MAINE ORTHOPAEDICS ADDITION

1601 CONGRESS STREET
PORTLAND, MAINE

2 OCTOBER, 2004

WHIPPLE-CALLENDER ARCHITECTS

SPECIFICATIONS

MAINE ORTHOPAEDICS ADDITION

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Portland, ME 04102

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CONSTRUCTION MANAGER
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ELECTRICAL
Design Build

October 1, 2004

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SECTION 01010 - SUMMARY OF WORK

1.01 The addition is on the Congress Street side of the existing building. It is about 3300 sq. ft. in footprint, with medical offices on the main floor and a basement left unfinished except for the furnace room and a lunch room. There will be about 3950 sq. ft. of finished office space, counting the basement lunch room.

The second floor will be left unfinished for the tenant to fit up. The CM will be responsible for the shell without finishes, plumbing piping to and from locations as shown in the drawings (**TBD**), and heating and ventilating systems - furnace and central air handling unit - with main supply and return stopping at the second floor.

The new construction is to match or exceed the existing building in quality of materials and construction.

END OF SECTION 01010

INTERPRETATION OF DRAWINGS AND SPECIFICATIONS

Figure dimensions shall supersede scale measurements. Large scale details shall take precedence over small, and all measurements must be verified at the site. The more specific description of the work takes precedence over the more general. The most recent drawings, addenda, or agreements take priority. No alterations shall be made in the drawings or specifications except by the Architect.

In case of any conflict or inconsistency between the drawings and other documents, the Architect's interpretation shall govern. Any discrepancy between figures and drawings shall be submitted by the Contractor to the Architect, whose decision thereon shall be conclusive.

END OF SECTION

SECTION 01020 - ALLOWANCES

Part 1 GENERAL

1.01 Selected materials and equipment, and in some cases installation are included in Contract Documents by allowances. Allowances are established to defer selection until more information is available. Other requirements will be issued by a Change Order.

1.02 Types of allowances required include the following:

A. Lump sum allowances.
B. Unit-cost allowances.
C. Contingency allowance.

1.03 Procedures for submitting and handling Change Orders are included in Section "Change Order Procedures."

1.04 Selection and Purchase.

A. At the earliest feasible date after Contract award, advise the Architect of the date when selection and purchase of each product or system described by an allowance must be completed to avoid delay.

B. When requested by the Architect, obtain proposals for each allowance for use in making final selections; include recommendations that are relevant to performance of the Work.

C. Purchase products and systems from the designated supplier.

1.05 Submittals.

A. Submit proposals for purchase of products or systems included in allowances in the form of Change Orders.

B. Submit invoices or delivery slips to indicate quantities of materials delivered for use in fulfillment of each allowance.

1.06 Unit-cost Allowances: Allowances given are amounts the owner gets to spend for the items listed. Please specify in bid whether installation is or is not included in allowance figure. The sub contractor's profit & overhead will be carried in the allowance figure; the construction manager's profit and overhead will not.

1.07 Contingency Allowances: Use the contingency allowance only as directed for the Owner's purposes, and only by Change Orders which designate amounts to be charged to the allowance.

A. Related costs for products or equipment ordered under the contingency allowance, including delivery, installation, taxes, insurance, and similar costs are not part of the Contract Sum.

B. Change Orders authorizing use of funds from the contingency allowance will include related costs and overhead and profit set by contract with the owner.

C. At Project close-out, credit unused amounts remaining in the contingency allowance to Owner by Change Order.

1.08 Unused Materials.

A. Return unused materials for credit to the Owner, after installation has been completed and accepted.

B. If it is not feasible to return unused material, prepare unused material for the Owner's storage, and deliver to the storage space as directed. Otherwise, disposal is the Contractor's responsibility.

1.09 Inspection: Inspect products covered by an allowance promptly upon delivery for damage or defects.

1.10 Preparation: Coordinate materials and installation for each allowance with related materials and installations to ensure that each allowance item is integrated with related construction activities.

Part 2 PRODUCTS

2.01 Unit-cost allowances.

A. Carpeting: Allow $28.00 per square yard for carpet w / adhered rubber backing installed on slab.

B. VCT: Allow $1.75 per square foot.

END OF SECTION 01020

SECTION 01027 - APPLICATIONS FOR PAYMENT

Part 1 GENERAL

1.01 Schedule of Values.

A. Coordinate preparation of the Schedule of Values with the Contractor's Construction Schedule.

B. Correlate line items in the Schedule of Values with other schedules and forms, including:
   1. Contractor's Construction Schedule.
   2. Application for Payment form.
   3. List of subcontractors.
   4. List of products.
   5. Schedule of submittals.

1.02 Submit the Schedule of Values to the Architect at the earliest date, but no later than 7 days before the date scheduled for submittal of the initial Application for Payment.

A. Format and Content: Use the Project Manual Table of Contents and AIA Document G703 as a guide to establish the format.

B. Identification: Include the following identification:
   1. Project name and location.
   2. Name of the Architect.
   3. Project number.
   4. Contractor's name and address.
   5. Date of submittal.

C. Arrange the Schedule in tabular form with columns to indicate the following for each item:
   1. Description of work.
   2. Related Specification Section.
   3. Budget value.
   4. Change Orders (numbers) that have affected value.
   5. Dollar value.
   6. Percentage of Contract Sum to the nearest one-hundredth percent, adjusted to total 100 percent.

D. Break Contract Sum down in enough detail to facilitate evaluation of Applications for Payment. Break subcontract amounts down into several line items. Round amounts off to the nearest dollar; the total shall equal the Contract Sum.

E. For each item where an Application for Payment includes products purchased or fabricated and stored, but not installed, provide separate line items for initial cost, each subsequent stage of completion, and installed value.

F. Show line items for indirect costs, and margins on costs, to extent that such items will be listed individually in Applications for Payment. Each item in the Schedule of Values and Applications for Payment shall be complete including total cost and share of overhead and profit.

G. Temporary facilities and items are not direct cost of Work-in-place may be shown as separate line items or distributed as general overhead expense.

H. Update and resubmit the schedule when Change Orders or Construction Change Directives change the Contract Sum. List the change orders as a new line item.

1.03 Applications for Payment.

A. Each Application for Payment shall be consistent with previous applications and payments as certified by the Architect and paid for by the Owner.

B. Payment Application Times: Payments will be made monthly or as agreed upon in contract between Owner and Contractor.

C. Payment Application Forms: Use AIA Document G 702 and Continuation Sheets G 703 as the form for the application.

D. Application Preparation: Complete every entry, including notarization and execution by person authorized to sign on behalf of the Owner. Incomplete applications will be returned without action.

F. Entries shall match data on the Schedule of Values and Contractor's Construction Schedule. Use updated schedules if revisions have been made.

G. Include amounts of Change Orders and Construction Change Directives issued prior to the last day of the period covered by the application.

H. Transmittal: Submit 3 executed copies of each application to the Architect within 24 hours; one copy shall be complete, including waivers of lien and similar attachments.

I. Transmit each copy with a transmittal listing attachments, and recording information related to the application.

J. Waivers of Lien: With each application, submit waivers of lien from every entity who may file a lien arising out of the Contract, and related to the Work covered by the payment.

1. Submit partial waivers on each item for amount requested, prior to deduction for retainage, on each item.

2. When an application shows completion of an item, submit final or full waivers.

3. Waiver Delays: Submit each application with Contractor's waiver of lien for the period covered by the application.

4. Submit final Application for Payment with final waivers from every entity involved with performance of Work covered by the application who could be entitled to a lien.

K. Waiver Forms: Submit waivers of lien on forms, and executed in a manner, acceptable to Owner.

1.04 Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of the first Application for Payment include:

A. List of subcontractors.

B. List of suppliers and fabricators.

C. Schedule of Values.

D. Contractor's Construction Schedule (preliminary if not final).

E. Submittal Schedule (preliminary if not final).

F. List of Contractor's staff assignments.

G. Copies of building permits.

H. Copies of licenses from governing authorities.

I. Certificates of insurance and insurance policies.

J. Performance and payment bonds (if required).

1.05 Application for Payment at Substantial Completion: Following issuance of the Certificate of Substantial Completion, submit an Application for Payment; reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions. Administrative actions and submittals that precede or coincide with this application include:

A. Occupancy permits.

B. Warranties and maintenance agreements.

C. Test/adjust/balance records.

D. Maintenance instructions.

E. Final cleaning.

F. Application for reduction of retainage, and consent of surety.

1.06 Final Payment Application: Administrative actions and submittals which must precede or coincide with submittal of the final payment application include:

A. Completion of Project close-out requirements.

B. Completion of items specified for completion after Substantial Completion.

C. Transmittal of required Project construction records to Owner.

D. Proof that taxes, fees and similar obligations have been paid.

END OF SECTION 01027

SECTION 01030 - ALTERNATES

Part 1 GENERAL

1.01 An alternate is an amount proposed by Bidders and stated on the Bid Form for certain items that may be added to or deducted from Base Bid amount if the Owner decides to accept a corresponding change in either the amount of construction to be completed, or in the products, materials, equipment, systems or installation methods described in Contract Documents.

1.02 Coordination: Coordinate related Work and modify or adjust adjacent Work as necessary to ensure that Work affected by each accepted alternate is complete and fully integrated into the Project.

1.03 Notification: Immediately following Contract award, prepare and distribute to each party involved, notification of the status of each alternate. Indicate whether alternates have been accepted, rejected or deferred for consideration at a later date. Include a complete description of negotiated modifications to alternates.

1.04 Schedule.

A. A "Schedule of Alternates" is included at the end of this Section. Specification Sections referenced in the Schedule contain requirements for materials and methods necessary to achieve the Work described under each alternate.

B. Include as part of each alternate, miscellaneous devices, accessory objects and similar items incidental to or required for a complete installation whether or not mentioned as part of the alternate.

Part 2 PRODUCTS

2.01 Schedule of Alternates:

Alternate 1: Heat system for melting snow on sidewalk in front of main entrance. **(This item does not have to be estimated in initial bid proposal.)**

END OF SECTION 01030

SECTION 01035 - MODIFICATION PROCEDURES

Part 1 GENERAL

1.01 General: This section specifies administrative and procedural requirements for handling and processing Contract modifications.

1.02 Minor Changes in the Work: Supplemental instructions authorizing minor changes in the Work, not involving adjustment to Contract Sum or Time, will be issued by the Architect.

1.03 Change Order Proposal Requests: Proposal requests that require adjustment to the Contract Sum or Time if accepted, will be issued by the Architect, with a detailed description of the proposed change and supplemental or revised Drawings and Specification. Proposal requests are for information only and shall not be considered as instruction to stop work in progress, or to execute the change.

A. Unless otherwise indicated, within twenty days of receipt, submit an estimate of cost to execute the change.

1. Include a list of quantities of products to be purchased and unit costs, along with the amount of purchases to be made. If requested, furnish survey data to substantiate quantities.

2. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.

3. Include a statement indicating the effect the proposed change in the Work will have on the Contract time.

1.04 Contractor Initiated Change Order Proposal Requests: When unforeseen conditions require modifications to the Contract, the Contractor may propose changes by submitting a request to the Architect.

A. Include a statement outlining reasons for the change. Provide a complete description of the change. Indicate effect of the proposed change on the Contract Sum and Time.

B. Include a list of quantities of products to be purchased and unit costs, along with amount of purchases to be made. If requested, furnish survey data to substantiate quantities.

C. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.

D. Comply with requirements in Section "Product Substitutions" if the change requires substitution of one product or system for product or system specified.

1.05 Proposal Request Form: Use AIA Document G 709.

1.06 Allowance Adjustment: Base each change order proposal request for an allowance cost adjustment on the difference between the actual purchase amount and the allowance, multiplied by the final measurement of work-in-place, with reasonable allowances for cutting losses, tolerances, mixing wastes, normal product imperfections and similar margins.

A. Include installation costs in the purchase amount only where indicated as part of the allowance.

B. When requested, prepare explanations and documentation to substantiate margins claimed.

C. Submit substantiation of a change in scope of work claimed in the change orders related to unit-cost allowances.

D. The Owner reserves the right to establish the actual quantity of work-in-place by independent quantity survey, measure or count.

1.07 Submit claims for increased costs because of change in scope or nature of the allowance described in contract documents, whether for purchase amount or Contractor's handling, labor, installation, overhead and profit, within 20 days of receipt of change order or construction change directive authorizing work to proceed. Claims submitted later than 20 days will be rejected.

A. Change order cost amount shall not include Contractor's or subcontractor's indirect expense except when clearly demonstrated that the nature or scope of work required was changed from what could have been foreseen from the allowance description and other information in contract documents.

B. No change to the Contractor's indirect expense is permitted for selection of higher or lower priced materials or systems, of the same scope and nature as originally indicated.

1.08 Construction Change Directive.

A. When the Owner and Contractor are not in agreement on terms of a Change Order Proposal Request, the Architect may issue Construction Change Directive on AIA Form G714, instructing the Contractor to proceed with a change, for subsequent inclusion in a Change Order.

B. Construction Change Directive will contain a complete description of the change and designate method to be followed to determine change in the Contract Sum or Time.

1.09 Documentation

A. Maintain detailed records on a time and material basis of work required by the Construction Change Directive.

B. After completion of the change submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

1.10 Change Order Procedures: Upon the Owner's approval of a Change Order Proposal Request, the Architect will issue a Change Order for signatures of the Owner and Contractor on AIA Form G701, as provided in the Conditions of the Contract.

END OF SECTION 01035

SECTION 01040 - PROJECT COORDINATION

Part 1 GENERAL

1.01 This Section specifies requirements for project coordination including:

A. Coordination.

B. Administrative and supervisory personnel.

C. General installation provisions.

D. Cleaning and protection.

1.02 Coordination: Coordinate activities included in various Sections to assure efficient and orderly installation of each component. Coordinate operations included under different Sections that are dependent on each other for proper installation and operation.

A. Phasing of project will require installation of components in earlier phases to allow installation of components in later phases including but not limited to plumbing and wiring.

B. Where installation of one component depends on installation of other components before or after its own installation, schedule activities in the sequence required to obtain the best results.

C. Where space is limited, coordinate installation of different components to assure maximum accessibility for maintenance, service and repair.

D. Make provisions to accommodate items scheduled for later installation.

1.03 Prepare memoranda for distribution to each party involved outlining required coordination procedures. Include required notices, reports, and attendance at meetings.

A. Prepare similar memoranda for the Owner and separate Contractors where coordination of their Work is required.

1.04 Administrative Procedures: Coordinate scheduling and timing of administrative procedures with other activities to avoid conflicts and ensure orderly progress. Such activities include:

A. Preparation of schedules.

B. Installation and removal of temporary facilities.

C. Delivery and processing of submittals.

D. Progress meetings.

E. Project close-out activities.

1.05 Staff Names.

A. Within 15 days of Notice to Proceed, submit a list of Contractor's staff assignments, including Superintendent and personnel at the site; identify individuals, their duties and responsibilities, addresses and telephone numbers.

B. Post copies in the Project meeting room, the field office, and at each temporary telephone.

1.05 Inspection of Conditions: The Installer of each component shall inspect the substrate and conditions under which Work is performed. Do not proceed until unsatisfactory conditions have been corrected.

1.06 Manufacturer's Instructions: Comply with manufacturer's installation instructions and recommendations, to the extent that they are more stringent than requirements in Contract Documents.

1.07 Inspect material immediately upon delivery and again prior to installation. Reject damaged and defective items.

1.08 Provide attachment and connection devices and methods necessary for securing each construction element. Secure each construction element true to line and level. Allow for expansion and building movement.

1.09 Visual Effects: Provide uniform joint widths in exposed Work. Arrange joints to obtain the best effect. Refer questionable choices to the Architect for decision.

1.10 Recheck measurements and dimensions, before starting installation.

1.11 Install each component during weather conditions and project status that will ensure the best results. Isolate each part from incompatible material as necessary to prevent deterioration.

1.12 Coordinate temporary enclosures with inspections and tests, to minimize uncovering completed construction for that purpose.

1.13 Mounting Heights: Where mounting heights are not indicated, install components at standard heights for the application indicated. Refer questionable decisions to the Architect. All items need to meet ADA and ANSI A117.1 for accessibility for physically handicapped people.

1.14 Cleaning and Protection: During handling and installation, clean and protect construction in progress and adjoining materials in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

A. Clean and maintain completed construction as often as necessary through the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

B. Limiting Exposures: Supervise operations to ensure that no part of construction, completed or in progress, is subject to harmful or deleterious exposure. Such exposures include:

1. Excessive weathering.

2. Excessively high or low temperatures or humidity.

3. Water or ice.

4. Chemicals or solvents.

5. Heavy traffic, soiling, staining and corrosion.

6. Rodent and insect infestation.

7. Unusual wear or other misuse.

8. Contact between incompatible materials.

END OF SECTION 01040

SECTION 01090 - DEFINITIONS AND STANDARDS

Part 1 GENERAL

1.01 Definitions: Basic Contract definitions are included in the General Conditions.

A. Indicated refers to graphic representations, notes or schedules on Drawings, or Paragraphs or Schedules in Specifications, and similar requirements in Contract Documents. Where terms such as "shown," "noted," "scheduled," and "specified" are used, it is to help locate the reference.

B. Directed: Terms such as "directed", "requested", "authorized", "selected", "approved", "required", and "permitted" mean "directed by the Architect", "requested by the Architect", and similar phrases. No implied meaning shall be interpreted to extend the Architect's responsibility into the Contractor's supervision of construction.

C. Approve, used in conjunction with action on submittals, applications, and requests, is limited to the Architect's duties and responsibilities stated in General and Supplementary Conditions. Approval shall not release the Contractor from responsibility to fulfill Contract requirements.

D. Regulation includes laws, ordinances, statutes and lawful orders issued by authorities having jurisdiction, and rules, conventions and agreements within the construction industry that control performance of the Work, whether lawfully imposed by authorities having jurisdiction or not.

E. Furnish means "supply and deliver, ready for unloading, unpacking, assembly, installation, and similar operations."

F. Install describes operations at the site including "unloading, unpacking, assembly, erection, anchoring, applying, working to dimension, protecting, cleaning and similar operations."

G. Provide means "furnish and install, complete and ready for use."

H. Installer: "Installer" is the Contractor or an entity engaged by the Contractor, as an employee, subcontractor, or sub-subcontractor for performance of a particular construction activity, including installation, erection, application and similar operations. Installers are required to be experienced in the operations they are engaged to perform.

1. The term "experienced," when used with "Installer" means having a minimum of 5 previous Projects similar in size to this Project, and familiar with the precautions required, and with requirements of the authority having jurisdiction.

I. Project Site is the space available for construction activities, either exclusively or with others performing other construction on the Project. The extent of the Project Site is shown on the Drawings, and may or may not be identical with the description of the land upon which the Project is to be built.

J. Testing Laboratories: A "testing laboratory" is an independent entity engaged to perform specific inspections or tests, at the Project Site or elsewhere, and to report on, and, if required, to interpret, results of those inspections or tests.

1.02 Specification Format.

A. These Specifications are organized into Divisions and Sections based on the Construction Specifications Institute's 16-Division format and numbering system.

B. Language used in the Specifications is the abbreviated type. Implied words and meanings will be appropriately interpreted. Singular words will be interpreted as plural and plural words interpreted as singular where applicable and where the context so indicates.

C. Imperative language is used generally. Requirements expressed in the imperative mood are to be performed by the Contractor. At certain locations in the text subjective language is used to describe responsibilities which must be fulfilled indirectly by the Contractor, or by others when so noted.

1. The words "shall be" shall be included by inference wherever a colon (:) is used within a sentence or phrase.

1.03 Assignment of Specialists: Certain construction activities shall be performed by specialists, recognized experts in the operations to be performed. Specialists must be engaged for those activities, and assignments are requirements over which the Contractor has no option. Nevertheless, the ultimate responsibility for fulfilling Contract requirements remains with the Contractor.

1.04 Drawing Symbols: Where not otherwise noted, symbols are defined by "Architectural Graphic Standards," published by John Wiley & Sons, Inc., eighth edition.

1.05 Mechanical/Electrical Drawings: Graphic symbols on mechanical and electrical Drawings are aligned with symbols recommended by ASHRAE. Where appropriate, they are supplemented by symbols recommended by technical associations. Refer instances of uncertainty to the Architect for clarification before proceeding.

1.06 Applicability of Standards: Except where the Contract Documents include more stringent requirements, applicable industry standards have the same force and effect as if bound or copied into Contract Documents. Such standards are part of the Contract Documents by reference. Individual Sections indicate standards the Contractor must keep available at the Project Site.

1.07 Publication Dates.

A. Where the date of issue of a referenced standard is not specified, comply with the standard in effect as of date of Contract Documents.

B.. Updated Standards: Submit a Change Order proposal where an applicable standard has been revised and reissued after the date of the Contract Documents and before performance of Work. The Architect will decide whether to issue a Change Order to proceed with the updated standard.

1.08 Conflicting Requirements.

A. Where compliance with two or more standards that establish different or conflicting requirements for minimum quantities or quality levels, the most stringent requirement will be enforced. Refer uncertainties as to which quality level is more stringent to the Architect for a decision before proceeding.

B. Minimum Quantities or Quality Levels: The quantity or quality shown or specified is the minimum to be provided or performed. indicated values are

minimum or maximum values, as appropriate for the requirements. Refer instances of uncertainty to the Architect for decision before proceeding.

1.09 Copies of Standards.

A. Each entity engaged on the Project shall be familiar with standards applicable to that activity. Copies of applicable standards are not bound with the Contract Documents.

B. Where copies of standards are needed for performance of a required construction activity, the Contractor shall obtain copies directly from the publication source.

C. Although copies of standards needed for enforcement of requirements may be part of submittals, the Architect reserves the right to require submittal of additional copies for enforcement of requirements.

1.10 Abbreviations and Names: Where acronyms or abbreviations are used in the Specifications or other Contract Documents they mean the recognized name of the trade association, standards generating organization, authority having jurisdiction or other entity applicable. Refer to the "Encyclopedia of Associations," published by Gale Research Co., available in most libraries.

1.11 Permits, Licenses, and Certificates: For the Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, and similar documents, correspondence and records established in conjunction with compliance with standards and regulations bearing upon performance of the Work.

Part 2 PRODUCTS (Not Applicable)

Part 3 EXECUTION (Not Applicable)

END OF SECTION 01090

SECTION 01200 - PROJECT MEETINGS

Part 1 GENERAL

1.01 Summary: This Section specifies requirements for Project meetings including:

A. Pre-Construction Conference.

B. Progress Meetings.

1.02 Pre-construction Conference: Construct a pre-construction conference after execution of the Agreement and prior to commencement of construction activities. Review responsibilities and personnel assignments.

A. Attendees: The Owner, Architect and their consultants, the Contractor and its superintendent, subcontractors, suppliers, manufacturers, and other concerned parties shall be represented by persons authorized to conclude matters relating to the Work.

B. Agenda: Discuss significant items that could affect progress, including the tentative construction schedule, critical sequencing, use of the premises, procedures for processing Change Orders and equipment deliveries.

1.03 Progress Meetings: Conduct progress meetings at regular intervals. Notify the Owner and Architect of scheduled dates. Coordinate meeting dates with preparation of the payment request.

A. Attendees: The Owner and Architect, each subcontractor, supplier or other entity concerned with progress or involved in planning, coordination or performance of future activities shall be represented by persons familiar with the Project and authorized to conclude matters relating to progress.

B. Agenda: Review minutes of the previous progress meeting. Review significance items that could affect progress. Include topics appropriate to the current status of the Project.

C. Contractor's Construction Schedule: Review progress since the last meeting. Determine where each activity is in relation to the Contractor's Construction Schedule, whether on time or ahead or behind schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.

D. Review the present and future needs of each entity present, including such items as:

1. Time.

2. Sequences.

3. Deliveries.

4. Off-site fabrication problems.

5. Site utilization.

6. Temporary facilities and services.

7. Hazards and risks.

8. Quality and Work standards.

9. Change Orders.

10. Documentation of information for payment requests.

1.04 Reporting: No later than 3 days after each meeting, distribute copies of minutes of the meeting to each party present and to parties who should have been present. Include a summary, in narrative form, of progress since the previous meeting.

END OF SECTION 01200

SECTION 01300 - SUBMITTALS

Part 1 GENERAL

1.01 Summary: This Section specifies requirements for handling submittals.

1.02 General Procedures.

A. Coordinate submittal preparation with performance of construction activities, and with purchasing or fabrication, delivery, other submittals and related activities. Transmit in advance of performance of related activities to avoid delay.

B. Coordinate transmittal of different submittals for related elements so processing will not be delayed by the need to review concurrently for coordination. The Architect reserves the right to withhold action on a submittal requiring coordination until related submittals are received.

C. Processing: Allow two weeks for initial review. Allow more time if processing must be delayed for coordination with other submittals. The Architect will advise the Contractor when a submittal must be delayed for coordination. Allow two weeks for reprocessing each submittal.

D. No extension of time will be authorized because of failure to transmit submittals sufficiently in advance of the Work to permit processing.

1.03 Submittal Preparation: Place a label or title block on each submittal for identification. Provide a 4" x 5" space on the label or beside the title block on Shop Drawings to record Contractor's review and approval markings and action taken. Include the following information on the label for processing and recording action taken.

A. Project name.

B. Date.

C. Name and address of Architect.

D. Name and address of Contractor.

E. Name and address of subcontractor.

F. Name and address of supplier.

G. Name of manufacturer.

1.04 Submittal Transmittal: Package submittals appropriately for transmittal and handling. Transmit with a transmittal form. Submittals received from other than the Contractor will be returned without action.

1.05 Shop Drawings.

A. Submit new information, drawn to accurate scale. Indicate deviations from Contract Documents. Do not reproduce Contract Documents or copy standard information as the basis of Shop Drawings. Include the following information:

1. Dimensions.

2. Identification of products and materials included.

3. Notation of coordination requirements.

4. Notation of dimensions established by field measurement.

B. Sheet Size: Except for templates, patterns and similar full-size Drawings, submit Shop Drawings on sheets at least 8-1/2" x 11" but no larger than 24" x 36".

C. Final Submittal: Submit 3 blue-line prints; if the Drawing is required for maintenance manuals submit 5 prints. 2 prints will be retained; the remainder will be returned. One of the prints returned shall be maintained as a "Record Document".

D. Do not use Shop Drawings without a final stamp indicating action taken in connection with construction.

1.06 Product Data: Collect Product Data into a single submittal for each element or system. Mark each copy to show applicable choices and options. Where Product Data includes information on several products, some of which are not required, mark copies to indicate the applicable information. Include the following information:

A. Manufacturer's printed recommendations.

B. Compliance with recognized trade association standards.

C. Compliance with recognized testing agency standards.

D. Application of testing agency labels and seals.

E. Notation of dimensions verified by field measurement.

F. Notation of coordination requirements.

1.07 Submittals.

A. Submit 4 copies of each required submittal. The Architect and Owner will retain one each, and will return the others marked with action taken and corrections or modifications required.

B. Unless noncompliance with Contract Document provisions is observed, the submittal may serve as the final submittal.

1.08 Distribution.

A. Furnish copies of final submittal to installers, and others required for performance of construction activities. Show distribution on transmittal forms. Do not proceed with installation until an applicable copy of Product Data is in the installer's possession.

B. Do not permit use of unmarked copies of Product Data in connection with construction.

1.09 Samples.

A. Submit full-size Samples cured and finished as specified and identical to the product proposed. Mount, display, or package Samples to facilitate review. Prepare Samples to match the Architect's Sample. Include the following:

1. Generic description.

2. Source.

3. Product name or name of manufacturer.

4. Compliance with recognized standards.

5. Availability and delivery time.

B. Submit Samples for review of kind, color, pattern, and texture, for a final check of these characteristics, and a comparison of these characteristics between the final submittal and the component as delivered and installed. Where variations are inherent in the product, submit multiple units that show limits of the variations.

1.10 Preliminary submittals: Where Samples are for selection of characteristics from a range of choices, submit a full set of choices for the product. Preliminary submittals will be reviewed and returned indicating selection and other action.

1.11 Submittals: Except for Samples illustrating assembly details, workmanship, fabrication techniques, connections, operation and similar characteristics, submit 3 sets; one will be returned marked with the action taken. Maintain Sample sets at the Project site, for quality comparisons.

A. Unless noncompliance with Contract Document provisions is observed, the submittal may serve as the final submittal.

B. Sample sets may be used to obtain final acceptance of the construction associated with each set.

1.12 Architect's Action: Except for submittals for record, information or similar purposes, where action and return is required, the Architect or Owner's representative will review each submittal, mark to indicate action taken, and return. Compliance with specified characteristics is the Contractor's responsibility.

END OF SECTION 01300

SECTION 01500 - TEMPORARY FACILITIES

Part 1 GENERAL

1.01 Summary: This Section specifies temporary services and facilities, including utilities, construction and support facilities, security and protection. Provide facilities ready for use. Maintain, expand and modify as needed. Remove when no longer needed, or replaced by permanent facilities.

1.04 Regulations: Comply with applicable laws and regulations.

1.05 Standards: Comply with NFPA Code 241, "Building Construction and Demolition Operations", ANSI-A10 Series standards for "Safety Requirements for Construction and Demolition", and NECA Electrical Design Library "Temporary Electrical Facilities."

A. Refer to "Guidelines for Bid Conditions for Temporary Job Utilities and Services", prepared by AGC and ASC.

B. Electrical Service: Comply with NEMA, NECA and UL standards and regulations for temporary electric service. Install service in compliance with National Electric Code (NFPA 70).

1.06 Inspections: Arrange for authorities having jurisdiction to inspect and test each temporary utility before use. Obtain required certifications and permits.

1.07 Conditions of Use: Keep facilities clean and neat. Operate in a safe and efficient manner. Take necessary fire prevention measures. Do not overload, or permit facilities to interfere with progress. Do not allow hazardous, dangerous or unsanitary conditions, or public nuisances to develop or persist on the site. Keep in mind that this is a campus and there will be curious kids crossing the site and possibly looking for mischief. Take appropriate precautions.

END OF SECTION 01500

SECTION 01600 - MATERIALS AND EQUIPMENT

Part 1 GENERAL

1.01 "Products" are items purchased for incorporation in the Work, whether purchased for the Project or taken from previously purchased stock.

1.02 "Named Products" are items identified by manufacturer's product name, including make or model designation indicated in the manufacturer's product literature.

1.03 "Materials" are products that are shaped, cut, worked, mixed, finished, refined or otherwise fabricated, processed, or installed to form a part of the Work.

1.04 "Equipment" is a product with operational parts, whether motorized or manually operated, that requires service connections such as wiring or piping.

1.05 Source Limitations.

A. To the fullest extent possible, provide products of the same kind, from a single source.

B. When the Contractor has the option of selecting between two or more products, the product selected shall be compatible with products previously selected.

1.07 Nameplates: Except for required labels and operating data, do not attach manufacturer's nameplates or trademarks on surfaces exposed to view in occupied spaces or on the exterior.

1.08 Equipment Nameplates: Provide a permanent nameplate on each item of service-connected or power-operated equipment. Locate on an inconspicuous accessible surface. The nameplate shall contain the following information and essential operating data:

A. Name of product and manufacturer.

B. Model and serial number.

C. Capacity.

D. Speed.

E. Ratings.

1.09 Product Delivery, Storage, and Handling: Deliver, store and handle products in accordance with manufacturer's recommendations, using methods that will prevent damage, deterioration and loss.

A. Schedule delivery to minimize long-term storage and prevent overcrowding construction spaces. Coordinate with installation to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft and other losses.

B. Deliver products in manufacturer's original sealed container or packaging system, complete with labels and instructions for handling, storing, unpacking, protecting and installing.

C. Inspect products on delivery to ensure compliance with Contract Documents, and to ensure that products are undamaged and properly protected.

D. Store products to facilitate inspection and measurement of quantity or counting of units. Store heavy materials away from the structure in a manner that will not endanger supporting construction.

E. Store products subject to damage by the elements above ground, under cover in a weather tight enclosure, with ventilation adequate to prevent condensation. Maintain temperature and humidity within range required by manufacturer's instructions.

1.10 Product Selection.

A. Provide products that comply with the Contract Documents, are undamaged and unused at installation.

B. Provide products complete with all accessories, trim, finish, safety guards and other devices and details needed for a complete installation and for the intended use and effect.

1.11 Proprietary Specification Requirements: Where only a single product or manufacturer is named, provide the product indicated. No substitutions will be permitted.

1.12 Semiproprietary Specification Requirements: Where two or more products or manufacturers are named, provide one of the products indicated. No substitutions will be permitted.

1.13 Where products are specified by name, accompanied by the term "or equal" comply with provisions for "substitutions" to obtain approval for use of an unnamed product.

1.14 Non-Proprietary Specifications: When Specifications list products or manufacturers that are available and may be used, but do not restrict the Contractor to use of these products only, the Contractor may propose any product that complies with Contract requirements. Comply with provisions for "substitutions" to obtain approval for use of an unnamed product.

1.15 Descriptive Specification Requirements: Where Specifications describe a product, listing characteristics required, with or without use of a brand name, provide a product that provides the characteristics and otherwise complies with requirements.

1.16 Performance Specification Requirements: Where Specifications require compliance with performance requirements, provide products that comply and are recommended for the application. Manufacturer's recommendations may be contained in product literature, or by certification of performance.

1.17 Compliance with Standards: Where Specifications require compliance with a standard, select a product that complies with the standard specified.

1.18 Visual Matching: Where Specifications require matching a Sample, the Architect's decision on whether a proposed product matches is final. Where no product matches and complies with other requirements, comply with provisions for "substitutions" for selection of a matching product in another category.

1.19 Visual Selection: Where requirements include the phrase "...as selected from manufacturer's standard colors, patterns, textures..." or a similar phrase, select a product that complies with other requirements. The Architect will select color, pattern and texture from the product line selected.

Part 2 PRODUCTS (NOT APPLICABLE)

Part 3 EXECUTION

3.01 Installation of Products: Comply with manufacturer's instructions and recommendations for installation of products. Anchor each product securely in place, accurately located and aligned with other Work. Clean exposed surfaces and protect to ensure freedom from damage and deterioration at time of Substantial Completion.

END OF SECTION 01600

SECTION 01631 - PRODUCT SUBSTITUTIONS

Part 1 GENERAL

1.01 Substitutions: Requests for changes in products, materials, equipment, and methods of construction required by Contract Documents proposed by the Contractor after award of the Contract are considered requests for "substitutions." The following are not considered substitutions:

A. Substitutions requested during the bidding period, and accepted prior to award of Contract.

B. Revisions to Contract Documents requested by the Owner or Architect.

C. Specified options of products and construction methods included in Contract Documents.

D. Compliance with governing regulations and orders issued by governing authorities.

1.02 Submittal: Requests for substitution will be considered if received within 60 days after commencement of the Work. Requests received more than 60 days after commencement of the Work may be considered or rejected at the discretion of the Architect.

A. Submit 3 copies of each request for substitution in the form and in accordance with procedures for Change Order proposals.

B. Identify the product, or installation method to be replaced in each request. Include related Specification Section and Drawing numbers. Document compliance with requirements for substitutions, and the following information, as appropriate:

1. Product Data, including Drawings and descriptions of products, fabrication and installation procedures.

2. Samples, where applicable or requested.

3. A list of changes or modifications needed to other parts of the Work and to construction performed by the Owner and separate Contractors, that will be necessary to accommodate the proposed substitution.

4. A statement indicating the substitution's effect on the Construction Schedule compared to the schedule without approval of the substitution. Indicate the effect of the proposed substitution on overall Contract Time.

5. Cost information, including a proposal of the net change, if any in the Contract Sum.

6. Certification that the substitution is equal-to or better in every respect to that required by Contract Documents, and that it will perform adequately in application indicated. Include Contractor's waiver of rights to additional payment or time, that may be necessary because of the substitution's failure to perform adequately.

C. Architect's Action: Within one week of receipt of the request for substitution, the Architect will request additional information necessary for evaluation. Within 2 weeks of receipt of the request, or one week of receipt of additional information, which ever is later, the Architect will notify the Contractor of acceptance or rejection. If a decision on use of a substitute cannot be made within the time allocated, use the product specified. Acceptance will be in the form of a Change Order.

1.03 Substitutions: The Contractor's substitution request will be received and considered by the Architect when one or more of the following conditions are satisfied, as determined by the Architect; otherwise requests will be returned without action except to record noncompliance with these requirements.

A. Extensive revisions to Contract Documents are not required.

B. Proposed changes are in keeping with the general intent of Contract Documents.

C. The request is timely, fully documented and properly submitted.

D. The request is directly related to an "or equal" clause or similar language in the Contract Documents.

E. The specified product or method of construction cannot be provided within the Contract Time. The request will not be considered if the product or method cannot be provided as a result of failure to pursue the Work promptly or coordinate activities properly.

F. The specified product or method of construction cannot receive necessary approval by a governing authority, and the requested substitution can be approved.

G. A substantial advantage is offered the Owner, in terms of cost, time, energy conservation or other considerations of merit, after deducting offsetting responsibilities the Owner may be required to bear. Additional responsibilities for the Owner may include additional compensation to the Architect for redesign and evaluation services, increased cost of other construction by the Owner or separate contractors, and similar considerations.

H. The specified product or method of construction cannot be provided in a manner that is compatible with other materials, and where the Contractor certifies that the substitution will overcome the incompatibility.

I. The specified product or method of construction cannot be coordinated with other materials, and where the Contractor certifies that the proposed substitution can be coordinated.

J. The specified product or method of construction cannot provide a warranty required by the Contract Documents and where the Contractor certifies that the proposed substitution provide the required warranty.

1.04 The Contractor's submittal and Architect's acceptance of Shop Drawings, Product Data or Samples that relate to construction activities not complying with the Contract Documents does not constitute an acceptable or valid request for substitution, nor does it constitute approval.

Part 2 PRODUCTS (Not Applicable)

Part 3 EXECUTION (Not Applicable)

END OF SECTION 01631

SECTION 01700 - PROJECT CLOSEOUT

Part 1 GENERAL

1.01 Substantial Completion: Before requesting inspection for certification of Substantial Completion, complete the following:

A. In the Application for Payment that coincides with the date Substantial Completion is claimed, show 100 percent completion for the portion of the Work claimed substantially complete.

B. Submit specific warranties, workmanship bonds, maintenance agreements, final certifications and similar documents.

C. Submit record drawings, maintenance manuals, final project photographs, damage or settlement survey, property survey, and similar record information.

D. Complete start-up testing of systems, and instruction of the Owner's personnel. Remove temporary facilities from the site, along with construction tools, mock-ups, and similar elements.

E. Complete final clean up. Touch-up and repair and restore marred exposed finishes.

1.02 Inspection Procedures: On receipt of a request for inspection, the Architect will proceed or advise the Contractor of unfilled requirements. The Architect will prepare the Certificate of Substantial Completion following inspection, or advise the Contractor of construction that must be completed or corrected before the certificate will be issued.

A. The Architect will repeat inspection when requested and assured that the Work has been substantially completed.

B. Results of the completed inspection will form the basis of requirements for final acceptance.

1.03 Final Acceptance: Before requesting inspection for certification of final acceptance and final payment, complete the following:

A. Submit final payment request with releases.

B. Submit a final statement, accounting for changes to the Contract Sum.

C. Submit a copy of the final inspection list stating that each item has been completed or otherwise resolved for acceptance.

D. Submit consent of surety to final payment.

E. Submit evidence of continuing insurance coverage complying with insurance requirements.

1.04 Reinspection Procedure: The Architect will reinspect the Work upon receipt of notice that the Work has been completed, except items whose completion has been delayed because of circumstances acceptable to the Architect.

A. Upon completion of reinspection, the Architect will prepare a certificate of final acceptance, or advise the Contractor of work that is incomplete or of obligations that have not been fulfilled but are required for final acceptance.

B. If necessary, reinspection will be repeated.

1.05 Record Document Submittals: Do not use Record Documents for construction purposes; protect from loss in a secure location; provide access to Record Documents for the Architect's reference.

1.06 Record Drawings.

A. Maintain a clean, undamaged set of blue or black line white-prints of Contract Drawings and Shop Drawings. Mark-up these drawings to show the actual installation. Mark whichever drawing is most capable of showing conditions accurately. Give particular attention to concealed elements that would be difficult to measure and record at a later date.

B. Organize record drawing sheets into manageable sets, bind with durable paper cover sheets, and print suitable titles, dates and other identification on the cover.

1.07 Record Specifications: Maintain one copy of the Project Manual, including addenda. Mark to show variations in actual Work performed in comparison with the Specifications and modifications. Give particular attention to substitutions, selection of options and similar information on elements that are concealed or cannot be readily discerned later by direct observation. Note related record drawing information and Product Data.

Upon completion of the Work, submit record Specifications to the Architect for the Owner's records.

1.08 Maintenance Manuals: Organize maintenance data into sets of manageable size. Bind in individual heavy-duty 2-inch, 3-ring vinyl-covered binders, with pocket folders for folded sheet information. Mark identification on front and spine of each binder. Include the following information:

A. Emergency instructions.

B. Spare parts list.

C. Copies of warranties.

D. Wiring diagrams.

E. Recommended "turn around" cycles.

F. Inspection procedures.

G. Shop Drawings and Product Data.

H. Fixture lamping schedule.

1.09 Operating and Maintenance Instructions.

A. Arrange for the installer of equipment that requires regular maintenance to meet with the Owner's personnel to provide instruction in proper operation and maintenance. Include a detailed review of the following:

1. Maintenance manuals.

2. Spare parts and materials.

3. Tools.

4. Lubricants.

5. Control sequences.

6. Hazards.

7. Warranties and bonds.

8. Maintenance agreements and similar continuing commitments.

B. As part of instruction for operating equipment, demonstrate the following procedures:

1. Start-up and shutdown.

2. Emergency operations.

3. Noise and vibration adjustments.

4. Safety procedures.

1.10 Final Cleaning: Employ experienced workers for final cleaning. Clean each surface to the condition expected in a commercial building cleaning and maintenance program. Complete the following before requesting inspection for certification of Substantial Completion:

A. Remove labels that are not permanent labels.

B. Clean transparent materials. Remove glazing compound. Replace chipped or broken glass.

C. Clean exposed hard-surfaced finishes to a dust-free condition, free of stains, films and similar foreign substances. Restore reflective surfaces to their original reflective condition. Leave concrete floors broom clean. Vacuum carpeted surfaces.

D. Wipe surfaces of mechanical and electrical equipment. Remove excess lubrication. Clean plumbing fixtures to a sanitary condition. Clean light fixtures and lamps.

E. Clean the site of rubbish, litter and other foreign substances. Sweep paved areas; remove stains, spills and other foreign deposits. Rake grounds that are neither paved nor planted, to a smooth even-textured surface.

1.11 Removal of Protection: Remove temporary protection and facilities.

1.12 Compliance: Comply with regulations of authorities having jurisdiction and safety standards for cleaning. Remove waste materials from the site and dispose of in a lawful manner.

END OF SECTION 01700

SECTION 01740 - WARRANTIES AND BONDS

Part 1 GENERAL

1.01 Standard Product Warranties are preprinted written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to the Owner.

1.02 Requirements for warranties for products and installations that are specified to be warranted, are included in the individual sections of these Specifications.

1.03 Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the Work that incorporates the products, nor does it relieve suppliers, manufacturers, and Subcontractors required to countersign special warranties with the Contractor.

1.04 Related Damages and Losses: When correcting warranted Work that has failed, remove and replace other Work that has been damaged as a result of such failure or that must be removed and replaced to provide access for correction of warranted Work.

1.05 Reinstatement of Warranty: When Work covered by a warranty has failed and been corrected, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.

1.06 Replacement Cost: On determination that Work covered by a warranty has failed, replace or rebuild the Work to an acceptable condition complying with requirements of Contract Documents. The Contractor is responsible for the cost of replacing or rebuilding defective Work regardless of whether the Owner has benefited from use of the Work through part of its useful service life.

1.07 Owner's Recourse.

A. Written warranties made to the Owner are in addition to implied warranties, and shall not limit duties, obligations, right and remedies otherwise available under the law, nor shall warranty periods be interpreted as limitations on time in which the Owner can enforce such other duties, obligations, rights, or remedies.

B. Rejection of Warranties: The Owner reserves the right to reject warranties and to limit selections to products with warranties not in conflict with requirements of the Contract Documents.

C. The Owner reserves the right to refuse to accept Work where a special warranty, or similar commitment is required, until evidence is presented that entities required to countersign commitments are willing to do so.

1.08 Submit written warranties to the Architect prior to the date certified for Substantial Completion. If the Architect's Certificate of Substantial Completion designates a commencement date for warranties other than the date of Substantial Completion, submit written warranties on the Architect's request.

When a designated portion of the Work is completed and occupied or used, by separate agreement with the Contractor during the construction period, submit properly executed warranties to the Architect within fifteen days of completion of that designated portion of the Work.

1.09 Bind warranties and bonds in heavy-duty, commercial quality, durable 3-ring vinyl covered loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2" by 11" paper.

A. Provide heavy paper dividers with celluloid covered tabs for each warranty. Mark the tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product, and the name, address and telephone number of the installer.

B. Identify each binder on the front and the spine with the typed or printed title "WARRANTIES AND BONDS," the Project title or name, and the name of the Contractor.

1.10 When operating and maintenance manuals are required for warranted construction, provide additional copies of each warranty, as necessary, for inclusion in each required manual.

END OF SECTION 01740

SECTION 02100 - CLEARING AND GRUBBING

Part 1 GENERAL

1.01 Related Work Specified Elsewhere:

A. The general provisions and documents of the Contract, including General and Special Conditions, apply to the work specified in this Section.

B. Site Earthwork - Section 02200.

C. Site Improvements - Section 02460.

D. Landscaping - Section 02500.

Part 2 PRODUCTS

2.01 Materials:

A. Seed for erosion control and temporary seeding - Aroostook rye applied at 2.6# / 1,000 square feet.

Part 3 EXECUTION

3.01 Protections:

A. Provide temporary fences, barricades, coverings or other protections to prevent damage to existing improvements, trees or vegetation indicated on the Drawings to remain.

B. Protect improvements on adjoining properties and on Owner's property.

3.02 Clearing:

A. All areas requiring clearing within the Limit of Work area, shown on the Drawings, shall be done in accordance with applicable laws and ordinances. Clear site of trees, shrubs and other vegetation, except for those indicated to be left standing or transplanted. The Contractor shall be responsible for coordinating selective removal of vegetation with the Landscape Architect.

3.03 Grubbing:

A. In areas where topsoil is to be removed or disturbed, existing grades shall be grubbed free of stumps, stones, rubbish, roots or other extraneous growth or debris.

B. Dispose of grubbings off Owner's property. Grubbings shall not be buried on site.

END OF SECTION 02100

SECTION 02110 - SITE CLEARING

Part 1 GENERAL

1.01 Related Sections:

A. 02200 - Earthwork

B. 02910 -Lawns

C. 02950 - Plantings

1.02 Section Includes The Following:

A. Protection of existing trees.

B. Removal of trees and other vegetation.

C. Topsoil stripping.

D. Clearing and grubbing.

1.03 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: Protect improvements on adjoining properties and on Owner's property.

C. Restore damaged improvements to their original condition, as acceptable to property owners.

D. Install appropriate soil erosion measures prior to commencement of work.

1.04 Protection of Existing Trees And Vegetation:

A. 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.

B. Water trees and other vegetation to remain within limits of contract work as required to maintain their health during course of construction operations.

C. Provide protection for roots over 1-1/2 inches in diameter that are cut during construction operations. Coat cut faces with an emulsified asphalt, or other acceptable coating, formulated for 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.

D. Repair or replace trees and vegetation indicated to remain which are damaged by construction operations, in a manner acceptable to Owner. Employ a licensed arborist to repair damages to trees and shrubs.

1.05 Quality Assurance:

A. General: Comply with requirements of Section 01400 - Quality Assurance; Submittals.

1.06 Submittals: Provide copies of disposal waste manifests to owner.

Part 2 PRODUCTS (Not Applicable)

Part 3 EXECUTION

3.01 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 disposing of stumps and roots.

B. 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.

3.02 Topsoil Stripping:

A. Topsoil: Topsoil is defined as friable clay loam surface soil found in a depth of not less than 4 inches. Satisfactory topsoil is reasonably free of subsoil, clay lumps, stones, and other objects over 2 inches in diameter, and without weeds, roots, and other objectionable material.

B. Strip topsoil to whatever depths encountered in a manner to prevent intermingling with underlying subsoil or other objectionable material.

C. Where existing trees are indicated to remain, leave existing topsoil in place within drip lines to prevent damage to root system.

D. Stockpile topsoil in storage piles in areas indicated or directed. Construct storage piles to provide free drainage of surface water. Cover storage piles, if required, to prevent wind erosion, or seed with temporary seed mix.

3.03 Clearing And Grubbing:

A. Clear site of trees, shrubs, and other vegetation, except for those indicated to be left standing.

B. Completely remove stumps, roots, and other debris protruding through ground surface.

C. Use only hand methods for grubbing inside drip line of trees indicated to remain.

D. Fill depressions caused by clearing and grubbing operations with satisfactory soil material, unless further excavation or earthwork is indicated.

3.04 Disposal of Waste Materials:

A. Burning on Owner's Property: Burning will not be permitted.

B. Remove and legally dispose of all unsuitable material, waste materials, and spoil from the site. Provide owner with copies of disposal waste manifests.

END OF SECTION 02110

SECTION 02150 - SHORING AND BRACING

Part 1 GENERAL

1.01 Building excavation is specified in another Division-2 section.

1.02 Supervision: Engage and assign supervision of shoring and bracing work to a qualified foundation consultant.

1.03 Regulations: Comply with local codes and ordinances of governing authorities having jurisdiction.

1.04 Job Conditions: Before starting work, check and verify governing dimensions and elevations. Survey condition of adjoining properties, take photographs, recording existing settlement or cracking of structures, pavements, and other improvements. Prepare list of such damages, verified by dated photographs, and signed by Contractor and others conducting investigation.

1.05 Survey adjacent structures and improvements, establishing exact elevations at fixed points to act as benchmarks. Clearly identify benchmarks and record existing elevations. Locate datum level used to establish benchmark elevations sufficiently distant so as not to be affected by movement resulting from excavation operations.

1.06 During excavation, re-survey benchmarks weekly, employing licensed Land Surveyor or registered Professional Engineer, licensed in State of project. Maintain accurate log of surveyed elevations for comparison with original elevations. Promptly notify Architect if changes in elevations occur or if cracks, sags or other damage is evident.

1.07 Existing Utilities: Protect existing active utility services and structures from damage during shoring and bracing work. Repair or replace damages to satisfaction of utility owner.

1.08 Materials: Provide suitable shoring and bracing materials which will support loads imposed.

1.09 Shoring: Protect site from caving and unacceptable soil movement. Where shoring is required, locate system to clear permanent construction and to permit forming and finishing of concrete surfaces. Provide shoring system adequately anchored and braced to resist earth and hydrostatic pressures.

1.10 Shoring systems retaining earth on which support or stability of existing structures is dependent must be left in place at completion of work. If wood is part of shoring system near existing structures, use pressure preservative treated materials or remove before placement of backfill.

1.11 Bracing: Locate bracing to clear columns, floor framing construction, and other permanent work. If necessary to move a brace, install new bracing prior to removal of original brace.

1.12 Do not place bracing where it will be cast into or included in permanent concrete work, except as otherwise acceptable to Architect.

1.13 Install internal bracing, if required, to prevent spreading or distortion to braced frames.

1.14 Maintain bracing until structural elements are rebraced by other bracing or until permanent construction is able to withstand lateral earth and hydrostatic pressures.

1.15 Remove sheeting, shoring and bracing in stages to avoid disturbance to underlying soils and damage to structures, pavements, facilities, and utilities.

1.16 Repair or replace adjacent work damaged or displaced through installation or removal of shoring and bracing work.

Part 2 PRODUCTS (Not Applicable)

Part 3 EXECUTION (Not Applicable)

END OF SECTION 02150

SECTION 02200 - SITE EARTHWORK

Part 1 GENERAL

1.01 Related Work Specified Elsewhere:

A. The general provisions and documents of the Contract, including General and Special Conditions, apply to the work specified in this Section.

B. Clearing and Grubbing – Section 02100

C. Site Drainage - Section 02400

D. Site Utilities - Section 02420

E. Site Improvements – Section 02460

F. Construction Drawings - Refer to architectural plans and specifications for specific requirements regarding the earthwork beneath the building. Where the architectural plans earthwork requirements for the building subgrade pad are more stringent than those stated herein, the architectural plans and specifications shall govern.

1.02 Utility Easements:

A. The Contractor shall contact all utility companies and determine if additional easements will be required to complete the project.

1.03 Standards:

A. Conform to all applicable city, county and state codes for excavation, earthwork and disposal of debris.

B. Conform to all applicable standards of the various utility companies.

1.04 Inspection:

A. Drawings do not purport to show above ground objects existing on site. Contractor shall visit site and acquaint himself with all observable conditions as they exist before submitting his Bid.

1.05 Grade and Elevations:

A. The Drawings indicate, in general, the alignment and finished grade elevations. The Landscape Architect, however, may make such adjustments in grades and alignment as are found necessary in order to avoid interference or to adapt piping to other special conditions encountered.

B. The Contractor shall establish the lines and grades in conformity with the Drawings and maintain by means of suitable stakes placed in the field.

1.06 Limit of Work:

A. Take special care to keep all operations within the Limit of Work as shown on the Drawings. The Contractor shall take all necessary precautions to protect existing site elements to remain.

1.07 References:

A. Where M.D.O.T. appears it shall be taken to mean The State of Maine Department of Transportation Specifications, Highways and Bridges - (Latest Revision).

1.08 Reference Standards:

A. The following most current publications form part of this specification to the extent indicated by references thereto and shall be followed for all construction testing:

American Society for Testing and Materials (ASTM):

D 422	Method for Particle Size Analysis of Soils
D 698	Test for Moisture-Density Relations of Soils Using 5.5 lb. (2.5 kg) hammer and 12-inch (304.8mm) Drop (Standard Proctor)
D 1556	Test for Density of Soil in Place by the Sand Cone Method
D 1557	Test for Moisture-Density Relations of Soils Using 10-lb (4.5 Kg) hammer and 18-inch (457 mm) Drop (Modified Proctor)
D 1559	Test Method for Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus
D 2167	Test for Density of Soil in Place by the Rubber Balloon Method
D 2216	Laboratory Determination of Moisture Content of Soil
D 2487	Classification of Soils for Engineering Purposes
D 2922	Tests for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
D 3017	Test for Moisture Content of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
D 4318	Test for Plastic Limit, Liquid Limit, & Plasticity Index of Soils
C 25	Chemical Analysis of Limestone, Quicklime and Hydrated Lime
C 110	Physical Testing for Quicklime and Hydrated Lime, Wet Sieve Method
C 618	Specification for Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete

1.09 Tests:

A. Tests for soil density and/or gradations as herein designated shall be taken at the option of the Architect and or Landscape Architect. Costs of testing shall be paid by the Owner.

B. Soil samples representative of the borrow source and suitable laboratory testing shall be furnished by the Contractor for each material listed in Section 2.1. Test results shall be submitted at least two (2) weeks prior to their proposed use or placement on the site. In the event a proposed material does not meet the specified gradation requirements, the material type shall not be placed on-site until an alternative borrow source is selected and the laboratory test results indicate the material meets the specified gradation requirements.

C. Compaction tests shall be determined on the basis of laboratory Proctor tests (ASTM D.1557, Modified Proctor).

D. Field density tests not specified on a comparative basis shall be to the percent density specified in this Section for both earth excavation and earth and granular type fills. Tests shall be in accordance with ASTM D.1556, ASTM D.2167, ASTM D.2922 OR ASTM D.3017.

1.10 Protection of Existing Structures and Utilities:

A. Barricade open excavations occurring as part of this work and post with warning signs. Backfilling or secured covering of excavations shall be required.

B. Provide necessary supports, bracing and covering to protect existing and new structures and utilities during all phases of excavation and backfill.

C. Notify appropriate owners before excavating adjacent to poles, cables, pipes, and other utilities.

D. Note that location of existing underground utilities on plans is approximate and may be incomplete. Responsibility for exact locations and protection of all utilities rest with the Contractor. The Contractor shall be responsible for confirming invert elevations for existing and proposed sewer installation and connection. Where location of existing underground utilities differs from that shown on plans, notify the Landscape Architect immediately.

E. Conflicts between existing and new utilities and/or structures to be built under this contract shall be reported to the Landscape Architect or Owner's Representative.

1.11 Erosion and Sedimentation Control:

A. The General Contractor shall perform all work necessary to control erosion. Installation of erosion control structures prior to construction shall be performed in accordance with the Standards of the U.S. Department of Agriculture, Soil Conservation Service, "Maine Erosion and Sediment Control Handbook for Construction: Best Management Practices" by the Cumberland County SWCD, State of Maine, and as shown on the Plans.

B. Weekly inspections, as well as routine inspections following rain falls, shall be conducted by the Contractor of all temporary and permanent erosion control devices until final acceptance of the project. Necessary repairs shall be made immediately to correct undermining or deterioration. Final acceptance shall include a site inspection to verify the stability of all disturbed areas and slopes. Until final inspection, all erosion and sedimentation control measures shall immediately be cleaned, and repaired by the Contractor after each storm event, as required. Disposal of all temporary erosion control devices shall be the responsibility of the Contractor. Removal of temporary erosion control devices shall not occur until a minimum 75% catch of vegetation occurs or permanent structural measures are in place.

1.12 Removals:

A. The Contractor shall perform all work necessary for clearing and grubbing and / or removal, backfill and disposal of all existing materials noted on the Drawings, as well as temporary structures installed for construction.

Part 2 PRODUCTS

2.01 Materials:

A. Fill Materials: Backfill and ordinary fill materials shall be as follows:

1. Materials from excavation: Excavated material which can be readily spread and compacted, and consists of mineral soil, substantially free of organic materials, loam, wood, rubbish or other perishable substance may be used for common fill. Boulders (rocks over eight (8) inches) shall be removed from excavated material before using for fill.

2. Backfill over pipes shall be free of stones over one (1) inch diameter for first one (1) foot over pipes.

3. Aggregate Base, Crushed - M.D.O.T. 703.06, (a), Type A. (No rocks larger than two inches). - Compacted at 95% ASTM D-1557

4. Aggregate Subbase Gravel - M.D.O.T. 703.06, (a), Type C, Size of stone no larger than six (6) inches. - Compacted at 95% ASTM D-1557.

5. Aggregate Subbase Gravel, M.D.O.T. 703.06 (b) Type D (no stone larger than 4 inches – compacted at 95% ASTM D – 1557.

6. Structural Fill - M.D.O.T. 703.06, (a), Type C. Size of stone no larger than six (6) inches, and further limited to a maximum particle size equal to three (3) inches within twelve (12) inches of slab grade. Compacted at 95% ASTM D-1557

7. Aggregate for Foundation Backfill: M.D.O.T. 703.6 (a) Type B. Size of stone no larger than four (4) inches.

8. Gravel Borrow - M.D.O.T. 703.20. Size of stone no larger than six (6) inches. Compacted at 95% ASTM D-1557

9. Drainage Stone - M.D.O.T. 703.22, Type C. - Vibrated with hand vibrating plate.

10. Native silty sand (Glacial till) found on-site can be re-used for subgrade preparation provided that the natural moisture content at the time of placement and compaction is at slightly below optimum moisture as determined by MPMDD. On-site soils should not be utilized as backfill against foundations or as slab-on-grade base material.

B. Bedding Material: Bedding and Backfill Material for Pipes:

1. The refilling of all excavation below the pipe invert and below the crown of the pipes (as indicated by the details) shall be made with crushed stone meeting the following criteria:

Screen Size Square Openings	% by Weight Passing
1- 1/2"	100
1"	90 - 100
1/2"	0 - 15

2. Where ordered by the Landscape Architect to stabilize the trench base or for excavation below grade, use 3/4 inch crushed stone.

3. PVC Pipe and Polyethylene Pipe: Use 1/2 inch to 1 inch crushed stone in the zone twelve (12) inches above and six (6) inches below the pipe.

C. Sand Blanket:

1. Use (over and under insulation) where insulation is installed over pipe or culvert and at such other places as required in the Contract Documents, or when ordered by the Landscape Architect. Clean sand, free from organic matter, so graded that 90 - 100 percent passes a 1/2 inch sieve and not more than 7 percent passes a No. 200 sieve. (**Exception**: For corrugated polyethlene pipe where crushed stone is required over top of pipe).

D. Suitable Backfill Material:

1. Structural fill or natural material excavated during the course of construction, excluding debris, pieces of pavement, organic matter, topsoil, all wet or soft muck, peat, or clay, all excavated ledge material, and all rocks over six (6) inches in largest dimension, or any material which will not provide sufficient support or maintain the completed construction in a stable condition, all approved by the Landscape Architect. (**Exception**: may not be used to backfill foundation or under slab).

E. Geotextile Materials:

1. Acceptable Geotextiles and Geogrids:

a. Mirafi 600x

b. Phillips 66 Supac 6WS

c. Dupont Typar 3401 and 3601

d. Trevira S1114 and S1120

e. AMOCO 2006

f. Tensar SS-1 and SS-2

g. Exxon GTF-200 or 350

h. Conwed Stratagrid GB-5033

i. Miragrid 3xT

2. Filter / Drainage Geotextiles:

a. Mirafi 160N or equal

3. Silt Fencing Geotextiles:

b. Mirafi 100x or equal

Part 3 EXECUTION

3.01 Classifications:

A. Earth Excavation - Removal and disposal of pavements and other obstructions visible on ground surface, underground structures and utilities indicated to be demolished and removed, any material indicated in the data on subsurface conditions, and other materials encountered that are not classified as rock excavation or unauthorized excavation.

B. Rock Excavation - Removal and disposal of materials encountered that cannot be excavated without continuous and systematic drilling and blasting or continuous use of a ripper or other special equipment except such materials that are classed as earth excavation.

1. Typical Materials: Boulders 2 cu. yd. or more in volume, solid rock, rock in ledges, and rock-hard cementitious aggregate deposits.

2. Intermittent drilling performed to increase production and not necessary to permit excavation of material encountered will be classified as earth excavation.

C. Footing and Slab on Grade Excavation

1. Foundation subgrade improvements will require the excavation of all existing fill within the influence zone of the footings and replaced with compacted structural fill. Excavation of all fill material within two (2) feet of slab on grade shall be required and filled with compacted structural fill material.

D. Unauthorized Excavation

1. Removal of materials beyond indicated subgrade elevations or dimensions without specific direction of the Architect or Landscape Architect.

2. Under footings or foundation bases, fill unauthorized excavation by filling with Structural Fill and compacting to 95 percent of ASTM D-1557 without altering top elevation.

3.02 Topsoil Removal:

A. Topsoil shall be stripped to its entire depth from area within the Limit of Work and reusable materials shall be temporarily removed from the site, screened, and returned to the site as needed. Stripped topsoil shall be free from clay, large stones, debris, and peat. Topsoil for reuse on site shall be screened and tested in accordance with Section 02500 - Landscaping.

3.03 General Excavation:

A. Grades, Dimensions - excavate where indicated and as necessary to obtain subgrades as shown on the Drawings and hereinafter specified. All excavation shall include the satisfactory removal of all materials of whatever substance encountered within the indicated limits. Only suitable materials shall be used or stockpiled for later use in backfill preparation. Disturbed subgrade material shall be removed prior to pouring of footings and replaced with either compacted structural fill or thickened footing concrete. All footing subgrades shall be approved by the owner's representative prior to pouring concrete for footings.

B. The Contractor shall provide temporary drains, ditches and the necessary equipment, as required, to maintain the site of work and adjacent areas in a well drained condition. Keep all excavations free of both ground and surface water at all times. All water pumped or drained from the work shall be disposed of so as not to endanger public health, property or any portion of the work under construction or completed.

C. The Contractor shall provide shoring, sheeting and bracing as may be required to maintain excavations and trenches secure and safe from collapse and to protect adjacent structures.

D. Excavation shall not be made below specified subgrades except where rock or unstable material is encountered. If suitable bearing is not found at levels shown on the Drawings, the Architect and or the Landscape Architect shall be notified in writing immediately so that adjustments or changes may be made. Material removed below specified subgrade without the approval of the Landscape Architect shall be replaced and compacted with an approved gravel at the Contractor's expense.

E. All work shall be carried out in a manner consistent with the regulations of such Federal, State and Local authorities as may have jurisdiction over such activities.

3.04 Summary of Utility Installation:

A. Set all lines, elevations and grades for utility and drainage system work and control system for duration of work, including careful maintenance of bench marks, property corners, monuments or other reference points.

B. Perform all excavation for underground piping and utility systems to the depths indicated on the Drawings or as otherwise specified. Trenches shall be excavated by open cut.

C. Maintain in operating condition existing utilities, active utilities and drainage systems encountered in utility installation. Repair any surface or subsurface improvements shown on Drawings.

D. Verify location, size, elevation and other pertinent data required to make connections to existing utilities and drainage systems as indicated on Drawings. Contractor shall comply with local codes and regulations.

E. Inspection of stormwater system excavation, utility excavation and backfilling subject to review by utility company, city engineer and third party inspection by project engineer.

3.05 Excavation, Trenching and Backfilling:

A. Perform excavation as indicated for specified depths. During excavation, stockpile materials suitable for backfilling in an orderly manner far enough from bank of trench to avoid overloading, slides or cave-ins.

B. Remove excavated materials not required or not suitable for backfill or embankments and waste as specified. Any structures discovered during excavation(s) shall be disposed of as specified.

C. Prevent surface water from flowing into trenches or other excavations by temporary grading or other methods, as required. Remove accumulated water in trenches or other excavations by pumping or other acceptable methods.

D. Open cut excavation with trenching machine or backhoe. Where machines other than ladder or wheel-type trenching machines are used, do not use clods for backfill. Dispose of unsuitable material and provide other suitable material at no additional cost to Owner.

E. Excavations for all foundation work shall be backfilled with structural fill meeting specifications set forth herein.

3.06 Trench Excavation:

A. The Contractor shall contact the local utility companies before excavation begins. Dig trench at proper width and depth for laying pipe, conduit or cable. Cut trench banks as nearly vertical as practical and remove stones as necessary to avoid point-bearing. Over-excavate wet or unstable soil, if encountered, from trench bottom as necessary to provide suitable base for continuous and uniform bedding.

B. All trench excavation side walls greater than five (5) feet in depth shall be sloped, shored, sheeted, braced or otherwise supported by means of the sufficient strength to protect the workmen within them in accordance with the applicable rules and regulations established for construction by the Department of Labor, Occupational Safety and Health Administration (OSHA), and by local ordinances. Lateral travel distance to an exit ladder or steps shall not be greater than 25 feet in trenches four (4) feet or deeper.

C. Accurately grade trench bottom to provide uniform bearing and support for each section of pipe on bedding material at every point along entire length, except where necessary to excavate for bell holes, proper sealing of pipe joints or other required connections. Dig bell holes and depressions for joints after trench bottom has been graded. Dig no deeper, longer or wider than needed to make joint connection properly.

D. Trench width requirements below the top of the pipe shall not be less than 12 inches nor more than 18 inches wider than outside surface of any pipe or conduit that is to be installed to designated elevations and grades. All other trench width requirements for pipe, conduit or cable shall be least practical width that will allow for proper compaction of trench backfill.

E. Trench depth requirements measured from finished grade or paved surface shall meet the following requirements or applicable codes and ordinances:

1. Water Mains: 66 inches to top of pipe barrel.

2. Storm Sewer: Depths, elevations and grades as shown on Drawings. For pipe with less than four (4) feet of cover, provide two (2) inches of rigid insulation per plan and detail.

3.07 Sheeting and Bracing:

A. Provide sheeting and bracing, when necessary, in trenches and other excavations where protection of workmen is required. Sheeting may be removed after sufficient backfilling to protect against damaging or injurious caving.

3.08 Pipe Bedding:

A. Accurately cut trenches for pipe or conduit that is to be installed to designated elevations and grades to line and grade as specified below bottom of pipe and to width as specified. Place specified depth of bedding material, compact in bottom of trench, and accurately shape to conform to low portion of pipe barrel. After pipe installation, place select bedding material in accordance with details and compact as required.

3.09 Trench Backfilling:

A. Criteria: Trenches shall not be backfilled until required tests are performed and the utility systems comply with and are accepted by applicable governing authorities. Backfill trenches as specified. If improperly backfilled, reopen to depth required to obtain proper compaction. Backfill and compact as specified, to properly correct condition in an acceptable manner.

B. Backfilling: After pipe or conduit has been installed, bedded, and tested as specified, backfill trench or structure excavation with specified material placed in eight (8) inch maximum loose lifts.

C. Fill shall not be placed on a surface of frozen material, nor shall snow, ice, frozen earth or debris be incorporated in the fill. Compact to minimum density of 95% of maximum dry density in accordance with ASTM D 698 (or 92% of maximum dry density in accordance with ASTM D1557). For utility trenches located in pavement and sidewalk areas, place backfill in eight (8) inch maximum loose lifts and compaction to 95% of ASTM D.1557 maximum dry density.

3.10 Structural Excavation:

A. Earth shall be excavated to the depth and sections required for installation of all catchbasins, manholes, footings, floor slabs or other appurtenant facilities to the extent indicated on the Plans. Care shall be taken that the foundation areas of

structures are not excavated below subgrade or are disturbed so as to lessen their bearing capacity.

B. All excavations for structures shall be sheeted, braced, sloped, or otherwise protected in the same manner and meeting the safety requirements and conditions specified above under paragraph Section 3.6 (b). Any excess excavated material shall be removed from the site.

3.11 Rock Excavation:

A. Soils investigations indicate that removal of rock will not be required for this project. If however, removal of rock is required, the Contractor shall take the following steps:

1. Uncover and expose material claimed as rock.

2. Notify the Landscape Architect immediately before proceeding with any work in this regard.

3. Obtain written consent and approval from local authorities for the methods to be used before proceeding with blasting or related work.

4. Perform a pre-blast survey of neighboring properties.

5. Handle and employ explosives as stipulated in the Manual of Accident Prevention in Construction of the A.G.C.

B. Rock excavation shall include boulders over two (2) cubic yards in volume and masses of rock or conglomerate masses requiring systematic drilling and blasting to be removed.

C. Payment

1. Payment for rock required to be removed shall be based upon a cubic yard basis. Provide ledge removal inspection for quantity verification of ledge removal by the site contractor.

2. Payment for rock trench excavation shall be calculated to depths of six (6) inches below the bottom of pipes, twelve (12) inches below bottoms of footings, and for a width equal to the diameter of the pipe plus eighteen (18) inches beyond each side. Removal cost shall be based upon a unit cost to include rock removal and required trench backfill material.

3. Rock excavation removed with open masses but below the required elevation for the mass, as for footing drains, shall not be considered as trench excavation.

4. Excavation which does not meet the above requirements for Rock Excavation will be classified as General Earth Excavation.

3.12 Drainage:

A. The Contractor shall provide and maintain ample means and devices (including spare units kept ready for immediate use in case of breakdowns) with which to

intercept and/or remove promptly and dispose of properly all water entering excavations. Such excavations shall be kept dry until the structures and appurtenances to be built therein, have been completed to such extent that they will not be damaged.

B. Dewatering shall be accomplished in a manner that will preserve the undisturbed state of the foundation soils. All water pumped or drained from the work shall be disposed of in a suitable manner without undue interference with other work, other surfaces, or property. Suitable temporary pipes, flumes or channels shall be provided for water that may flow along or across the site of the work.

C. Temporary underdrains, if used, shall be laid in trenches beneath the grade of the structure. Trenches shall be of suitable dimensions to provide room for the chosen size of underdrain and its surrounding screened gravel.

D. Temporary underdrains, if used, shall be laid at an approved distance below the bottom of the normal excavation and entirely surrounded by screened gravel. The distance between the bottom of the pipe or structure and the top of the bell of the underdrain pipe shall be at least three (3) inches, unless otherwise permitted. The space between the underdrain and the pipe or structure shall be filled with sand meeting the requirements of ASTM Designation C-33 which shall be rammed if necessary and left with a surface suitable for laying the pipe or building structure. Following their use, underdrains shall be plugged as directed by the Landscape Architect.

3.13 Compaction:

A. Compaction densities specified herein shall be the percentage of the maximum dry density obtainable at optimum moisture content as determined and controlled in accordance with ASTM D.1557. Field density tests shall be made in accordance with ASTM D.1556, D.2167 or D.2922. Each layer of backfill shall be moistened or dried as required, and shall be compacted to the required densities unless otherwise specified in the project specifications.

B. Fills placed under footings, floor slabs, roads, parking areas and walks shall be compacted to not less than 95 percent of the ASTM D - 1557 maximum dry density.

C. The subbase material placed under the road gravel base in fill areas shall be compacted to not less than 95 percent of the ASTM D1557 maximum density.

D. Fills adjacent to building walls from the exterior face of the building and/or retaining walls to a point not less than 10'-0" from the exterior face of the wall shall be compacted to not less than 92 percent of the ASTM D. 698 maximum compaction dry densities as herein before specified.

E. Bedding material and trench sand under pavement: 95%

F. Bedding material and trench sand non-pavement areas: 92%

G. Loam areas: 90%

H. All other areas: 85%

I. Methods and equipment proposed for compaction shall be subject to the prior acceptance by the Owner's representative. Compaction generally shall be done with vibrating equipment. Displacement of, or injury to the pipe and structure shall be avoided. Movement of in-place pipe or structures shall be at the Contractor's risk. Any pipe or structure damaged thereby shall be replaced or repaired as directed by the Landscape Architect and at the expense of the Contractor.

3.14 Filling and Subgrade Preparation - Building Area:

A. Building subgrade pad shall be that portion of site directly beneath and ten feet (10') beyond the building and appurtenant limits.

B. Unless specifically indicated otherwise on the Drawings, areas exposed by excavation or stripping and on which building subgrade preparations are to be performed, shall be compacted to a minimum of 95% of the Modified Proctor Maximum Dry Density (MPMDD). Building floor slab subgrades consisting of native sands, silty sands shall be compacted with a 15 ton highway roller to achieve 95% of MPMDD to a minimum of 12 inches.

C. Any soft areas revealed during compaction of the base of the excavation should be excavated and replaced with structural fill per this specification.

D. Building floor slab fill areas shall be filled (two feet below slab) with structural fill not to exceed 12 inch loose lifts and compacted to 95% of MPMDD. Footing subgrades consisting of sands or silty sands or structural fill material shall be compacted to 95% of MPMMDD, loose lifts not to exceed twelve (12) inches (two feet below slab).

E. Unless specifically indicated otherwise on the Drawings, Structural Fill materials used in preparation of building subgrade shall be placed in lifts or layers not to exceed twelve (12) inches loose measure and compacted to a minimum of 95% of the M.P.M.D.D.

F. All fill material shall be free of snow, ice, or foreign contaminants before placement. All lifts placed during winter construction shall be compacted by the end of the work day. Any lifts exposed to ice, snow and freezing conditions prior to compaction shall be removed at the Contractor's expense.

3.15 Filling and Subgrade Preparation - Exclusive of Building Area:

A. All materials shall be placed and compacted to conform to the lines, elevations and cross-sections indicated on the Drawings. Do not start fills until the area has been inspected and approved by the Landscape Architect or Owner’s Representative.

B. Fill shall not be placed on a surface of frozen material, nor shall snow, ice, frozen earth or debris be incorporated in the fill. All materials shall be approved by the Landscape Architect or Owner's Representative before being placed.

C. Unless specifically stated otherwise on the Drawings, areas exposed by excavation or stripping and on which subgrade preparations are to be performed, shall be compacted to a minimum of 95% of maximum dry density, in accordance with ASTM D 1557. Subgrades consisting of native sands or silty sands shall be

compacted with a 15 ton highway roller. These areas shall then be proof-rolled to detect any areas of insufficient compaction. Proof-rolling shall be accomplished by making a minimum of two (2) complete passes with a fully-loaded tandem-axle dump truck, or approved equivalent, in each of the two perpendicular directions. Areas of failure shall be excavated and recompacted as stated above.

D. If sufficient suitable fill material is not available from excavations under this Contract, additional fill, suitable for use, shall be brought to the site from other sources. Subgrade fill in pavement areas shall consist of Gravel Borrow (M.D.O.T. 703.20) or Structural Fill (M.D.O.T. 703.06 (a) Type C. Place in maximum 12 inch layers and compact to 92 percent of maximum density in accordance with ASTM D 1557. Each layer shall be free from ruts and shall meet compaction requirements before next layer is placed. Maintain layers with crown or other practical means of drainage.

E. Stones in fills shall be well distributed. Do not have stones over six (6) inches in diameter within twelve (12) inches of subgrade.

3.16 Finish Grading:

A. Grade all areas where finish grade elevations or contours are indicated on Drawings, other than paved areas and buildings, including excavated areas, filled and transition areas, and landscaped areas. Graded areas shall be uniform and smooth, free from rock, debris, or irregular surface changes. Finished subgrade surface shall not be more than 0.10 feet above or below established finished subgrade elevation, and all ground surfaces shall vary uniformly between indicated elevations. Ditches and swales shall be graded to allow for proper drainage without ponding and in a manner that will minimize erosion potential. For topsoil application, refer to Section 02500-LANDSCAPING.

B. Correct all settlement and eroded areas within one year after date of completion at no additional expense to Owner. Bring grades to proper elevation. Replant or replace any grass, shrubs, trees or other vegetation disturbed by construction using corrective measures.

3.17 Field Quality Control:

A. If Owner elects to test, an independent testing laboratory selected and paid by the Owner shall be retained to perform construction testing on site. Field density test may be ordered for each foot of depth of backfill at an average of 200 feet along the trench.

B. If compaction requirements are not complied with at any time during the construction process, remove and recompact deficient areas until proper compaction is obtained at no additional expense to Owner.

C. The independent testing laboratory shall prepare test reports that indicate test location, elevation data and test results. The Owner, Architect and Contractor shall be provided with copies of reports within 72 hours of time test was performed. In the event that any test performed fails to meet these Specifications, the Owner and Contractor shall be notified immediately by the independent testing laboratory.

D. All costs related to retesting due to failures shall be paid for by the Contractor at no additional expense to the Owner. The Owner reserves the right to employ an independent testing laboratory and to direct any testing that is deemed necessary. Contractor shall provide free access to site for testing activities.

3.18 Testing:

A. Field density test may be ordered by the Landscape Architect for each foot of depth of backfill at an average interval of 200 feet along the trench.

B. The Contractor shall furnish all necessary samples for laboratory tests and shall provide assistance and cooperation during field tests. The Contractor shall plan his operations to allow adequate time for laboratory tests and to permit taking of field density tests during compaction.

C. Any costs of re-testing required as a result of failure to meet compaction requirements shall be borne by the Contractor.

3.19 Work In Public Streets:

A. Work done in existing Municipal streets shall be done in accordance with local and/or State requirements as applicable.

3.20 Clean-up:

A. The Contractor shall remove all debris, construction equipment, and material from the areas to be loamed and seeded.

END OF SECTION 02200

SECTION 02400 - SITE DRAINAGE

Part 1 GENERAL

1.01 Related Work Specified Elsewhere:

A. The general provisions and documents of the Contract, including General and Special Conditions, apply to the work specified in this Section.

B. Site Earthwork - Section 02200

C. Stormwater Treatment System – Section 02410

D. Site Utilities – Section 02420

E. Construction Drawings

1.02 Quality Assurance:

A. It is the intention of this Section that the catchbasins, manholes and other structures, including all component parts, have adequate space and strength considered necessary for the intended service. Space requirements and configurations shall be as shown on the Drawings.

B. Catchbasins and manholes shall be an assembly of precast sections with or without steel reinforcement, with approved jointing. In any approved structures, the complete structure shall be of such material and quality as to withstand loads of eight (8) tons (H-20 loading) without failure, continuously for the life of the structure. Assume a period in excess of 25 years for all structures.

1.03 Submittals:

A. The Contractor shall submit the following information with sets of As-Built Drawings:

1. Shop Drawings of pipe and precast units, catchbasins and manholes.

2. Manufacturer's information of joint sealants, gaskets and waterproofing.

3. Storm drain pipe. Pipe of the same manufacturer shall be used throughout the project.

4. Source and gradation reports for soil materials.

5. Manufacturer’s information of physical, filtration/hydraulic, and mechanical properties of geotextile fabrics.

6. Drainage stone source and gradation analysis report.

7. Structural fill source and gradation analysis report.

1.04 Delivery, Storage and Handling:

A. Exercise care when handling pipe to prevent damage to pipe and finish.

B. Immediately remove damaged materials and replace at no additional cost to the Owner.

C. Store materials above ground on platforms, skids, or other adequate supports.

E. Protect geotextiles from ultraviolet light in accordance with manufacturer's requirements.

Part 2 PRODUCTS

2.01 Materials:

A. Catchbasin and Manhole: All structures shall conform to the City of Portland Technical and Design Standards and Guidelines - Latest Edition. Structures shall be precast concrete structures, 4 foot interior diameter, unless otherwise specified, as manufactured by Superior Concrete or approved equal with T & G joints and rubber ring or asphalt filler seals.

1. Bases - Precast sumps conforming to ASTM C478. Holes for pipes cast into the base section shall have a three (3) foot minimum clear distance between the inside bottom of the base section and the pipe invert.

2. Barrels - Precast sections of correct height, conforming to ASTM C478 or solid concrete barrel blocks conforming to ASTM C-139.

3. Cones - Precast, hunched type, conforming to ASTM C478.

4. Pipe to Catchbasin Joints: Only as approved by the Landscape Architect and, in general, will depend on water-tightness upon a rubber boot either cast-in-place or press-wedged in place.

5. Frames and Grates to conform to AASHTO M-105, Class 30, of gray cast iron by Etheridge Foundry. Refer to Drawings for type and size.

6. Each section of the precast structure shall have two holes for the purpose of handling and setting. The holes shall be tapered and shall be plugged with nonshrink mortar or grout in combination with concrete plugs after installation. Note: For storm drain sections that serve as cutoff drains for groundwater, provide 1/4 inch perforations along the top of pipe. Refer to project details and plans.

B. Storm Drain Pipe: PVC Pipe, Reinforced Concrete Pipe or Corrugated Polyethylene Pipe (refer to Drawings). Furnish as indicated on Drawings and of size shown. Provide couplings and special bends or elbows as shown or required by the work.

1. Polyvinyl Chloride (PVC) Pipe: Pipe and fittings shall comply with ASTM D 3034, rated SDR 35. Pipe shall be continually marked with manufacturer's name, pipe size, cell classification, SDR rating, and ASTM D 3034 classification. Pipe joints shall be integrally molded bell ends in accordance with ASTM D 3034, Table 2, with factory supplied elastomeric gaskets and lubricant.

2. Reinforced Concrete Pipe (RCP): Comply with requirements of ASTM C 76, Class III unless another class type is indicated on Drawings, installed with flexible plastic (Bitumen) gaskets at all joints. Gaskets shall comply with AASHTO M-198 75I, Type B, and shall be installed in strict accordance with pipe manufacturer's recommendations.

3. Corrugated Polyethylene Pipe (CPP) Smooth Interior: Conform with AASHTO Designations M 294 and M252. Pipe must be installed in accordance with pipe manufacturers installation Guidelines for Culvert and Other Heavy-Duty Drainage Applications. Acceptable manufacturers: Advanced Drainage Systems, Inc. (ADS) N-12) & Hancore, Inc. (Hi-Q smooth interior).

4. Foundation Drains: Pipe shall be perforated PVC pipe having a SDR of 35 or equivalent. Perforations shall consist of 3/8 inch diameter holes.

C. Brick: Comply with the ASTM Standard Specifications for Sewer Brick, Designation C32, for Grade SS, hard brick.

D. Cement: Shall be Type II. Concrete shall have a minimum strength of 3,000 psi at 28 days.

E. Structural Fill for foundation drain backfill - M.D.O.T. 703.06, (a), Type C.

F. Drainage Stone: M.D.O.T. 703.22 Type C. 3/8 - inch, pea stone or 3/4- inch crushed stone

G. Geotextiles: Shall be Mirafi 160 N or equivalent for filtration fabric or equivalent.

Part 3 EXECUTION

3.01 Catchbasins and Manholes:

A. After the excavation has been done and leveled, six (6) inches of bedding material shall be put in the bottom of the excavation, leveled and thoroughly compacted.

B. Precast concrete sections shall be set so as to be vertical and with section in true alignment, 1/4-inch maximum tolerance to be allowed.

C. Invert channels of manholes may be formed in 3,000 psi concrete or using brick. When brick is used, use Portland cement, ASTM C 150, Type II. Masonry cements shall not be used. The top shelf shall slope to drain towards the flowing through channel.

D. The top of the precast reinforced concrete unit shall be set at a grade that will allow a minimum of two (2) courses and a maximum of three (3) courses of brick and mortar before setting the cast-iron frame. Mortar for brick masonry shall be Portland cement, Type II, mixed in the proportion of one part cement to two parts sand, worked to the proper consistency.

E. The inside and outside of the masonry work of all catchbasins shall be plastered with 1:2 Portland cement mortar. The thickness of the mortar shall be one-half

(1/2) inch, and the mortar shall be carefully spread and thoroughly troweled, leaving a smooth, substantially waterproof surface. The mortar shall be extended to completely cover the outside and inside surfaces of all masonry work. To enhance proper curing, completed masonry shall be covered with a polyethylene plastic sheet or other appropriate means for a minimum of 24 hours before backfilling. The inside and outside of each horizontal joint in the precast manholes shall be filled with joint mortar and trowelled smooth.

F. Backfilling shall be done in a careful manner in 6”-12” lifts and compacted with a vibratory compactor, bringing the fill up evenly on all sides.

G. If any leaks appear in catchbasins, the Contractor shall uncover the structure and disassemble the sections and reconstruct the catchbasin, or perform other acceptable repairs approved by the Landscape Architect so as to secure a watertight structure. The Contractor shall install the precast units and pipeline connectors in a manner that will result in a watertight joint.

H. Catchbasins and manholes shall be constructed as the sections of the pipelines between them are completed, and unless this is done, the Landscape Architect shall have the authority to stop trenching and pipe laying until manhole construction is brought up properly. All ground water shall be kept away from any newly placed concrete or freshly laid masonry work until cement has properly set and until a watertight job is obtained.

3.02 Catchbasin and Manhole Frames and Grates:

A. Catchbasin and manhole frames shall be set with the tops conforming accurately to the grade of the pavement or finished ground surface, or as directed.

B. Frames shall be set concentric with the top of the masonry and in full bed of mortar so that the space between the top of the masonry and the bottom flange of the frame shall be completely filled and made watertight.

C. A thick ring of mortar extending to the outer edge of the masonry shall be placed all around and on top of the bottom flange. Mortar shall be smoothly finished and have a slight slope to shed water away from the frame.

D. Manhole covers and catchbasin grates shall be left in place in the frames on completion of the other work at the manholes and catchbasins.

3.03 Drain Pipes:

A. Firmly support the pipe and fittings on bedding material as shown on the Drawings and as specified in the appropriate Sections of these Specifications. Do not permanently support the pipe or fittings on saddles, blocking stones, or any material which does not provide firm and uniform bearing along the outside length of the pipe. Thoroughly compact the material under the pipe to obtain a substantial unyielding bed shaped to fully support the pipe. Excavate suitable holes for the joints so that only the barrel of the pipe receives bearing pressure from the supporting material after placement.

B. Lay each pipe length so it forms a close joint with the adjoining length and bring the inverts to the required grade, without high spots. Do not drive the pipe down to grade by striking it with a shovel handle, timber, hammer, or any other unyielding object. When each pipe length has been properly set, place and

compact enough of the bedding material between the pipe and the sides of the trench to hold the pipe in correct alignment. After filling the sides of the trench, place and lightly tamp bedding material to complete the bedding as shown on the Drawing. Take all necessary precautions to prevent floatation of the pipe in the trench.

C. Temporary Plugs - When pipe installation work in trenches is not in progress, close the open ends of the pipe with temporary watertight plugs. If water is in the trench when work is resumed, do not remove plugs until all danger of water entering the pipe is eliminated. Do not use the pipelines as conductors for trench drainage during construction.

D. Jointing - Connect pipe in accordance with the latest manufacturer's instructions and recommendations. Clear each pipe length, coupling and fitting of all debris and dirt before installing. Provide and use coupling pullers for jointing the pipe. Provide gasket feeler gauges for use by the pipe layer for checking the position of the rubber gaskets in the completed joints.

E. Shove home each length of pipe against the pipe previously laid and hold securely in position. Do not pull or cramp joints. Make all pipe joints as watertight as possible with no visible leakage and no sand, silt, clay, or soil of any description entering the pipeline at the joints. Immediately after making a joint, fill the holes for the joints with bedding material, and compact.

F. Pipe Cutting - Cut in accordance with manufacturer's recommendations. Cut the pipe with a hand saw, metal-inserted abrasive wheel or pipe cutter with blades (not rollers). Examine all cut ends for possible cracks caused by cutting.

G. Inspection - Pipe installation shall be subject to inspection by the Landscape Architect for quality, adherence to line and grade, jointing, and proper backfill. Any joint not satisfactory to the Landscape Architect shall be removed and remade to his satisfaction at the Contractor's expense. No pipe shall be backfilled until it has been approved by the Landscape Architect.

3.04 Foundation Drain Pipe:

A. Bed all foundation drains in Drainage Stone, wrapped in Mirafi 160 N geotextile filter fabric or approved equal, as shown on the drawings.

B. Shape subgrade to drain outlets as shown on the grading and drainage plan.

C. Install geotextile stabilization fabric between subgrade and pavement subbase gravel, as determined by the geotechnical engineer or Owner's Representative.

3.05 Pipe Insulation:

A. Install two (2) inch thick by four (4) feet wide styrofoam SM insulation as manufactured by Dow Chemical Co., or approved equal, as shown on Detail Drawing.

B. Install over and along the sides of the pipe when there is less than four (4) feet of cover between the top of pipe and original ground grade.

3.06 Level-Lip Spreader:

A. Conform to erosion control provisions as shown on the Erosion Control Plan.

B. Disturb no more soil than actually required.

C. Install level-lip spreader as shown and detailed on the Drawings.

D. Install filter fabric with 18” lap, smooth, on compacted subgrade according to manufacturer’s suggested installation instructions.

E. Install crushed stone, and angular quarry stone as detailed on the Drawings.

F. Revegetate all disturbed areas around level-lip spreader.

END OF SECTION 02400

SECTION 02410 - STORMWATER TREATMENT SYSTEM

Part 1 GENERAL

1.01 Related Work Specified Elsewhere:

A. The general provisions and documents of the Contract, including General and Special Conditions, apply to the work specified in this Section.

B. Site Drainage – Section 02400

C. Construction Drawings

1.02 Description:

A. Work included:

The Contractor, and/or a manufacturer selected by the Contractor and approved by the Engineer, shall furnish all labor, materials, equipment and incidentals required and install all precast concrete stormwater treatment systems and appurtenances in accordance with the Drawings and these specifications.

1.03 Quality Control Inspection:

A. The quality of materials, the process of manufacture, and the finished sections shall be subject to inspection by the Engineer. Such inspection may be made at the place of manufacture, or on the work site after delivery, or at both places, and the sections shall be subject to rejection at any time if material conditions fail to meet any of the specification requirements, even though sample sections may have been accepted as satisfactory at the place of manufacture. Sections rejected after delivery to the site shall be marked for identification and shall be removed from the site at once. All sections which have been damaged beyond repair during delivery will be rejected and, if already installed, shall be repaired to the Engineer's acceptance level, if permitted, or removed and replaced, entirely at the Contractor's expense.

B. All sections shall be inspected for general appearance, dimensions, soundness, etc. The surface shall be dense, close textured and free of blisters, cracks, roughness and exposure of reinforcement.

C. Imperfections may be repaired, subject to the acceptance of the Engineer, after demonstration by the manufacturer that strong and permanent repairs result. Repairs shall be carefully inspected before final acceptance. Cement mortar used for repairs shall have a minimum compressive strength of 4,000 psi (28 MPa) at the end of 7 days and 5,000 psi (34 MPa) at the end of 28 days when tested in 3 inch (76 mm) diameter by 6 inch (152 mm) long cylinders stored in the standard manner. Epoxy mortar may be utilized for repairs.

1.04 Submittals:

A. Shop Drawings

The Contractor shall be provided with dimensional drawings and, when specified, utilize these drawings as the basis for preparation of shop drawings

showing details for construction, reinforcing, joints and any cast-in-place appurtenances. Shop drawings shall be annotated to indicate all materials to be used and all applicable standards for materials, required tests of materials and design assumptions for structural analysis. Structural design calculations and shop drawings shall be certified by a Professional Engineer retained by the system manufacturer or Contractor and licensed in the state where the system is to be installed. Shop drawings shall be prepared at a scale of not less than 3/16-inches per foot (1:75). Six (6) hard copies of said shop drawings shall be submitted to the Engineer for review and approval.

B. Affidavit on patent infringement

The Contractor shall submit to the Engineer, prior to installation of the stormwater treatment system, an affidavit regarding patent infringement rights stating that any suit or claim against the Owner due to alleged infringement rights shall be defended by the Contractor who will bear all the costs, expenses and attorney's fees incurred thereof.

C. Performance Documentation

The following documentation must be submitted by the Contractor and approved by the Engineer prior to the manufacture and delivery of any materials.

1. Laboratory Data

The stormwater treatment system supplier shall provide documentation of Total Suspended Solids (TSS) removal efficiency from laboratory testing conducted on the supplier's full-scale system. The documentation shall include:

a. TSS removal efficiency versus operating rate for the full operating range of the stormwater treatment system for a 50-micron particle size.

b. TSS removal calculations for each system specified herein. The calculations must demonstrate that the system(s) is capable of achieving a net annual TSS removal efficiency as required by local regulations and as based upon a 50-micron particle size and the best available rainfall data for the project site location.

2. Field Test Data

The stormwater treatment system supplier shall provide documentation of TSS removal efficiency from field testing conducted on an installed system. The documentation shall be in accordance with the following:

a. The testing and documentation shall have been conducted by an independent third party.

b. The testing and documentation shall include at least 10 storms.

c. The testing and documentation must show TSS removal results that meet or exceed the performance requirements for the system(s) specified herein.

3. Manufacturing Experience

The stormwater treatment supplier shall provide evidence of at least 5 years of successful product design and use. The supplier shall provide an installation list of projects, model sizes installed and installation dates where the same type systems as specified herein have been designed and produced by the supplier.

Part 2 PRODUCTS

2.01 Materials and Design:

A. Concrete for precast stormwater treatment systems shall conform to ASTM C 857 and C 858 and meet the following additional requirements:

1. The wall thickness shall not be less than 6 inches (152 mm) or as shown on the dimensional drawings. In all cases the wall thickness shall be no less than the minimum thickness necessary to sustain HS20-44 (MS18) loading requirements as determined by a Licensed Professional Engineer.

2. Sections shall have tongue and groove or ship-lap joints with a butyl mastic sealant conforming to ASTM C 990.

3. Cement shall be Type II Portland cement conforming to ASTM C 150.

4. All sections shall be cured by an approved method. Sections shall not be shipped until the concrete has attained a compressive strength of 4,000 psi (28 MPa) or until 5 days after fabrication and/or repair, whichever is the longer.

5. Pipe openings shall be sized to accept pipes of the specified size(s) and material(s), and shall be sealed by the Contractor with a hydraulic cement conforming to ASTM C 595M

B. Internal aluminum plate components shall be aluminum alloy 5052-H32 in accordance with ASTM B 209.

C. Sealant to be utilized at the base of the swirl chamber shall be 60 durometer extruded nitrile butadiene rubber (Buna N) and shall be provided to the concrete precaster for installation.

D. Brick or masonry used to build the manhole frame to grade shall conform to ASTM C 32 or ASTM C 139 and shall be installed in conformance with all local requirements.

E. Casting for manhole frames and covers shall be in accordance with ASTM A48, CL.35B and AASHTO M105. The manhole frame and cover shall be equivalent to Campbell Foundry Pattern #1009A or #1012D custom cast with the Vortechnics® logo and the words “Vortechs® Stormwater Treatment System”.

F. A bitumen (butyl mastic) sealant in conformance with ASTM C 990 shall be utilized in affixing the swirl chamber to the concrete vault.

2.02 Performance:

Each stormwater treatment system shall adhere to the following performance specifications at the design treatment capacities, as listed below:

Table 2.2

Vortechs® Model	**Design Treatment Capacity** (cfs) / (l / s)	**Sediment Storage** (yd^3) / (m^3)
1000	**0 - 1.6 (0 - 45)**	**0.7 (0.54)**
2000	**1.6 - 2.8 (45-80)**	**1.2 (0.91)**
3000	**2.8 - 4.5 (80-125)**	**1.8 (1.38)**
4000	**4.5 - 6.0 (125-175)**	**2.4 (1.84)**
5000	**6.0 - 8.5 (175-240)**	**3.2 (2.45)**
7000	**8.5 - 11.0 (240-315)**	**4.0 (3.06)**
9000	**11.0 - 14.0 (315-400)**	**4.8 (3.67)**
11000	**14.0 - 17.5 (400-495)**	**5.6 (4.28)**
16000	**17.5 - 25.0 (495-710)**	**7.1 (5.43)**

Each stormwater treatment system shall include a circular aluminum “swirl chamber” (or “grit chamber”) with a tangential inlet to induce a swirling flow pattern that will accumulate and store settleable solids in a manner and a location that will prevent re-suspension of previously captured particulates.

Each stormwater treatment system shall be of a hydraulic design that includes flow controls designed and certified by a professional engineer using accepted principles of fluid mechanics that raise the water surface inside the tank to a pre-determined level in order to prevent the re-entrainment of trapped floating contaminants.

Each stormwater treatment system shall be capable of removing **80% of the net annual Total Suspended Solids (TSS)** load based on a 50-micron particle size. Annual TSS removal efficiency models shall be based on documented removal efficiency performance from full scale laboratory tests. Annual TSS removal efficiency models shall only be considered valid if they are corroborated by independent third party field testing. Said field testing shall include influent and effluent composite samples from a minimum of ten storms at one location. Individual stormwater treatment systems shall have the Design Treatment Capacity listed in Table 2.2, and shall not re-suspend trapped sediments or re-entrain floating contaminants at flow rates up to and including the specified Design Treatment Capacity.

Individual stormwater treatment systems shall have usable sediment storage capacity of not less than the corresponding volume listed in Table 2.2. The systems shall be designed such that the pump-out volume is less than _ of the total system volume. The systems shall be designed to not allow surcharge of the upstream piping network during dry weather conditions.

A water-lock feature shall be incorporated into the design of the stormwater treatment system to prevent the introduction of trapped oil and floatable contaminants to the downstream piping during routine maintenance and to ensure that no oil escapes the system during the ensuing rain event. Direct access shall be provided to the sediment

and floatable contaminant storage chambers to facilitate maintenance. There shall be no appurtenances or restrictions within these chambers.

The stormwater treatment system manufacturer shall furnish documentation which supports all product performance claims and features, storage capacities and maintenance requirements.

Stormwater treatment systems shall be completely housed within one rectangular structure.

2.03 Manufacturer:

Each stormwater treatment system shall be of a type that has been installed and used successfully for a minimum of 5 years. The manufacturer of said system shall have been regularly engaged in the engineering design and production of systems for the physical treatment of stormwater runoff during the aforementioned period.

An approved manufacturer is Vortechnics®, Inc., 200 Enterprise Drive, Scarborough, Maine 04074, phone: 207-885-9830, fax: 207-885-9825; producing the Vortechs® System as protected under U.S. Patent #5,759,415. Other manufacturers wishing to be approved must submit adequate proof of qualifications and experience in sufficient time for evaluation by the owner or its representative. The cost for any redesign or systems alterations to accommodate alternate manufacturers shall be borne by the Contractor at no additional cost to the owner. The structure shall meet all applicable requirements as set forth by local and state authorities.

Part 3 EXECUTION

3.01 Installation:

A. Each Stormwater Treatment System shall be constructed according to the sizes shown on the Drawings and as specified herein. Install at elevations and locations shown on the Drawings or as otherwise directed by the Engineer.

B. Place the precast base unit on a granular subbase of minimum thickness of six inches (152 mm) after compaction or of greater thickness and compaction if specified elsewhere. The granular subbase shall be checked for level prior to setting and the precast base section of the trap shall be checked for level at all four corners after it is set. If the slope from any corner to any other corner exceeds 0.5% the base section shall be removed and the granular subbase material re-leveled.

C. Prior to setting subsequent sections place bitumen sealant in conformance with ASTM C 990-91 along the construction joint in the section that is already in place.

D. After setting the base and wall or riser sections, prepare to install the swirl chamber. Place the butyl mastic sealant vertically on the outside of the swirl chamber starting one inch above the bottom of the swirl chamber and continuing to a height equal to the elevation of the bottom of the upper aperture of the swirl chamber. The butyl mastic sealant should abut the downstream side of the pre-drilled mounting holes that attach the swirl chamber to the long walls of the concrete vault. Next, install the extruded Buna N seal on the bottom edge of the 180 degree downstream section of the swirl chamber by first applying a bead of Sikaflex-1a polyurethane elastomeric sealant into the extruded slot then slide

the seal onto the swirl chamber. The extruded seal should extend 3-inches (76 mm) upstream of the mounting holes, toward the inlet end of the vault. Set the swirl chamber into position and keep the seal approximately _-inch (13 mm) above the floor of the concrete vault. Apply a continuous bead of Sikaflex-1a sealant under the cupped bottom of the seal. Set the circular swirl chamber on the floor of the vault and anchor it by bolting the swirl chamber to the side walls of the concrete vault at the three (3) tangent points and at the inlet tab using HILTI brand stainless steel drop-in wedge anchors or equivalent 3/8-inch (10 mm) diameter by 2-3/4 inch (70 mm) minimum length at heights of approximately three inches (3") (76 mm) off the floor and at fifteen inch (15") (381 mm) intervals to approximately the same height of the butyl mastic sealant (at locations of pre-drilled holes in aluminum components). Apply a continuous bead of Sikaflex-1a sealant to the intersection of the inside bottom edge of the extruded seal and the vault floor.

E. If the oil baffle wall (Baffle A) and flow control wall (Baffle B) are not integrally cast-in to riser/wall sections then the Baffle wall panels shall be placed in the formed keyways or between bolted-in-place angle flanges as provided by the manufacturer. Apply non-shrink grout or Sikaflex-1a sealant to each end of Baffle A and Baffle B at the upstream intersection with the side walls of the concrete vault.

F. Prior to setting the precast roof section, bitumen sealant equal to ASTM C 990 shall be placed along the top of the oil baffle wall (Baffle A), using more than one layer of mastic if necessary, to a thickness at least 1-inch (25 mm) greater than the nominal gap between the top of the baffle and the roof section. The nominal gap shall be determined either by field measurement or the shop drawings. Do not seal the top of Baffle B unless specified on the shop drawings to do so. After placement of the roof section has compressed the butyl mastic sealant in the gap over Baffle A, finish sealing the gap with an approved non-shrink grout on both sides of the gap using the butyl mastic as a backing material to which to apply the grout. If roof section is "clamshell" or "bathtub" halves, then finish sealing the ends of the Baffle walls by applying non-shrink grout or Sikaflex-1a sealant to each end of Baffle A at the upstream intersection with the side walls of the concrete vault and to each end of Baffle B at the downstream intersection with the side walls of the concrete vault.

G. After setting the precast roof section of the stormwater treatment system, set precast concrete manhole riser sections, to the height required to bring the cast iron manhole covers to grade, so that the sections are vertical and in true alignment with a _-inch (6 mm) maximum tolerance allowed. Backfill in a careful manner, bringing the fill up in 6-inch (152 mm) lifts on all sides. If leaks appear, clean the inside joints and caulk with lead wool to the satisfaction of the Engineer. Precast sections shall be set in a manner that will result in a watertight joint. In all instances, installation of Stormwater Treatment Systems shall conform to ASTM specification C 891 "Standard Practice for Installation of Underground Precast Utility Structures".

H. Holes made in the concrete sections for handling or other purposes shall be plugged with a nonshrink grout or by using grout in combination with concrete plugs.

I. Where holes must be cut in the precast sections to accommodate pipes, do all cutting before setting the sections in place to prevent any subsequent jarring which may loosen the mortar joints. The Contractor shall make all pipe connections.

END OF SECTION 02410

SECTION 02420 - SITE UTILITIES

Part 1. GENERAL

1.01 Related Documents:

A. The general provisions and documents of the Contract, including General and Special Conditions, apply to the work specified in this Section.

B. Site Earthwork - Section 02200

C. Site Drainage - Section 02400

D. Construction Drawings

1.02 Tests, Permits, Inspections, and Codes:

A. Sewer and water lines shall be tested before use.

B. Utility installations shall comply with all applicable local and state codes and with requirements of local sewer and water districts.

C. All utility installations shall be inspected and approved by the Landscape Architect or Owner’s authorized representative before being backfilled and also by utility company inspectors and local code enforcement where applicable.

D. The Contractor shall obtain and pay for any permits required for this portion of the work.

1.03 Submittals:

A. Refer to Section 02400, Paragraph 1.03.

B. Product Data: Provide data on pipe materials, pipe fittings, valves, meter pit and accessories.

C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

D. Project Record Documents: Record actual locations of piping mains, valves, connections; thrust restraints, and invert elevations. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

E. All materials including pipe, valves, hydrants, etc., shall be subject to approval by the Portland Water District or designated authority.

1.04 Quality Assurance:

A. Perform work in accordance with Portland Water District requirements. The Contractor shall comply with the requirements contained within this section and those contained within the Department's requirements. In the event of conflicting requirements, the more stringent standard shall apply.

1.05 Delivery, Storage and Handling:

A. Unload materials so as to avoid shock or damage. Handle and store all pipe in such a manner as to avoid deterioration or other injury thereto. Place no pipe within pipe of larger size. Store pipe and fittings on sills above storm drainage level and delivery for laying after trenches are excavated. Valves and hydrants shall be drained and stored to protect them from damage.

1.06 Damages:

A. If, during the process of this work, utilities in place are damaged, they shall be restored to their proper condition at no added cost to the Owner.

Part 2. PRODUCTS

2.01 Water Distribution System:

A. The Contractor shall contact and coordinate with the Portland Water District regarding the complete water system. Refer to the Portland Water District requirements.

2.02 Thrust Blocks:

A. Blocks shall be concrete of a mix not leaner than 1:2-1/2:5 cement: sand: stone, and shall have a compressive strength of not less than 3,000 psi at 28 days. Concrete for thrust blocks shall be placed against undisturbed earth.

B. Bedding: As specified in Section 02200.

C. Cover: As specified in Section 02200.

2.03 Accessories:

A. Concrete for Thrust Restraints: Concrete type specified in Section 03300.

PART 3. EXECUTION

3.01 Trenches:

A. Pipe trench excavation and backfill shall be as specified in Section 02200 - Site Earthwork.

3.02 Pipe Jointing and Pipe Laying:

A. Pipe Jointing - All joints shall be made in a dry trench and in accordance with the manufacturer's recommendations and the best practices for class of pipe laid. The ends of the pipe shall be wiped clean before making the joint.

B. Pipe Laying - The pipe shall be accurately laid to the line and grades to the satisfaction of the Landscape Architect or the Owner's authorized representative. Sewer pipe shall be placed on six (6) inches of specified crushed material. The line and grade may be adjusted by the Landscape Architect or his authorized representative or a City Engineering Department representative from that shown on the Drawings to meet field conditions and no extra compensation shall be claimed therefore. Whenever the nature of the material excavated is such as to render it unsuitable for bedding, the Contractor shall furnish suitable material as otherwise provided in these Specifications.

C. The interior of each length of pipe shall be swabbed and wiped clean before laying the next length. No length of pipe shall be laid until the previous length has had specified material placed and tamped around it to secure it firmly in place to prevent any disturbance. Bell ends shall be laid uphill. Whenever the work is stopped temporarily for any reason whatever, the end of the pipe shall be carefully protected against dirt, water or other extraneous material.

D. The pipe shall be cut as necessary. Sufficient short lengths of pipe shall be furnished so that pipe shall not be more than four (4) feet in length at points of connection with other piping.

E. Inspection - Pipe installation shall be subject to inspection by the Landscape Architect or his authorized representative for quality, adherence to line and grade, jointing and proper backfill. Any joint not satisfactory to the Inspector shall be removed and remade to his satisfaction at the Contractor's expense. No pipe shall be backfilled until it has been approved. All work must conform to the City of Portland standards for the sanitary installation.

F. Safety regulation of the State of Maine and the Federal Government, as applicable, shall be followed in regards to work in trenches and trench excavations.

3.03 Manhole Connection:

A. Neatly cut off main flush with inside of existing manhole where they enter structure walls, and point up irregularities and rough edges with nonshrinking grout. Shape inverts for smooth flow across structure floor as shown on Drawings. Use concrete and mortar to obtain proper grade and contour and finish surface with fine textured wood float.

3.04 Water Distribution System:

A. Work shall be in accordance with applicable AWWA, 10 State Standards, and Portland Water District Standards.

3.05 Lines and Grades:

A. All mains, valves, and curb stops locations shall be verified by the project engineer.

3.06 Excavation:

A. Excavation for trenches for the placing of water mains, valves, and fittings must be of sufficient width to permit the work to be done in the manner and to the depths specified or as shown on the plans. The trench shall be dug to the required level, and the bottom shaped by hand to conform to the shape of the pipe or appurtenances being installed.

3.07 Pipe Laying:

A. All pipe shall be laid to line as indicated on the Drawings. Pipes shall be laid with a minimum of 5 1/2 feet of cover over the pipe. This depth of cover shall be measured from finished grade. Pipe, fittings and valves shall be carefully handled to avoid damage.

B. Suitable equipment shall be provided by the Contractor for handling the pipe. Any damage to the pipe in handling or laying shall be at the Contractor's expense. Poured concrete thrust blocks shall be provided for all fittings shown on the Drawings and in accordance with the manufacturer's recommendations.

C. The Contractor shall install a warning tape in the water main trench that is detectable with an inductive type metal detector. The tape shall be blue and have printing that warns of a water line below. The tape shall be Allen Detectatape, as manufactured by Allen Systems, Inc., of Wheaton, Illinois or approved equal and have a 3" width.

D. Depth of installation shall be one to two feet below grade. The tape shall be detectable with an inductive type metal detector. Splicing of the tape shall be accomplished with manufacturer furnished metal clips. Where required by the Project Engineer, No. 9 gauge copper wire shall be clipped to the tape and brought to the ground surface or attached to other metal risers.

E. Unless special anchoring devices are indicated by the Project Engineer, all fittings shall be provided with concrete thrust blocks poured against the fitting and undisturbed earth to insure against disjointing from the pipe when placed under pressure. Concrete for thrust blocks shall be so placed that the pipe and joints will be accessible for repair. Concrete shall consist of one part Portland cement, 2 1/2 parts of fine aggregate, and 3 1/2 parts of course aggregate with just enough water to produce a workable consistency.

3.08 Vertical Separation From Sanitary Sewer :

A. Whenever water mains must cross sewer, lay at such an elevation that the top of the sewer is at least 18 inches below the bottom of the water main. When the elevation of the sewer cannot be buried to meet the above requirements, center one full length of water main over the sewer so that both joints will be as far from the sewer as possible.

3.09 Inspection:

A. The manufacturer shall certify to the Owner that all pipe and fittings furnished under this contract conform to these Specifications.

B. Acceptability of pipe shall be determined by results of strength tests and by inspection at point of delivery to determine whether pipe conforms to

Specifications in design and freedom from defects. Rejection on results of field inspection may be made on account of any of the following:

1. Variations in any dimensions exceeding permissible variations.

2. Visible cracks, holes, foreign inclusions or other injurious defects.

3. Any pipe or fittings showing a crack and any fitting or pipe which has received a severe blow that may have caused an incipient fracture, even though no such fracture can be seen, shall be marked as rejected and removed at once from work.

4. Variation of more than 1/16 inch per linear foot in alignment of pipe intended to be straight.

5. Insecure attachment of spurs or branches.

3.10 Backfilling:

A. Backfilling shall be done with approved materials free from roots, frozen pieces, rubbish, large clods or stones. Backfill materials shall be placed in trenches evenly and carefully around and over the pipe in layers. Each layer shall be thoroughly and properly compacted.

3.11 Testing:

A. Whenever practical, before the trench has been backfilled or the joints covered, the pipe shall be tested for leaks. The test may also be made with one foot of backfill placed on the pipe, or the pipe may be completely backfilled. All leaks above the allowable maximum shall be repaired, however regardless of when tests are made. The Contractor shall provide all necessary equipment including but not limited to an appropriate pump, water container, pressure gauge, valve, hydrant connection and corporation stop connection, and he shall perform all work required in connection with the test.

B. Each section tested shall be slowly filled with water, care being taken to expel all air from the mains and service lines, if installed. If necessary, the pipes shall be tapped at high points to vent the air. All foreign material shall then be flushed from the main. If possible, a flushing velocity of fps shall be run through the mains until clean.

C. The portion to be tested shall be placed under constant 150 percent of working pressure or 100 psi whichever is greater as designated by the project engineer, all leaks shall be repaired, additional tests instituted and continue the process until all major leakages are eliminated. The test pressure shall be at the minimum pressure at highest point in the water line. Further, line test pressure shall not exceed 15% of the pressure rating at the lowest point.

D. Allowable maximum leakage shall be determined, as follows L=(ND/ P/7400, where L = allowable leakage in gallons per hour, N if the total length tested divided by the standard length of pipe, D is the nominal diameter of the pipe in inches and P is the test pressure specified above.

E. A complete approved pressure test of a minimum of two hour duration will be accomplished prior to disinfection. Obtaining water at the site for testing shall be the Contractor's responsibility.

3.12 Disinfection of Water Mains and Fittings:

A. Disinfection of water mains and appurtenances shall be in accordance with the AWWA Standard C651-86, however, the tablet method is not allowed. Chlorinated water shall be directed along and through all lines and appurtenances to be disinfected until a minimum of fifty ppm of chlorine is detected at representative points throughout the line.

B. At the end of the 24-hour contact period, a minimum chlorine residual of 5 ppm free chlorine must be detected before disinfection will be considered successful. If unsuccessful, the lines must be re-chlorinated. Otherwise, the line shall be flushed out with clean water until a maximum of 0.4 ppm chlorine residual is detected. All valves and hydrants shall be operated several times during the twenty -four hour contact period. The disinfection water shall be wasted in an environmentally safe manner subject to the approval of the project engineer.

C. After disinfection, bacteriological samples will be collected and forwarded by the Contractor to a certified lab, such as the State Health Department, for analysis. If positive results are obtained, the system shall be repeated until negative results are obtained.

D. The method of disinfection and the chlorinating materials used shall be subject to the approval engineer.

3.13 Interference:

A. The Contractor shall be responsible for maintaining proper clearance between adjacent pipes and between pipes and structures. If an interference situation arises, any proposed new routing shall be approved by the Landscape Architect.

3.14 Clean-up:

A. Upon completion of the installation of the sanitary sewers, appurtenant structures, water distribution system and any other work incidental thereto, the Contractor shall remove from the project all equipment, surplus construction materials and debris of any type resulting from the work and shall leave the area in as good or better condition as prior to construction.

END OF SECTION 02420

SECTION 02460 - TREATED TIMBER PILES

Part 1 GENERAL

1.01 Description of Work:

A. General

The work covered by this Section, without limiting the generality thereof, consists of furnishing all plant, labor, equipment, appliances and material and performing all operations in connection with the furnishing and installing of 16-ton, 40-foot length design capacity treated timber friction piles at the locations and to the lines and grades shown on the drawings.

B. Related Work Specified Elsewhere

1. Excavation and Backfilling.

1.02 Definitions and Reference Standards:

A. Owner: The Owner is Maine Orthopedic Center of Portland, Maine.

B. Engineer: The Engineer is the firm of Pinkham and Greer Consulting Engineers, Inc., of Falmouth, Maine. The Engineer, or his authorized representative, is the authorized representative of the Owner for the work covered by this Section.

C. Contractor: The Contractor is the person or organization identified in the Agreement as being responsible for the work under this Section. The term Contractor shall also refer to an authorized representative of the Contractor.

D. ASTM: Specifications of the American Society for Testing and Materials.

E. AASHTO: American Association of State Highway and Transportation Officials.

F. Code: The BOCA National Building Code.

1.03 Quality Assurance:

A. Comply with all rules, regulations, laws and ordinances of the State of Maine and the City of Portland, Maine, and of all other authorities having jurisdiction. All labor, materials, equipment and services necessary to make work comply with such requirements shall be provided without additional cost to the Owner.

B. Field Monitoring and Testing

1. Full-time monitoring of pile driving operations will be provided by the Owner. No piles shall be driven except in the presence of an authorized representative of the Engineer.

2. Certification of quality of pile materials to be used in the work shall be furnished, in a form acceptable to the Engineer, at the time of delivery of materials to the site. Pile materials shall also be subject to on-site observation for conformance with specifications.

3. Approvals given by the Engineer or by testing agencies shall not relieve the Contractor of his responsibility for performing the work in accordance with the Contract Documents.

1.04 Submittals:

A. General: The Contractor shall submit the information specified herein to the Engineer for review. Unless otherwise specified, submittals shall be made not less than two weeks before the start of work.

B. Manufacturer's literature, including technical and performance literature for pile driving hammer, cushions, and other equipment for piles.

C. With each delivery the Contractor shall furnish certification of the creosote treatment for the piles at a retention of 12 pounds of creosote per cubic foot of wood.

D. As-Driven Pile Location Data

1. Submit pile location within two days after individual pile or pile cluster is completed.

2. At the completion of pile driving, submit final as-driven pile location plan, certified by a Registered Land Surveyor or Registered Professional Engineer.

1.05 Job Conditions:

A. Site and Subsurface Conditions

1. Subsurface investigation data are available from the Engineer in the report entitled, "Geotechnical Engineering Evaluation Proposed Maine Orthopedic Center Portland, Maine" dated 19 November 1990, by Consla Geotechnical Engineering, Inc., of Kennebunk, Maine, consulting geotechnical engineers.

Prior to submitting his bid, the Contractor shall review and understand the information contained in the report. The geotechnical report is made available to the Contractor for information on factual data only and shall not be interpreted as a warranty of subsurface conditions whether interpreted from written text, boring logs, or other data.

2. Available soil samples recovered from the borings may be examined at the office of Consla Geotechnical Engineering, Inc. The boring information is considered to represent the conditions at the locations of the test borings at the time the test borings were made. Variations from the conditions disclosed by the borings should be anticipated by this Contractor in planning and estimating the work.

3. The Contractor shall protect adjacent property, public utilities and structures, and completed work, from damage associated with the pile driving operation. Damage due to pile driving shall be repaired by the Contractor at his own expense.

4. Potential foundations and slabs of structures previously occupying the site may be encountered below grade during pile driving. A review of site history to determine if structures previously existed, and the extent and locations of all these structures should be determined prior to driving of piles.

1.06 Produce Delivery, Storage and Handling:

A. The Contractor shall deliver piles at times and in sequence to assure continuity of pile driving.

B. Piles shall be handled, transported, stacked and protected to prevent damage.

1.07 Lines and Grades:

A. The Contractor shall stake the pile locations and establish all elevations required. A baseline and benchmark located on or close to the site will be provided by the Owner. The Contractor shall be responsible for the maintenance and protection of the baseline and benchmark, and all pile location stakes.

B. The Contractor shall employ a licensed Registered Land Surveyor or a Registered Civil Engineer, familiar with pile installation, who shall establish lines and levels. The Contractor shall be responsible for the correct location of piles, as well as keeping up-to-date records of the amount of uplift of individual piles, and establishing actual pile locations. Locations of the centers of as-driven piles shall be shown on a Drawing in relation to the design location and submitted to the Engineer within two days after the individual pile or pile group is completed. Drawings shall include the following:

1. Column lines and north arrow.

2. Each pile identified by a separate number.

3. Elevation of each top of pile prior to cutting, to nearest 0.1 foot.

4. Deviation in inches, to the nearest one-fourth inch, from plan location at cutoff elevation.

C. Within two weeks after the completion of all pile driving, the Contractor shall provide the Engineer with a plan, certified by said Surveyor or Engineer, showing the as-driven location of all piles.

Part 2 PRODUCTS

2.01 Treated Timber Piles:

A. Treated timber piles shall be Southern Yellow Pine, Douglas fir, or Oak. Each pile shall be in one piece cut from a sound live tree, and free form any defects that will impair its strength and durability. All piles shall be butt-cut above the ground swell, shall have substantially uniform taper from butt to tip end, and shall be free from short kinks. Knots or blemishes shall be trimmed off close to and even with the body of the pile. The axis of the wood piles shall not deviate from the straight line more than one inch for each ten feet of length nor more than

six inches for the entire length. Except as otherwise provided herein, piles shall meet the requirements of ASTM D25.

B. The minimum pile tip diameter shall be 8 inches and the maximum allowable diameter three feet below the pile butt shall be 20 inches. A minimum pile butt diameter of 12 inches is required.

C. No inspection of wood piles will be made by the Owner prior to delivery of piles to the site of the work. At the site, the piles will be inspected by the Owner's representative and any piles which do not comply with the specifications will be rejected and shall be removed from the site by the Contractor. Regardless of this inspection, any pile broken or damaged during driving will be rejected.

D. Length of piles to be ordered shall be determined by the Contractor. Ordering and delivery of piles shall be planned in such a manner that changes in lengths of piles may be made if driving experience, as work progresses, indicates need for such changes.

E. Piles shall be pressure treated with a creosote-coal tar solution in accordance with the following American Wood Preserver's Association specifications.

1. C1-67 "Standard for Preservative Treatment by Pressure Process - All Timber Products".

2. C3-67 "Standard for the Preservative Treatment of Piles by Pressure Process, Land and Fresh Water Piles".

3. Retention of coal tar creosote shall be not less than 12 pounds per cubic foot of pile.

F. Splicing of piles will not be permitted.

Part 3 EXECUTION

3.01 Sequence of Operations and Equipment Requirements:

A. The Contractor shall provide at least one fully equipped pile driving rig in full-time operation at the site during the work, and shall mobilize additional equipment, if necessary to complete the work on schedule.

B. When piles are located in an area where excavation is to be made, the piles shall not be driven until the excavation has been completed.

C. The Contractor shall coordinate his pile driving operations with other work on the project.

D. Driving sequence in pile cap clusters shall be centermost pile first, then working outward from center.

3.02 Equipment:

A. Piles shall be installed with approved modern equipment. The proposed pile installation equipment and methods shall be subject to the approval of the Engineer and approval shall be secured before the start of installation.

B. The leads of the pile driving rig shall be fixed at two points; the points shall be at least half the length of the leads apart in order to maintain the pile and hammer in axial alignment at the correct plan location during the entire driving operation. The leads shall extend down to the lowest point at which the hammer must operate.

C. Friction piles may be driven with a single acting, double acting, or differential acting steam or air hammer, or diesel hammer.

D. Collars or bands of a design approved by the Owner shall be used where required for the protection of pile butts against splitting, brooming or other damage when the piles are driven.

E. The use of followers will not be permitted unless authorized in writing by the Engineer.

3.03 Installation:

A. Driving

1. As part of preparation for driving, each pile shall be marked at one-foot intervals along the entire pile length. In addition, the footage shall be marked and designated at five-foot intervals, starting from the tip of the pile.

2. All piles shall be driven at the locations shown on the Drawings. Pile locations shall be checked during driving and appropriate measures taken, as necessary, to maintain the correct pile location.

3. Each pile shall be driven to a depth of 40 feet and 16 ton capacity friction. Pile driving shall be continuous from ground surface to final top elevation without interruption.

4. Piles in a group shall be driven commencing in the center of the group and working toward the edge. All piles in any one group shall be driven before moving to other locations.

5. Immediately after a pile in a pile group is driven, the Contractor shall establish a reference point and its elevation on the pile for the purpose of checking uplift of the pile tip as additional piles are driven.

6. After all piles within the radius of uplift have been driven, the Contractor shall determine the elevation of the reference points on each of the piles in the group. If uplift of 0.04 feet or more has occurred, the pile shall be redriven to its original elevation. After redriving each pile, the Contractor shall reestablish the elevation of the reference point.

Redriving shall be repeated as often as necessary until the measured uplift on any pile is less than 0.04 feet.

7. The radius of uplift is defined as the maximum distance between piles such that pile driving causes uplift of 0.04 feet or more in the affected pile. Survey instruments used to establish the reference elevations shall be carefully checked and adjusted as necessary to insure accurate readings. Uplift measurements shall be submitted to the Engineer.

C. Obstructions: Piles abandoned because of obstructions encountered shall be cut off or pulled out at the discretion of the Engineer and the hole filled with sand.

D. Cutting Off Piles

1. Pile tops shall be cut off square within one inch of the elevations shown on the Drawings. The pile cut-offs shall become the property of the Contractor and shall be removed from the site.

2. After being cut to grade, the top surface of the pile shall be brush-treated with not less than three heavy coatings of hot creosote.

3. When piles are driven below the design cut-off grade, due to unexpected penetration, a limited number of build-ups will be permitted in accordance with designs provided by the Contractor and approved by the Engineer. Build-up costs shall be the responsibility of the Contractor.

END OF SECTION 02460

SECTION 02460 - SITE IMPROVEMENTS

Part 1. GENERAL

1.01 Related Work Specified Elsewhere:

A. The general provisions and documents of the Contract, including General and Special Conditions, apply to the work specified in this Section.

B. Clearing and Grubbing – Section 02100

C. Site Earthwork - Section 02200

D. Landscaping – Section02500

E. Construction Drawings

Part 2. PRODUCTS

2.01 Drip Strip:

A. Material for perimeter drip strip shall be Mirafi 160-N geotextile drainage fabric and inch washed stone.

2.02 Pavement Markings:

A. The paint shall be a non-bleeding, quick drying, alkyd petroleum base paint suitable for traffic-bearing surfaces and shall meet FS TTP-85E and mixed in accordance with manufacturer's instructions before application.

Part 3. EXECUTION

3.01 Drip-Strip:

A. The Contractor shall excavate to limits shown on the Drawings. Compact subgrade to provide a firm even base. Place 3/4" washed stone in six (6) inch layers and compact to achieve depth required on the Drawings.

3.02 Pavement Markings:

A. Immediately before applying the pavement marking paint to the pavement, the surface shall be dry and entirely free from dirt, grease, oil or other foreign matter which would reduce the bond between the paint and the pavement. The surface shall be thoroughly cleaned by sweeping and blowing, if required, to remove all dust, dirt and loose materials. Areas which cannot be satisfactorily cleaned by sweeping and blowing shall be scrubbed with water, as directed, after which the surface shall be allowed to dry prior to painting.

B. Apply two (2) coats of paint at manufacturer's recommended rate without the addition of thinner with a maximum of 125 square feet per gallon. Apply with mechanical equipment to produce uniform straight edges. At sidewalk curbs and crosswalks, use a straightedge to ensure a uniform, clean, and straight stripe.

END OF SECTION 02460

SECTION 02470 - BITUMINOUS CONCRETE PAVING

Part 1. GENERAL

1.01 Related Work Specified Elsewhere:

A. The general provisions and documents of the Contract, including General and Special Conditions, apply to the work specified in this Section.

B. Site Earthwork - Section 02200.

C. Construction Drawings.

1.02 References :

A. State of Maine Department of Transportation Standard Specifications Highways and Bridges, latest revision, hereafter designated as MDOT Specifications.

1.03 Material Certificates:

A. Submit materials certificate to onsite independent testing laboratory which is signed by material producer and Contractor, certifying that materials comply with, or exceed, the requirements herein.

Part 2. PRODUCTS

2.01 Materials:

A. Bituminous Concrete (parking and walkway) - An approved hot plant mix conforming to MDOT Standard Specifications (latest revision). Use 12.5mm Superpave HMA (MDOT Section 401) for binder and 9.5mm Superpave HMA (MDOT Section 401) for surface.

Part 3. EXECUTION

3.01 Bituminous Concrete Paving:

A. The Contractor shall be responsible that gravel is in proper condition to pave before starting work.

B. Proof roll prepared base material surface to check for areas requiring additional compaction and areas requiring removal and recompaction.

C. Do not begin paving work until deficient base material areas have been corrected and are ready to receive paving.

D. Pavement mix for parking areas shall be as herein specified and shall consist of the following courses after compaction:

	Binder Course	Wearing Course
Standard Duty Pavement:	1.5"	1"

E. The spreading of bituminous concrete shall be done wherever practicable by an approved mechanical spreader. Place mixture while it is still hot (+250 D.F.). Rolling shall be done as soon as practicable after spreading and in no case after the mixture is cooled. The exposed finished surface shall present a true, smooth plane, free from roller marks, conspicuous joining lines, patches, voids or other imperfections. Where brown spots or other serious imperfections occur they shall be cut down to the base course and replaced by new pavement rather than by attempting to patch the surface. Feathered edge patches will not be permitted.

F. Apply successive lifts of asphaltic concrete in transverse directions with the surface course placed in the direction of surface-water flow. Place in typical strips not less than 10' - 0" wide.

G. 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 asphalt concrete course. Joints at existing street paving and new paving shall be saw cut. Clean contact surfaces and apply tack coat.

H. Mix placed by hand shall be placed on a steel dump board or wheelbarrow from the truck and then shoveled into place.

3.02 Rolling and Compaction:

A. The mixture, after being spread, shall be thoroughly compacted by rolling as soon as it will bear the weight of the rollers without undue displacement. Mixture shall be compacted to a minimum of 92% theoretical maximum density. The number, weight and types of rollers and sequences of rolling operations shall be such that the required density and surface are consistently attained while the mixture is in workable condition.

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 thoroughly 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 maximum density.

F. Patching: Remove and replace paving areas mixed with foreign materials and defective areas. Cut out such areas and fill with fresh, hot asphalt concrete. Compact by rolling to maximum surface density and smoothness.

G. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

H. Do not permit maneuvering of excavating equipment, lifts or other vehicles with tight turning or tracking capabilities on finished surface. Damaged areas shall be restored by Contractor at no additional expense to Owner.

3.03 Field Quality Control:

A. Grade Control: Establish and maintain required lines and elevations.

B. Thickness: In-place compacted thickness shall not be less than thickness specified on the Drawings. Areas of deficient paving thickness shall receive a tack coat and a minimum one (1) inch overlay; or shall be removed and replaced to the proper thickness, at the discretion of the Owner; until specified thickness of the course is met or exceeded at no additional expense to the Owner.

C. Surface Smoothness: Testing shall be performed on the finished surface of each asphalt concrete course for smoothness, using 10' - 0" straightedge applied parallel with, and at right angles to centerline of paved area.

The results of these tests shall be made available to the Owner upon request. Surfaces will not be acceptable if exceeding following tolerances for smoothness:

Base Course Surface:	1/4"
Wearing Course Surface:	3/16"

D. Check surface areas at intervals necessary to eliminate ponding areas. Remove and replace unacceptable paving as directed by Owner.

E. Compaction: Field density tests for in-place materials shall be performed by examination of field cores in accordance with one of the following standards:

1. Bulk specific gravity of paraffin-coated specimens: ASTM D-1188.

2. Bulk specific gravity using saturated surface-dry specimens: ASTM D-2726.

F. Rate of testing shall be one (1) core per 20,000 square feet of pavement, with a minimum of three (3) cores from heavy-duty areas and three (3) cores from standard-duty areas. Cores shall be cut from areas representative of the project.

G. Areas of insufficient compaction shall be delineated, removed and replaced in compliance with the specifications at no expense to the Owner. Areas damaged by construction equipment shall be repaired to satisfaction of Owner at no expense to Owner.

END OF SECTION 02470

SECTION 02480 - CURBING

Part 1. GENERAL

1.01 Related Work Specified Elsewhere:

A. The general provisions and documents of the Contract, including General and Special Conditions, apply to the work specified in this Section.

B. Site Earthwork – Section 02200

C. Construction Drawings

1.02 References:

A. Where M.D.O.T. appears it shall be taken to mean The State of Maine Department of Transportation Specifications, Highways and Bridges – Latest Revision.

Part 2. PRODUCTS

2.01 Materials:

A. Bituminous Concrete Curb: An approved hot plant mix conforming to curb mix specifications.

Part 3. EXECUTION

3.01 Bituminous Concrete Curb:

A. Place curb by machine in locations shown on drawings. Use bituminous pad beneath curb at all locations. Taper terminus ends of bituminous curb to meet adjacent grade. Hand work on bituminous curb shall provide a smooth, even transition between formed curb and transition grade. Irregular or rough surfaces shall not be accepted.

3.02 Protection:

A. The Contractor shall be responsible to protect and repair as necessary all bituminous concrete curbing disturbed during construction at no expense to owner. Provide temporary barriers at all radius locations where truck entry would impact curbing.

END OF SECTION 02480

SECTION 02500 - LANDSCAPING

PART 1. GENERAL

1.01 Related Work Specified Elsewhere:

A. The general provisions and documents of the Contract, including General and Special Conditions, apply to the work specified in this Section.

B. Clearing and Grubbing – Section 02100

C. Site Improvements - Section 02460

D. Construction Drawings

1.02 Scope:

A. Work under this Section shall include all labor, materials, services, equipment and accessories necessary to furnish and install trees, shrubs, and turf in accordance with the specifications and applicable Drawings.

1.03 Certification of Acceptability:

A. Inspection of the work covered by this Section to determine completion of the work involved will be made at the conclusion of the Maintenance Period upon written notice requesting such inspection submitted by the Landscape Contractor at least ten (10) days prior to the anticipated date. The condition of turf and plantings will be noted and determination made by the Landscape Architect whether maintenance shall continue.

1.04 Standards:

A. Provide plants which are true to name. Tag one of each bundle or Lot with the name and size of plants and shall conform to ANSI Z260.1 - Nursery Stock, latest edition, of the American Association of Nurserymen, Inc.

B. Workmanship: Perform work in accordance with the best standards of practice for Landscape work and under the continual supervision of a competent foreman capable of interpreting the Drawings and Specifications.

C. Submit documentation to Landscape Architect of Record within twenty-five (25) days after award of contract stating that plant material is available. Any and all substitutions due to unavailability must be requested in writing prior to confirmation of ordering.

D. Plants shall be subject to review and approval of Landscape Architect of Record at place of growth or upon delivery for conformity to specifications. Such approval shall not impair the right of review and rejections during progress of the work. Submit written request for review of plant material at place of growth to Landscape Architect of Record. Written request shall state the place of growth and quantity of plants to be reviewed. Landscape Architect of Record reserves the right to refuse review at this time if, in his judgment, sufficient quantity of plants is not available for review. Review shall be for character and form.

1.05 Guarantee:

A. Turf and plantings shall be guaranteed for one (1) full year after certification of acceptability by the Landscape Architect and shall be alive and in satisfactory growth at the end of the guarantee period, except for damage resulting from causes beyond the responsibility of the Contractor. **The Contractor shall provide the Owner with a written guarantee upon certification of acceptability.** For plant material in question at the end of the guarantee, the Landscape Architect, Owner and Contractor shall determine a reasonable extension of the guarantee period.

1.06 Tests and Certifications:

A. Tests specified in this Section shall be paid for by the Contractor. **Certifications required must be submitted to the Landscape Architect or Owner's Representative for approval before use of materials on the site.**

B. **The Contractor shall be required to take representative soil samples of the topsoil** to be provided from several locations (on-site) in the area(s) under consideration for testing. Imported topsoil shall also require test results prior to placement. Tests shall be made by a State Commercial Soil Testing Laboratory using methods approved by the Association of Official Agricultural Chemist or the State Agricultural Experiment Station, or by the University of Maine at Orono. Testing shall include chemical balance (pH) **as well as organic content. The required pH level shall be between 6.6-7.3% and the organic content shall be between 6.5-8%.**

C. The Contractor shall provide testing data for composted soil amendment if required to supplement the required minimum organic content.

PART 2. PRODUCTS

2.01 Materials:

A. Topsoil - The Contractor shall furnish and place topsoil to give the specified depths. **The Contractor shall furnish and place 18 inches of loam in all shrub beds, and 6 inches under all turf areas.** Topsoil mix shall be placed in all tree and shrub pits as shown on the Drawings. Natural loam topsoil shall be of uniform quality, free from hard clods, still clay, hard pan sods, stones over _ inches and undesirable inorganic materials. The Owner and/or Landscape Architect reserves the right to reject on or after delivery any materials which do not, in his or her opinion, meet these Specifications.

B. Additives:

1. Humus - Ground or shredded peat that has been stockpiled at least one year prior to use, or commercial bagged peat.

2. Manure - Well-rotted unleached stable manure with no more that 25% straw, shavings, or sawdust content. A mixture of one (1) cubic yard of peat humus or peat moss and 100 lbs. of commercial dehydrated-bagged manure such as Bovung or Spurigon may be used.

3. Mulch for Plants - Well-rotted **(black)** shredded pine bark as approved by the Landscape Architect.

4. Lime - Commercial ground lime with no less than 85% total carbonates, 50% passing a 100 mesh sieve and 90% passing a 200 mesh sieve as approved by the Landscape Architect. Coarser material will be accepted provided that specific rates of application increased proportionately.

5. Compost soil amendment – Acceptable compost for "compost manufactured topsoil" shall conform to EPA Chapter 40 CFR 503 (pathogen, metals and vector attraction reduction) as well as applicable state regulations.

C. Commercial Fertilizer:

1. Seeding - 19-26-5 dust free homogenous granular material such as Scotts Pro-Turf Starter Fertilizer or an approved equal (application rate as recommended by manufacturer).

2. Sodding - 10-6-4 with 50% nitrogen derived from ureaform, such as Agway Turfwood Special Premium or an approved equal (application rate as recommended by manufacturer).

3. Superphosphate - 0-20-0 in unopened bags with manufacturer analysis printed on the bag.

D. Plant Materials - Furnish plants shown and specified on the Drawings and listed in the plant materials list. Discrepancies between the number of plants shown on the Drawings and the number listed in the plant list shall not be grounds for additional renumeration for the Contractor. Plants shall be nursery grown, typical of their species or variety and have a normal habit of growth. **Any plant with broken, damaged, or badly bruised branches, trunks, or root balls shall be rejected.**

1. Sizes: Plants larger than specified in the plant list may be used if approved by the Landscape Architect but use of such plants shall not increase the contract price. If the use of the larger plants is approved, the spread of roots or ball of earth shall be increased in proportion to the size of the plants.

2. Substitutions: In the event that trees, shrubs or other plant material specified in the plant list are impossible or unreasonably difficult to obtain, the Contractor shall immediately notify the Landscape Architect to discuss appropriate substitutions. No substitutions of plant material may be made without the approval of the Landscape Architect.

E. Grass Seed

1. Grass Seed mixtures shall be fresh, clean, new crop seed. Seed may be mixed by an approved method on the site, or may be mixed by the dealer. If the seed is mixed on the site, each variety shall be delivered in the original containers which shall bear the dealer's guaranteed statement of the composition of the mixture and the percentage of purity of each variety. **The Dealer's Guarantee Statement shall be delivered to the Landscape Architect.**

2. Grass seed mixture shall be of the following types of seed:

Lawn Areas:

Park Mix by Allen, Sterling & Lothrop or approved equal

35% Kentucky Bluegrass 85/80
20% Creeping Red Fescue
15% Chewings Fescue
15% Perennial Ryegrass
15% Ryegrass

PART 3. EXECUTION

3.01 Pre-Plant Weed Control:

A. If live perennial weeds exist on site at the beginning of work, spray with a non-selective systemic contact herbicide, as recommended and applied by an approved licensed landscape pest control advisor and applicator. Leave sprayed plants intact for at least fifteen days to allow systemic kill or as directed by advisor.

B. Maintain site weed free until final acceptance by Owner utilizing mechanical, manual and/or chemical treatment.

3.02 Planting of Trees and Shrubs:

A. **Plants must be located by the Contractor and approved by the Landscape Architect before pits are dug. The Contractor shall notify the Landscape Architect at least 48 hours prior to scheduling installation of plant material.** Locations as shown on the Drawings may be varied due to existing conditions.

B. Preparation of Soil - Manure, peat humus and superphosphate additives shall be incorporated into topsoil by placing the additives over topsoil piles and turning piles at least 3 times or until thoroughly mixed. (Refer to planting detail)

3.03 Staking and Guying:

A. Trees shall be staked at the time of planting as shown on the typical section of Tree Planting Detail.

3.04 Pruning and Mulching:

A. Remove all dead wood and/or suckers and all broken or badly bruised branches. All pruning shall conform to standards established by the National Arborist Association.

B. Immediately after planting operations are completed, cover all tree and shrub pits with three (3) inch layer of specified mulch. The limit of this mulch for trees shall be the area of the pit and for shrubs in beds, the entire area of the shrub bed.

3.05 Watering:

A. The Contractor shall be responsible for thoroughly watering all plant material upon installation.

B. Watering shall be monitored on a daily basis when temperatures exceed 70 degrees. The depth of moisture in all tree and shrub plantings shall be adequate to prevent wilting.

C. Watering (as required) of plant material shall continue for the duration of the maintenance period until certification of acceptability.

3.06 Loaming and Seeding:

A. Conduct planting operations under favorable weather conditions. Areas not required to be developed otherwise shall be seeded to turf.

B. Compost Manufactured Topsoil – The soil (source material) shall be free of lumps, plants, weeds, roots and other debris over 2 inches in any dimension and free of stones over inch in any dimension. The organic compost shall be uniformly incorporated into the loam source by rolling and tumbling, by a front-end loader or by processing in a mixing plant. The material shall be mixed sufficiently to produce a homogenous soil, free of lumps and clods. In addition to the requirements for the compost amendment, the Contractor shall provide documentation that the recommended rate of fertilizer, per the testing analysis, has been applied to lawn areas prior to seeding.

C. Prior to placing loam, scarify subgrade areas; remove all rocks over two (2) inches and debris; and set grade stakes as necessary. Place topsoil evenly over all areas to be loamed to a minimum thickness of six (6) inches. Hand rake to remove clods, lumps, brush, roots, and stones over _ inch in diameter. Hand roll to show depressions and uneven grades. Regrade as necessary to obtain smooth, even grades. Surplus topsoil shall become the property of the Contractor and shall be removed off the site.

D. Apply additives (lime, fertilizer, compost etc.) as per the recommendation of the testing lab. Apply additives and harrow into top two (2) inches of the seedbed.

E. Sow seed specified by use of a mechanical spreader at the rates specified. Rake lightly in; roll with 200 lb. roller and water with a fine spray.

F. Following compaction, apply a one- (1) inch layer of straw to hasten germination.

G. Full even growth in all areas must be guaranteed. The maintenance period shall continue after seeding and until the lawns are certified acceptable by the Landscape Architect.

H. Repair damage resulting from erosion, gullies, washouts or other similar causes if such damage occurs before certification of acceptability of turf and planting by the Landscape Architect.

I. Watering

1. First and Second Week - The Contractor shall provide all labor and arrange for all watering necessary for establishment of the turf. In the absence of

adequate rainfall, watering shall be performed daily or as often as necessary during the first and second week and in sufficient quantities to maintain moist soil to a depth of at least four (4) inches. Watering should be done during the heat of the day to help prevent wilting.

2. Watering shall continue to be the responsibility of the Contractor until such time as the Owner or project Landscape Architect has certified acceptance of lawn areas.

3.07 Maintenance:

A. General - Maintenance shall begin immediately after each portion of seed and each plant is planted and shall continue in accordance with the following:

1. Lawns: The Contractor shall be responsible for establishing a uniform stand of the specified seed and until a Certification of Acceptability is received. No bare spots shall be allowed. After the seed has started, all areas and parts of areas that fail to show a uniform stand of grass, for any reason whatsoever, shall be seeded or sodded repeatedly until all areas are covered with a satisfactory growth of grass. T**he Contractor shall be responsible for the first two (2) mowings.**

2. New Plantings: Protect and maintain new planting until the end of the lawn maintenance period, or, if installed after the lawn maintenance period, until installation of planting is certified acceptable by the Landscape Architect. Maintenance shall include watering, spraying and dusting for insect and fungal control, mulching, tightening and repairing guys, replacement of sick or dead plants, resetting plants to proper grades or upright position, and restoration of planting saucer, and all other care needed for proper growth and maintenance of the plants. Planting completed after the lawn preparation shall provide proper protection to lawn areas. Any damage resulting from planting operations shall be promptly repaired.

3. Spraying and Dusting: During the maintenance and guarantee periods, the Contractor shall do all seasonal spraying and / or dusting of trees and shrubs as required.

4. Protection: Planting areas and plants shall be protected against trespassing and damage of any kind. If any plants become damaged or injuries occur, they shall be treated or replaced as directed.

5. Damage: Damage resulting from erosion, gullies, washouts, or other causes shall be repaired by filling with topsoil, tamping, re-fertilizing, and sodding by the Contractor at his own expense if such damage occurs prior to certification of acceptability of turf and plantings by the Landscape Architect.

6. Responsibility: The Contractor's responsibility for maintenance shall cease at the time of certification of acceptability by the Landscape Architect. During the guarantee period, the Contractor shall be held responsible for making replacements, but no maintenance shall be required, other than spraying and dusting.

3.08 Replacement:

A. At the end of the guarantee period, inspection will be made by the Landscape Architect upon written notice requesting such inspection submitted by the Contractor at least ten (10) days before the anticipated date. Any plant required under this Contract that is dead or not in satisfactory condition, as determined by the Landscape Architect, shall be removed from the site. These, and any other plants missing due to the negligence of the Contractor, shall be replaced with plants of the same type and size as originally specified. Replanting shall be done as soon as conditions permit, but during the normal planting season. Plant items in accordance with these specifications.

3.09 Clean-up:

A. The Landscape Contractor shall remove all debris, construction equipment, excess fill, rocks, and other excess material caused by his work, from the site upon completion of his portion of the work.

END OF SECTION 02500

SECTION 03310 - CONCRETE WORK

Part 1 GENERAL

1.01 Description of Work:

A. Provide all cast-in-place concrete work.

1.02 Quality Assurance:

A. Codes and Standards: Comply with provisions of following codes, specifications, and standards, except where more stringent requirements are shown or specified.

1. ACI 301 "Specifications for Structural Concrete for Buildings"

2. ACI 318 "Building Code Requirements for Reinforced Concrete"

3. Concrete Reinforcing Steel Institute, "Manual of Standard Practice"

B. Testing and Services by Contractor: Performed by an approved testing laboratory at the Contractor's expense:

1. Material Evaluation Tests

2. Concrete Mix Designs

3. Tests not specifically indicated to be done at Owner's expense, including re-testing of rejected materials and installed work.

4. Furnish equipment, including buckets, shovels, and wheelbarrows, for proper sampling of concrete mix, molds for compression test specimens, and facilities for storing and curing specimens at the job site, and labor to assist technician performing field tests.

C. Materials and installed work may require testing and re-testing at any time during the progress of the work as directed by the Engineer. Allow free access to material stockpiles and facilities. These tests will be done by an independent approved laboratory at the Contractor's expense.

D. Testing by Owner: Field tests will be by the Engineer's representative or by an independent testing laboratory. Tests may be done for slump, air content, and concrete temperature, and compression test specimens will be taken. See Part 3 - Execution.

E. Field Testing for Small Placements: For placements of 15 cubic yards or less and for critical placements, variation from the ASTM requirement for sampling the middle portion of the batch for testing will be required. This is to prevent the first portion of a batch of defective concrete from being used in a small placement. Prior to small placements, meet with Engineer and determine an acceptable testing procedure based on the first portion of each batch.

1.03 Submittals:

A. Product Data: Submit manufacturer's product data with application and installation instructions for proprietary materials and items, including reinforcing accessories, admixtures, patching compounds, waterstops, joint systems, curing compounds, and others as requested by Engineer.

B. Shop Drawings; Reinforcement: Submit shop drawings for fabrication, bending, and placement of concrete reinforcement. Comply with ACI 315 "Manual of Standard Practice for Detailing Reinforced Concrete Structures," showing bar schedules, stirrup spacing, diagrams of bent bars, and arrangement of concrete reinforcement. Include special reinforcement required and openings through concrete structures.

C. Samples: Submit samples of materials as specified and as otherwise requested by Engineer, including names, sources, and descriptions.

D. Laboratory Test Reports and Mix Designs: Submit laboratory test reports for concrete materials and mix design test as specified.

E. Material Certificates: Provide materials certificates in lieu of materials laboratory test reports when permitted by Engineer. Material certificates shall be signed by manufacturer and Contractor, certifying that each material item complies with, or exceeds, specified requirements.

Part 2 PRODUCTS

2.01 Form Materials:

A. Forms for Exposed Finish Concrete: Unless otherwise indicated, construct formwork for exposed concrete surfaces with plywood, metal, metal-framed plywood faced, or other acceptable panel-type materials, to provide continuous, straight, smooth, exposed surfaces. Furnish in largest practicable sizes to minimize number of joints and to conform to joint system shown on drawings. Provide form material with sufficient stiffness to withstand pressure of newly-placed concrete without bow or deflection.

B. Forms for Unexposed Finish Concrete: Form concrete surfaces which will be unexposed in finished structure with plywood, lumber, metal, or other acceptable material.

C. Form Coatings: Provide commercial formulation form-coating compounds that will not bond with, stain, nor adversely affect concrete surfaces, and will not impair subsequent treatments of concrete surfaces.

D. Form Ties: Factory-fabricated, adjustable-length, removable, or snap-off metal form ties with waterstops, designed to prevent form deflection, and to prevent spalling concrete surfaces upon removal.

Unless otherwise indicated, provide ties so portion remaining within concrete after removal is at least 1" inside concrete.

Unless otherwise shown, provide form ties, which will not leave holes larger than 1" diameter in concrete surface.

2.02 Reinforcing Materials:

A. Reinforcing Bars: ANSI/ASTM A615, Grade 60, deformed.

B. Tolerances for fabrication are listed in a table at the end of this section.

C. Welded Wire Fabric (WWF): ANSI/ASTM A 185, welded steel wire fabric.

D. Supports for Reinforcement: Provide supports for reinforcement, including bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire fabric in place. Use wire bar type supports complying with CRSI recommendations, unless otherwise acceptable.

For slabs-on-grade, use continuous high-chair upper supports with appropriate sand plates or horizontal runners which will not damage vapor barrier or where base material will not support chair legs. Do not use concrete bricks, concrete blocks, or plastic supports.

2.03 Concrete Materials:

A. Portland Cement: ANSI/ASTM C 150, Type I or Type II, unless otherwise acceptable to Engineer.

Use one brand of cement throughout project, unless otherwise acceptable to Engineer.

B. Normal Weight Aggregates: ANSI/ASTM C 33, and as herein specified. Provide aggregates from a single source for exposed concrete.

Local aggregates not complying with ANSI/ASTM C33, but which have shown by special test or actual service to produce concrete of adequate strength and durability, may be used when acceptable to the Engineer.

C. Water: Potable.

D. Air-Entraining Admixture: ANSI/ASTM C 260.

E. Water-Reducing Admixture (use at Contractor's option): ANSI/ASTM C 494, Type A, and contain not more than 1% chloride ions.

F. High-Range Water-Reducing Admixture (Super Plasticizer) (use at Contractor's option): ASTM C 494, Type F or Type G and contain not more than 1% chloride ions. DO NOT use high-range water reducing admixtures for slabs on grade.

G. Water-Reducing, Accelerator Admixture: ASTM C 494, Type C or E.

H. Calcium chloride not permitted.

2.04 Related Materials:

A. Non-Shrink Grout: CRD-C 621, Type D, non-metallic factory pre-mixed grout.

B. Moisture-Retaining Cover: One of the following, complying with ANSI/ASTM C 171.

For slabs: Standard Grade Wet Strength Curing Paper equivalent to Hydramat by Century Floors.

For other concrete: Polyethylene Film or Polyethylene-Coated Burlap.

C. Liquid Membrane-Forming Curing Compound: Liquid type membrane-forming curing compound complying with ANSI / ASTM C 309, Type I, unless other type acceptable to Engineer. CURING COMPOUND IS NOT ACCEPTABLE FOR CURING FLOOR SLABS.

D. Bonding Compound: Acrylic emulsion, non-re-wettable type, equivalent to "Everbond" by L & M Chemicals, Inc.

E. Joint Sealant: Polyurethane-based one-part elastomeric sealant, complying with FS TT-S-00230, Class A, Type I (self-leveling) or Type II, as recommended by manufacturer for application shown.

F. Joint Primer / Sealer: As recommended by sealant manufacturer for joint surfaces to be primed or sealed.

G. Bond Breaker Tape: Polyethylene tape or other plastic tape as recommended by sealant manufacturer to be applied to sealant-contact surfaces where bond to substrate or joint filler must be avoided for proper performance of sealant. Provide self-adhesive tape where applicable.

H. Sealant Backer Rod: Compressible polyethylene foam, polyethylene jacketed polyurethane foam, butyl rubber foam, neoprene foam, or other flexible, permanent, durable, non-absorptive material as recommended by sealant manufacturer for compatibility with sealant.

I. Joint Filler: Resilient, non-extruding, pre-molded, bituminous, impregnated fiberboard complying with ASTM D1751, FS HH-F341, Type 1.

J. Bond Breaker: Equivalent to Thompsons Water Seal

K. Screed-Key Metal Slab Form: KEY-LOC Joint System by Form-A-Key products, size as required by slab thickness.

2.05 Proportioning and Design of Mixes:

A. Prepare design mixes for each type and strength of concrete by either laboratory trial batch or field experience methods as specified in ACI 301. If trial batch method is used, use an independent testing facility acceptable to Engineer for preparing and reporting proposed mix designs. The testing facility shall not be the same as used for field quality control testing unless otherwise acceptable to Engineer.

B. Submit written reports to Engineer of each proposed mix for each class of concrete at least 15 days prior to start of work. Do not begin concrete production until mixes have been reviewed by Engineer. Include the following in mix design submittals:

1. Identification of aggregate source of supply.

2. Results of compliance tests for aggregates.

3. Scale weights of each aggregate.

4. Absorbed water in each aggregate.

5. Brand, type, and amount of each cement and each admixture.

6. Proportions of each material required per cubic yard.

C. Design mixes to provide normal weight concrete with the following properties:

1. Min. 28-Day Compressive Strength: 3000 PSI

2. Max. Water/Cement Ratio: 0.50

3. Min. Cement Content: 564 lbs per cubic yard for all slabs; 470 lbs per cubic yard for other concrete

4. Slump: Not less than 1", not more than 4"
Concrete with HRWR Admixture: Not more than 8"

5. Max. Aggregate Size: 3/4"

6. Air Content: 6% ± 1 1/2% by volume for exterior concrete
2% maximum entrapped air only for interior slabs, no entrained air is permitted.

D. Adjustment to Concrete Mixes: Mix design adjustments may be requested by Contractor when characteristics of materials, job conditions, test results, weather, or other circumstances warrant, at no additional cost to Owner and as accepted by Engineer. Laboratory test data for revised mix design and strength results must be submitted to and accepted by Engineer before using in work.

E. Admixtures: Comply with manufacturer's instructions for use of admixtures.

F. Use water-reducing admixture, high range water-reducing admixture (super plasticizer), or accelerating admixture at Contractor's option. HRWR is not permitted in slabs.

2.06 Concrete Mixes:

A. Ready-Mix Concrete: Comply with requirements of ANSI/ASTM C 94, and as herein specified. Do not exceed total mixing and delivery time of 1-1/2 hours.

Water may be added for re-tempering provided maximum permissible slump and maximum water-cement ratio is not exceeded. Do not make additions without notifying the Engineer. Additional field tests and compressive test specimens may be required.

During hot weather, or under conditions contributing to rapid setting of concrete, a shorter mixing time than specified in ANSI/ASTM C 94 may be required.

When air temperature is between 85º F (30º C) and 90º F (32º C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes and, when air temperature is above 90º F (32º C), reduce mixing and delivery time to 60 minutes.

Part 3 EXECUTION

3.01 Forms:

A. Design, erect, support, brace, and maintain formwork to support vertical and lateral loads that might be applied until such loads can be supported by concrete structure. Construct formwork so concrete members and structures are of correct size, shape, alignment, elevation, and position, and have correct finish.

B. Tolerances for formed surfaces are listed in a table at the end of this section.

C. Design formwork to be readily removable without impact, shock, or damage to cast-in-place concrete surfaces and adjacent materials.

D. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces where slope is too steep to place concrete with bottom forms only. Kerf wood inserts for forming keyways, reglets, and recesses for easy removal.

E. Provide temporary openings where interior area of formwork is inaccessible for cleanout, for inspection before concrete placement, and for placement of concrete. Securely brace temporary openings and set tight-openings on forms at inconspicuous locations.

F. Chamfer exposed corners and edges as indicated, using wood, metal, PVC, or rubber chamfer strips fabricated to produce uniform smooth lines and tight edge joints.

G. Provisions for Other Trades: Provide openings in concrete formwork to accommodate work of other trades. Determine size and location of openings, recesses, and chases from trades providing such items. Accurately place and securely support items built into forms.

H. Cleaning and Tightening: Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, or other debris just before concrete is placed. Retighten forms and bracing after concrete placement is required to eliminate mortar leaks and maintain proper alignment.

3.02 Placing Reinforcement:

A. Comply with Concrete Reinforcing Steel Institute's recommended practice for "Placing Reinforcing Bars" for details and methods of reinforcement placement and supports, and as herein specified.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other materials, which reduce or destroy bond with concrete.

C. Accurately position, support, and secure reinforcement against displacement by formwork, construction, or concrete placement operations. Locate and support reinforcing by metal chairs, runners, bolsters, spacers, and hangers, as required.

D. Tolerances for placing reinforcement are given in Table 3 at the end of this section.

E. Place reinforcement to obtain at least minimum coverages for concrete protection. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement operations. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.

F. Install welded wire fabric in lengths as long as practicable. Lap adjoining pieces at least one full mesh and lace splices with wire. Offset end laps in adjacent widths to prevent continuous laps in either direction.

G. Support reinforcement for slabs-on-grade with continuous high-chairs placed at a maximum of 3' o.c.

3.03 Joints In Walls:

A. Construction Joints: Locate and install construction joints, which are not shown on drawings, so as not to impair strength and appearance of the structure, as acceptable to Engineer.

B. Provide keyways at least 1-1/2" deep in construction joints in walls and slabs and between walls and footings unless shown otherwise on the drawings.

C. Place construction joints perpendicular to the main reinforcement. Continue reinforcement across construction joints.

D. Control joints: Locate control joints in walls 30' o.c. max. at mid point in wall between column piers. If control joints in masonry are used, locate control joints to align with masonry control joints.

A. Sealant and Joint Filler Installation: Comply with manufacturer's printed instructions.

3.04 Joints In Slabs-On-Grade:

A. Construction joints in slabs: Required construction joint locations are shown on the Drawings. Other construction joint locations may be used as required by placement sequencing and operations. Continue reinforcement across construction joints.

B. Apply bond breaker material to face of previous placement (or existing) concrete at construction joints and at perimeter walls.

C. Control joints in slabs: Locate as shown on the Drawings. Continue reinforcement across joints. Where screed-key (sk) joints are required, install metal bulkhead at joint location and continue reinforcing through joint.

D. Sawcut control joints as soon as possible after finishing, without raveling joints, using soft-cut saws. Sawcut joints at column lines first. Install a new skid for soft-cut saws when a new saw blade is installed.

3.05 Installation of Embedded Items:

A. General: Set and build into work anchorage devices and other embedded items required for other work that is attached to, or supported by, cast-in-place concrete. Use setting drawings, diagrams, instructions, and directions provided by suppliers of these items.

B. Edge Forms and Screed Strips for Slabs: Set edge forms or bulkheads and intermediate screed strips for slabs to obtain required elevations and contours in finished slab surface. Provide and secure units sufficiently strong to support types of screed strips by use of strike-off templates or accepted compacting type screeds.

3.06 Preparation of Form Surfaces:

A. Coat contact surfaces of forms with a form-coating compound before reinforcement is placed.

Thin form-coating compounds only with thinning agent of type, and in amount, and under conditions of form-coating compound manufacturer's directions. Do not allow excess form coating material to accumulate in forms or to come into contact with concrete surfaces against which fresh concrete will be placed. Apply in compliance with manufacturer's instructions.

Coat steel forms with a non-staining, rust-preventative form oil or otherwise protect against rusting. Rust-stained steel formwork is not acceptable.

3.07 Concrete Placement:

A. General: Comply with ACI 304, and these specifications. Before placing concrete, inspect and complete formwork installation, reinforcing steel, and items to be embedded or cast in. Notify other crafts to permit installation of their work; cooperate with other trades in setting such work. Moisten wood forms immediately before placing concrete where form coatings are not used. Coordinate the installation of joint materials and moisture barriers with placement of forms and reinforcing steel.

B. Deposit concrete continuously or in layers of such thickness that no concrete will be placed on concrete which has hardened sufficiently to cause the formation of seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as herein specified. Deposit concrete as nearly as practicable to its final location to avoid segregation.

C. Placing Concrete in Forms: Deposit concrete in forms in horizontal layers not deeper than 24" and in a manner to avoid inclined construction joints. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints.

Do not exceed 4' free fall of concrete without approval of Engineer.

D. Consolidate placed concrete by mechanical vibrating equipment supplemented by hand-spading, rodding, or tamping. Use equipment and procedures for consolidation of concrete in accordance with ACI recommended practices.

E. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations not farther than visible

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

F. Remove all frost from slab base. Do not place concrete if temperature difference between base material and air is more than 20º F.

G. Maintain reinforcing in proper position during concrete placement operations.

H. Cold Weather Placing: Comply with ACI 306. Protect concrete work from physical damage or reduced strength, which could be caused by frost, freezing actions, or low temperatures. When air temperature has fallen to or is expected to fall below 40º F (4º C), obtain a concrete mixture temperature of not less than 50º F (10º C), and not more than 80º F (27º C) at point of placement.

Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.

Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators, unless otherwise accepted in mix designs.

I. Hot Weather Placing: Comply with ACI 305 when hot weather conditions exist that would impair quality and strength of concrete.

Maintain concrete temperature at time of placement below 90º F (32º 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.

Cover reinforced steel with water-soaked burlap if it becomes too hot so that steel temperature will not exceed the ambient air temperature immediately before embedment in concrete.

Wet forms thoroughly before placing concrete.

Use water-reducing retarding admixture (Type D) when required by high temperatures, low humidity, or other adverse placing conditions.

3.08 Finish Of Formed Surfaces:

A. Rough Form Finish: For formed concrete surfaces not exposed-to-view in the finish work or by other construction, unless otherwise indicated. This is the concrete surface having texture imparted by form facing material used, with tie holes and defective areas repaired and patched and fins and other projections exceeding 1/4" in height rubbed down or chipped off.

B. Smooth Form Finish: For formed concrete surfaces exposed-to-view or that are to be covered with a coating material applied directly to concrete, or a covering material applied directly to concrete, such as waterproofing, damp-proofing, painting, or other similar system. This is as-cast concrete surface obtained with selected form facing material, arranged orderly and symmetrically with a minimum of seams. Repair and patch defective areas with fins or other projections completely removed and smoothed.

C. Related Unformed Surfaces: At tops of walls, horizontal offsets surfaces occurring adjacent to formed surfaces, strike-off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

3.09 Monolithic Slab Finishes:

A. Float Finish: Apply float finish to all monolithic slab surfaces. After screeding, consolidating, and leveling concrete slabs, do not work surface until ready for floating. Begin floating when surface water has disappeared or when concrete has stiffened sufficiently to permit operation of power-driven floats, or both. Consolidate surface with power-driven floats, or by hand-floating if area is small or inaccessible to power units. Cut down high spots and fill low spots. Uniformly slope surfaces to drains. Immediately after leveling, re-float surface to a uniform, smooth granular texture.

B. Trowel Finish: Apply a smooth, tight trowel finish to monolithic slab surfaces to be exposed-to-view, and slab surfaces to be covered with resilient flooring, paint or other thin film finish coating system. A burnished finish is not desired.

Use operations to produce a concrete surface free of trowel marks, uniform in texture and appearance, and with a surface plane tolerance not exceeding 1/8" in 10' when tested with a 10' straightedge. Grind smooth surface defects which would telegraph through applied floor covering system.

C. Non-Slip Broom Finish: Apply non-slip broom finish to exterior concrete platforms, steps and ramps, and elsewhere as indicated.

Immediately after trowel finishing, slightly roughen concrete surface by brooming with fiber bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

3.10 Concrete Curing and Protection:

A. General: comply with ACI 308. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Start curing as soon as free water has disappeared from concrete surface after placing and finishing. Continue curing for at least 7 days in accordance with ACI procedures. Avoid rapid drying at end of final curing period.

B. Curing Methods: Perform curing of concrete except for slabs on grade or structural slabs by moisture curing, by moisture-retaining cover curing, by curing compound, and/or combinations of methods.

1. Provide moisture curing by the following methods:

a. Keep concrete surface continuously wet by covering with water.

b. Continuous water-fog spray.

c. Covering concrete surface with specified absorptive cover, thoroughly saturating cover with water and keeping continuously

wet. Place absorptive cover to provide coverage of concrete surfaces and edges, with 4" lap over adjacent absorptive covers.

2. Provide moisture-retaining cover curing as follows:

   Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 4: 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 methods are not acceptable for slabs on grade or structural slabs. For surfaces where this method is acceptable, follow manufacturers' instructions for application methods and rate of application.

C. Curing Formed Surfaces: Cure formed concrete surfaces, including undersides of beams, supported slabs, and other similar surfaces by moist curing with forms in place for full curing period or until forms are removed. If forms are removed, continue curing by methods specified above, as applicable.

D. Curing Unformed Surfaces: Cure unformed surfaces, other than slabs, using curing methods specified above.

E. Curing Slabs-on-Grade and Structural Slabs: Provide 7 day wet cure by covering slab with dry, wet strength curing paper placed in widest practical widths, with all seams lapped 4" and sealed with waterproof tape. Immediately repair any holes or tears during curing period using cover material and waterproof tape. Do not add additional water for curing. Limit construction traffic to foot traffic for 3 days. Do not allow lifts on floor during curing period. Do not apply curing compound.

3.11 Removal Of Forms:

A. Formwork not supporting weight of concrete, such as sides of beams, walls, columns, and similar parts of the work, may be removed after cumulatively curing at not less than 50º F (10º C) for 24 hours after placing concrete, provided concrete is sufficiently hard to not be damaged by form removal operations, and provided curing and protection operations are maintained.

B. Formwork supporting weight of concrete, such as beam soffits, joints, slabs, and other structural elements, may not be removed in less than 14 days and until concrete has attained design minimum compressive strength at 28 days. Determine potential compressive strength of in-place concrete by testing field-cured specimens representative of concrete location or members.

3.12 Miscellaneous Concrete Items:

A. Filling-In: Fill-in holes and openings left in concrete structures for passage of work by other trades, unless otherwise shown or directed, after work of other trades is in place. Mix, place, and cure concrete as herein specified, to blend with in-place construction. Provide other miscellaneous concrete filling shown or required to complete work.

3.13 Concrete Surface Repairs:

A. Patching Defective Areas: Repair and patch defective areas with cement mortar immediately after removal of forms, when acceptable to Engineer.

Cut out honeycomb, rock pockets, voids over 1/4" in any dimension, and holes left by tie rods and bolts, down to solid concrete, but in no case to a depth of less than 1". Make edges of cuts perpendicular to the concrete surface. Thoroughly clean, dampen with water, and brush coat the area to be patched with specified bonding agent. Place patching mortar after bonding compound has dried.

B. For exposed-to-view surfaces, blend white Portland cement and standard Portland cement so that, when dry, patching mortar will match color surrounding. Provide test areas at inconspicuous location to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.

C. Repair of Formed Surfaces: Remove and replace concrete having defective surfaces if defects cannot be repaired to satisfaction of Engineer. Surface defects, as such, include color and texture irregularities, cracks, spalls, air bubbles, honeycomb, rock pockets, fins and other projections on surface, and stains and other discolorations that cannot be removed by cleaning. Flush out form tie holes, fill with dry pack mortar, or precast cement cone plugs secured in place with bonding agent.

D. Repair concealed formed surfaces, where possible, that contain defects that affect the durability of concrete. If defects cannot be repaired, remove and replace concrete.

E. Repair of Unformed Surfaces: Test unformed surfaces, such as monolithic slabs, for smoothness and verify surface plane to tolerances specified for each surface and finish. Correct low and high areas as herein specified. Test unformed surfaces sloped to drain for trueness of slope, in addition to smoothness, using a template having required slope.

Repair finished, unformed surfaces that contain defects, which affect durability of concrete. Surface defects, as such, include crazing, cracks in excess of 0.01" wide or which penetrate to reinforcement or completely through non-reinforced sections regardless of width, spalling, pop-outs, honeycomb, rock pockets, and other objectionable conditions.

Correct high areas in unformed surfaces by grinding, after concrete has cured at least 14 days.

Correct low areas in unformed surfaces during, or immediately after, completion of surface finishing operations by cutting out low areas and replacing with fresh concrete. Finish repaired areas to blend into adjacent concrete. Proprietary patching compounds may be used when acceptable to Engineer.

F. Repair defective areas, except random cracks and single holes not exceeding 1" diameter, by cutting out and replacing with fresh concrete. Remove defective areas to sound concrete with clean, square cuts and expose reinforcing steel with at least 3/4" clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding compound. Mix patching concrete of same materials to provide concrete of same type or class as original concrete. Place,

compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.

G. Repair isolated random cracks and single holes not over 1" in diameter by dry-pack method. Groove top of cracks and cut-out holes to sound concrete and clean of dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding compound. Mix dry-pack, consisting of one part Portland cement to 2-1/2 parts fine aggregate passing a No. 16 mesh sieve, using only enough water as required for handling and placing. Place dry pack after bonding compound has dried.

Compact dry-pack mixture in place and finish to match adjacent concrete. Keep patched area continuously moist for not less than 72 hours.

Use epoxy-based mortar for structural repairs, where directed by Engineer.

H. Repair cracks in floor slabs, which form due to shrinkage occurring prior to cutting of control joints using epoxy injection.

I. Repair methods not specified above may be used, subject to acceptance of Engineer.

3.14 Quality Control Testing During Construction:

A. The Owner will employ a testing laboratory to perform field tests and to submit test reports.

B. Sampling and testing for quality control during placement of concrete may include the following, as directed by Engineer. Tests will be made for each concrete load and for each set of compression test specimens or as often as required to ensure compliance with the specifications.

1. Sampling Fresh Concrete: ASTM C 172, except modified for slump to comply with ASTM C 94.

2. Slump: ASTM C 143, at point of discharge.

3. Air Content: ASTM C 173, volumetric method for lightweight or normal weight concrete; ASTM C 231 pressure for normal weight concrete.

4. Concrete Temperature: Test hourly when air temperature is 40º F (4º C) and below, and when 80º F (27º C) and above.

5. Compression Test Specimen: ASTM C 31; one set of 3 standard cylinders for each compressive strength test unless field-cured cylinders are required. Mold and store cylinders for laboratory cured test specimens except when field-cure test specimens are required.

6. Compressive Strength Tests: ASTM C 39; 1 specimen tested at 7 days, 2 specimens tested at 28 days.

When frequency of testing will provide less than 5 strength tests for a given class of concrete, conduct testing from at least 5 randomly selected batches or from each batch if fewer than 5 are used.

When strength of field-cured cylinders is less than 85% of companion laboratory-cured cylinders, evaluate current operations and provide corrective procedures for protecting and curing the in-place concrete.

Concrete is satisfactory if averages of sets of three consecutive strength test results equal or exceed specified compressive strength, and no individual strength test result falls below specified compressive strength by more than 500 psi.

C. Test results will be reported in writing to Engineer and Contractor on same day that tests are made. Reports of compressive strength tests shall contain the project identification name and, date of concrete placement, name of concrete testing service, concrete type and class, location of concrete batch in structure, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7-day tests and 28-day tests.

D. Additional Tests: The testing service will make additional tests of in-place concrete when test results indicate that specified concrete strengths and other characteristics have not been attained in the structure, as directed by Engineer. Testing service may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42, or by other methods as stated in ACI 301.

Contractor shall pay for such tests conducted, and any other additional testing as may be required, when unacceptable concrete is verified.

3.15 Defective Work Acceptance and Remedies:

A. Defective Work: Any work which fails to comply with the requirements of these specifications or does not comply with the acceptance requirements of Chapters 17 and 18 of ACI 301.

B. Remedies: Work, which may be repaired to comply with these specifications using approved repair methods may be accepted. All repairs are at the Contractor's expense.

C. Remove and replace work, which cannot be repaired or strengthened with, approved methods. Removal and replacement are at the Contractor's expense.

D. Inadequate Concrete Strength: If test results show inadequate concrete strength, the following may be required at the Contractor's expense:

1. Additional curing of areas with inadequate concrete.

2. Modifications to mix designs for remaining work.

3. Changes in member size or reinforcing for remaining work.

TABLE 1

TOLERANCES FOR FORMED SURFACES

1. Variation from plumb:

   A. In the lines and surfaces of columns, piers, walls, and in arrises:
      In any 10-foot length.....1/4 in.
      Maximum for the entire length.....1 in.
   B. For exposed corner columns, control-joint grooves, and other conspicuous lines:
      In any 20-foot length.....1/4 in.
      Maximum for the entire length.....1/2 in.

---

2. Variation from the level or from the grades specified in the contract documents:

   A. In slab soffits, ceilings, beam soffits, and in arrises, measured before removal of supporting shores
      In any 10-foot length.....1/4 in.
      In any bay or in any 20-foot length.....3/8 in.
      Maximum for the entire length.....3/4 in.
   B. In exposed lintels, sills, parapets, horizontal grooves, and other conspicuous lines:
      In any bay or in 20-foot length.....1/4 in.
      Maximum for the entire length.....1/2 in.

---

3. Variation of the linear building line from established position in plan and related position of columns, walls, and partitions:
   In any bay.....1/2 in.
   In any 20-foot length.....1/2 in.
   Maximum for the entire length..... 1 in.

TABLE 1 (cont.)

TOLERANCES FOR FORMED SURFACES

4. Variation in the sizes and location of sleeves, floor openings, and wall openings.....±1/4 in.

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5. Variation in cross-sectional dimensions of columns and beams and in the thickness of slabs and walls:
   Minus.....1/4 in.
   Plus.....1/2 in.

---

6. Footings*
   A. Variations in dimensions in plan:
      Minus.....1/2 in.
      Plus..... 2 in.
   B. Misplacement or eccentricity:
      2 percent of the footing width in the direction of misplacement but not more than..... 2 in.
   C. Thickness:
      Decrease in specified thickness..... 5 %
      Increase in specified thickness.....No limit

---

7. Variation in steps:
   A. In a flight of stairs:
      Rise..... ±1/16 in.
      Tread.....± 1/8 in.

---

*Tolerances apply to concrete dimensions only, not to positioning of vertical reinforcing steel, dowels, or embedded items.

TABLE 2

TOLERANCES FOR FABRICATING REINFORCEMENT

Sheared length ..... ± 1 in.
Depth of truss bars .....+ 0 - 1/2 in.
Overall dimensions of stirrups, ties, & spirals ... ± 1/2 in.
All other bends ..... ± 1 in.

TABLE 3

TOLERANCES FOR PLACING REINFORCEMENT

Clear distance to formed surfaces..... ± 1/4 in.
Minimum spacing between bars..... - 1/4 in.
Top bars in slabs and beams:
Members 8 inches deep or less.....± 1/4 in.
Members more than 8 inches
but not over 2 feet deep..... ± 1/2 in.
Members more than 2 feet deep.....1 in.
Crosswise of members....spaced evenly within 2 in.
Lengthwise of members..... ± 2 in.

END OF SECTION 03310

SECTION 04200 - MASONRY

Part 1 GENERAL

1.01 Related Documents:

A. Drawings and related provisions of the contract including general and supplementary conditions, division 1 specification sections, Section 07900- Joint Sealers, 07600- Flashing and Sheet Metal, 09250- Gypsum Wallboard apply to this section.

1.02 Scope:

A. Install new CMU veneer, include all mortar and accessories for a complete job.

1.03 Quality Assurance:

A. Single source responsibility for the CMU- Obtain blocks from one manufacturer compliant with this specification and approved by architect.

B. Single source responsibility for the mortar- Obtain mortar from one manufacturer compliant with this specification and approved by architect.

1.03 Submittals:

A. Product data: Submit manufacturers product data for each type of masonry unit, accessory and other products including certifications each type complies with specified requirements.

B Submit the following samples for verification purposes:

1. Unit masonry samples showing expected color range.

2. Mortar masonry samples as required.

3. Sealants, weeps, and cavity wall accessories.

1.04 Delivery, Storage, and Handling:

A. Deliver brick to project in undamaged condition.

B. Store and handle CMU and accessories to prevent damage of any kind. Cull damaged brick as required.

C. Store cementitious material in elevated, dry, covered location.

1.05 Protection of work / Project Conditions:

A. During summer and fall months, after installing brick, maintain air temperature greater than 40 degrees F for at least 72 hours. If masonry is to be installed during winter months, protect, heat, and take all precautions to insure proper setting of brick. All masonry shall be kept dry during construction with waterpoof covering.

B. Cover top of walls at end of each days work with heavy waterproof sheeting. Extend a minimum of 24" down the walls and fix in place.

C. Protect all block work from staining, mortar droppings, or other material that may permanently mark brick veneer.

Part 2 PRODUCTS

2.01 Masonry Materials: Concrete Block

A. Provide standard modular block (7 5/8" x 3 5/8" x 15 5/8").

B. Facing block: ASTM C 90-96 formed and split faced concrete block, Style G&S 6P Split Face by Gagne and Sons Concrete Block, Warren Ave., Westbrook, Me. 1-800-339-9184 or 1-800-339-3313.

C. Size: Actual size shall be modular 7 5/8" x 3 5/8" x 15 5/8".

2.02 Mortar Materials:

A. Type I Portland cement: ASTM C 150, Type I

B. Type N medium strength mortar mix.

C. Hydrated Lime: ASTM C 207, Type I.

D. Colored Mortar Aggregate: Natural or manufactured sand selected to produce mortar color.

E. Architect shall approve sample area prior to beginning of masonry work.

F. Water: Clean, free of oils, acids, alkalis and organic matter.

G. No admixtures, air entraining, calcium chloride, or antifreeze shall be added to the mortar mix.

2.03 Masonry Accessories:

A. Masonry Ties: Galvanized triagular wire ties 3/16" dia.

B. Provide galvanized corner reinforcement at corners typical.

C. Weep Holes: Provide clear butyrate rectangular (3/8" x 1 1/2" x 3 1/2")

D. Bond breaker strips: Aspahlt impregnated 30 lb roofing felt.

E. Provide and install mortar net at base of all cavity wall air spaces. Mortar Maze by Advanced Building Products, 1-800-252-2306

2.05 Masonry measure and mixing:

A. All cementitious materials and aggregate shall be mixed for at least 3 minutes and not more than 5 minutes in a mechanical batch mixer with maximum water for workable consistency.

B. Mortars that have stiffened due to evaporation may be retempered by adding water for workability. Mortar shall be placed a maximum of 2 1/2 hrs. after initial mixing.

2.06 Masonry cleaners:

A. Acidic cleaner: Sure Lean No. 600 Detergent by Pro So Co or equal.

Part 3 EXECUTION

3.01 Construction tolerances:

A. Verify that the foundation and structure are within code tolerances before starting work.

B. 1/4" in 10 vertical feet

C. 1/4" in 20 feet for horizontal joints.

3.02 Laying masonry walls:

A. Layout walls in advance to insure accuracy of joing spacing, returns, offsets, and expansion joints. Layout walls to comply with specified tolerances, with courses accurately spaced and coordinated with other work.

B. Install units when mortar is soft and plastic. Do not adjust or move units after initial bond has been established. Remove and replace units with fresh mortar. Tool mortar joints when mortar is thumbprint hard.

C. Stopping and resuming work; Rack back 1/2 unit length in each course, do not tooth. Clean surfaces, wet brick and remove loose material as required before beginning work.

D. Keep airspace free of mortar droppings and debris, knock back protrusions of 1/4" or greater inside airspace.

E. Clean reinforcement of all oil, mud and debris that will adversely affect bond.

3.03 Mortar Mixes: Measure cementitious and aggregate materials in a dry condition by volume or equivalent weight and mix in a clean mechanical mixer. Mix with maximum amount of water consistent with workability to provide maximum tensile bond strength.

3.04 Joint Pointing: Joints shall be fully bedded free from voids and separation cracks. Tool joint to match existing brick walls.

3.05 Flashing: Flashing material shall be carefully placed as follows (Refer to Section 07600):

A. Above grade at base of walls.

B. Under and behind sills.

C. Between brick and bearing angles.

D. Continuous through wall flashing at base of all brick cavities.

E. Seams in flashing shall be permanetnly bonded and waterproofed.

F. Over wall openings.

3.06 Anchoring masonry work:

A. Anchor brick veneer to substrate and studs to comply with this section. Flashing material shall be carefully placed as indicated in this specification and on the drawings.

B. Fasten each anchor through substrate to stud with 2 corrosion resistant screws.

C. Locate anchor squarely on course to allow maximum vertical differential movement.

D. Space anchors 16: o.c. horizontally and 24" o.c. vertically. Install additional anchors within 12: of any openings. Place additional ties around openings and within 12" of of the ends of openings.

3.07 Expansion joints:

A. Expansion joints shall be placed at corners, openings, changes in height and at releiving angles.

B. Expansion joint shall be a face of sealant with a minimum of 1/4" of mortar with a backer rod. The remainder of the jooint shall be a compressible neoprene joint filler. Do not bridge the expansion joint with reinforcement or mortar. Do not use a non compressible back up filler.

C. Locate anchor squarely on course to allow maximum vertical differential movement.

D. Space anchors 16: o.c. horizontally and 24" o.c. vertically. Install additional anchors within 12: of any openings. Place additional ties around openings and within 12" of of the ends of openings.

3.08 Cleaning: After mortar is thoroughly set and cured clean as follows:

A. Remove particles of mortar with non metallic tools.

B. Protect adjacent non masonry surfaces from contact with cleaner by covering with poly sheeting and strippable tape or agent.

C. Saturate wall surfaces with water prior to application of cleaners remove cleaners promptly by rinsing as directed by manufacturer.

D. Use bucket and brush hand cleaning method.

END OF SECTION 04200

SECTION 05120 - STRUCTURAL STEEL

Part 1 GENERAL

1.01 Description Of Work:

A. Provide all structural steel as shown on the Drawings.

B. Structural steel: Work defined in AISC "Code of Standard Practice".

1.02 Quality Assurance:

A. Comply with the following, except as otherwise indicated:

AISC "Code of Standard Practice for Steel Buildings and Bridges".

AISC "Allowable Stress Design Specification for Structural Steel Buildings", including the "Appendices", "Commentary", and any supplements thereto as issued.

AISC "Specifications for Structural Joints using ASTM A 325 or A 490 Bolts" approved by the Research Council on Structural Connections (RCSC) of the Engineering Foundation, June 23, 2000.

AWS D1.1 "Structural Welding Code".

AWS D1.3 “Structural Welding Code- Sheet Steel”

ASTM A6 "General Requirements for Delivery of Rolled Steel Plates, Shapes, Sheet Piling and Bars for Structural Use".

B. Fabricator Qualifications: Meet one of the following requirements.

1. AISC or SSFNE member with 10 years experience in fabrication of building types listed in AISC Category I.

2. AISC Certified for Category I Buildings.

If the above requirements cannot be met, the fabricator shall retain an American Welding Society Certified Welding Inspector and submit weld procedures prepared per the American Welding Society D1.1 Structural Welding Code, latest edition. The welding procedures shall be reviewed and stamped by the CWI for conformance to ANSI/AWS D1.1.

The CWI shall insure compliance with the welding procedures on the shop floor and inspect a minimum of 50% of shop welds. If 10% of the inspected welds are unacceptable during initial inspection, 100% of all welds shall be inspected. Submit a report signed by the CWI showing the results of the inspections.

C. Qualifications for Welding Work: Qualify welding processes and welding operators in accordance with AWS "Standard Qualification Procedure".

Provide certification that welders to be employed in work have satisfactorily passed AWS qualification tests.

If re-certification of welders is required, re-testing will be Contractor's responsibility.

1.03 Submittals:

A. Product Data: Submit producer's or manufacturer's specifications and installation instructions for following products. Include laboratory test reports and other data to show compliance with specifications (including specified standards).

Structural steel (each type).

High-strength bolts including nuts and washers.

Structural steel primer paint.

Shrinkage-resistant grout.

B. Shop Drawings: Submit shop drawings including complete details and schedules for fabrication and assembly of structural steel members procedures and diagrams.

Provide setting drawings, templates, and directions for installation of anchor bolts and other anchorages to be installed by others.

C. Welder Qualifications: Submit AWS certification for all shop and field welders.

D. Welding Procedures: Submit written welding procedures for ALL field welding PRIOR to the start of any field welding.

1.04 Delivery, Storage and Handling:

A. Deliver anchor bolts and anchorage devices, which are to be embedded in cast-in-place concrete or masonry, in ample time to not delay work.

B. Store materials to permit easy access for inspection and identification. Keep steel members off ground. Protect steel members and packaged materials from deterioration.

Do not store materials on structure in a manner that might cause distortion or damage to members or supporting structures. Repair or replace damaged materials or structures as directed.

Part 2 PRODUCTS

2.01 Materials:

A. Metal Surfaces, General: For fabrication of work which will be exposed to view, use only materials which are smooth and free of surface blemishes including pitting, seam marks, rolled trade names and roughness. Remove such blemishes by grinding, or by welding and grinding, prior to cleaning, treating and application of surface finishes.

B. Structural Steel: W-shapes: ASTM A 992.

C. Structural Steel: other Shapes, Plates and Bars: ASTM A 36.

D. Structural Steel Tubes: ASTM A 500, Grade B.

E. Structural Steel Pipe: ASTM A 53, Grade B.

F. Anchor Bolts: ASTM A36.

G. High-Strength Threaded Fasteners: Heavy hexagon structural bolts, heavy hexagon nuts, and hardened washers, ASTM A 325.

H. Electrodes for Welding: Comply with AWS Code.

I. Structural Steel Primer Paint: Equivalent to Tnemec 10-99 or FD88-555.

J. Non-metallic Shrinkage-Resistant Grout: Pre-mixed, non-metallic, non-corrosive, non-staining product complying with CRD-C621 equal to the following:

Euco N.S.; Euclid Chemical Co.
Crystex; L&M Construction Chemicals
Masterflow 713; Master Builders.
Five Star Grout; U.S. Grout Corp.

2.02 Fabrication:

A. Shop Fabrication and Assembly: Shop fabricate and assemble to greatest extent possible in accordance with AISC Specifications and as indicated on final shop drawings. Provide camber in structural members where indicated.

Properly mark and match-mark materials for field assembly. Fabricate for delivery sequence, which will expedite erection and minimize field handling of materials.

Where finishing is required, complete assembly, including welding of units, before start of finishing operations. Provide finish surfaces of members exposed in final structure free of markings, burrs, and other defects.

B. Connections: Weld or bolt shop connections, as indicated.

Bolt field connections, except where welded connections or other connections are indicated.

C. High-Strength Bolted Construction: Install in accordance with AISC "Specifications for Structural Joints using ASTM A325 or A 490 Bolts".

D. Welded Construction: Comply with AWS Code for procedures, appearance and quality of welds, and methods used in correcting welding work.

E. Holes: Provide holes required for securing other work to structural steel framing, and for passage of other work through steel framing members, as shown on final shop drawings.

Provide threaded nuts welded to framing, and other specialty items as indicated to receive other work.

Cut, drill, or punch holes perpendicular to metal surfaces. Do not flame cut holes or enlarge holes by burning. Drill holes in bearing plates.

2.03 Shop Painting:

A. General: Shop paint structural steel, except those members or portions of members to be embedded in concrete or mortar and where not required on the drawings. Paint embedded steel, which is partially exposed on exposed portions and initial 2" of embedded areas only.

Do not paint surfaces which are to be welded or high- strength bolted connections with slip-critical joints.

Do not paint surfaces, which are scheduled to receive sprayed-on fireproofing.

B. Surface Preparation: Clean in accordance with Steel Structures Painting Council as follows:

SP-1 Solvent Cleaning: Oil and grease removal.

SP-2 Hand Tool Cleaning or SP-3 Power Tool Cleaning: for steel to be enclosed or protected.

SP-6 Commercial Blast Cleaning: for exposed steel or steel subject to prolonged job-site exposure.

C. Painting: Apply primer in accordance with manufacturer's instructions to provide dry film thickness of not less than 2.0 mils. Use painting methods, which result in full coverage of joints, corners, edges and exposed surfaces.

Part 3 EXECUTION

3.01 Erection:

A. Check elevations of concrete and masonry bearing surfaces, and locations of anchor bolts and similar devices, before erection work proceeds, and report discrepancies to Engineer. Do not proceed with erection until corrections have been made, or until compensating adjustments to structural steel work have been agreed upon with Engineer.

B. Temporary Shoring and Bracing: Provide temporary shoring and bracing members with connections of sufficient strength to bear imposed loads. Remove temporary members and connections when permanent members are in place and final connections are made. Provide temporary guy lines to achieve proper alignment of structures as erection proceeds.

C. Temporary Planking: Provide temporary planking and working platforms as necessary.

D. Anchor Bolts: Furnish anchor bolts and other connectors required for securing structural steel to foundations and other in-place work.

Furnish templates and other devices as necessary for presetting bolts and other anchors to accurate locations.

E. Setting Bases and Bearing Plates: Clean concrete and masonry bearing surfaces of bond-reducing materials and roughen to improve bond to surfaces. Clean bottom surface of base and bearing plates.

Set loose and attached base plates and bearing plates for structural members on wedges or other adjusting devices, or set loose leveling plates in grout. Set leveling plates so that additional shimming or adjustment is not required to plumb supported members.

F. Tighten anchor bolts after supported members have been positioned and plumbed. Do not remove wedges or shims, but if protruding, cut off flush with edge of base or bearing plate prior to packing with grout.

G. Pack grout solidly between bearing surfaces and bases or plates to ensure that no voids remain. Finish exposed surfaces, protect installed materials, and allow to cure.

For proprietary grout materials, comply with manufacturer's instructions.

H. Field Assembly: Set structural frames accurately to lines and elevations indicated. Align and adjust various members forming a part of complete frame or structure before permanently fastening. Clean bearing surfaces and other surfaces, which will be in permanent contact before assembly. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

Level and plumb individual members of structure within specified AISC tolerances.

Splice members only where indicated and accepted on shop drawings.

I. Comply with AISC Specifications for bearing, adequacy of temporary connections, alignment, and removal of paint on surfaces adjacent to field welds.

Do not enlarge unfair holes in members by burning or by use of drift pins, except in secondary bracing members. Ream holes that must be enlarged to admit bolts.

J. Gas Cutting: Do not use gas-cutting torches in field for correcting fabrication errors in primary structural framing.

K. Touch-up Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint. Apply paint to exposed areas using same material as used for shop painting to provide a minimum dry film thickness of 2.0 mils.

3.02 Quality Control:

A. Owner will engage an independent testing and inspection agency to inspect high-strength bolted connections and field welded connections and to perform tests and prepare test reports.

Testing agency shall conduct and interpret tests and state in each report whether test specimens comply with requirements, and specifically state any deviations therefrom.

Provide access for testing agency to places where structural steel work is being fabricated or produced so that required inspection and testing can be accomplished.

Testing agency may inspect structural steel at plant before shipment; however, Engineer reserves right, at any time before final acceptance, to reject material not complying with specified requirements.

B. Correct deficiencies in structural steel work which inspections and laboratory test reports have indicated to be not in compliance with requirements. Perform additional tests, at Contractor's expense, as necessary to reconfirm any noncompliance of original work, and as necessary to show compliance of corrected work.

C. Shop Welding: Inspect and test during fabrication of structural steel assemblies, as follows:

Certify welders and conduct inspections and tests as required. Record types and locations of defects found in work. Record work required and performed to correct deficiencies.

Perform visual inspection of all welds.

Perform tests of welds as follows. Inspection procedures listed are to be used at Contractor's option.

Liquid Penetrant Inspection: ASTM E 165.

Magnetic Particle Inspection: ASTM E 109; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration not acceptable.

Radiographic Inspection: ASTM E 94 and ASTM E 142; minimum quality level "2-2T".

Ultrasonic Inspection: ASTM E 164.

D. Field Welding: Inspect and test during erection of structural steel as follows:

Certify welders and conduct inspections and tests as required. Record types and locations of defects found in work. Record work required and performed to correct deficiencies.

Perform visual inspection of all welds.

Test 20% of all field welds using liquid penetrant, magnetic particle, radiographic or ultrasonic methods. If 20% of these tests show deficiencies, Engineer may require additional tests at no cost to the Owner.

END OF SECTION 05120

SECTION 05210 - STEEL JOISTS

Part 1 GENERAL

1.01 Description Of Work:

A. Provide steel joists and bridging as shown on drawings.

1.02 Quality Assurance:

A. Provide joists fabricated in compliance with the following, and as herein specified:

SJI "Standard Specifications, Load Tables and Weight Tables: Steel Joists and Joist Girders.

B. Qualification of Field Welding: Qualify welding processes and welding operators in accordance with the AWS "Standard Qualification Procedure".

Joists welded in place are subject to inspection and testing. Expense of removing and replacing any portion of steel joists for testing purposes will be born by Owner if welds are found to be satisfactory. Remove and replace work found to be defective and provide new acceptable work.

1.03 Submittals:

A. Product Data: Manufacturer's specifications and installation instructions for each type of joist and accessories. Include manufacturer's certification that joists comply with SJI "Specifications".

B. Shop Drawings: Submit detailed drawings showing layout of joist units, special connections, jointing and accessories. Include mark, number, type, location and spacing of joists and bridging.

1.04 Delivery, Storage and Handling:

A. Deliver, store and handle steel joists as recommended in SJI "Specifications". Handle and store joists in a manner to avoid deforming members and to avoid excessive stresses.

Part 2 PRODUCTS

2.01 Materials:

A. Steel: Comply with SJI "Specifications".

B. Unfinished Threaded Fasteners: ASTM A 307, Grade A, regular hexagon type, low carbon steel.

C. Steel Prime Paint: Comply with SJI "Specifications", except asphalt type paint not permitted.

2.02 Fabrication:

A. General: Fabricate steel joists in accordance with SJI "Specifications".

B. Bridging: Provide diagonal type bridging for "open web" joists, complying with SJI "Specifications".

Provide bridging anchors for ends of bridging lines terminating at walls or beams.

C. End Anchorage: Provide end anchorages to secure joists to adjacent construction, complying with SJI "Specifications", unless otherwise indicated. Do not extend bottom chords of joists at columns or walls except where required on the drawings.

D. Shop Painting: Remove loose scale, heavy rust, and other foreign materials from fabricated joists and accessories before application of shop paint, per SSPC-SP 3.63.

Apply one shop coat of primer paint to steel joists and accessories, by spray, dipping, or other method to provide a continuous dry paint film thickness of not less than 1.5 mil.

Part 3 EXECUTION

3.01 Inspection:

A. Erector must examine areas and conditions under which steel joists are to be installed and notify Contractor and Engineer in writing of conditions detrimental to proper and timely completion of work. Do not proceed with work until unsatisfactory conditions have been corrected in a manner acceptable to Erector.

3.02 Erection:

A. Place and secure steel joists in accordance with SJI "Specifications", final shop drawings, and as herein specified.

B. Placing Joists: Do not start placement of steel joists until supporting work is in place and secured. Place joists on supporting work, adjust and align in accurate locations and spacing before permanently fastening.

Provide temporary bridging, connections, and anchors to ensure lateral stability during construction. Where "open web" joist lengths are 40 feet and longer, install a center row of bolted bridging to provide lateral stability before slackening of hoisting lines.

C. Bridging: Install bridging simultaneously with joist erection, before construction loads are applied. Anchor ends of bridging lines at top and bottom chords where terminating at walls or beams.

D. Field weld joists to supporting steel framework in accordance with SJI "Specifications" for type of joists used. Coordinate welding sequence and procedure with placing of joists.

E. Bolt joists to supporting steel framework in accordance with SJI "Specifications" for type of joists used.

1. Provide unfinished threaded fasteners for bolted connections.

F. Secure Joists resting on masonry bearing surfaces by bedding in grout and anchoring to masonry construction as specified in SJI "Specifications".

G. Touch-Up Painting: After joist installation, paint field bolt heads and nuts, and welded areas, abraded or rusty surfaces on joists and steel supporting members. Wire brush surfaces and clean with solvent before painting. Use same type of paint as used for shop painting.

END OF SECTION 05210

SECTION 05300 - METAL DECKING

Part 1 GENERAL

1.01 Description Of Work:

A. 9/16" deep Metal Form Deck.

1.02 Quality Assurance:

A. Codes and Standards: Comply with provisions of the following codes and standards, except as otherwise indicated or specified:

1. AISI "Specification for the Design of Cold-Formed Steel Structural Members".

2. AWS D1.1 "Structural Welding Code".

3. AWS D1.3 "Structural Welding Code- Sheet Steel".

4. SDI "Design Manual for Floor Decks and Roof Decks", "Specifications for Roof Deck", "Specifications for Floor Decks".

B. Qualification of Field Welding: Qualify welding processes and welding operators in accordance with AWS "Standard Qualification Procedure".

Welded decking in place is subject to inspection and testing. Expense of removing and replacing portions of decking for testing purposes will be borne by Owner if welds are found to be satisfactory. Remove work found to be defective and replace with new acceptable work.

C. Underwriters' Label: Provide UL labeled floor deck units.

1.03 Submittals:

A. Product Data: Submit manufacturer's specifications and installation instructions for each type of decking and accessories. Include manufacturer's certification as may be required to show compliance with these specifications.

B. Shop Drawings: Submit detailed drawings showing layout and types of deck panels, anchorage details, and conditions requiring closure panels, supplementary framing, sump pans, cant strips, cut openings, special jointing or other accessories.

Part 2 PRODUCTS

2.01 Materials:

A. Steel for Painted Metal Deck Units: ASTM A 611, Grade C.

B. Steel for Galvanized Metal Deck Units: ASTM A 611 or A 446, minimum yield 33 ksi.

C. Miscellaneous Steel Shapes: ASTM A 36.

D. Sheet Metal Accessories: ASTM A 526, commercial quality, galvanized.

E. Paint: Manufacturer's baked-on, rust-inhibitive paint, for application to metal surfaces, which have been chemically cleaned, and phosphate chemical treated.

F. Galvanizing: ASTM A 525 galvanized finish, G 90 designation.

2.02 Fabrication:

A. General: Fabricate deck units in lengths to span 3 or more supports, with flush, telescoped or nested 2" laps at ends and nested side laps.

B. Floor Deck Units: 26 ga. galvanized metal equal to UFS by United Steel Deck or Permaform Type S by Roll Form Products.

C. Metal Closure Strips: Fabricate metal closure strips, for cell raceways and openings between decking and other construction, of not less than 0.045" min. (18 gage) sheet steel. Form to provide tight-fitting closures at open ends of cells or flutes and sides of decking.

D. Pour Stops: Galvanized steel, size as recommended by manufacturer for slab thickness and overhang.

Part 3 EXECUTION

3.01 Inspection:

A. Installer must examine areas and conditions under which metal decking is to be installed and notify Contractor and Engineer in writing of conditions detrimental to proper and timely completion of work. Do not proceed with work until unsatisfactory conditions have been corrected in a manner acceptable to Installer.

3.02 Installation:

A. General: Install deck units and accessories in accordance with manufacturer's recommendations and final shop drawings, and as specified herein.

Place deck units on supporting steel framework and adjust to final position with ends accurately aligned and bearing on supporting members before being permanently fastened. Do not stretch or contract side lap interlock.

Place deck units in straight alignment for entire length of run of cells and with close alignment between cells at end of abutting units.

Place deck units flat and square, secured to adjacent framing without warp or excessive deflection.

3.03 Fastening Deck Units:

A. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used in correcting welding work.

B. Floor Deck Units:

1. Fasten floor deck units to steel supporting members using 5/8" diameter puddle welds or 1/2" diameter welds with welding washers, depending on deck gage, as recommended by SDI. Weld to support in a weld pattern as recommended by SDI.

2. Side Laps: welded or screwed as recommended by SDI.

C. Cutting and Fitting: Cut and neatly fit deck units and accessories around other work projecting through or adjacent to the decking.

D. Reinforcement at Openings: Provide additional metal reinforcement and closure pieces as required for strength, continuity of decking and support of other work shown.

E. Closure Strips: Provide metal closure strips at open uncovered ends and edges of metal decking, and in voids between decking and other construction. Weld into position to provide a complete decking installation.

F. Touch-Up Painting: After decking installation, wire brush, clean and paint scarred areas, welds and rust spots on top and bottom surfaces of decking units and supporting steel members.

1. Touch-up painted and galvanized surfaces with same type of shop paint or galvanizing repair paint used on adjacent surfaces.

2. In areas where shop painted surfaces are to be exposed, apply touch-up paint to blend into adjacent surfaces.

END OF SECTION 05300