEWER	---SS---
TELEPHONE	---T---	TELEPHONE	---T---
UNDERGROUND TELEPHONE	---UT---	UNDERGROUND TELEPHONE	---UT---
FIBER OPTIC	---FO---	FIBER OPTIC	---FO---
WATER	---W---	WATER	---W---
FORCE MAIN	---FM---	FORCE MAIN	---FM---
STORM DRAIN	---SD---	STORM DRAIN	---SD---
INDIVIDUAL TREE TO BE REMOVED	⊗	INDIVIDUAL TREE TO REMAIN	⊙
LIGHT POLE	☆ LP	LIGHT POLE	☆ LP
UTILITY POLE	⊕ PP	UTILITY POLE	⊕ PP
MANHOLE	⊙ MH	MANHOLE	⊙ MH
CLEAN OUT	⊙ CO	CLEAN OUT	⊙ CO
DROP INLET/CATCH BASIN	⊙ DI, CB	DROP INLET/CATCH BASIN	⊙ DI, CB
FIRE HYDRANT	⊙ FH	FIRE HYDRANT	⊙ FH
WATER VALVE	⊙ WV	WATER VALVE	⊙ WV
CONSTR./CLEARING LIMITS	---	PAVEMENT, S/W, C&G TO BE REMOVED	▨
TREE PROTECTION FENCE	⊙	BUILDING/STRUCTURE TO BE REMOVED. SEE ARCHITECTURAL PLANS.	▩

- KEY NOTES**
- (A) TEMPORARY TREE PROTECTION FENCE, SEE DETAIL SHEET C-5.1
 - (B) CLEAR AND GRUB, STRIP TOPSOIL WITHIN CONSTRUCTION LIMITS.
 - (C) REMOVE STRUCTURE/UTILITY, SEE ARCHITECTURAL PLANS
 - (D) EXISTING PAVEMENT: SIDEWALK, CONCRETE, CURB AND GUTTER, ASPHALT TO BE REMOVED; SAW CUT EDGES AS NECESSARY.
 - (E) EXISTING UNDERGROUND BACKFLOW PREVENTOR AND CONCRETE VAULT TO BE REMOVED EXISTING FDC AND PORTIONS OF EXISTING DOMESTIC AND FIRE PROTECTION LINES TO BE REMOVED TO ALLOW FOR INSTALLATION OF NEW ABOVE GROUND BACKFLOW PREVENTORS. SEE UTILITY PLAN FOR ADDITIONAL INFORMATION.
 - (F) EXISTING TREE CANOPY

- GENERAL NOTES**
1. ALL EXISTING STRUCTURES AND UTILITIES SHALL BE REMOVED AS NEEDED TO ALLOW NEW CONSTRUCTION. IN GENERAL FEATURES INDICATED IN BOLD ON THIS PLAN SHALL BE REMOVED.
 2. ALL PAVEMENT OR CONCRETE TO BE REMOVED SHALL BE SAW CUT TO PROVIDE A STRAIGHT AND UNIFORM JOINT FOR NEW PAVEMENT, SIDEWALK, OR CURB AND GUTTER, ETC. ANY EXISTING PAVEMENT, SIDEWALK, CURB AND GUTTER, ETC. THAT MUST BE REMOVED TO ALLOW NEW CONSTRUCTION SHALL BE REMOVED AND REPAIRED PER THE SPECIFICATIONS AND DETAILS OR TO MATCH PRE-CONSTRUCTION CONDITIONS (WHETHER OR NOT SHOWN ON THE DRAWINGS TO BE REMOVED).
 3. ALL UTILITIES OR STRUCTURES NOT INDICATED FOR REMOVAL OR MODIFICATION ARE TO REMAIN AND BE PROTECTED FROM DAMAGE.
 4. ALL WASTE MATERIAL GENERATED FROM DEMOLITION ACTIVITIES SHALL BE DISPOSED OF OFF-SITE IN ACCORDANCE WITH APPLICABLE LAWS AND REGULATIONS.
 5. EXISTING SITE BOUNDARY AND TOPOGRAPHIC SURVEY INFORMATION WAS TAKEN FROM SURVEY BY J.C. WALLER, PERFORMED MARCH 10, 2023. THESE PLANS DO NOT ASSUME ANY LIABILITY FOR ANY EXISTING INFORMATION BOTH SHOWN AND NOT SHOWN ON THE SURVEY AND ANY CHANGES TO THE EXISTING CONDITIONS THAT MAY HAVE OCCURRED AFTER THE SURVEY WAS ISSUED. CONTRACTOR SHALL VERIFY ALL EXISTING SITE CONDITIONS PRIOR TO CONSTRUCTION.
 6. TREE PROTECTION FENCE CONSTRUCTED OF A MATERIAL RESISTANT TO DEGRADATION BY SUN, WIND, AND MOISTURE FOR THE DURATION OF THE CONSTRUCTION, MUST BE IN PLACE PRIOR TO ANY DEMOLITION, LAND DISTURBANCE, OR ESCALATION OF A GRADING PERMIT. SUCH FENCING SHALL BE MOUNTED ON METAL POSTS PLACED NO FURTHER THAN 10 FEET APART. SALT FENCING SHALL NOT SERVE AS TREE PROTECTION FENCING. WARNING SIGNS SHALL BE POSTED AT EACH END OF THE TREE PROTECTION FENCE WITH PERMETER SIGNS SPACED A MAXIMUM OF 100 FEET ON CENTER THEREAFTER. EACH SIGN SHALL READ: "NO TRESPASSING/TREE PROTECTION AREA" AND "PROHIBITED ENTRY / ZONA PROTECTORA PARA LOS ARBOLES".
 7. INSTALL TREE PROTECTION FENCING PRIOR TO BEGINNING CLEARING OPERATIONS. CLEAR AND GRUB ALL AREAS AS SHOWN AND REQUIRED TO PERMIT INSTALLATION OF NEW CONSTRUCTION PER SPECIFICATIONS AND DRAWINGS. EXISTING TREES, SHRUBS OR OTHER LANDSCAPE MATERIAL WHICH WILL CONFLICT WITH NEW CONSTRUCTION SHALL BE REMOVED (WHETHER OR NOT SHOWN ON THE DRAWINGS). ALL CONTRACTORS SHALL VISIT THE SITE AND OBSERVE EXISTING CONDITIONS PRIOR TO BIDDING.
 8. TO MINIMIZE DAMAGE TO EXISTING TREES NEAR THE INTERIOR EDGE OF CLEARING LIMITS, THE CONTRACTOR SHALL CUT 2-FT DEEP TRENCHES ALONG THE LIMITS OF DISTURBANCE, SO AS TO CUT, RATHER THAN TEAR, ROOTS.
 9. PRIOR TO DEMOLISHING EXISTING STRUCTURES, MAKE AN INSPECTION FOR ANY HAZARDOUS MATERIALS. CONTACT ARCHITECT IMMEDIATELY IF ANY HAZARDOUS MATERIALS ARE DISCOVERED. CAP AND REMOVE UTILITY SERVICES, FUEL TANKS AND SEPTIC SYSTEMS. ALL WORK TO BE PERFORMED IN ACCORDANCE WITH APPLICABLE FEDERAL, STATE AND LOCAL REGULATIONS.
 10. VERIFY ALL ILLUSTRATED UNDERGROUND ELEMENTS/UTILITIES. EXERCISE REASONABLE EFFORTS TO PROTECT ANY UNKNOWN UNDERGROUND UTILITIES. NOTIFY THE ARCHITECT IMMEDIATELY IF UNKNOWN ELEMENTS/UTILITIES ARE DISCOVERED THAT WOULD NECESSITATE MODIFICATION TO THE PROPOSED DESIGN.
 11. CONTACT UTILITY LOCATING SERVICE AT LEAST 48-HRS PRIOR TO EXCAVATION.
 12. PROTECT ALL ADJACENT PROPERTIES, THE GENERAL PUBLIC AND ALL OF THE OWNER'S FACILITIES. SHOULD DAMAGES OCCUR, REPAIR IMMEDIATELY AS DIRECTED BY THE ARCHITECT. AREAS TO BE PROTECTED, REPAIRED AND CLEANED SHALL ALSO INCLUDE ANY STAGING AREAS, ACCESS ROUTES AND OTHER EXISTING IMPROVEMENTS WITHIN THE CONSTRUCTION LIMITS THAT ARE TO REMAIN.
 13. ALL CONSTRUCTION TO BE IN ACCORDANCE WITH ALL CITY OF DURHAM AND/OR NCDOT STANDARDS AND SPECIFICATIONS.
 14. ALL EXISTING VAULTS, MANHOLES, STORM DRAIN STRUCTURES, CLEANOUTS, ETC. SHALL BE ADJUSTED AS NEEDED TO MATCH FINISH GRADE.
 15. DEMOLITION AND PATCHING OF PAVEMENT, SIDEWALK, CURB AND GUTTER AND OTHER EXISTING PAVED SURFACES IN ADDITION TO THAT INDICATED ON THIS PLAN SHALL BE PERFORMED AS REQUIRED TO CONSTRUCT AND INSTALL NEW UTILITIES. ALL SUCH DEMOLITION AND PATCHING SHALL BE INCLUDED IN THE BASE BID SCOPE OF WORK. SEE SHEET C-7.1 FOR PAVEMENT REPAIR DETAILS.
 16. THIS SITE IS NOT LOCATED WITHIN SPECIAL FLOOD HAZARD AREAS AS DETERMINED BY FEMA AND DEPICTED ON F.I.R.M. MAP 3720084100K, DATED 10/19/2018 AS BEING WITHIN ZONE "X" OTHER AREA.
 17. NO WORK SHALL BE PERFORMED ON RIGHT-OF-WAYS OR ADJACENT PROPERTIES UNTIL THE OWNER NOTIFIES CONTRACTOR IN WRITING OF PROCUREMENT OF APPROPRIATE PERMITS, EASEMENTS, AGREEMENTS, OR RIGHTS-OF-WAY.
 18. FROM SECTION 4E.4 LIGHT INDUSTRIAL DISTRICT ZONING REQUIREMENTS:
 - 4E.4.7 SETBACK REQUIREMENTS
 - 1. STREET SIDES: BUILDING SETBACK - 40 FEET
 - 2. PARKING AREAS AND INTERNAL DRIVEWAYS - 20 FEET
 - 3. INTERNAL SIDES: FROM RESIDENTIALLY ZONED PROPERTY - 30 FEET (BUILDINGS) FROM NON-RESIDENTIALLY ZONED PROPERTY - 30 FEET
 - 4. ALL BUFFER AND SCREENING REQUIREMENTS FOUND ELSEWHERE IN THE ORDINANCE MUST BE MET. SETBACK DISTANCE MAY BE USED TO MEET BUFFER REQUIREMENTS.
 - 5. SETBACK REQUIREMENTS FROM ACTIVE RAILROADS SHALL BE ONE HALF OF THOSE STATED ABOVE AND MAY BE FURTHER REDUCED BY THE DEVELOPMENT REVIEW BOARD UPON FINDINGS THAT SUCH REDUCTIONS WOULD NOT ADVERSELY AFFECT SURROUNDING PROPERTIES.



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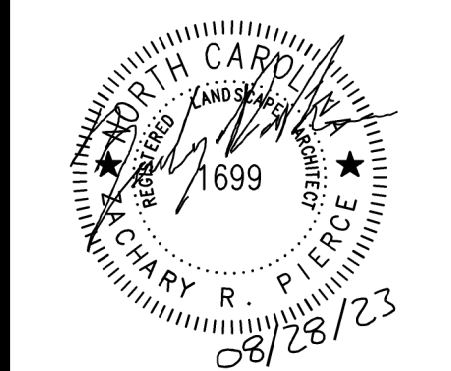


RENOVATIONS TO:

**CITY OF DURHAM
WHEELS
SKATING
CENTER**

715 N HOOVER RD
DURHAM, NC

PROJECT NUMBER
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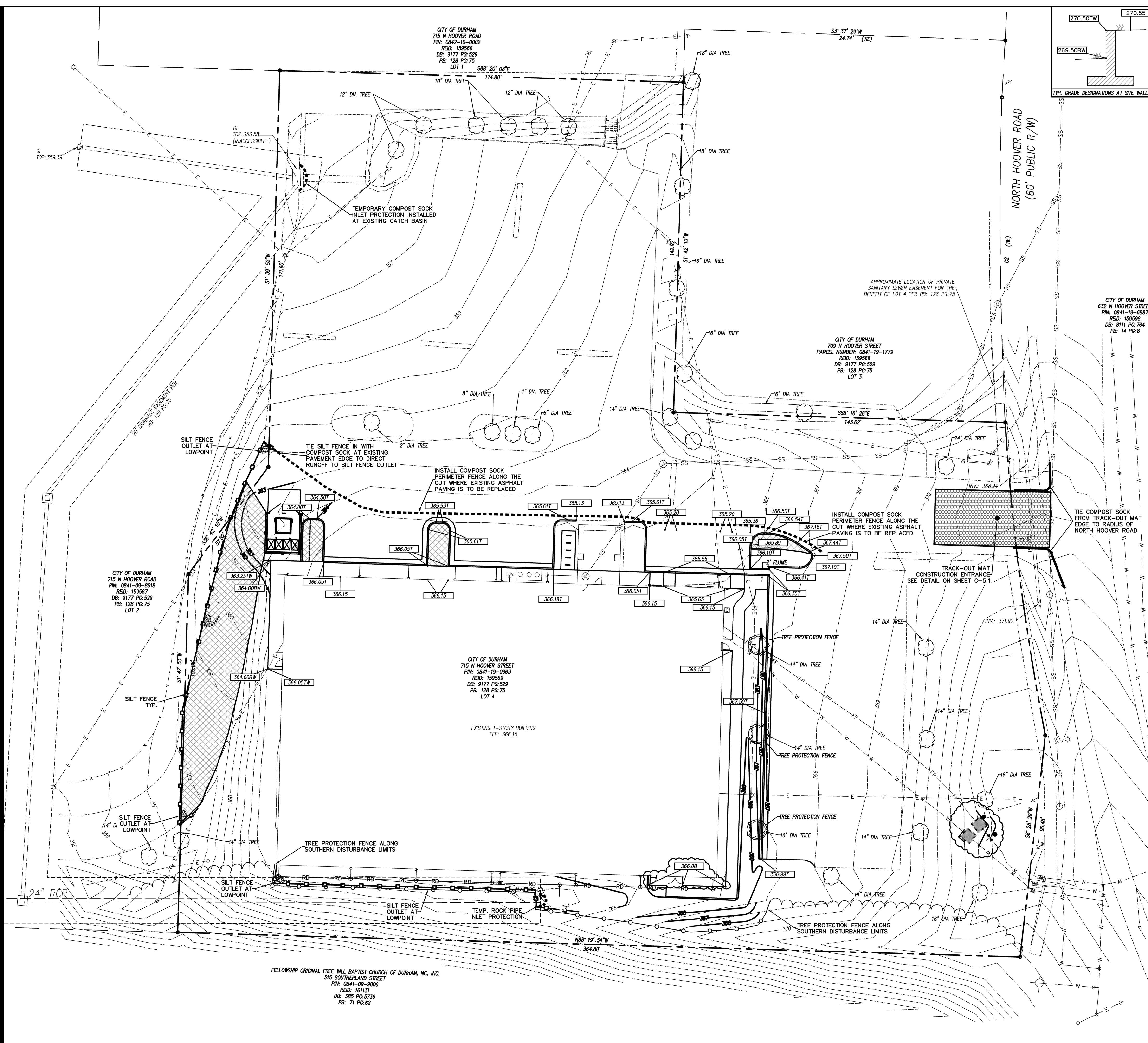
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Revisions

1	9/14/2023
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Checked RW
Date SEPTEMBER 14, 2023
Sheet
C-1.0
EXISTING CONDITIONS & DEMOLITION PLAN



LEGEND

	TEMP. TRACK OUT MAT CONSTR. ENTRANCE SEE DETAIL SHEET C-5.1		TEMP. SILT FENCE SEE DETAIL SHEET C-5.1
	TEMP. REINFORCED SILT FENCE OUTLET SEE DETAIL SHEET C-5.1		FINISHED CONTOUR
	TEMP. J-HOOK PROTECTION SEE DETAIL SHEET C-5.2		TREE PROTECTION FENCE SEE DETAIL SHEET C-5.1
	TEMP. COMPOST SOCK INLET PROTECTION SEE DETAIL SHEET C-5.2		TEMP. COMPOST SOCK SEE DETAIL SHEET C-5.2
	TEMP. ROCK PIPE INLET PROTECTION SEE DETAIL SHEET C-5.2		PROPOSED STORM SEWER PIPES
	TEMP. COMPOST SOCK INLET PROTECTION SEE DETAIL SHEET C-5.2		EXISTING STORM SEWER PIPES
	PREVIOUSLY COMPACTED SURFACE REMEDIATION AREA, SEE GENERAL NOTES BELOW		CONSTRUCTION LIMITS UNLESS OTHERWISE NOTED.
	PROPOSED TOP OF CURB SPOT ELEVATION		EXISTING STORM DRAIN PIPE
	PROPOSED GROUND OR PAVEMENT ELEVATION		PROPOSED ROOF DRAIN
	PROPOSED TOP OF WALL ELEVATION		PROPOSED FINISHED GRADE AT TOP OF WALL ELEVATION
	PROPOSED BOTTOM OF WALL ELEVATION		PROPOSED FINISHED GRADE AT BOTTOM OF WALL ELEVATION

- EROSION CONTROL NOTES**
- ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH ALL CITY OF DURHAM, NCDOT, AND NCDOT STANDARDS, SPECIFICATIONS AND DETAILS.
 - THE CONTRACTOR SHALL COMPLY WITH ALL STATE AND LOCAL CODES IN OBSERVING EROSION CONTROL MEASURES BOTH ON AND OFF SITE. ALL OFF-SITE SOIL BORROW AND WASTE STILES SHALL BE PROPERLY PERMITTED FOR SUCH ACTIVITIES. CONTRACTOR SHALL PROVIDE WRITTEN DOCUMENTATION OF SEDIMENT & EROSION CONTROL PERMIT FOR ANY OFF-SITE SITES TO OWNER PRIOR TO RELOCATING ANY STOCKPILE MATERIALS.
 - THE CONTRACTOR SHALL MAINTAIN ALL EROSION CONTROL DEVICES AFTER EACH RAINFALL EVENT OR AS DIRECTED BY LOCAL AUTHORITIES OR ARCHITECT.
 - TOTAL DISTURBED AREA = 0.43 AC
 - THE INDICATED STAGING AREA IS INTENDED FOR VEHICLES AND NON-ERODIBLE MATERIALS ONLY. NO SOIL, SAND OR OTHER ERODIBLE FINE GRAINED MATERIAL SHALL BE STORED OUTSIDE OF THE LIMITS OF THE SITE PROTECTED BY SEDIMENT AND EROSION CONTROL DEVICES AND MEASURES.
 - SOIL AND OTHER MATERIALS SHALL ONLY BE TEMPORARILY STOCKPILED WITHIN THE CONSTRUCTION LIMITS PROTECTED BY SEDIMENT AND EROSION CONTROL DEVICES AND MEASURES. STOCKPILES SHALL BE STABILIZED AS REQUIRED AS INDICATED IN THE SLOPE & SURFACE STABILIZATION NOTES ON THIS SHEET.
 - TREE PROTECTION FENCE CONSTRUCTED OF A MATERIAL RESISTANT TO DEGRADATION BY SUN, WIND, AND MOISTURE FOR THE DURATION OF THE CONSTRUCTION MUST BE IN PLACE PRIOR TO ANY DEMOLITION, LAND DISTURBANCE, OR ISSUANCE OF A GRADING PERMIT. SUCH FENCING SHALL BE MOUNTED ON METAL POSTS PLACED NO FURTHER THAN 10 FEET APART. SILT FENCING SHALL NOT SERVE AS TREE PROTECTION FENCING. WARNING SIGNS SHALL BE POSTED AT EACH END OF TREE PROTECTION FENCE WITH PERIMETER SIGNS SPACED A MAXIMUM OF 100 FEET ON CENTER THEREAFTER. EACH SIGN SHALL READ: "NO TRESPASSING/TREE PROTECTION AREA" AND "PROHIBIDO ENTRAR / ZONA PROTECTORA PARA LOS ARBOLES".
 - THE TREE PROTECTION FENCE SHALL BE MAINTAINED ON THE SITE UNTIL ALL SITE WORK IS COMPLETED AND THE FINAL SITE INSPECTION IS SCHEDULED PRIOR TO THE ISSUANCE OF A CERTIFICATE OF OCCUPANCY (CO). THE FENCING SHALL BE REMOVED IMMEDIATELY PRIOR TO THE FINAL SITE INSPECTION FOR THE SITE.
 - TREE PROTECTION FENCING SHALL NOT BE MOVED AND THERE SHALL BE NO ENCROACHMENT INTO SUCH PROTECTED AREA(S) WITHOUT WRITTEN AUTHORIZATION OF THE COUNTY ZONING COMPLIANCE STAFF. ANY ACTIVITY (LANDSCAPING, FENCING, OR UTILITY INSTALLATION) SHOWN ON THE APPROVED PLANS IN A TREE PROTECTION AREA SHALL ALSO NOT OCCUR WITHOUT WRITTEN AUTHORIZATION FROM THE COUNTY ZONING COMPLIANCE STAFF. ANY UNAUTHORIZED ENCROACHMENT OR DISTURBANCE WITHIN THE BOUNDARIES OF A TREE PROTECTION AREA SHALL AUTOMATICALLY RESULT IN FINES AND THE REPLACEMENT OF ANY DAMAGED VEGETATION IN ACCORDANCE WITH THE LAND DEVELOPMENT ORDINANCE.
 - CHANNELS SHALL BE STABILIZED DAILY UNTIL PERMANENT GROUND COVER IS ESTABLISHED.
 - INSTALL TEMPORARY MATTING TO TOP OF ALL SIDE SLOPES ON CHANNELS, DIVERSION DITCHES AND TEMPORARY SEDIMENT BASINS. SEE DETAIL SHEET C702 (PERMANENT CHANNEL) AND C4.2 (TEMPORARY DIVERSION DITCH) FOR TYPE OF MATTING TO USE.
 - ANY DETAHERING OF SEDIMENT CONTAINMENT DEVICES FOR MAINTENANCE, REMOVAL OR CONVERSION PURPOSES IS TO BE DONE THROUGH A SILT BAG.
 - ANY DETAHERING OF STORM/UTILITY TRENCHES IS TO BE DONE THROUGH A SILT BAG.
 - GROUND COVER IS TO BE APPLIED PER CONDITIONS OF THE NPDES PERMIT OR AT THE END OF THE DAY IN CRITICAL AREAS.
 - CONTRACTOR SHALL USE TIRE WASH STATION TO PREVENT SEDIMENT FROM TRACKING ONTO THE ROAD IF CONSTRUCTION ENTRANCE IS FOUND INSUFFICIENT AT NO ADDITIONAL COST TO OWNER.
 - CONTRACTOR SHALL UTILIZE PAM FLOCCULANTS TO REDUCE RUN-OFF TURBIDITY. SEE SPECS.

- GRADING NOTES**
- ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH ALL CITY OF DURHAM, NCDOT AND NCDOT STANDARDS, SPECIFICATIONS AND DETAILS.
 - ALL SPOT ELEVATIONS INDICATED AT CURB AND GUTTER AND ARE DENOTED TO TOP OF CURB, UNLESS OTHERWISE SHOWN.
 - TOTAL DENIED AREA = 0.43 AC
 - CONTRACTOR SHALL ADJUST ALL EXISTING VAULTS, MANHOLES, STORM DRAIN STRUCTURES, CLEANOUTS, ETC. AS NEEDED TO MATCH FINISH GRADE.
 - ALL BACKFILL, COMPACTION, SOILS TESTING, ETC. SHALL BE PERFORMED BY THE OWNER'S INDEPENDENT TESTING LABORATORY. (SEE SPECIFICATIONS FOR ADDITIONAL INFORMATION)
 - ALL STORM DRAIN PIPES SHALL BE PROTECTED WITH STONE FILTER PROTECTION AFTER STOPPAGE OF WORK EACH DAY.
 - EXISTING VEGETATION WITHIN TREE PROTECTION AREAS SHALL REMAIN UNDISTURBED, UNLESS NOTED OTHERWISE.
 - ANY AND ALL LANDSCAPING AND EXISTING TREES & SHRUBS TO REMAIN WHICH ARE DAMAGED DURING DEMOLITION OR CONSTRUCTION SHALL BE REPLACED BY THE CONTRACTOR UTILIZING A LICENSED LANDSCAPE CONTRACTOR AT NO ADDITIONAL COST TO THE OWNER.
 - THE GRADING CONTRACTOR SHALL COMPLY WITH ALL STATE CODES IN OBSERVING EROSION CONTROL MEASURES BOTH ON AND OFF-SITE.
 - THE GRADING CONTRACTOR SHALL MAINTAIN ALL EROSION CONTROL DEVICES AFTER EACH RAINFALL EVENT OR AS DIRECTED BY STATE AUTHORITIES OR THE ARCHITECT.
 - THE GRADING CONTRACTOR SHALL BE RESPONSIBLE FOR OFF-SITE DISPOSAL OF ALL CLEARING AND GRADING WASTE MATERIALS GENERATED DURING CONSTRUCTION AND FOR OBTAINING ALL APPLICABLE PERMITS FOR OFF-SITE STOCKPILES AND/OR WASTE AREAS.
 - THE CROSS-SLOPE ON ALL SIDEWALKS SHALL BE A MAXIMUM OF 2.0%.
 - CONTRACTOR SHALL VERIFY ALL EXISTING ELEVATIONS WHERE NEW CONSTRUCTION JOIN OR CONNECT TO EXISTING PAVEMENT, CURB AND OTHER RIGID STRUCTURES. NOTIFY ARCHITECT IF DISCREPANCIES OCCUR.
 - THE PROCEDURE FOR COMPACTED SOIL REMEDIATION IS AS FOLLOWS:
14.1. REMOVE ALL IMPERIOUS SURFACES FROM THE SUBJECT AREAS.
14.2. TILL THE AREA TO A DEPTH OF 12" BELOW THE TOP OF THE COMPACTED SUBGRADE.
14.3. SUITABLE RATES AND TYPES OF SOIL AMENDMENTS SHALL BE DETERMINED THROUGH SOIL TESTS. LIMESTONE AND FERTILIZER SHALL BE APPLIED UNIFORMLY DURING SEEDBED PREPARATION AND MIXED WELL WITH THE TOP 4-6" OF SOIL.

- MAINTENANCE PLAN**
- DURING ALL PHASES OF CONSTRUCTION, GROUND COVER ON EXPOSED SLOPES SHALL BE PROVIDED ACCORDING TO GROUND STABILIZATION TABLE (SHEET C-5.1) FOLLOWING COMPLETION OF ANY PHASE OF GRADING.
 - FINAL PERMANENT GROUND COVER FOR ALL DISTURBED AREAS SHALL BE PROVIDED ON ALL DISTURBED AREAS ACCORDING TO GROUND STABILIZATION TABLE (SHEET C-5.1) FOLLOWING COMPLETION OF CONSTRUCTION OR DEVELOPMENT.
 - THE ABOVE REQUIREMENTS ARE THE MINIMUM NECESSARY TO MEET EROSION AND SEDIMENT CONTROL REGULATIONS. THE CONTRACT DOCUMENTS INCLUDE ADDITIONAL SEEDING AND STABILIZATION REQUIREMENTS AND SCHEDULES WHICH MAY EXCEED THOSE ABOVE.
 - SLOPE EROSION CONTROL MATTING SHALL BE INSTALLED FOR TEMPORARY STABILIZATION DURING THE ESTABLISHMENT OF VEGETATIVE COVER ON ALL STEEP SLOPES (6:1 OR STEEPER). REFER TO MATERIAL SPECIFICATIONS. INSTALL MATTING PER MANUFACTURER'S INSTRUCTIONS.
 - ALL OTHER SEEDING AREAS SHALL BE MULCHED WITH STRAW AND TACKED WITH ASPHALT.

SELF-INSPECTION RULES

SEE SHEET C-5.1 FOR SELF-INSPECTION REQUIREMENTS.

THE FINANCIALLY RESPONSIBLE PERSON AND/OR HIS AGENT WILL BE PERFORM SELF INSPECTIONS OF THE EROSION AND SEDIMENTATION CONTROL MEASURES USING NCDOT'S SELF INSPECTION REPORT (WORKSHEET) AND THIS WILL BE KEPT ON-SITE.

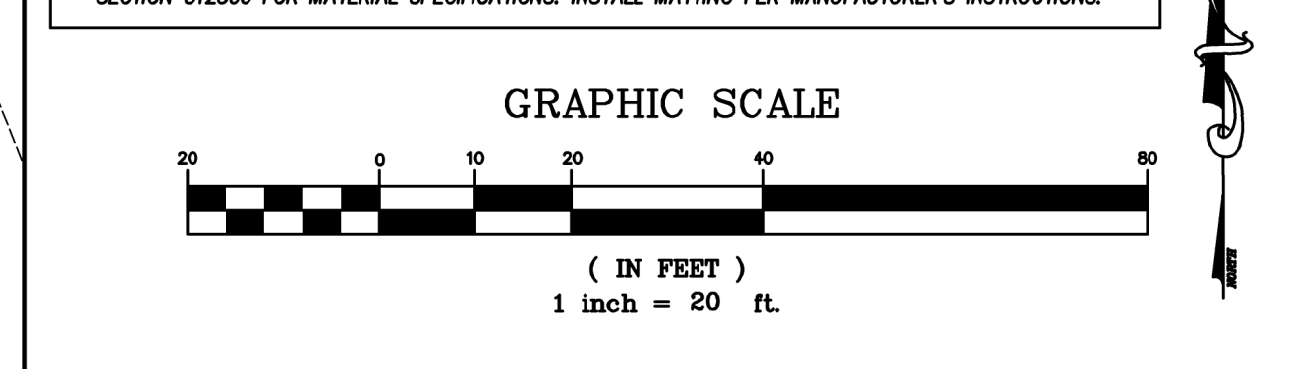
SLOPE & SURFACE STABILIZATION

GROUND STABILIZATION SHALL BE PROVIDED ON ALL DISTURBED AREAS ACCORDING TO GROUND STABILIZATION NOTES SEE SHEET C-5.1

EXTENSIONS OF TIME MAY BE APPROVED BY THE PERMITTING AUTHORITY BASED ON WEATHER OR OTHER SITE-SPECIFIC CONDITIONS THAT MAKE COMPLIANCE IMPRACTICABLE (SECTION 1B(2) (b)).

THE REQUIREMENTS ON SHEET C-5.1 ARE THE MINIMUM NECESSARY TO MEET EROSION AND SEDIMENT CONTROL REGULATIONS. THE CONTRACT DOCUMENTS INCLUDE ADDITIONAL SEEDING AND STABILIZATION REQUIREMENTS AND SCHEDULES WHICH MAY EXCEED MINIMUM REQUIREMENTS.

INSTALL TEMPORARY EXCELSIOR MATTING FOR STABILIZATION DURING THE ESTABLISHMENT OF VEGETATIVE COVER ON ALL STEEP SLOPES (6:1 OR STEEPER) AND AREAS OF CONCENTRATED FLOW (CHANNELS, DITCHES, SWALES, ETC.). UTILIZE TEMPORARY COCOMAT IN AREAS IDENTIFIED ON PLAN. REFER TO SPECIFICATION SECTION 312500 FOR MATERIAL SPECIFICATIONS. INSTALL MATTING PER MANUFACTURER'S INSTRUCTIONS.



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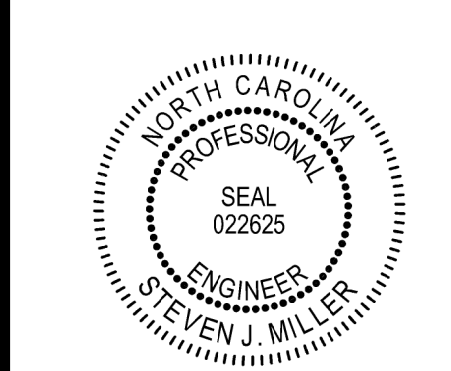
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RENOVATIONS TO:
**CITY OF DURHAM
WHEELS
SKATING
CENTER**

715 N HOOVER RD
DURHAM, NC

PROJECT NUMBER
22059



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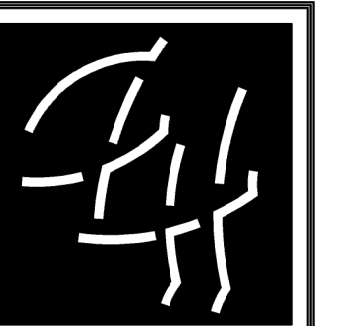
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Revisions

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GRADING &
EROSION CONTROL

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UTILITY LEGEND

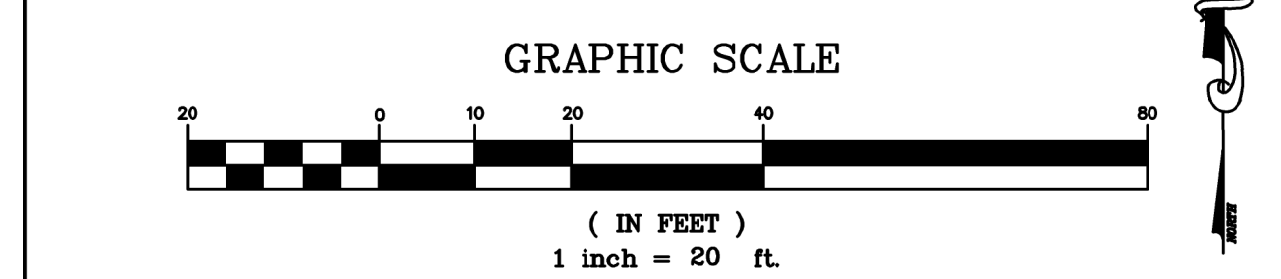
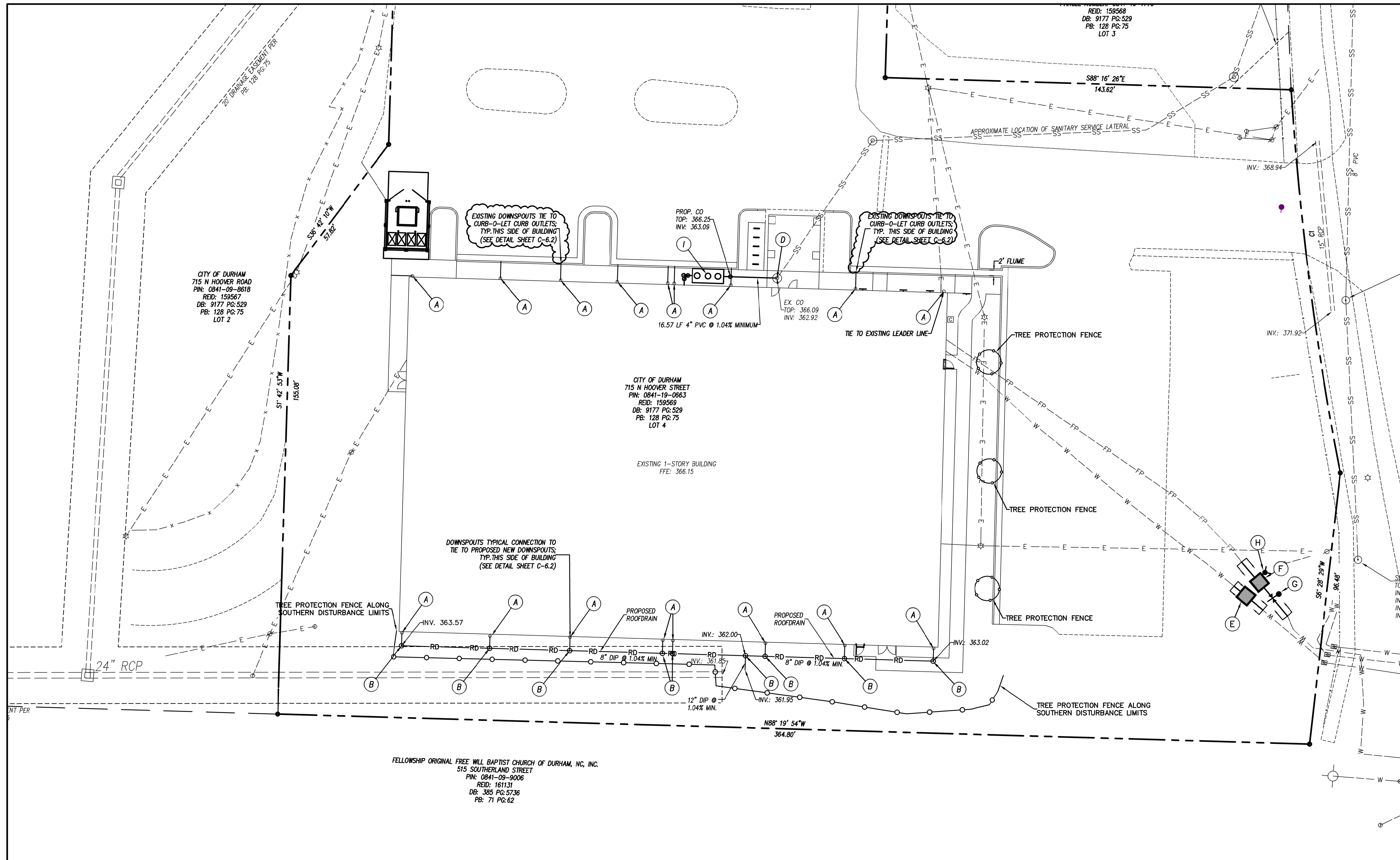
	EXISTING	PROPOSED
CHILLED WATER	---CW---	CW
ELECTRICAL (OVERHEAD)	---E---	E
ELECTRICAL (UNDERGROUND)	---UE---	UE
FOUNDATION DRAIN	---FD---	FD
GAS	---G---	G
SANITARY SEWER	---SS---	SS
TELEPHONE (OVERHEAD)	---T---	T
TELEPHONE (UNDERGROUND)	---UT---	UT
WATER	---W---	W
ROOF DRAIN	---RD---	RD
FIRE PROTECTION	---FP---	FP
STORM DRAIN	---SD---	SD
TREE PROTECTION FENCING, SEE EROSION CONTROL PLANS		
LIGHT POLE	☆ LP	*
UTILITY POLE	⊙ PP	⊙
MANHOLE	⊙ MH	⊙
CLEAN OUT	⊙ CO	⊙
DROP INLET/CATCH BASIN	⊙ DI, CB	⊙
FIRE HYDRANT	⊙ FH	⊙
WATER VALVE	⊙ WV	⊙
POST INDICATOR VALVE (PIV)	⊙ PIV	⊙
FIRE DEPARTMENT CONNECTION (FDC)	⊙ FDC	⊙
THRUST BLOCKING	⊙ TB	⊙
SANITARY SEWER STRUCTURE IDENTIFICATION		1

GENERAL NOTES-UTILITY

- ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH ALL CITY OF DURHAM AND NCDOT STANDARDS, SPECIFICATIONS AND DETAILS.
- INSTALL ALL UTILITIES TO PROVIDE REQUIRED CLEARANCES AS INDICATED IN THE SPECIFICATIONS.
- COORDINATE AND SCHEDULE INSTALLATION OF ALL UTILITIES WITH OTHER PRIME CONTRACTORS, UTILITY COMPANIES AND OTHER TRADES INCLUDING BUT NOT LIMITED TO: NATURAL GAS, ELECTRICITY, TELEPHONE AND CATV.
- VERIFY EXISTING CONDITIONS AND CONNECTIONS TO EXISTING UTILITIES PRIOR TO CONSTRUCTION. NOTIFY ARCHITECT IF ANY DISCREPANCIES ARE DISCOVERED.
- CONTRACTOR IS RESPONSIBLE FOR ALL DAMAGES DURING CONSTRUCTION AND SHALL MAKE REPAIRS AT NO EXPENSE TO THE OWNER.
- ALL CONSTRUCTION SHALL COMPLY WITH ALL APPLICABLE NCSRC AND OSHA REQUIREMENTS.
- THE CONTRACTOR SHALL PROVIDE AN AS-BUILT SURVEY OF ALL UTILITY AND STORM DRAINAGE IMPROVEMENTS FOLLOWING CONSTRUCTION.
- CONTRACTOR SHALL PHASE DEMOLITION AND NEW CONSTRUCTION TO ENSURE UNINTERRUPTED ACCESS AND UTILITY SERVICE TO ADJACENT FACILITIES. COORDINATE SHORT-TERM, OFF-HOUR, TEMPORARY SHUT-DOWNS WITH THE OWNER.
- SEE GENERAL NOTES ON EXISTING CONDITIONS AND DEMOLITION PLAN FOR REQUIREMENTS FOR REMOVAL AND PATCHING OF PAVEMENT FOR UTILITY INSTALLATION.
- ALL ROOF DRAINS SHALL BE 6" PVC (SCH 40) @ 1.04% MIN. SLOPE UNLESS INDICATED OTHERWISE. USE DUCTILE IRON WHEN COVER IS LESS THAN 24-IN.
- ALL SANITARY SEWER SERVICES SHALL BE 4" PVC (SCH 40) @ 1.04% MIN. SLOPE UNLESS INDICATED OTHERWISE. USE DUCTILE IRON WHEN COVER IS LESS THAN 24-IN.
- ALL CONDENSATE LINES SHALL BE CONNECTED TO STORM DRAINAGE SYSTEM.
- NO WORK SHALL BE PERFORMED ON RIGHT-OF-WAYS OR ADJACENT PROPERTIES UNTIL THE OWNER NOTIFIES CONTRACTOR IN WRITING OF PROCUREMENT OF APPROPRIATE PERMITS, EASEMENTS, AGREEMENTS, OR RIGHTS-OF-WAY.

KEY NOTES

- (A) DOWNSPOUT CONNECTION, SEE DETAIL SHEET C-6.2
- (B) ROOF DRAIN CLEANOOUT
- (D) EXISTING SANITARY SEWER CLEANOUT ELEVATION TO BE FIELD VERIFIED FOR USE BY GREASE INTERCEPTOR
- (E) 2.5" REDUCED PRESSURE BACKFLOW ASSEMBLY (RPBA) IN ABOVE GROUND HOTBOX ASSEMBLY TO BE INSTALLED ON EXISTING 2" DOMESTIC SERVICE (SEE DETAIL SHEET C-6.1)
- (F) 6" REDUCED PRESSURE ZONE DETECTOR ASSEMBLY (RPZA) IN ABOVE GROUND HOTBOX ASSEMBLY TO BE INSTALLED ON EXISTING 6" FIRE PROTECTION LINE EXISTING UNDERGROUND BACKFLOW PREVENTER TO BE DISCONNECTED AND REMOVED (SEE DETAIL SHEET C-6.2)
- (G) POST INDICATOR VALVE
- (H) FIRE DEPARTMENT CONNECTION (SEE DETAIL SHEET C-6.1)
- (I) 1,000 GALLON GREASE INTERCEPTOR, REFER TO MEP DRAWINGS FOR COORDINATION

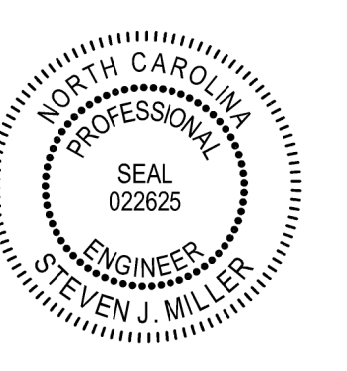


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CENTER**

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UTILITY PLAN



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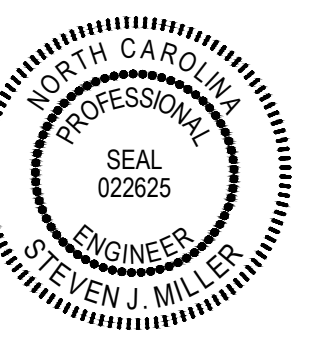
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RENOVATIONS TO:

CITY OF DURHAM WHEELS SKATING CENTER

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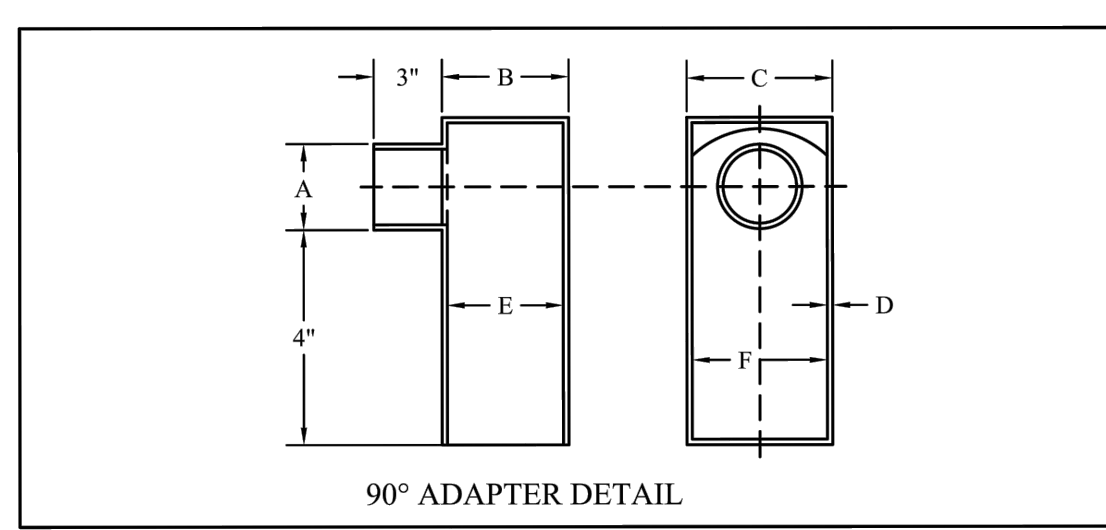
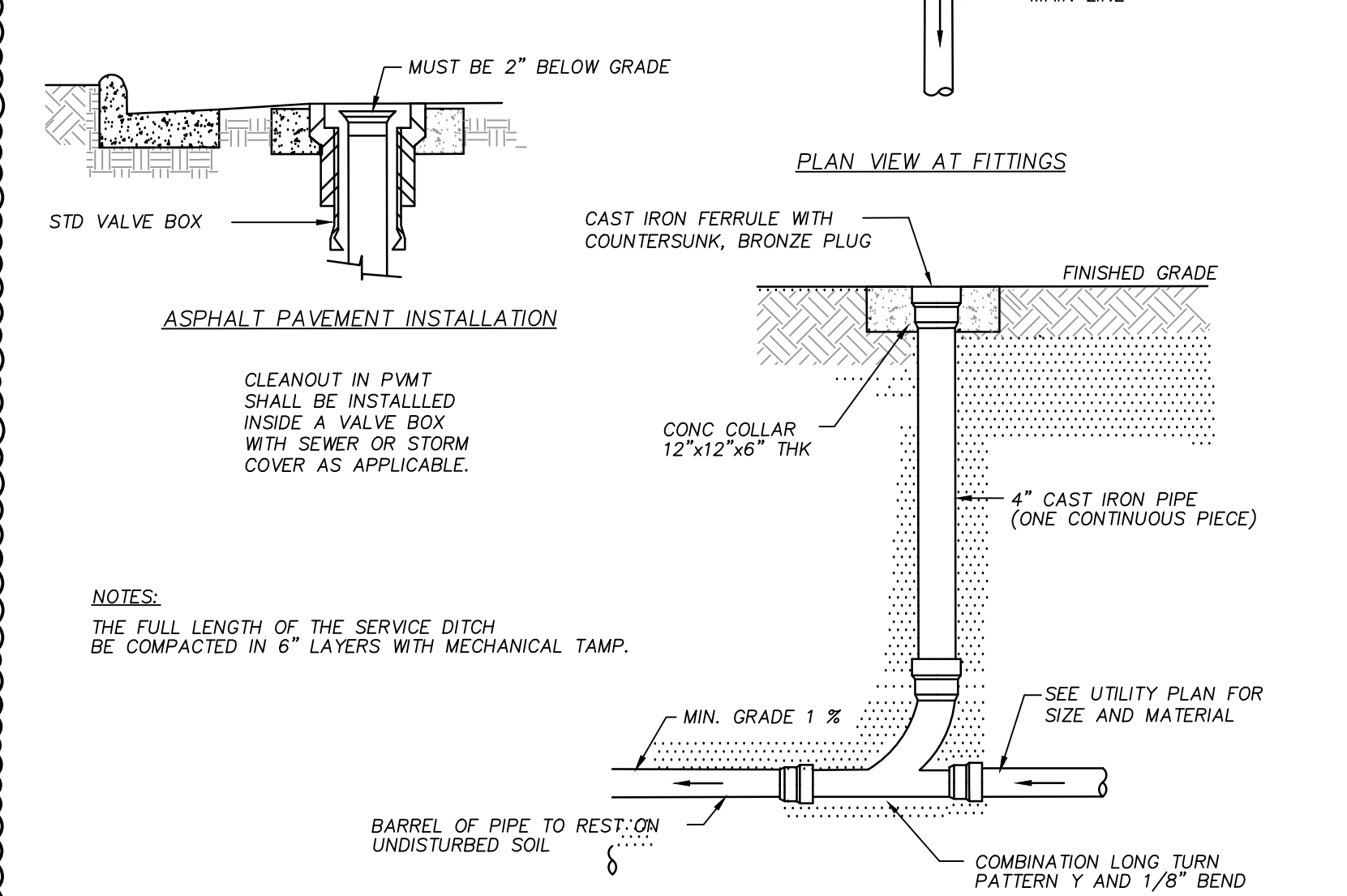
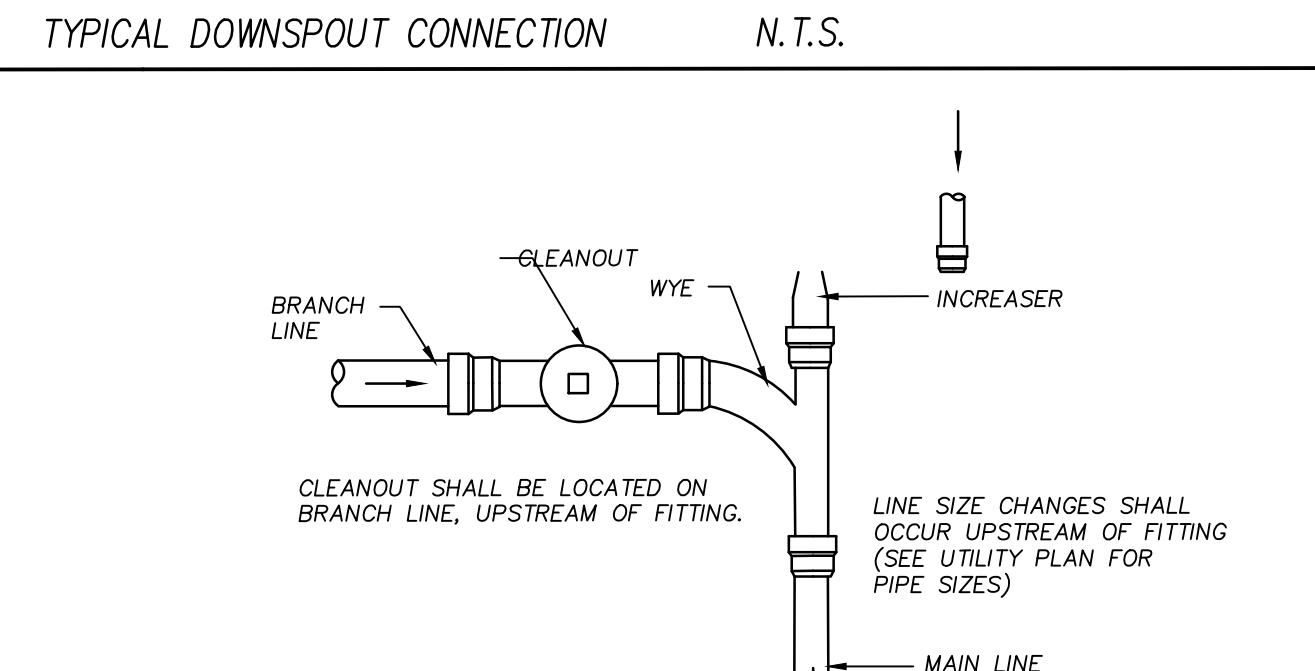
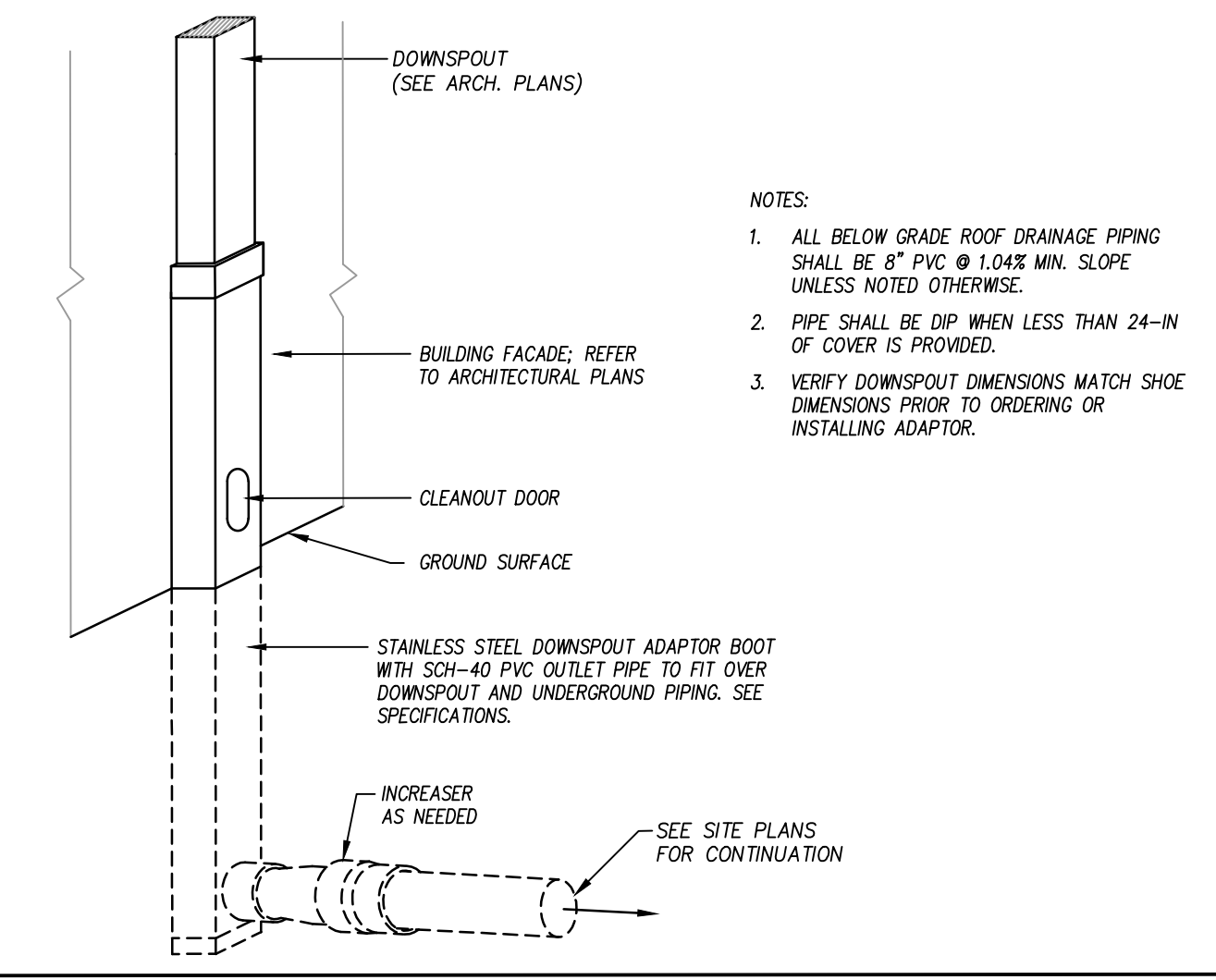
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Date **AUGUST 28, 2023**

Sheet

C-6.2

UTILITY DETAILS



PRODUCT SPECIFICATION - 90° ADAPTER

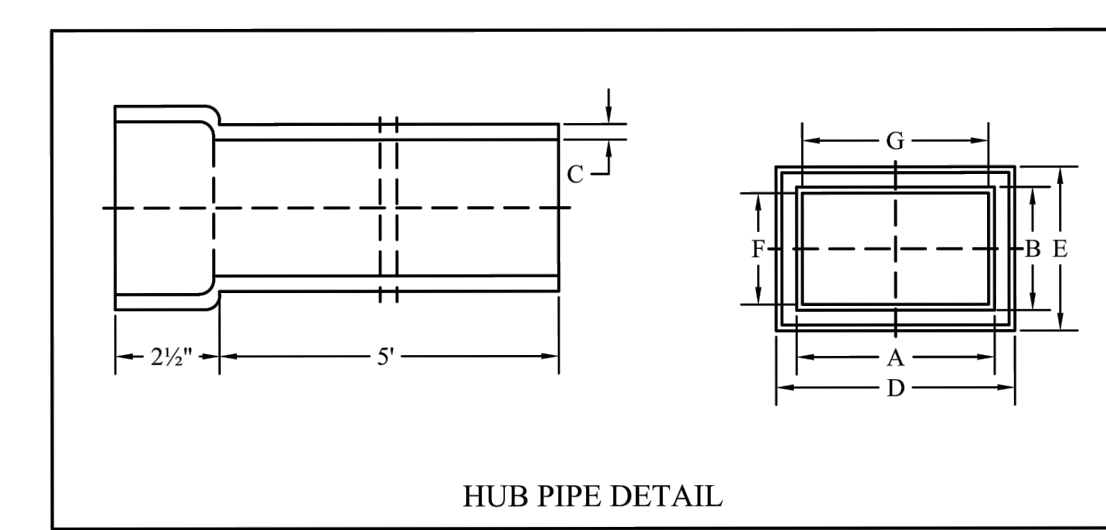
PRODUCT LIST		PRODUCT DIMENSIONS							
MODEL	DIMENSIONS	ROUND EQUIV.	ROUND TRANSVERSE AREA (SQ. IN.)	A	B	C	D	E	F
CP-SP905	3"x5"x9"	4"	12.724	4.5"	3.269"	5.269"	10 GA.	3"	5"
CP-SP908	3"x8"x10"	5"	20.040	5.563"	3.269"	8.269"	10 GA.	3"	8"
CP-SP912	3"x12"x11"	6"	28.886	6.625"	3.269"	12.269"	10 GA.	3"	12"
CP-SP917	3"x17"x13"	8"	50.014	8.625"	4.269"	17.269"	10 GA.	3"	17"
CP-SP914	4"x14"x13"	8"	50.014	8.625"	3.269"	14.269"	10 GA.	4"	14"
CP-SP927	3"x27"x13"	10"	78.814	10.625"	3.269"	27.269"	10 GA.	3"	27"
CP-SP922	4"x22"x13"	10"	78.814	10.625"	4.269"	22.269"	10 GA.	4"	22"

MATERIAL: 10 GAUGE GALVANIZED A653 G90 MEETS ASTM A-653. TENSILE STRENGTH 50,000.0 YIELD 36,000. ALL WELDS WILL BE SPRAYED, ROLLED OR BRUSHED WITH GALVANIZED #90 COATING.
RECTANGULAR CONNECTION: MASTIC, CAULKING, EPOXY BINDING OR OTHER APPROVED METHOD.
ROUND CONNECTION: CAST IRON/PLASTIC PIPE CONNECTION USE CAST IRON OR PLASTIC TO STEEL COUPLINGS.

Curb-O-Let
Thru The Curb Drain

RECTANGULAR STEEL PIPE AND FITTINGS, 90° ADAPTER

TRENCH DRAIN SUPPLY 877-903-7246 www.trenchdrainsupply.com



PRODUCT SPECIFICATION - HUB PIPE

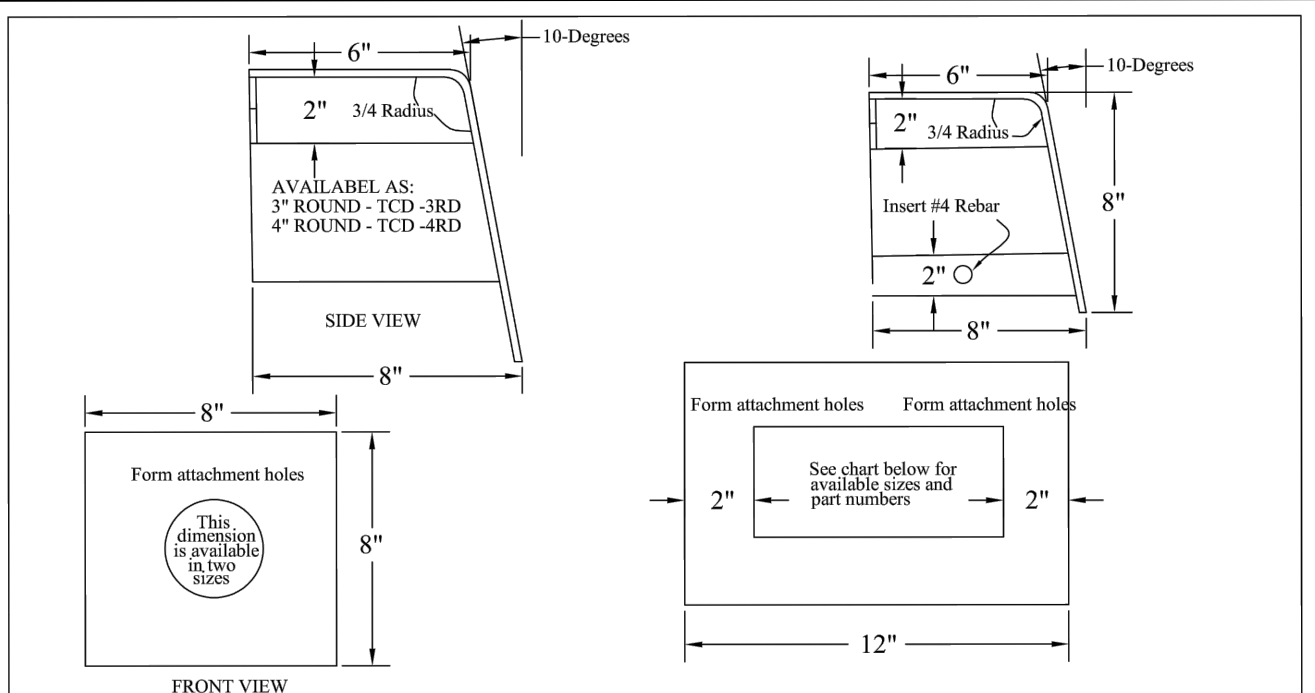
PRODUCT LIST		PRODUCT DIMENSIONS								
MODEL	DIMENSIONS	ROUND EQUIV.	ROUND TRANSVERSE AREA (SQ. IN.)	A	B	C	D	E	F	G
CP-SP305H	3"x5"x5"	4"	12.724	5.269"	3.269"	10 GA.	5.5"	3.5"	3"	5"
CP-SP308H	3"x8"x5"	5"	20.040	8.269"	3.269"	10 GA.	8.5"	3.5"	3"	8"
CP-SP312H	3"x12"x5"	6"	28.886	12.269"	3.269"	10 GA.	12.5"	3.5"	3"	12"
CP-SP317H	3"x17"x5"	8"	50.014	17.269"	3.269"	10 GA.	17.50"	3.5"	3"	17"
CP-SP414H	4"x14"x5"	8"	50.014	14.269"	4.269"	10 GA.	14.50"	4.5"	4"	14"
CP-SP327H	3"x27"x5"	10"	78.814	27.269"	3.269"	10 GA.	27.50"	3.5"	3"	27"
CP-SP422H	4"x22"x5"	10"	78.814	22.269"	4.269"	10 GA.	22.50"	4.5"	4"	22"

MATERIAL: 10 GAUGE GALVANIZED A653 G90 MEETS ASTM A-653. TENSILE STRENGTH 50,000.0 YIELD 36,000. ALL WELDS WILL BE SPRAYED, ROLLED OR BRUSHED WITH GALVANIZED #90 COATING.
RECTANGULAR CONNECTION: MASTIC, CAULKING, EPOXY BINDING OR OTHER APPROVED METHOD.
ROUND CONNECTION: CAST IRON/PLASTIC PIPE CONNECTION USE CAST IRON OR PLASTIC TO STEEL COUPLINGS.

Curb-O-Let
Thru The Curb Drain

RECTANGULAR STEEL PIPE AND FITTINGS, HUB PIPE

TRENCH DRAIN SUPPLY 877-903-7246 www.trenchdrainsupply.com



PRODUCT SPECIFICATION - CURB-O-LET

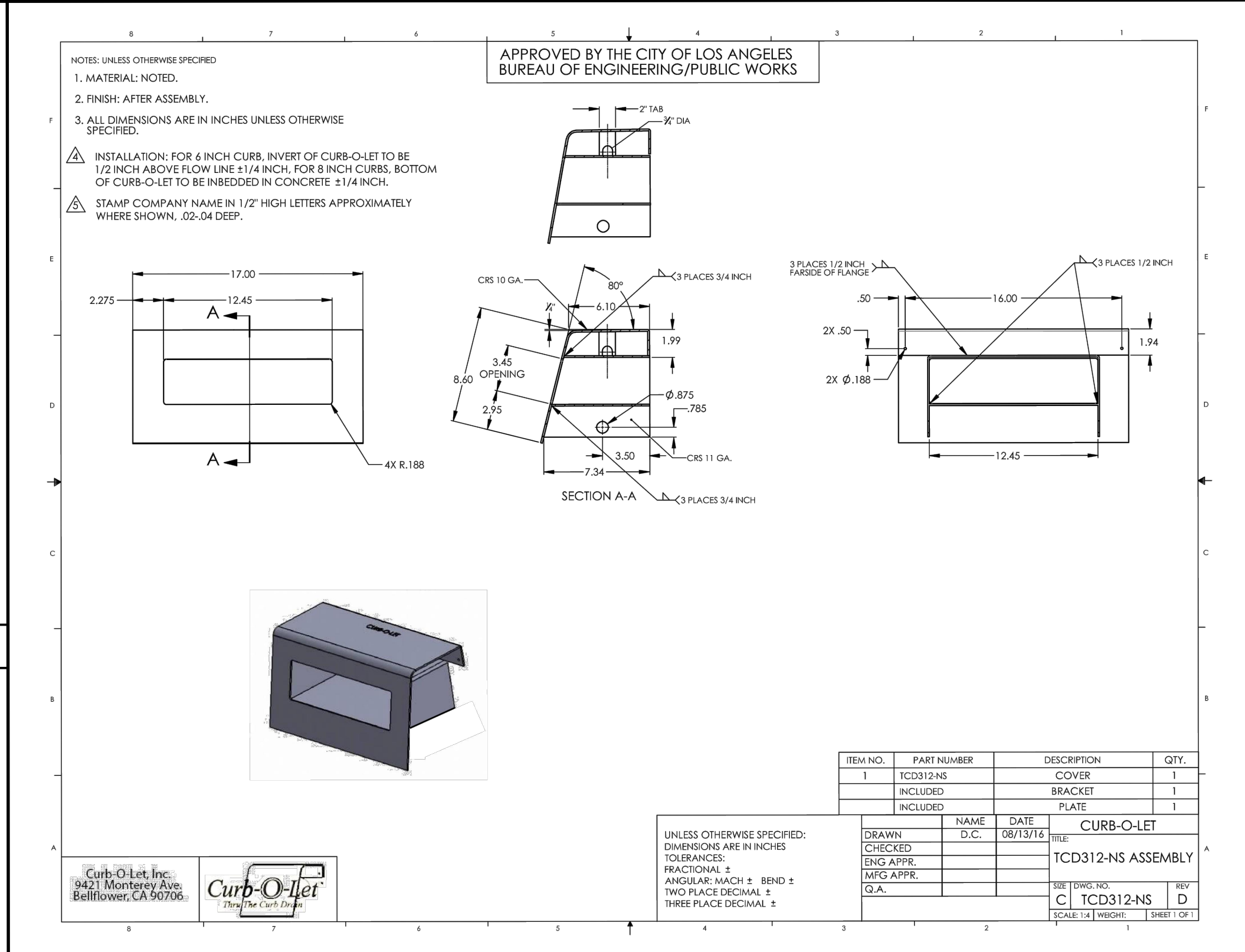
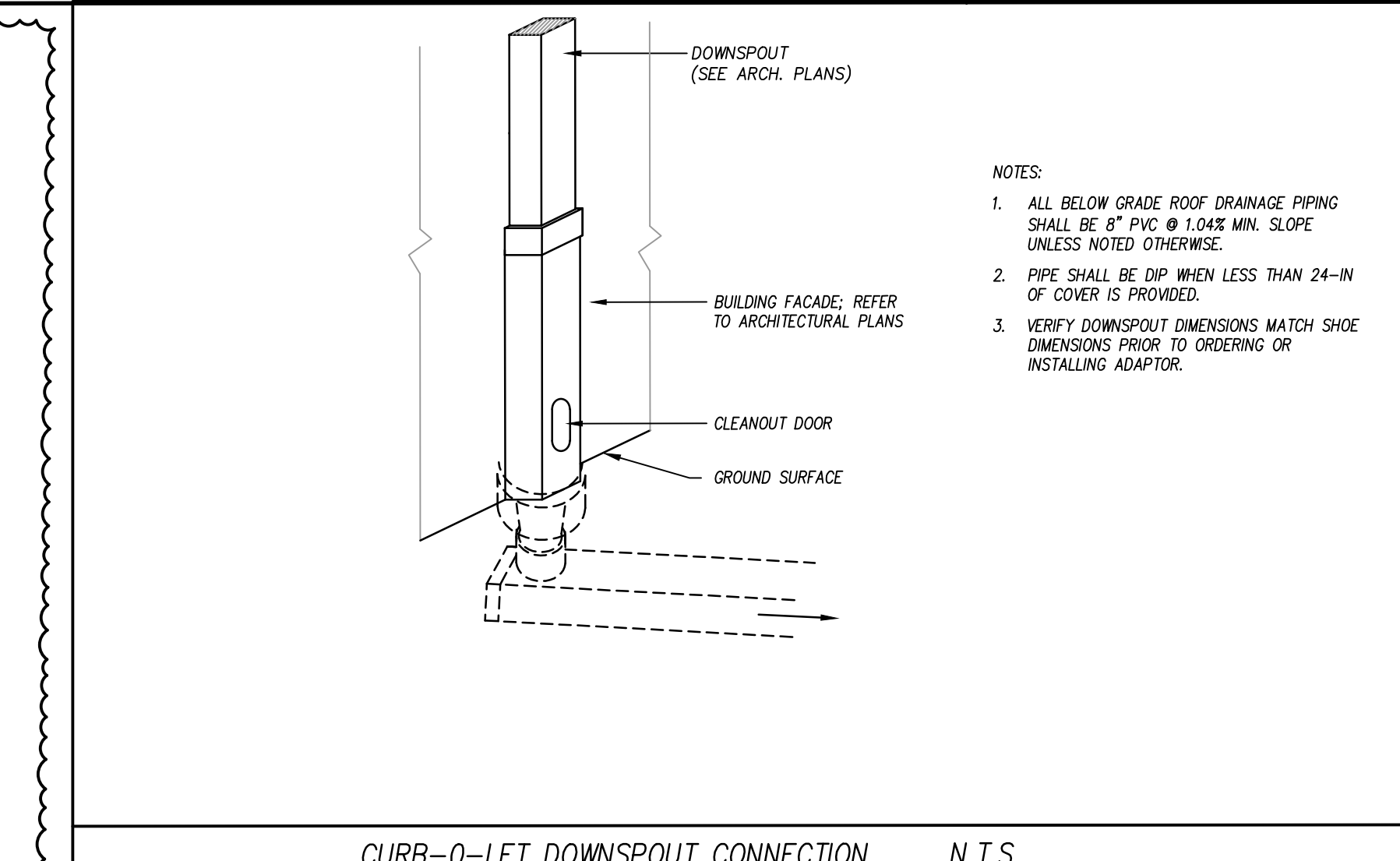
PRODUCT LIST		(ROOF DRAIN) LABEL MODEL NUMBER	(OVERFLOW DRAIN) LABEL MODEL NUMBER	REMARKS
ROUND EQUIV.	SIZE	MODEL	MODEL	
3"	3" ROUND	TCD-3RD	TCD-3RD-OFD	6"-8" CURB FACE
4"	4" ROUND	TCD-4RD	TCD-4RD-OFD	6"-8" CURB FACE
4"	3"x5"	TCD-35	TCD-35-RFD	6"-8" CURB FACE
5"	3"x8"	TCD-38	TCD-38-RFD	6"-8" CURB FACE
6"	3"x12"	TCD-312	TCD-312-RFD	6"-8" CURB FACE
8"	4"x14"	TCD-414	TCD-414-RFD	NOTE: 8" CURB FACE ONLY
8"	3"x17"	TCD-317	TCD-317-OFD	6"-8" CURB FACE
10"	3"x27"	TCD-327	TCD-327-RFD	6"-8" CURB FACE
10"	4"x22"	TCD-422	TCD-422-RFD	NOTE: 8" CURB FACE ONLY

ALL CURB-O-LET PRODUCTS ARE MANUFACTURED TO CLOSE TOLERANCES. VERY SLIGHT VARIATIONS IN SIZE ARE POSSIBLE. CURB-O-LET FITS STANDARD 6" AND 8" CURB FACE. EPOXY COATING FINISHES AVAILABLE ON REQUEST.

Curb-O-Let
Thru The Curb Drain

RECTANGULAR STEEL PIPE AND FITTINGS, CURB-O-LET

9421 Monterey Ave. Bellflower, CA 90706 - Office (714) 903-2468
SCALE: _____ DRAWN BY: _____ DATE: 08/15/16 CHECKED BY: _____ APPROVED BY: _____



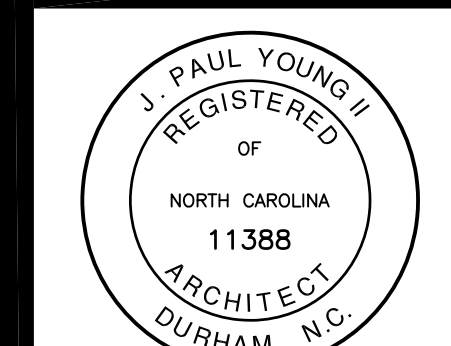
Curb-O-Let
Thru The Curb Drain

9421 Monterey Ave. Bellflower, CA 90706

FLOOR PLAN

UPFIT TO:
**CITY OF DURHAM
 FORMER WHEELS
 SKATING CENTER**
 715 N HOOVER RD
 DURHAM, NC

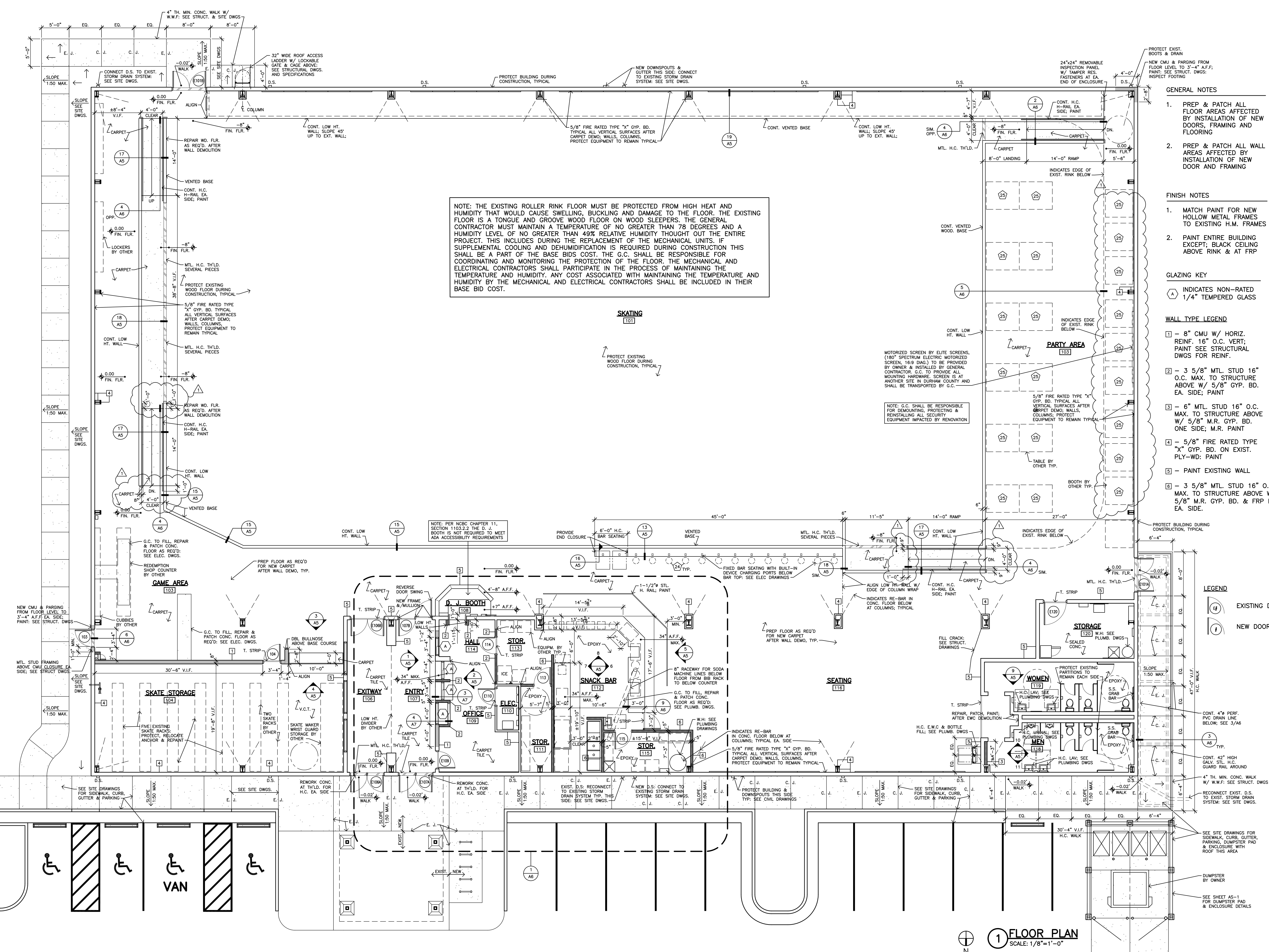
PROJECT NUMBER
 22059



DTW
Architects & Planners, Ltd.
 3333 Durham-Chapel Hill Blvd
 Suite D-100
 Durham, NC 27707
 919.317.4020

CONSTRUCTION DOCUMENTS
 Revisions
 ADDENDUM A - 9/22/2023
 Drawn F.W.D.
 Checked J.P.Y.
 Date SEPTEMBER 1, 2023
 Sheet

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NOTE: THE EXISTING ROLLER RINK FLOOR MUST BE PROTECTED FROM HIGH HEAT AND HUMIDITY THAT WOULD CAUSE SWELLING, BUCKLING AND DAMAGE TO THE FLOOR. THE EXISTING FLOOR IS A TONGUE AND GROOVE WOOD FLOOR ON WOOD SLEEPERS. THE GENERAL CONTRACTOR MUST MAINTAIN A TEMPERATURE OF NO GREATER THAN 78 DEGREES AND A HUMIDITY LEVEL OF NO GREATER THAN 49% RELATIVE HUMIDITY THROUGHT OUT THE ENTIRE PROJECT. THIS INCLUDES DURING THE REPLACEMENT OF THE MECHANICAL UNITS. IF SUPPLEMENTAL COOLING AND DEHUMIDIFICATION IS REQUIRED DURING CONSTRUCTION THIS SHALL BE A PART OF THE BASE BID COST. THE G.C. SHALL BE RESPONSIBLE FOR COORDINATING AND MONITORING THE PROTECTION OF THE FLOOR. THE MECHANICAL AND ELECTRICAL CONTRACTORS SHALL PARTICIPATE IN THE PROCESS OF MAINTAINING THE TEMPERATURE AND HUMIDITY. ANY COST ASSOCIATED WITH MAINTAINING THE TEMPERATURE AND HUMIDITY BY THE MECHANICAL AND ELECTRICAL CONTRACTORS SHALL BE INCLUDED IN THEIR BASE BID COST.

GENERAL NOTES

- PREP & PATCH ALL FLOOR AREAS AFFECTED BY INSTALLATION OF NEW DOORS, FRAMING AND FLOORING
- PREP & PATCH ALL WALL AREAS AFFECTED BY INSTALLATION OF NEW DOOR AND FRAMING

FINISH NOTES

- MATCH PAINT FOR NEW HOLLOW METAL FRAMES TO EXISTING H.M. FRAMES
- PAINT ENTIRE BUILDING EXCEPT BLACK CEILING ABOVE RINK & AT FRP

GLAZING KEY

- INDICATES NON-RATED 1/4" TEMPERED GLASS

WALL TYPE LEGEND

- 8" CMU W/ HORIZ. REINF. 16" O.C. VERT. PAINT SEE STRUCTURAL DWGS FOR REINF.
- 3 5/8" MTL. STUD 16" O.C. MAX. TO STRUCTURE ABOVE W/ 5/8" GYP. BD. EA. SIDE; PAINT
- 6" MTL. STUD 16" O.C. MAX. TO STRUCTURE ABOVE W/ 5/8" M.R. GYP. BD. ONE SIDE; M.R. PAINT
- 5/8" FIRE RATED TYPE "X" GYP. BD. ON EXIST. PLY-WD; PAINT
- PAINT EXISTING WALL
- 3 5/8" MTL. STUD 16" O.C. MAX. TO STRUCTURE ABOVE W/ 5/8" M.R. GYP. BD. & FRP BD. EA. SIDE.

LEGEND

- EXISTING DOOR
- NEW DOOR

1 FLOOR PLAN
 SCALE: 1/8"=1'-0"

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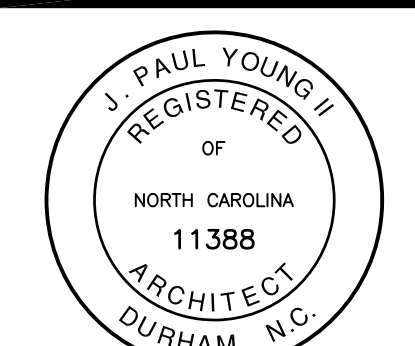
ENLARGED PLAN & DETAILS

UPFIT TO :

CITY OF DURHAM
FORMER
WHEELS
SKATING
CENTER

715 N HOOVER RD
DURHAM, NC

PROJECT NUMBER
22059



DTW
Architects &
Planners, Ltd.
3333 Durham-Chapel Hill Blvd
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Durham, NC 27707
919.317.4020

CONSTRUCTION DOCUMENTS

Revisions
ADDENDUM A - 9/22/2023

Drawn F.W.D.
Checked J.P.Y.
Date SEPTEMBER 1, 2023

Sheet

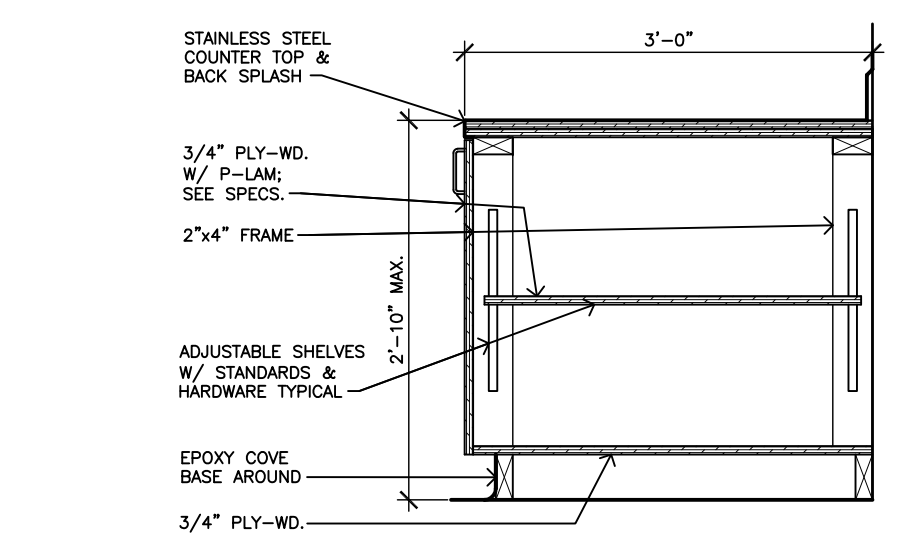
A6

EQUIPMENT SCHEDULE

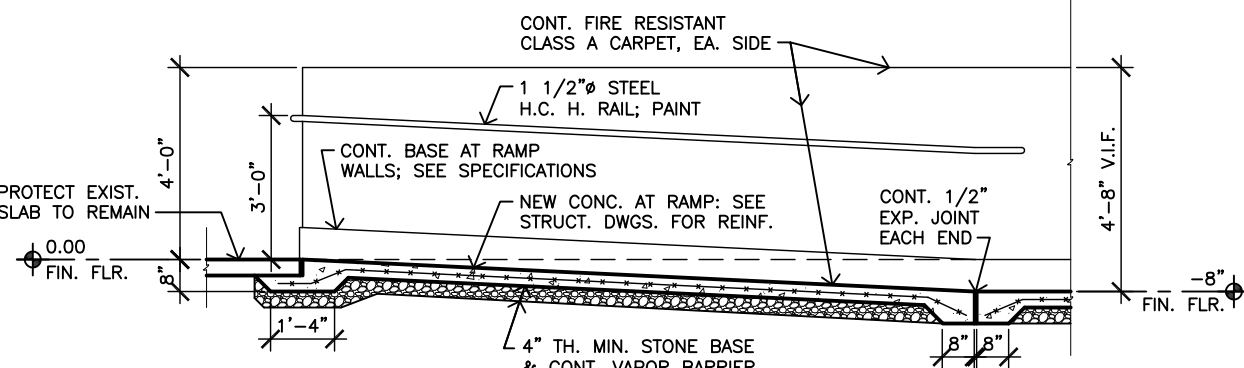
ALL EQUIPMENT TO BE PROVIDED & INSTALLED BY OTHERS, UNLESS OTHERWISE NOTED & ALL PLUMBING, HVAC, & ELECTRICAL HOOK UPS BY CONTRACTOR IN BASE BID.

EQUIPMENT	MANUFACTURER	NUMBER OF UNITS	MODEL	INSTALL	
1	3 COMP SINK	ADVANCE TABCO	1	REGALINE 16 GA. 304 S.S. 93-63-54-24RL	P.C.
2	MOP SINK	SEE PLUMBING	1	SEE PLUMBING	P.C.
3	ICE MACHINE	SCOTSMAN	1	MACHINE: PRODIGY C0530MA-1, BIN: B530S	OTHERS
4	SINGLE DOOR FREEZER	AVANTCO	3	A-19F-HC 29"	
5	SINGLE DOOR FRIDGE	AVANTCO	2	A-19R-HC 29"	
6	NOT USED				
7	HAND WASH SINK	SEE PLUMBING	1	SEE PLUMBING	
8	PIZZA OVEN		1	2500 - STANDARD, DUAL VOLTAGE	
9	PIZZA PREP		1		
10	AUTO FRYER	AUTO FRY	1	MTI-40C	
11	IMPULSE DISPLAY CABINET	HATCO	3	FDWD-1X	
12	NACHO MACHINE	SERVIT	1	423PDW12D1SNC	
13	PRETZEL		1	NEED ONE STANDARD 120 OUTLET	
14	MICROWAVE		1	NEED ONE STANDARD 120 OUTLET	
15	ICEE MACHINE	THE ICEE CO.	1	MODEL: 772	
16	COTTON CANDY	GOLD MEDAL	1	"THE BREEZE" - 3030-00-000	
17	COTTON CANDY DISPLAY		1		
18	SODA FOUNTAIN MACHINE	COCA-COLA	2	DROP IN DISPENSER (6V)	
19	POINT OF SALES		2	NEED TWO STANDARD 120 OUTLETS	
20	CHEST FREEZER	GALAXY	1	CF20HC - 19.4 cu ft	
21	SODA BIB RACKS		1		
22	NACHO CHEESE MACHINE	CARNIVAL KING	1	CD225 PERISTALTIC CHEESE SAUCE DISPENSER	
23	PIZZA OVEN HOOD	SEE PME	1	SEE PME	G.C.
24	BAR STOOL	(SEE SPEC.)	13	29" HIGH W/ 14.5" STOOL (SEE SPEC.)	G.C.
25	PICNIC TABLE	KAY PARK-REC	22	6J2GF	G.C.
26	NOT USED				

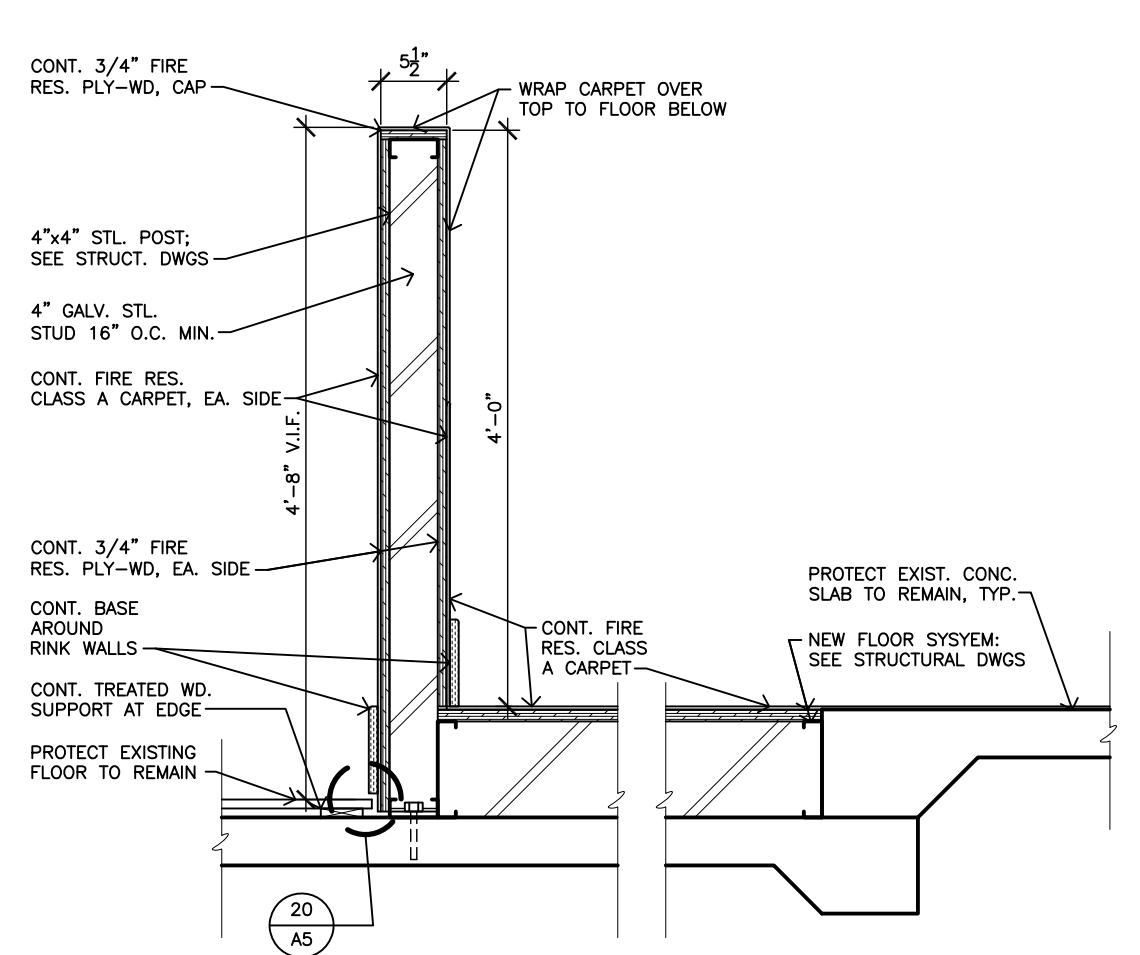
G.C. = GENERAL CONTRACTOR TO PROVIDE & INSTALL
P.C. = PLUMBING CONTRACTOR TO PROVIDE & INSTALL



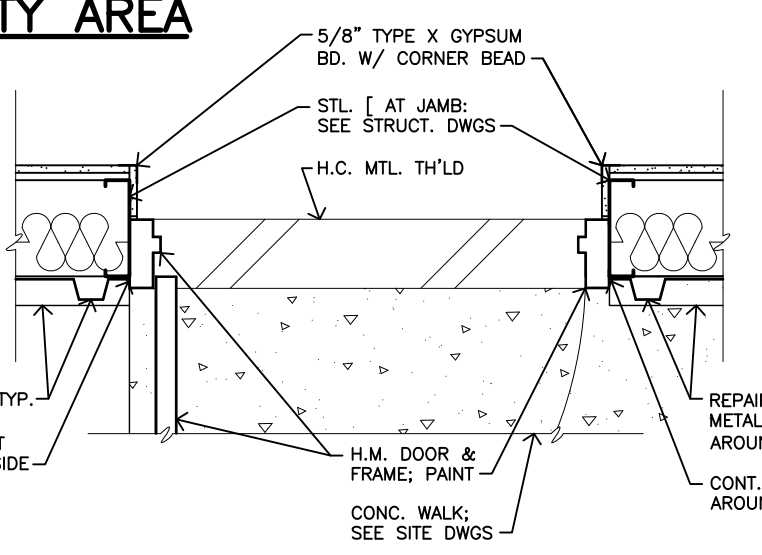
10 CASEWORK SECTION
SCALE: 3/4"=1'-0"



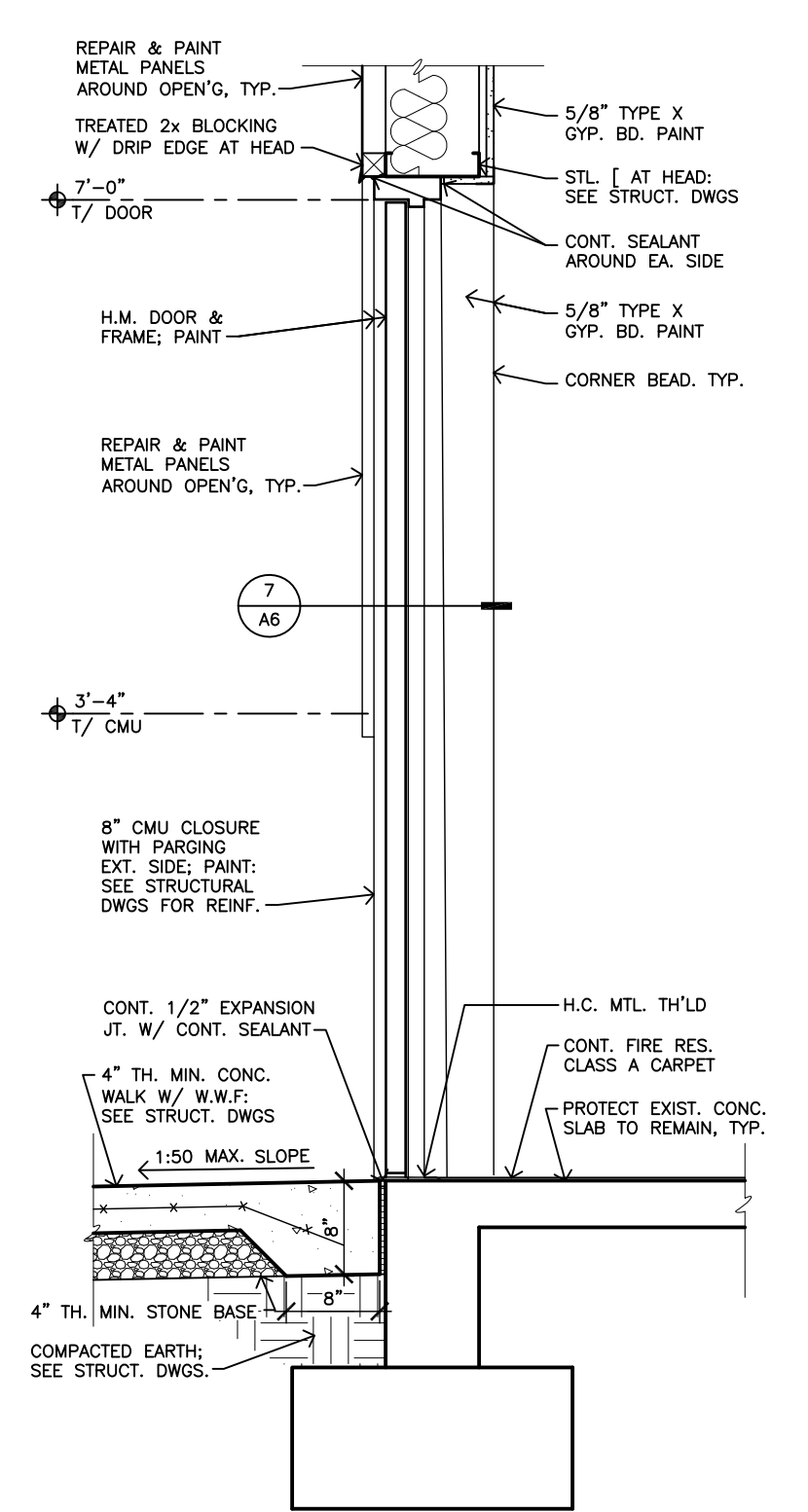
4 RAMP SECTION
SCALE: 1/4"=1'-0"



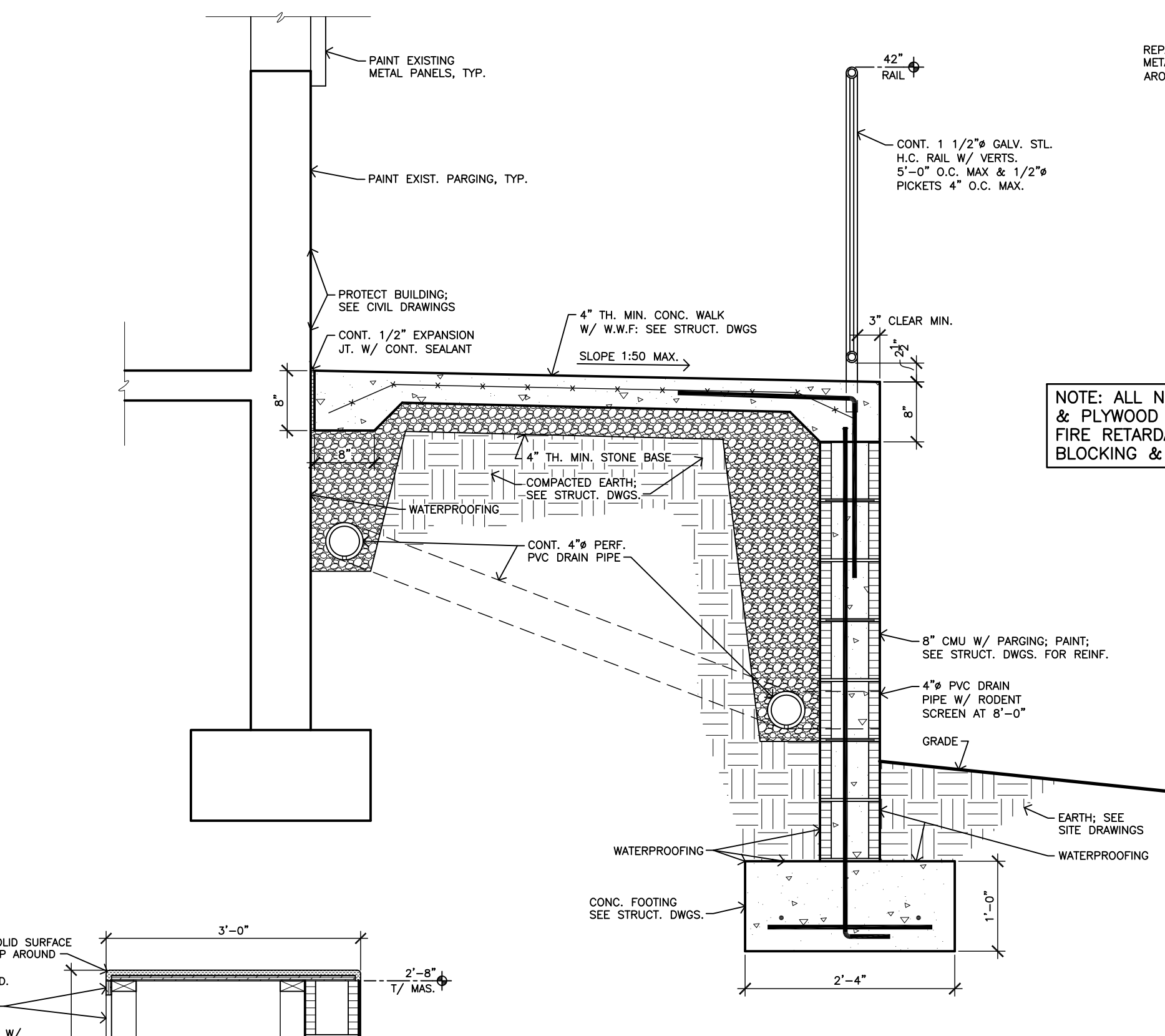
5 SECTION AT PARTY AREA
SCALE: 3/4"=1'-0"



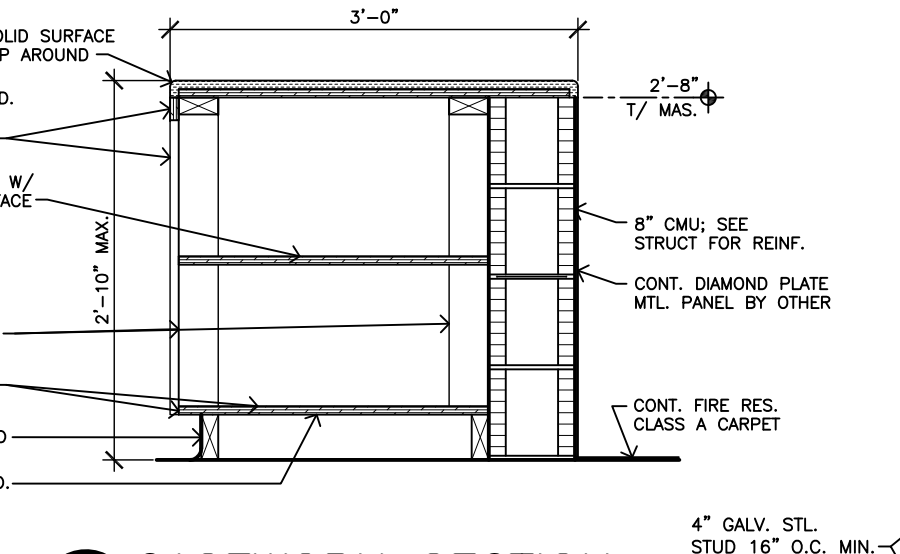
7 HORIZ. SECTION AT NEW DOOR
SCALE: 3/4"=1'-0"



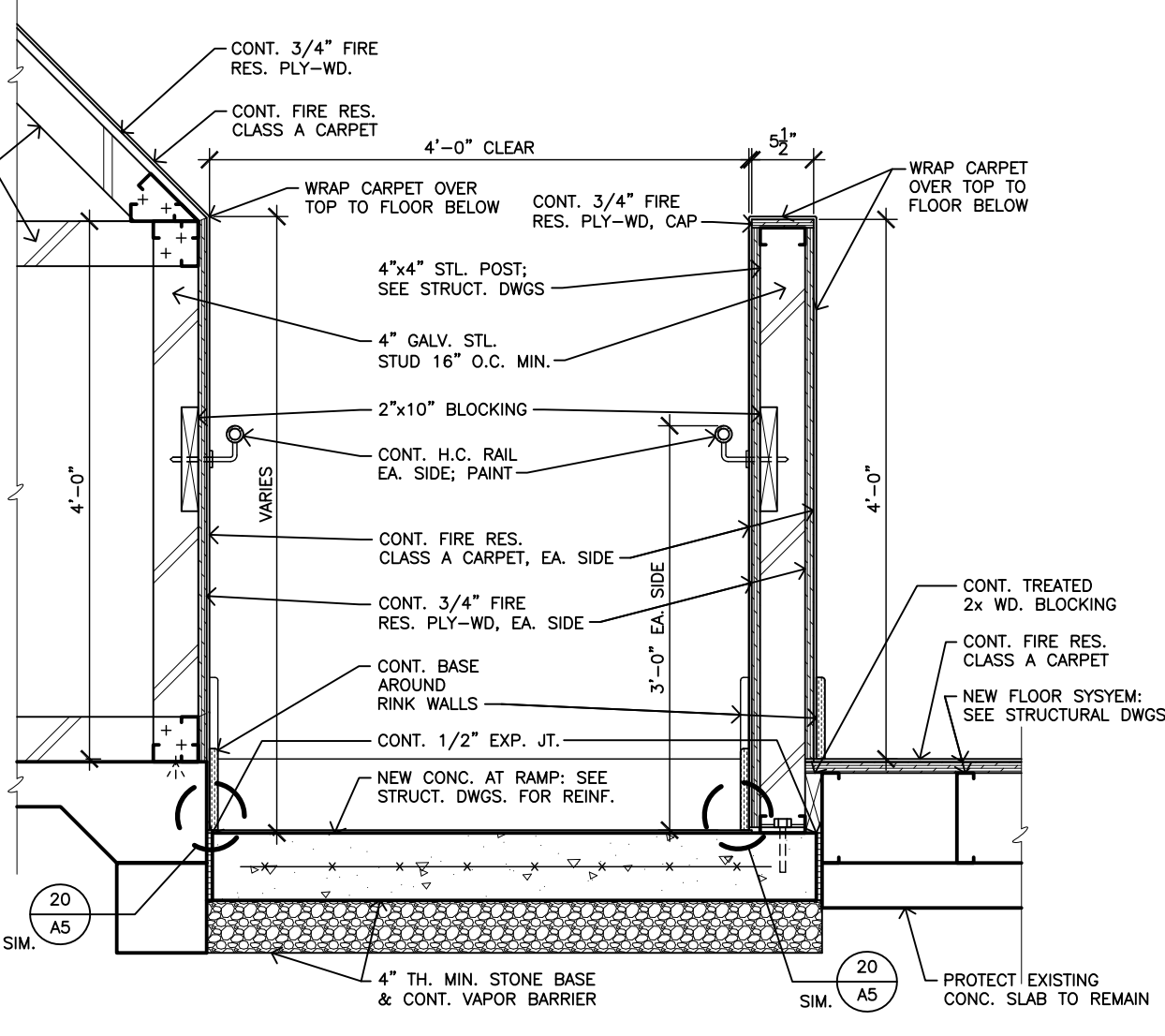
6 SECTION AT NEW DOOR
SCALE: 3/4"=1'-0"



3 WALK SECTION
SCALE: 3/4"=1'-0"

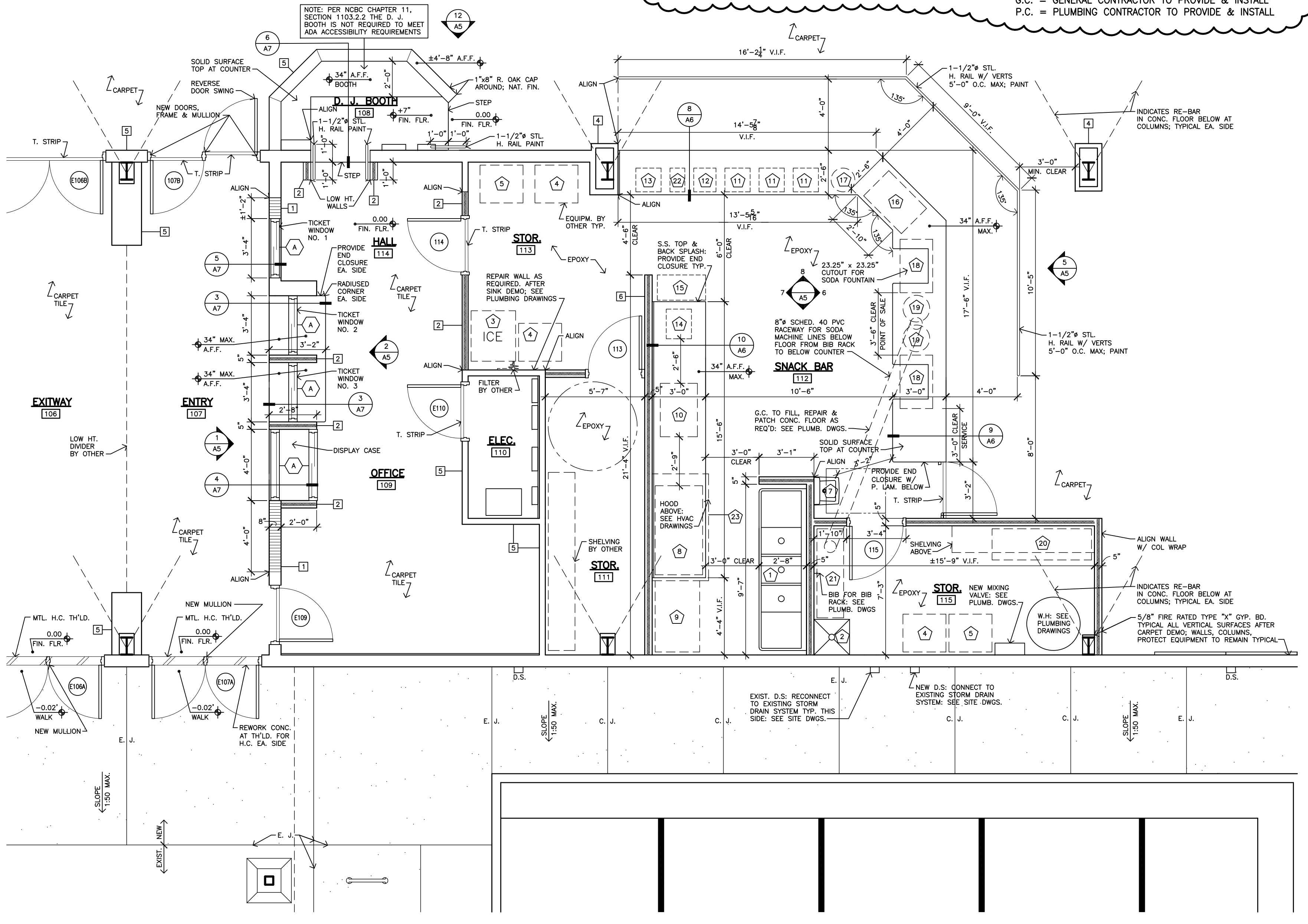


9 CASEWORK SECTION
SCALE: 3/4"=1'-0"



2 RAMP SECTION
SCALE: 3/4"=1'-0"

8 CASEWORK SECTION
SCALE: 3/4"=1'-0"



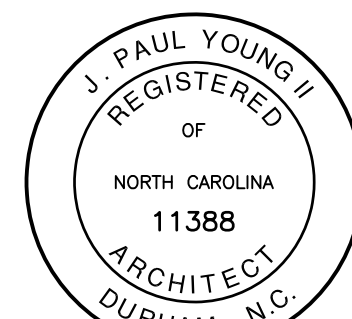
1 ENLARGED PLAN
SCALE: 1/4"=1'-0"

UPFIT TO:

CITY OF DURHAM
FORMER WHEELS
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715 N HOOVER RD
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PROJECT NUMBER
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CONSTRUCTION DOCUMENTS

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Of

DOOR SCHEDULE														
DOOR NUMBER	EXISTING TO REMAIN	DOORS			FRAMES							NOTE		
		DOOR TYPE	DOOR MATERIAL	GLASS & GLAZING	W	H	FRAME TYPE	FRAME MATERIAL	JAMB	HEAD	SILL		LABEL	HARDWARE SET
E101A	2	-	-	-	-	-	-	-	-	-	-	-	1	NOTE 1, 2
E101B	2	-	-	-	-	-	-	-	-	-	-	-	1	NOTE 1, 2
103	1	A	H.M.	-	-	-	2	H.M.	-	-	-	-	2	NOTE 3
104	1	A	H.M.	-	-	-	1	H.M.	-	-	-	-	3	NOTE 3
105	NOT USED											5		
E106A	2	-	-	-	-	-	-	-	-	-	-	-	5	
E106B	2	-	-	-	-	-	-	-	-	-	-	-	6	NOTE 1, 2
E107A	2	-	-	-	-	-	-	-	-	-	-	-	5	NOTE 1, 2
E107B	2	-	-	-	-	-	-	-	-	-	-	-	4	NOTE 1, 2, 4
E109	2	-	-	-	-	-	-	-	-	-	-	-	3	NOTE 1, 2
E110	2	-	-	-	-	-	-	-	-	-	-	-	9	NOTE 1, 2
113	1	A	H.M.	-	-	-	2	H.M.	-	-	-	-	7	NOTE 3
114	1	B	H.M.	-	-	-	2	H.M.	-	-	-	-	8	NOTE 3
115	1	A	H.M.	-	-	-	2	H.M.	-	-	-	-	7	NOTE 3
E120	2	-	-	-	-	-	-	-	-	-	-	-	9	NOTE 1, 2

NOTES:

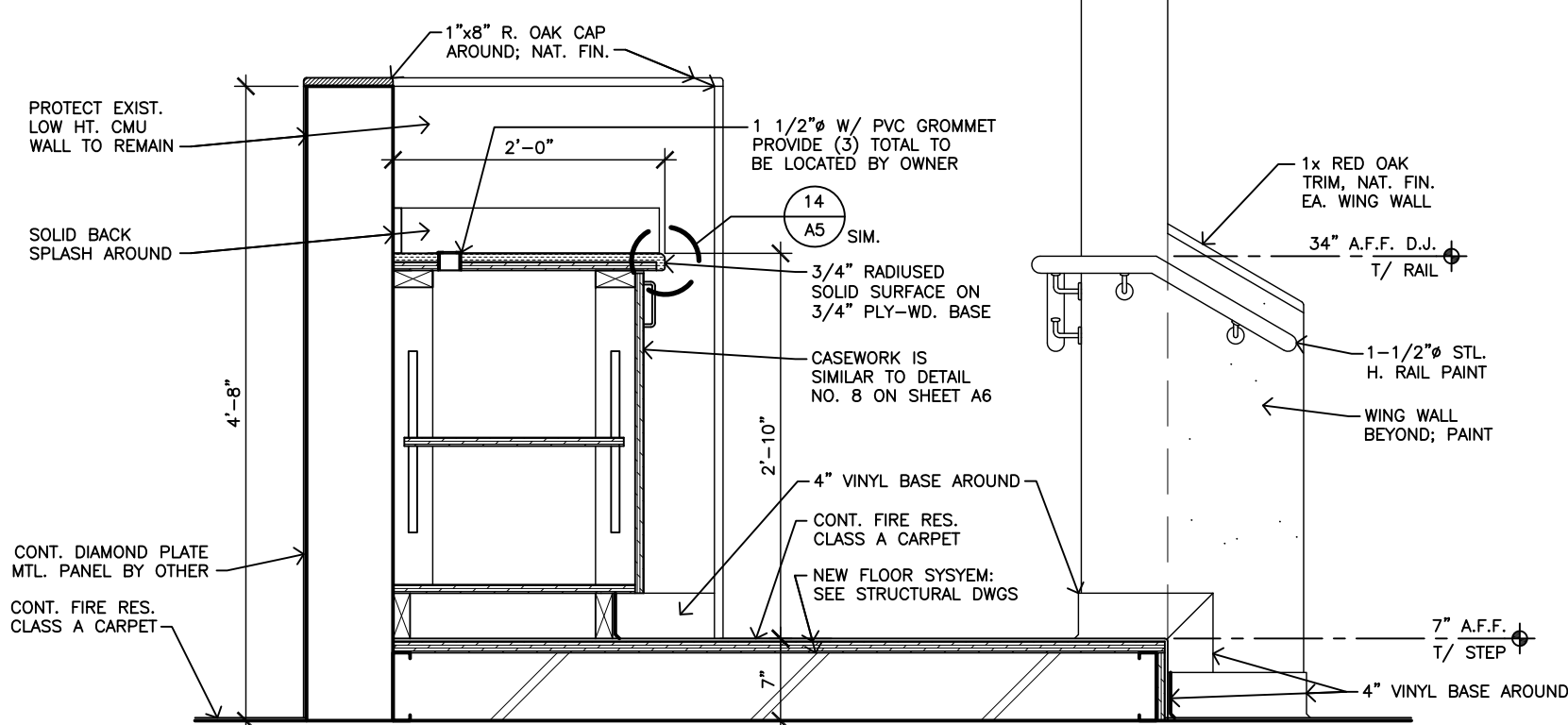
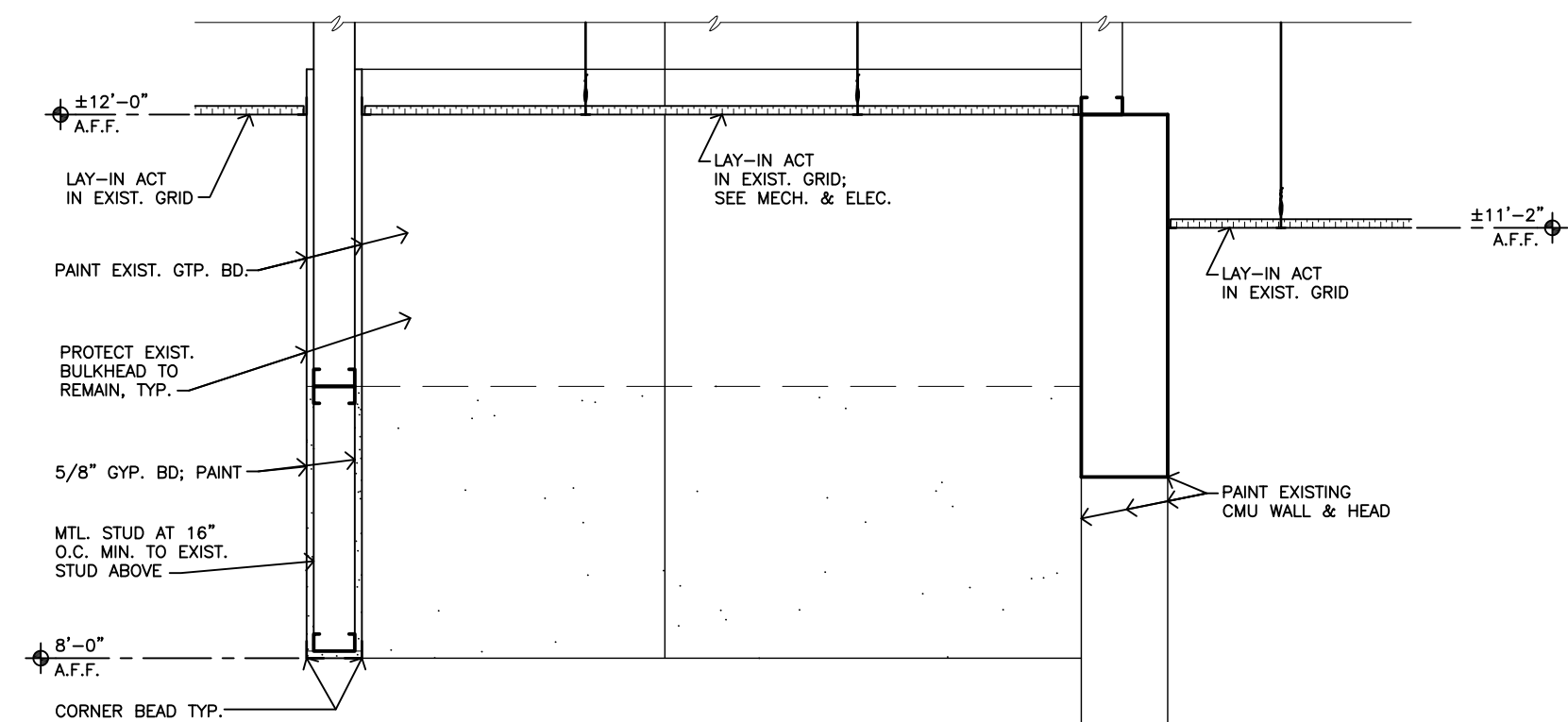
- REPLACE EXISTING HARDWARE PER SPECIFICATIONS.
- PAINT EXISTING DOOR & FRAME.
- PAINT NEW DOOR & FRAME
- REWORK FRAME TO REVERSE DOOR SWING ON TICKET WINDOW SIDE

ROOM NUMBER	FLOOR MATERIAL	MATERIAL	WS	HT.	WALL MATERIAL	CEILING MATL.					CEILING HEIGHT	NOTE NUMBER		
						1	2	3	4	5				
101	SKATING	1	2			1	2	3						
102	NOT USED													
103	GAME AREA	2			2	4			1	3	12'		NOTE 1, 2	
104	SKATE STORAGE								1		12'		NOTE 1, 2	
105	NOT USED													
106	EXITWAY	2	6						1		10'		NOTE 1, 2	
107	ENTRY	2	6						1		12'		NOTE 1, 2	
108	D. J. BOOTH	2	6						1	2	4	9'-3"	NOTE 1, 2	
109	OFFICE	2	6						1	2	4	9'-9 1/2"	NOTE 1, 2	
110	ELEC.		4						1				NOTE 1, 2	
111	STOR.		5								6	5	12'	NOTE 1, 2
112	SNACK BAR		5								6	5	12'	NOTE 1, 2
113	STOR.		5								6	5	12'	NOTE 1, 2
114	HALL	2			1	2	3	4	1	5	11'-2"		NOTE 1, 2	
115	STOR.		5								6	5	12'	NOTE 1, 2
116	SEATING	2							1			12'	NOTE 1, 2	
117	NOT USED													
118	MEN		5						1			12'	NOTE 1, 2	
119	WOMEN		5						1			12'	NOTE 1, 2	
120	STOR.		4						1				NOTE 1, 2	

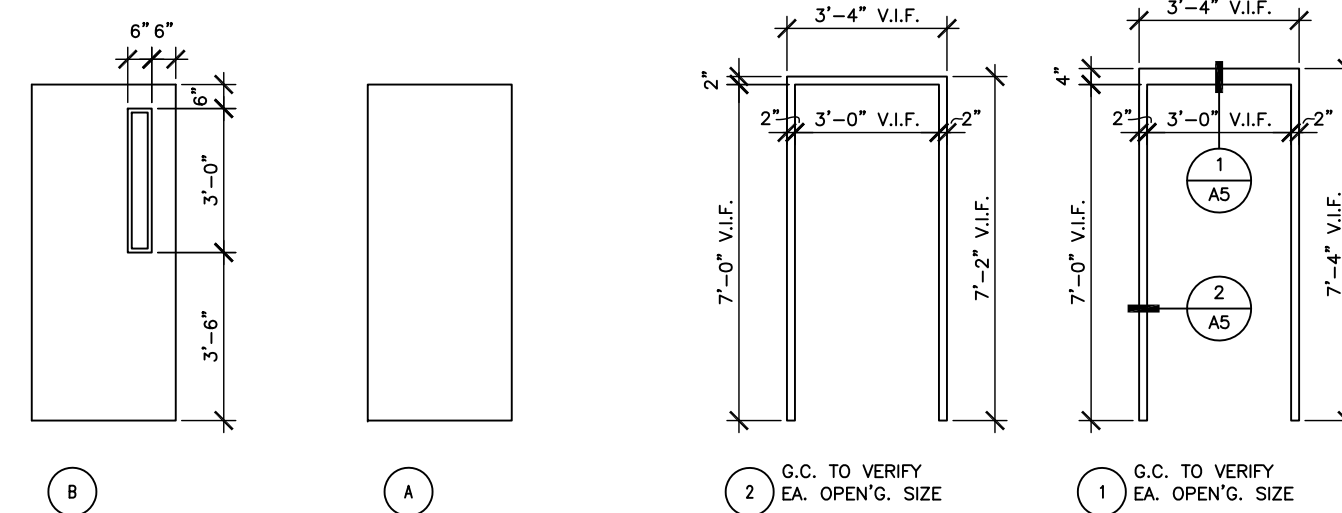
*SEE CARPET PLAN SHEET A8 FOR CARPET TYPES & LOCATIONS.

NOTES:

- EPOXY PAINT ALL WALLS.
- REVIEW DRAWINGS FOR AREAS OF TILE REPLACEMENT ONLY

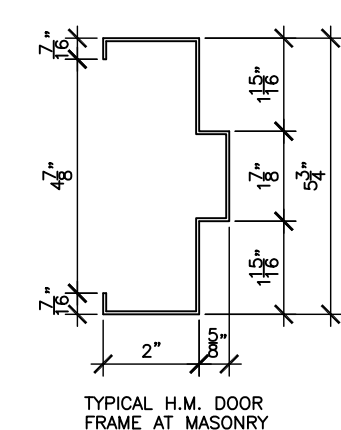


6 D. J. BOOTH SECTION
SCALE: 3/4"=1'-0"

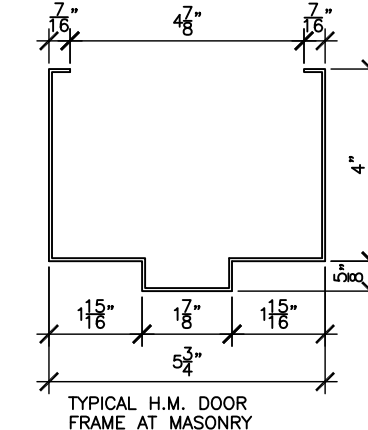


DOOR TYPES
SCALE: 1/4" = 1'-0"

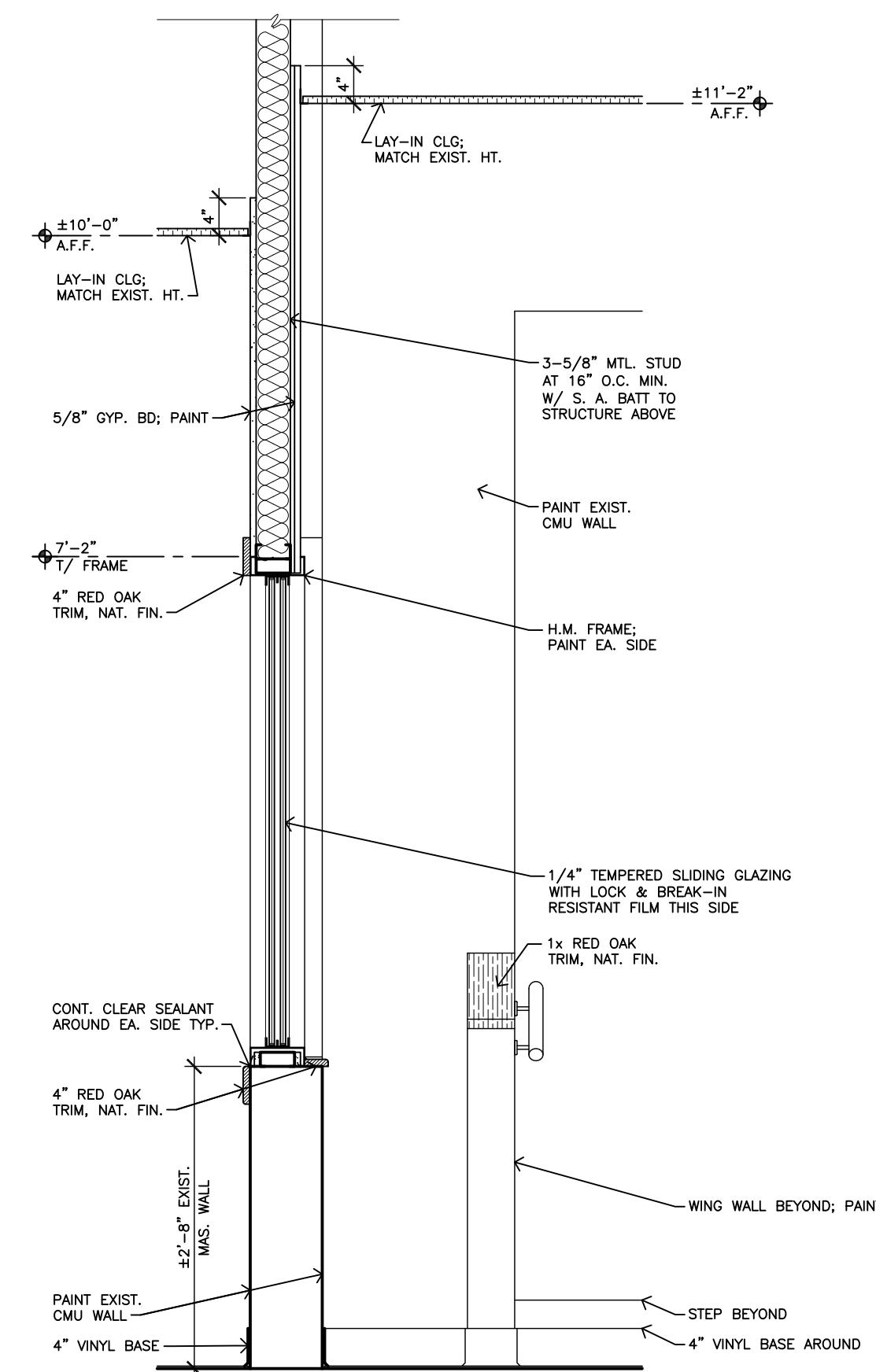
H.M. FRAME TYPES
SCALE: 1/4" = 1'-0"



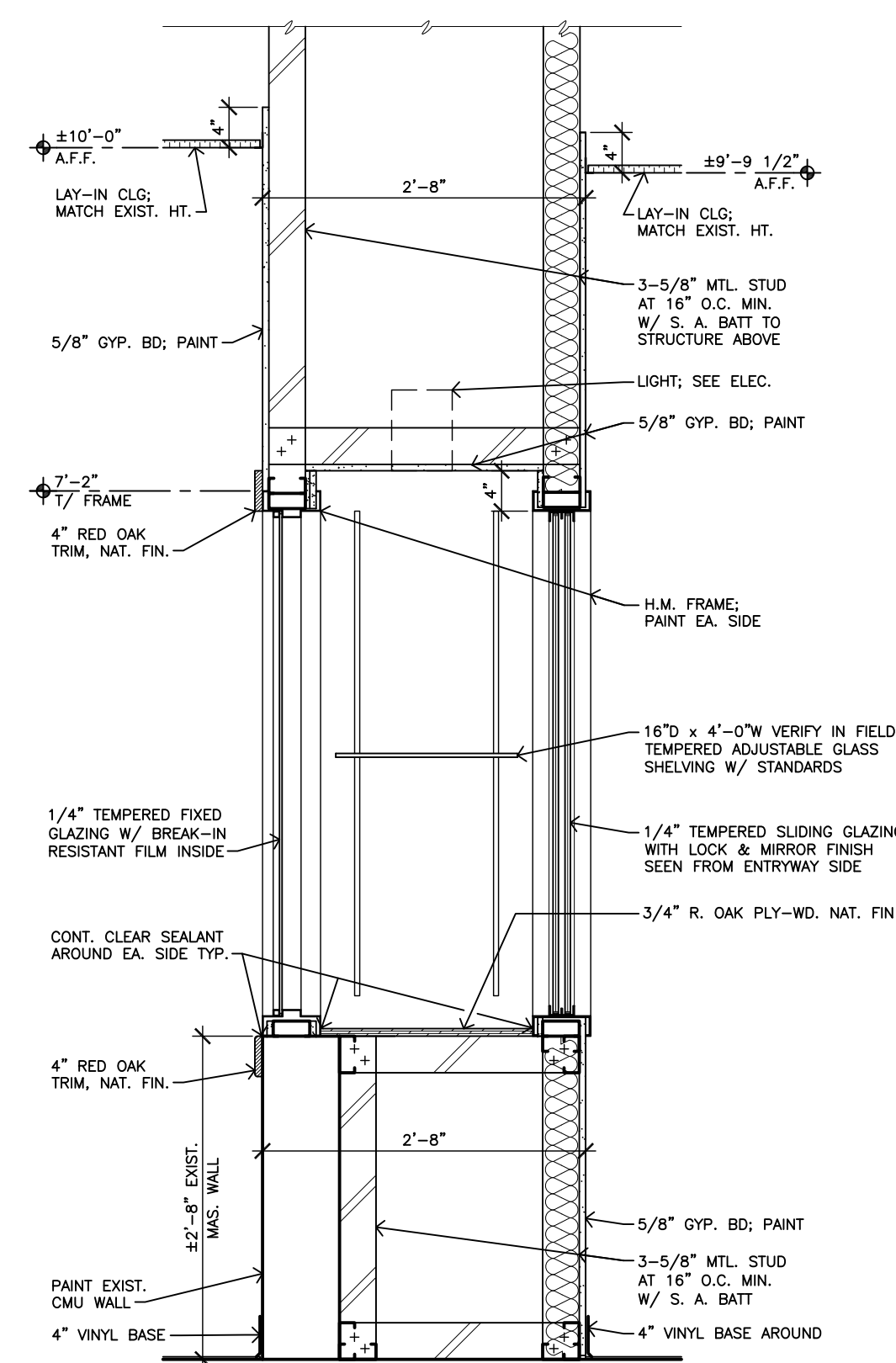
2 JAMB
SCALE: 3/8"=1'-0"



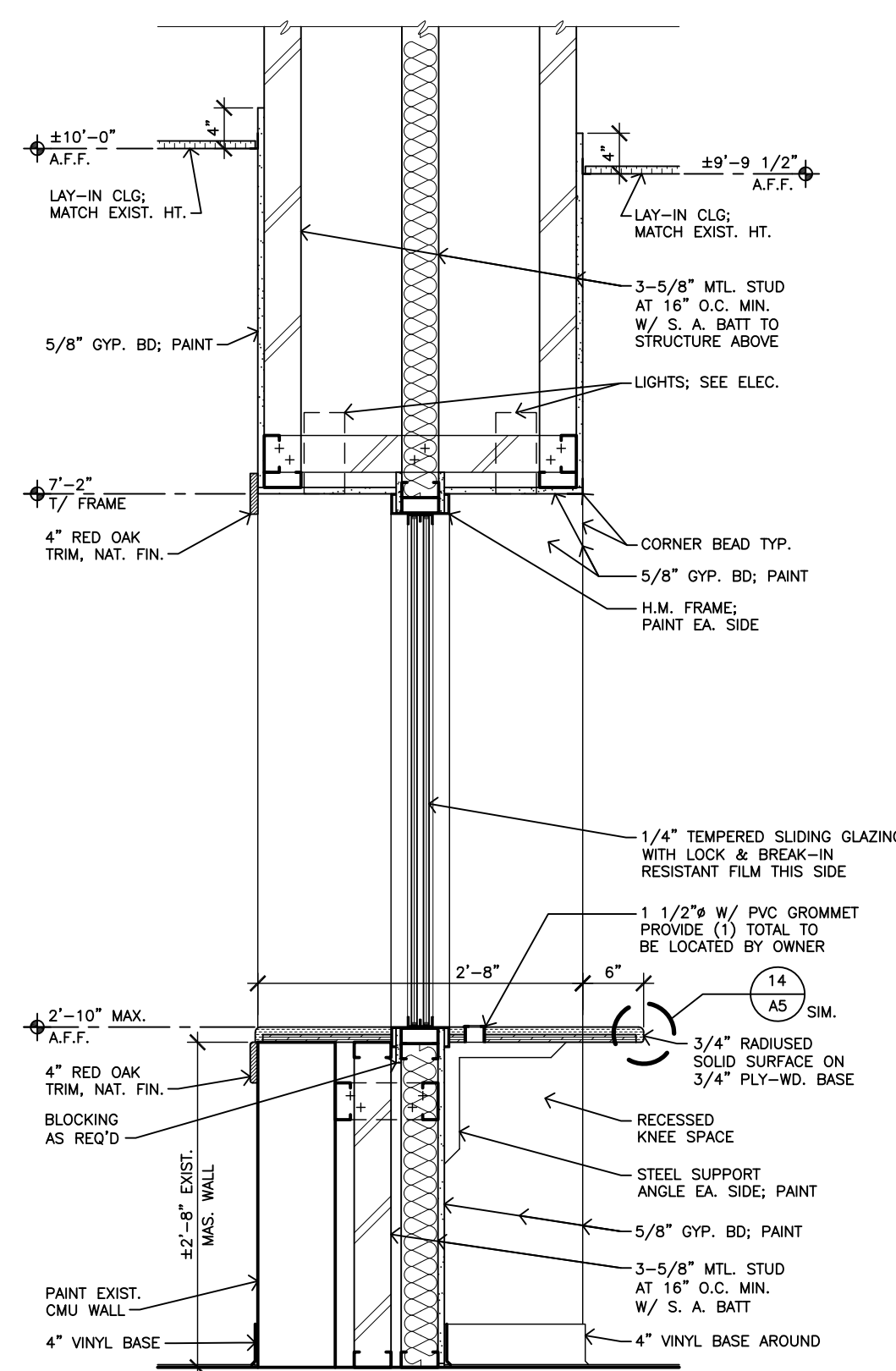
1 HEAD
SCALE: 3/8"=1'-0"



5 WINDOW SECTION
SCALE: 3/4"=1'-0"



4 DISPLAY SECTION
SCALE: 3/4"=1'-0"



3 SECTION
SCALE: 3/4"=1'-0"

NOTES	CKT	LOAD	DESCRIPTION	COND	EGG	N	W	CB	LOAD	CB	W	N	EGG	COND	DESCRIPTION	LOAD	CKT	NOTES
	1	4200	GO-CART TRACK LIGHTS	EX	EX	EX	EX	50	20820	60	3	-	-	-	NEW RTU-3	16620	2	
	3	4200	GO-CART TRACK LIGHTS	EX	EX	EX	EX	3P	20820	3P	3	-	-	-	NEW RTU-3	16620	4	
	5	4200	GO-CART TRACK LIGHTS	EX	EX	EX	EX	3P	20820	3P	3	-	-	-	NEW RTU-3	16620	6	
	7	16620	NEW RTU-1	1-1/4"	8	-	3	60	33240	60	3	-	-	-	NEW RTU-4	16620	8	
	9	16620	NEW RTU-1	1-1/4"	8	-	3	60	33240	60	3	-	-	-	NEW RTU-4	16620	10	
	11	16620	NEW RTU-2	1-1/4"	8	-	3	60	30747	60	3	-	-	-	NEW RTU-5	14127	12	
	13	16620	NEW RTU-2	1-1/4"	8	-	3	60	30747	60	3	-	-	-	NEW RTU-5	14127	14	
	15	16620	NEW RTU-2	1-1/4"	8	-	3	60	30747	60	3	-	-	-	NEW RTU-5	14127	16	
	17	16620	NEW RTU-2	1-1/4"	8	-	3	60	30747	60	3	-	-	-	NEW RTU-5	14127	18	
	19	22027	TRANSFORMER - 75KVA	EX	EX	EX	EX	100	27507	25	10	-	-	-	TRANSFORMER - 45KVA	5480	20	
	21	20507	MAIN ELEC ROOM	SEE RISER	3P	3P	3P	25987	3P	10	-	-	-	TRANSFORMER - 45KVA	5480	22		
	23	22427	EXISTING PANEL 'B'	SEE RISER	3P	3P	3P	27527	3P	19	-	-	-	TRANSFORMER - 45KVA	5480	24		
	25	5880	EXISTING PANEL 'B'	SEE RISER	3P	3P	3P	21620	3P	3P	-	-	-	TRANSFORMER - 45KVA	14620	26		
	27	6660	EXISTING PANEL 'B'	SEE RISER	3P	3P	3P	22570	3P	3P	-	-	-	TRANSFORMER - 45KVA	14620	28		
	29	5160	FEED THRU	N/A										TRANSFORMER - 45KVA	17410	30		

NOTES	CKT	LOAD	DESCRIPTION	COND	EGG	N	W	CB	LOAD	CB	W	N	EGG	COND	DESCRIPTION	LOAD	CKT	NOTES
	1	120	REC - TELEPHONE BOARD	EX	EX	EX	EX	20	2720	20	EX	EX	EX	EX	BATHROOM EX FANS	500	2	
	3	500	CLS CIRCUITS	EX	EX	EX	EX	20	1000	20	EX	EX	EX	EX	BATHROOM EX FANS	500	4	
	5	500	CLS CIRCUITS	EX	EX	EX	EX	20	2000	20	EX	EX	EX	EX	HAND DRYER	1500	6	
	7	500	CLS CIRCUITS	EX	EX	EX	EX	20	825	20	EX	EX	EX	EX	WATER COOLER	325	8	
	9	500	CLS CIRCUITS	EX	EX	EX	EX	20	2000	20	EX	EX	EX	EX	HAND DRYER	1500	10	
	11	500	CLS CIRCUITS	EX	EX	EX	EX	20	1580	20	EX	EX	EX	EX	REC - SIDE WALL	1080	12	
	13	500	CLS CIRCUITS	EX	EX	EX	EX	20	1580	20	EX	EX	EX	EX	REC - SIDE WALL	1080	14	
	15	900	REC - BACK WALL	EX	EX	EX	EX	20	1880	20	EX	EX	EX	EX	REC - ELEC ROOM	1080	16	
	17	900	CLS CIRCUITS	EX	EX	EX	EX	20	1580	20	EX	EX	EX	EX	REC - COLUMNS	1080	18	
	19	1080	REC - BOOTHS	EX	EX	EX	EX	20	2160	20	EX	EX	EX	EX	REC - COLUMNS	1080	20	
	21	1080	REC - BACK WALL	EX	EX	EX	EX	20	2160	20	EX	EX	EX	EX	REC - REAR WALL	1080	22	
	23	1080	REC - GAME AREA	EX	EX	EX	EX	20	1880	20	EX	EX	EX	EX	REC - BAR TOP	900	24	
	25	360	PROJECTION SCREEN	3/4"	12	12	12	3/4"	1260	20	EX	EX	EX	EX	REC - BAR TOP	900	26	
	27	300	PROJECTOR	3/4"	12	12	12	3/4"	1020	20	EX	EX	EX	EX	REC - BAR TOP	720	28	
	29	900	REC - OFFICE COMPUTER	EX	EX	EX	EX	20	1300	20	EX	EX	EX	EX	FLOOR LIT ZONE 3A	400	30	
	31	1000	LTS - CANOPY PRO SHOP	EX	EX	EX	EX	20	1400	20	EX	EX	EX	EX	FLOOR LIT ZONE 3B	400	32	
	33	500	SPACE						150	20	EX	EX	EX	EX	FLOOR LIT ZONE 4A	150	34	
	35	400	FLOOR LIT ZONE 1A	EX	EX	EX	EX	20	550	20	EX	EX	EX	EX	FLOOR LIT ZONE 4B	150	36	
	37	400	FLOOR LIT ZONE 1B	EX	EX	EX	EX	20	760	20	EX	EX	EX	EX	FLOOR LIT ZONE CONTROLLER	360	38	
	39	400	FLOOR LIT ZONE 2A	EX	EX	EX	EX	20	760	20	EX	EX	EX	EX	REC - GAME ROOM	360	40	
	41	400	FLOOR LIT ZONE 2B	EX	EX	EX	EX	20	760	20	EX	EX	EX	EX	REC - GAME ROOM	360	42	
	43	360	REC - LOCKER WALL	3/4"	12	12	12	3/4"	720	20	EX	EX	EX	EX	REC - GAME ROOM	360	44	
	45	360	REC - LOCKER WALL	3/4"	12	12	12	3/4"	720	20	EX	EX	EX	EX	REC - GAME ROOM	360	46	
	47	360	REC - LOCKER WALL	3/4"	12	12	12	3/4"	720	20	EX	EX	EX	EX	REC - GAME ROOM	360	48	
	49	10242	NEW PANEL 'SB'	SEE RISER	3P	3P	3P	10602	60	60	-	-	-	REC - GAME ROOM	360	50		
	51	10717	NEW PANEL 'SB'	SEE RISER	3P	3P	3P	10717	60	60	-	-	-	REC - GAME ROOM	360	52		
	53	11877	FEED THRU	N/A					11877	2P				SPACE		54		

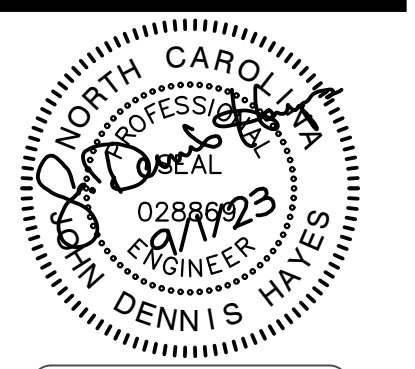
NOTES	CKT	LOAD	DESCRIPTION	COND	EGG	N	W	CB	LOAD	CB	W	N	EGG	COND	DESCRIPTION	LOAD	CKT	NOTES
	1	1080	REC - EAST SNACK BAR	EX	EX	EX	EX	20	1680	20	EX	EX	EX	EX	POWER PACK	500	2	
	3	500	SPACE	EX	EX	EX	EX	20	500	20	EX	EX	EX	EX	POWER PACK	500	4	
	5	500	STAGE DISCONNECT	EX	EX	EX	EX	20	2250	3P	EX	EX	EX	EX	WATER HEATER	2250	6	
	7	1200	EXHAUST FAN	EX	EX	EX	EX	2P	2250	3P	EX	EX	EX	EX	WATER HEATER	2250	8	
	9	1200	EXHAUST FAN	EX	EX	EX	EX	2P	2250	3P	EX	EX	EX	EX	WATER HEATER - 115	6000	10	
	11	1200	EXHAUST FAN	EX	EX	EX	EX	2P	2250	3P	EX	EX	EX	EX	WATER HEATER - 115	6000	12	
	13	500	SPACE						6000	20	EX	EX	EX	EX	REC - DRINK ROOM	24		
	15	500	SPACE						500	20	EX	EX	EX	EX	FIRE ALARM	500	16	
	17	500	SPACE						500	20	EX	EX	EX	EX	REC - STAGE FLOOR	1080	18	
	19	1000	LTS - STAGE, PRO SHOP	EX	EX	EX	EX	20	1500	20	EX	EX	EX	EX	LIGHTS - DISPLAY	500	20	
	21	1000	LTS - DJ, NORTH WALL	EX	EX	EX	EX	20	2080	20	EX	EX	EX	EX	REC - STAGE WALL	1080	22	
	23	1000	LTS - NORTH WALL	EX	EX	EX	EX	20	2080	20	EX	EX	EX	EX	REC - DRINK ROOM	1080	24	
	25	1000	LTS - SW WALL	EX	EX	EX	EX	20	1500	20	EX	EX	EX	EX	CASH REGISTER TICKET	500	26	
	27	1000	LTS - WEST WALL	EX	EX	EX	EX	20	1900	20	EX	EX	EX	EX	REC - OFFICE	500	28	
	29	900	REC - W & S BAR	EX	EX	EX	EX	20	1600	20	EX	EX	EX	EX	REC - ELEC ROOM	900	30	
	31	900	SPACE						500	20	EX	EX	EX	EX	CLS CIRCUIT	500	32	
	33	900	REC - OFFICE	EX	EX	EX	EX	20	1980	20	EX	EX	EX	EX	CLS CIRCUIT	500	34	
	35	900	REC - PRO SHOP	EX	EX	EX	EX	20	1400	20	EX	EX	EX	EX	CLS CIRCUIT	500	36	
	37	900	REC - SKATE RENTAL	EX	EX	EX	EX	20	900	20	EX	EX	EX	EX	SPACE	38		
	39	500	SPACE						500	20	EX	EX	EX	EX	CLS CIRCUIT	500	40	
	41	1000	FPBFF HOT BOX HEAT	1"	12	12	12	20	1600	20	EX	EX	EX	EX	LIGHTS - CANOPY	600	42	

NOTES	CKT	LOAD	DESCRIPTION	COND	EGG	N	W	CB	LOAD	CB	W	N	EGG	COND	DESCRIPTION	LOAD	CKT	NOTES
	1	315	SGL DR FREEZER - (6)	3/4"	12	12	12	3/4"	495	20	EX	EX	EX	EX	POS TERMINAL - (18)	180	2	
	3	1824	ICE MACHINE - (8)	3/4"	12	12	12	3/4"	2004	20	EX	EX	EX	EX	DRINK DISP - (18)	180	4	
	5	165	SGL DR REFRIG - (8)	3/4"	12	12	12	3/4"	1365	20	EX	EX	EX	EX	ICE MACHINE - (18)	180	6	
	7	315	SGL DR FREEZER - (6)	3/4"	12	12	12	3/4"	1515	20	EX	EX	EX	EX	ICE MACHINE - (18)	180	8	
	9	300	PIZZA WARM - (18)	3/4"	12	12	12	3/4"	1500	20	EX	EX	EX	EX	MICROWAVE - (14)	140	10	
	11	225	CHEESE WARM - (2)	3/4"	12	12	12	3/4"	5025	50	8	8	10	3/4"	AUTO FRYER - (18)	180	12	
	13	800	CHP WARM - (2)	3/4"	12	12	12	3/4"	5600	20	EX	EX	EX	EX	PIZZA OVEN - (8)	800	14	
	15	1382	FOOD WARM - (11)	3/4"	12	12	12	3/4"	4382	20	EX	EX	EX	EX	PIZZA OVEN - (8)	800	16	
	17	1382	FOOD WARM - (11)	3/4"	12	12	12	3/4"	4382	20	EX	EX	EX	EX	PIZZA OVEN - (8)	800	18	
	19	1382	FOOD WARM - (11)	3/4"	12	12	12	3/4"	1692	20	EX	EX	EX	EX	CHEST FREEZ - (26)	160	20	
	21	996	COTTON CANDY - (16)	3/4"	12	12	12	3/4"	1161	20	EX	EX	EX	EX	SGL DR REFRIG - (8)	165	22	
	23	180	DRINK DISP - (18)	3/4"	12	12	12	3/4"	495	20	EX	EX	EX	EX				

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Power Renovation Plan

UPFIT TO:
CITY OF DURHAM FORMER WHEELS SKATING CENTER
715 N HOOVER RD
DURHAM, NC
PROJECT NUMBER
23-001

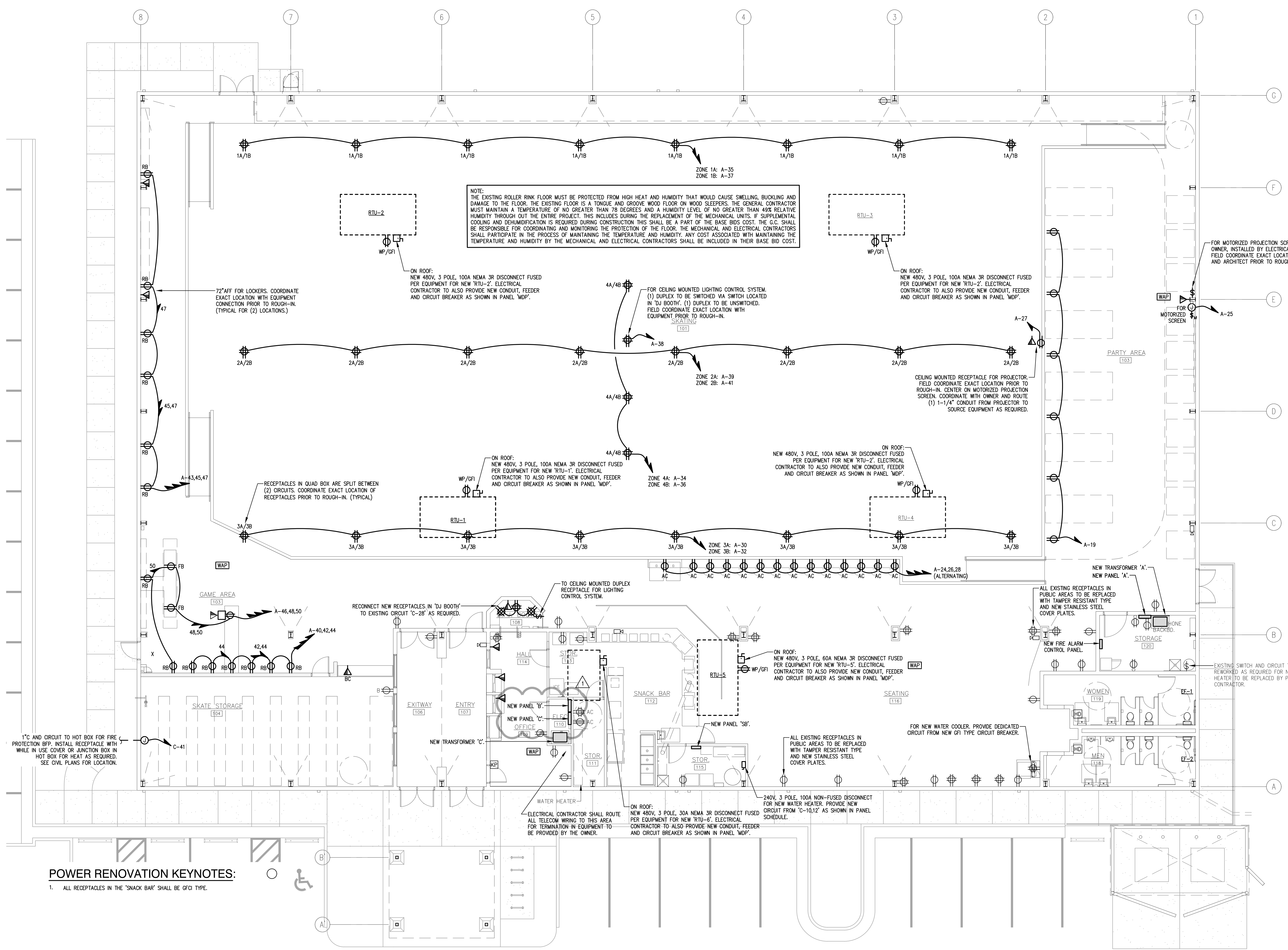


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CONSTRUCTION DOCUMENTS

Revisions	
9/15/23	ANR ADDENDUM #1
Drawn	ANR
Checked	JDH
Date	SEPTEMBER 1, 2023
Sheet	E2.1



POWER RENOVATION KEYNOTES:

1. ALL RECEPTACLES IN THE 'SNACK BAR' SHALL BE GFCI TYPE.

1 Power Renovation Plan
E2.1 SCALE: 1/8" = 1'-0"

P:\PROJECTS\2023\23-001 WHEELS SKATING RENOVATION\3-D CAD\3-D ELECTRICAL\2-D\DWG\POWER\9/15/2023 9:52 AM BY: RUSSEN_BAGAN