MAINE ORTHOPAEDICS ADDITION

1601 CONGRESS STREET
PORTLAND, MAINE

9 NOVEMBER, 2004

WHIPPLE-CALLENDER ARCHITECTS

SPECIFICATIONS

MAINE ORTHOPAEDICS ADDITION

OWNER
Maine Orthopaedics
1601 Congress St.
Portland, ME 04102

ARCHITECT
Whipple-Callender Architects
551 Congress Street
Portland, ME 04101
John Whipple 775-2696-104

CONSTRUCTION MANAGER
to be determined

LANDSCAPE and CIVIL
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Portland, ME 04101
John Mitchell, Betsey Melrose 774-4427

STRUCTURAL ENGINEER
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Falmouth, Maine 04105
Jay Moran, Ken Marsh, 781-5242

MECHANICAL ENGINEER
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Freeport, ME 04032 865-0753

ELECTRICAL
Design Build

November 9, 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.

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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.

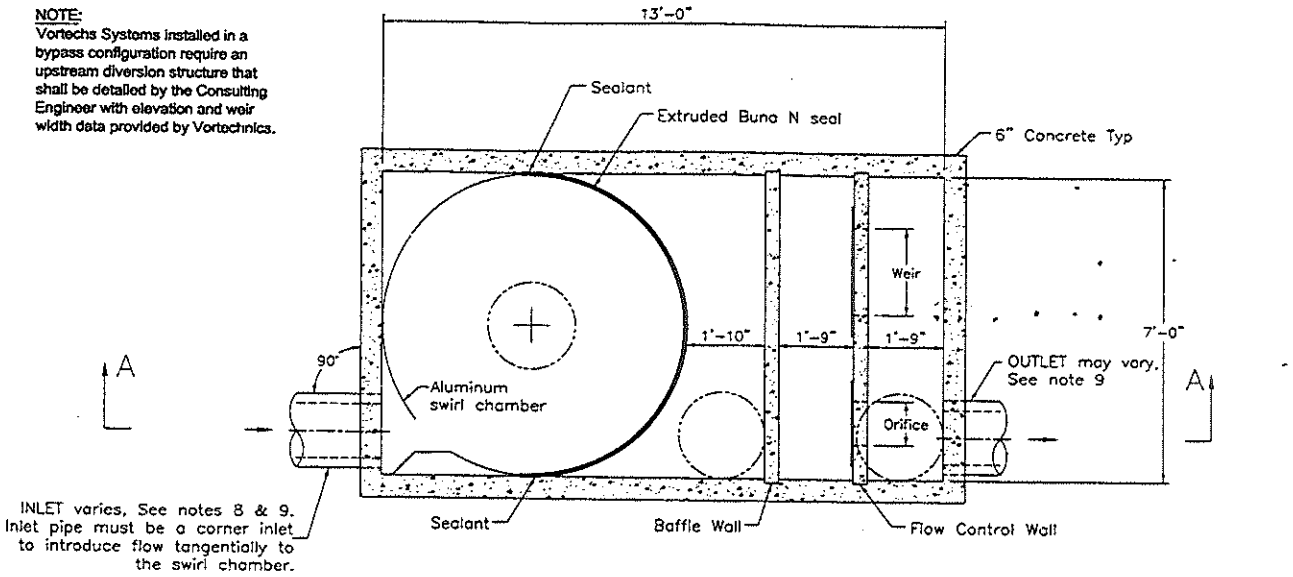
C. Sealant to be utilized at the base of the swirl chamber shall be 60 durometer extruded nitrile butadiene rubber (Buna N) and shall be provided to the concrete precaster for installation.

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.

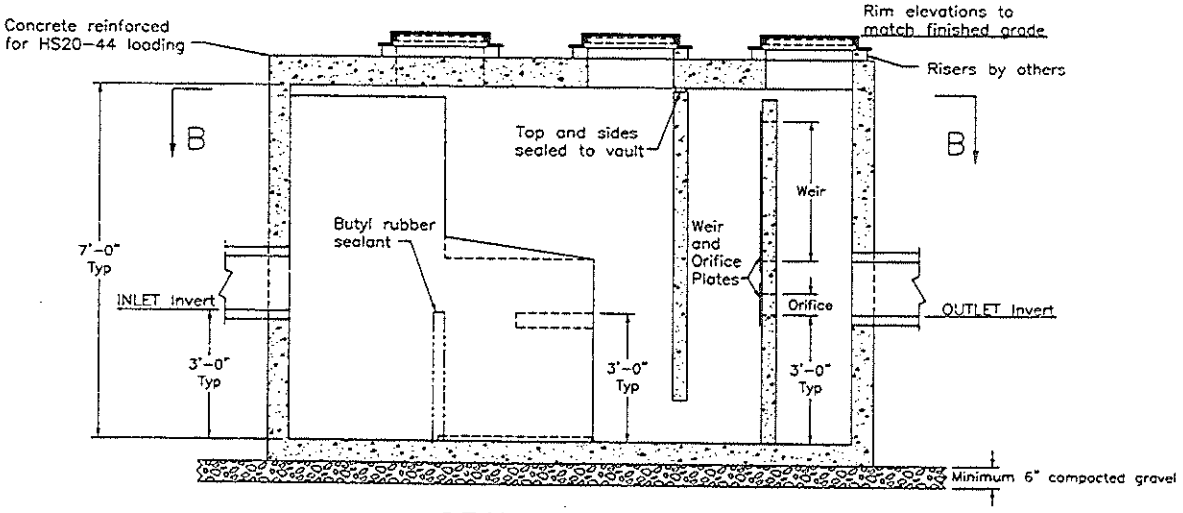
E. Casting for manhole frames and covers shall be in accordance with ASTM A48, CL.35B and AASHTO M105. The manhole frame and cover shall be equivalent to Campbell Foundry Pattern #1009A or #1012D custom cast with the Vortechnics® logo and the words "Vortechs® Stormwater Treatment System".

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

NOTE:
Vortechs Systems installed in a bypass configuration require an upstream diversion structure that shall be detailed by the Consulting Engineer with elevation and weir width data provided by Vortechnics.



PLAN VIEW B – B



SECTION A – A

NOTES:
1. Stormwater Treatment System (SWTS) shall have:
   Peak treatment capacity: 8.5 cfs
   Sediment storage: 3.25 cu yd
   Sediment chamber dia: 7' min
2. SWTS shall be contained in one rectangular structure
3. SWTS removal efficiency shall be documented based on particle size
4. SWTS shall retain floatables and trapped sediment up to and including peak treatment capacity
5. SWTS inverts in and out are typically at the same elevation
6. SWTS shall not be compromised by effects of downstream tailwater
7. SWTS shall have no internal components that obstruct maintenance access
8. Inlet pipe must be perpendicular to the structure
9. Pipe orientation may vary; see site plan for size and location
10. Purchaser shall not be responsible for assembly of unit
11. Manhole frames and perforated covers supplied with system, not installed
12. Purchaser to prepare excavation and provide crane for off-loading & setting at time of delivery
13. Contact Vortechnics @ (207) 885-9830 for ordering information

Vortechnics®
200 Enterprise Drive
Scarborough, ME 04074
Tel.: 207-885-9830
Fax: 207-885-9825

STANDARD DETAIL
STORMWATER TREATMENT SYSTEM
VORTECHS® MODEL 5000

U.S. PATENT No. 5,759,415

PROPRIETARY INFORMATION - NOT TO BE USED FOR CONSTRUCTION PURPOSES

DATE: 08/17/04	SCALE: 1/4" = 1'-0"	FILE NAME: STDSK	DRAWN BY: REC	CHECKED BY: NDG

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 02461 - 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 02461

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. **The 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 85° F (30° C) and 90° F (32° C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes and, when air temperature is above 90° F (32° 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 20° 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 40° F (4° C), obtain a concrete mixture temperature of not less than 50° F (10° C), and not more than 80° F (27° 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 90° F (32° 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 50° F (10° 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 40° F (4° C) and below, and when 80° F (27° 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

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7. Variation in steps:
   A. In a flight of stairs:
      Rise..... ±1/16 in.
      Tread.....± 1/8 in.

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*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

SECTION 06100 - ROUGH CARPENTRY

Part 1 GENERAL

1.01 Scope. Provide misc. carpentry and materials for the interior fit-up including blocking, headers, jack studs, nailers, plywood panels and any temporary carpentry needed for work in progress.

Part 2 PRODUCTS

2.01 Lumber and Other Rough Carpentry Materials:

A. Nailers, blocking, equipment bases, and other lumber of actual 1 1/2" or greater thickness shall be SPF (Spruce-Pine-Fir.)

B. Furring and other lumber less than 1 1/2" in thickness shall be No. 2 spruce or Douglas fir.

C. Plywood Sheathing: APA CDX in thicknesses indicated below and on the Drawings.

1. Wall Sheathing: APA Rated exterior plywood 24/0, 24/16, or wall 24 o.c. 1/2" minimum thickness.

2. Pitched Roof Sheathing: APA Rated sheathing: Exterior 32/16 5/8" minimum at rafter-supported roofs.

3. Flat Roof Sheathing: APA Rated sheathing: Exterior 32/16 3/4" minimum.

2.02 Construction Panels.

A. For types of concealed applications indicated below, provide wood panel products complying with PS 1 where applicable, and with "APA Performance Standard and Policies for Structural Use Panels" (Form E445) for requirements indicated.

2.03 Siding:

A. Shingles:
4" exposure clear White Cedar Shingles
7" exposure clear White Cedar Shingles

B. Exterior Siding Trim:
5/4" No 1 clear Cedar rough side out.

C. Miscellaneous trim @ windows:
MDO or clad plywood as supplied by window manufacturer.

D. Facias, eve and rake trim: Cedar 1" nominal boards A and better rough finish, back-primed

E. Soffits: Cedar 1 x 6 nominal, #2, T+G boards staggered. A and better rough finish, back-primed

2.04 Gable end vents: 42" high match existing 42" high x existing roof pitch.

2.05 Soffit vents: louvered strip 2" wide w/ screen. Match existing.

2.06 Fasteners and Anchorages: Of size, type, material and finish suited to application shown. Provide metal hangers and framing anchors of size and type recommended for intended use by manufacturer. Hot-dip galvanize fasteners and anchorages for work exposed to weather, in ground contact and high relative humidity to comply with ASTM A 153.

2.05 Building paper:

A. 15 lb asphalt saturated felt ASTM D-226 Type 1 non perforated over exterior walls behind masonry.

B. Tyvek building wrap behind wood siding and trim.

2.06 Sill Sealer: Glass fiber resilient insulation fabricated in strip form for use as a sill sealer: 1" nominal thickness compressible to 1/32"; width to suit width of sill members.

Part 3 EXECUTION

3.01 General. The contractor shall carefully layout and erect all structural members of rough carpentry, framing, sheathing, blocking, bridging, and other items of work as necessary to install the finished work as shown on plans or noted in Specifications. All members shall be properly braced, plumbed, and leveled. A sufficient number of nails, screws, and bolts shall be used to insure the rigidity of construction, and to meet local ordinances, including BOCA.

3.02 Nailers and Blocking. Blocking (2x6, 2x8, or wider) shall be provided as necessary for the application of plumbing accessories, and toilet accessories located on Drawings, other wall mounted accessories, electrical and communications equipment.

3.03 Interior Finished Carpentry. Install 3/4" fir plywood panelboards of sizes as required and in locations as necessary for all mechanical trades. Plywood shall be securely attached to the wall.

3.04 Installation of Miscellaneous Specialties. Refer to Toilet and Bath Accessories Specialties Section for items requiring installation hereunder. Receive all such items, and install in accordance with the instructions of the various manufacturers, using installation accessories furnished with the specific item.

3.05 Sheathing:

A. Wall sheathing shall be applied horizontally, with blocking at horizontal joints. Stagger joints. Leave 1/4" space at panel side joints, 1/8" end joints, unless otherwise recommended by manufacturer. Nail 1/2" sheathing with 6d common nails at 6" o.c. at edges, 12" o.c. at intermediate supports or staple with 16 GA galvanized wire staples with 3/8" minimum penetration in studs at 4" o.c. at panel edges and 8" o.c. at intermediate supports.

B. Roof sheathing shall be installed continuous over two or more spans with long dimension across supports. End joints shall be over supports and staggered in adjacent courses. Leave 1/4" space at panel edge joints and 1/8" space at panel end joints; unless otherwise recommended by manufacturer. Nail 6d common at 6" o.c. at panel edges, 12" o.c. at intermediate supports or staple 1 1/2" 16 GA Galvanized wire staples with 3/8" minimum crown at 4" o.c. at panel edges and 8" o.c. at intermediate supports.

3.06 Siding: Shingles shall be run true to level, starting at a point 1/2" below wall sheathing, and installed with specified exposures, nailed with 3d galvanized siding nails, 2 per shingle, following manufacturer's guidelines. Shingles shall be tightly butted to 5/4 x 5/4 cedar at inside corners; outside corners shall be woven or butted tightly to corner boards.

3.07 Exterior Trim: Fasten with 6d galvanized siding nails, double face- nail. Prime and back-prime all trim before installing.

END OF SECTION 06100

SECTION 06192 - PREFABRICATED WOOD TRUSSES

Part 1 GENERAL

1.01 Description Of Work:

A. Provide prefabricated wood trusses as shown on the drawings.

1.02 Quality Assurance:

A. Wood Truss Council of America (WTCA) and Truss Plate Institute (TPI) Standards:

1. "Design Specification for Metal Plate Connected Wood Trusses".

2. "Handling, Installing & Bracing of Metal Plate Connected Wood Trusses".

3. "Quality Control Manual".

B. Wood Structural Design Standard: National Design Specification for Wood Construction by American Forest & Paper Association.

C. Lumber Standard: PS 20 and applicable rules of respective grading inspecting agencies for species and grade of lumber indicated.

D. Connector Plate Manufacturer's Qualifications: TPI member complying with TPI quality control procedures for manufacture of connector plates published in TPI "Quality Control Manual".

E. Fabricator's Qualifications: Firm with a 5-year record of successfully fabricating trusses similar to type indicated participating in TPI "Quality Assurance Inspection Program" as a licensee authorized to apply TPI marks to trusses.

1.03 Submittals:

A. Product Data: Fabricator's specifications and installation instructions for required work, covering lumber, metal plates, hardware, fabrication process, treatment (if any), handling and erection.

B. Shop Drawings: Show species, sizes and stress grades of lumber to be used; pitch, span, camber, configuration and spacing for each type of truss required; type, size, material, finish, design value, and location of metal connector plates; location and size of permanent bracing; bearing and anchorage details; and design calculations to ensure trusses comply with load requirements.

Provide shop drawings, which have been signed and stamped by a structural engineer licensed to practice in the state where trusses are erected. Unstamped submittals will be returned without review. Submit a certificate prepared by the aforementioned structural engineer stating that the trusses have been designed for the most critical combination of design loads given in Section 2.01, B.

1.04 Delivery, Storage and Handling:

A. Handle and store trusses in accordance with manufacturer's instructions and TPI recommendations.

B. Time delivery and erection to avoid extended on-site storage and delay of work of other trades.

Part 2 PRODUCTS

2.01 Trusses - General:

A. Acceptable Manufacturers of Metal Connector Plates:

Alpine Engineered Products, Inc.
Gang Nail Systems, Inc.
Hydro-Air Engineering, Inc.
Inter-Lock Steel Co., Inc.

B. Design Loads: Trusses must support the following loads in addition to truss self weight:

Roof Trusses:

Snow Load		
Balanced Snow Loading	42	psf
Unbalanced Snow Loading	52.5	psf leeward
	0.0	psf windward
Drift Loading		See Structural Drawings for drift loading diagram(s)
Top chord dead load	10	psf
Bottom chord dead load	10	psf
Concentrated loads		See Structural Drawings

2.02 Lumber:

A. Factory mark each piece of lumber with type, grade, mill and grading agency.

B. Species & Grade: No. 2 or better; any species meeting design requirements of truss plate manufacturer, truss designer, and fabricator.

C. Maximum Moisture Content: 15%.

2.03 Metal Connector Plates:

A. Connector Plate Material: Min. "0.036" thick galvanized sheet steel, ANSI/ASTM A 446, Grade A, Coating G60.

2.04 Fabrication:

A. Cut truss members to accurate lengths, angles and sizes to produce close fitting joints with proper wood-to-wood bearing in assembled units.

B. Assemble truss members using jigs or other means to ensure uniformity and accuracy of assembly with close fitting joints.

C. Connect truss members with metal connector plates accurately located and securely fastened to wood members.

Part 3 EXECUTION

3.01 Installation:

A. Erect and brace trusses: Comply with requirements of manufacturer and BCSI 1-03 "Guide to Good Practice for Handling, Installing & Bracing of Metal Plate Connected Wood Trusses", and Summary Sheets BCSI-B1 to B11, by WTCA and TPI.

B. Erect trusses with plane of truss webs vertical (plumb) and parallel; locate at design spacings indicated.

C. Hoist units using proper lifting equipment applied at proper lift points. Do not damage truss members or joints by out-of-plane bending or other causes.

D. Temporary bracing; Provide to maintain trusses plumb, parallel and in proper location, until permanent bracing is installed. Depending on bracing requirements, temporary bracing may be used as permanent bracing.

E. Anchor trusses securely at all bearing points; comply with methods and details indicated.

F. Install permanent bracing as shown on the Drawings and as required by truss manufacturer.

G. Do not cut or remove truss members. Repair damaged truss members as directed by the truss manufacturer.

END OF SECTION 06192

SECTION 06200 - FINISH CARPENTRY

Part 1 GENERAL

1.01 Scope. Work covered by this section includes interior window and door trim, shelving and closet rods, anything not included in the millwork package. The construction manager may assign the work as he thinks best and he will be responsible for avoiding overlapping proposals.

1.02 Related Sections.

A. 06100 - Rough Carpentry

B. 06402- Millwork

C. 09900 - Painting

1.03 Quality Assurance.

A. Standards.
   1. Any item not given a specific quality grade shall be Custom grade as defined in the latest edition of the AWI "Quality Standards".

B. Competence. The installer of exterior finish woodwork shall be experienced in the joinery of large wood members and steel framing as well as exterior trim installation.

1.04 Field Dimensions. The craftsman is responsible for details and dimensions not controlled by job conditions and shall show on the shop drawings all required field measurements beyond his control. The General Contractor and the craftsman shall cooperate to establish and maintain these field dimensions.

Part 2 PRODUCTS

2.01 Window and door trim:
Painted poplar in sizes and shapes to match existing.

2.02 Finishing. See Painting section of this specification.

Part 3 EXECUTION

3.01 Finish work. All items of millwork shall be carefully erected, leveled and plumbed with tight-fitting joints and square corners, carefully cut and secured. Exposed nails shall set adequately for putty. Moulds and faces shall be free from hammer or other tool marks, clean-cut and true pattern. All work shall be thoroughly cleaned and sanded to receive the finish. Sharp corners of small members of finished woodwork shall be slightly rounded. Where necessary, woodwork shall be scribed to adjacent work.

3.02 Except as otherwise specified hereunder, fabricate all millwork items in strict accordance with the workmanship standards set forth in the AWI Quality Standards Section 400, and 600 for Custom Grade.

3.03 Just prior to the completion of all work under this Section, inspect all portions of the Work, accompanied by the Architect, and make any required adjustments or corrections to the work.

END OF SECTION 06200

SECTION 06402 - MILLWORK

Part 1 GENERAL

1.01 Scope of work consists of fabrication and installation of the secretaries desks, planters, chair rails, half walls, cabinets, counters, interior window frames, storage shelves and display shelves.

1.02 Related Sections.

A. 06100 - Rough Carpentry

B. 06200 - Finish Carpentry

C. 09900 - Painting

1.03 Quality Assurance.

A. Standards.

1. The 'Quality Standards' of the Architectural Woodwork Institute shall apply and by reference are here by made a part of this specification. Any reference are hereby made a part of this specification. Any reference to Premium, Custom or Economy in this specification shall be as defined in the latest edition of the AWI "Quality Standards".

2. Any item not given a specific quality grade shall be Custom grade as defined in the latest edition of the AWI "Quality Standards".

B. Competence. The approved woodwork manufacturer must have a reputation for doing satisfactory work on time and shall have successfully completed comparable work. The architect reserves the right to approve the woodwork manufacturer selected to furnish all of the woodwork.

1.04 Submittals.

A. Shop Drawings: Submit shop drawings all cabinetry as per section 01300 - Submittals.

B. Brochures. Submit manufacturer's descriptive literature of specialty items not manufactured by the architectural woodworker, as requested by the architect.

C. Samples: Submit finished samples of each wood species and cut indicated for transparent finish; of each material indicated for opaque finish; of each color, pattern, and finish of plastic laminate; and of each type of cabinet hardware.

1.05 Field Dimensions. The woodwork manufacturer is responsible for details and dimensions not controlled by job conditions and shall show on the shop drawings all required field measurements beyond his control. The General Contractor and the woodwork manufacturer shall cooperate to establish and maintain these field dimensions.

Part 2 PRODUCTS

2.01 Schedule of Architectural Woodwork.

A. Coat rack and wheelchair parking at entry

1. Lumber Species for Transparent Finish: Maple

2. Laminate: **TBD**

B. Half walls, planters, fish tank pedestal

1. Lumber Species for Transparent Finish: Maple

2. Planter liner: Galvanized sheet metal

C. Chair rails in both waiting rooms (existing chair rail in Waiting room 1 is to be replaced): 3/4" x 3" Maple

D. Secretary stations: 1 x 4 Maple milled to shiplap w/ 3" exposed face.

E. Base trim where wood: 3/4" x 4" maple.

F. Work area cabinets: lower and upper cabinets with drawers, adjustable shelves, P lam countertops. Laminate covered plywood boxes, doors, drawer fronts. Melamine covered shelves and drawers. Laminate **TBD.**

G. Video booth: Lower triangular P lam cabinet w/ adjustable melamine shelves. P lam countertop.

H. X ray work: Lower triangular P lam cabinet w/ adjustable melamine shelves. P lam countertop.

I. Exam Rooms and cast room (6 ea.): same as E above., plus a corner shelve unit for display of bones and models to be made of Maple.

J. Storage closet 120: melamine shelving w/ adjustable heavy duty brackets. See plans for number.

K. File room: Lower P lam cabinet w/ adjustable melamine shelves, doors on one side, P lam countertop. Sliding security screens to close off room **TBD.**

L. Lunch room B101: lower and upper cabinets with drawers, adjustable shelves, P lam countertops. Laminate covered plywood boxes, doors, drawer fronts. Melamine covered shelves and drawers. Laminate **TBD.**

2.02 Formaldehyde Emission Levels: Comply with formaldehyde emission requirements of each voluntary standard referenced below:

A. Particleboard: NPA 8.

B. Medium-Density Fiberboard: NPA 9.

C. Hardwood Plywood: HPMA FE.

2.03 Plastic Laminate: High-pressure decorative laminate complying with NEMA LD 3.

2.04 Interior Standing and Running Trim and Rails for Transparent Finish: Grade: Premium.

2.05 Interior Standing and Running Trim and Rails for Opaque Finish: Grade: Custom.

2.06 Wood Cabinets for Transparent Finish.

A. Grade: Premium.

B. AWI Type of Cabinet Construction: Flush with exposed face frame.

C. Grain Matching: Run and match grain vertically for drawer fronts, doors, and fixed panels.

D. Veneer Matching Within Panel Face: Center match.

2.07 Cabinet Hardware

A. Provide cabinet hardware and accessory materials associated with architectural cabinets, except for items specified in Division 8 section "Finish Hardware."

B. Cabinet Hardware Schedule: Refer to schedule at end of this section for cabinet hardware required for architectural cabinets.

C. For concealed hardware provide manufacturer's standard finish that complies with product class requirements of ANSI/BHMA A156.9.

2.09 High-Pressure Decorative Laminate Top:

A. Grade: Custom.

B. Plastic Laminate for Exposed Surfaces: GP-50 for nonpostformed surfaces; PF-42 for postformed surfaces.

C. Colors, Patterns, and Finishes: For exposed laminate clad surfaces, selections made by Architect from laminate manufacturer's full range of standard colors and finishes.

D. Edge Treatment: Same as laminate cladding on faces.
Edge Treatment: Lumber edge matching species and cut on exposed cabinet surfaces.

2.10 Finishes for Architectural Woodwork: Finish architectural woodwork as follows.

A. Shop-apply prime/base coat to the following types of architectural woodwork, in compliance with requirements indicated in Division 9 section "Painting."

B. Transparent Finish for Open-Grain Woods: Provide the following finish in compliance with AWI "Architectural Woodwork Quality Standards," Section 1500.

1. Grade: Premium.

2. AWI Finish System #3: Conversion varnish.

3. Staining: Match Architect's sample.

4. Effect: Open grain.

Part 3 EXECUTION

3.01 Install woodwork to comply with AWI Section 1700 for same grade specified in Part 2 of this section for type of woodwork involved.

3.02 Tops: Anchor securely to base units.

END OF SECTION 06402

SECTION 07100 - VAPOR BARRIERS, WATERPROOFING AND DAMPPROOFING

Part 1: GENERAL

1.01 Scope.

A. Furnish all labor material, tools, and equipment required to complete the installation of waterproofing membranes. At Southern eaves, 36" up slope of roof; at rakes, 36" from edge; at roof to wall junction, 36" each direction from center. North roof slope where flat roof meets pitched room is to be completely covered, eve to ridge.

C. Furnish all labor material, tools, and equipment required to complete the installation of underslab vapor barrier.

1.02 Related Sections

A. 02200 - Earthwork

B. 03310 - Concrete

C. all Division 7 sections

1.03 Quality Assurance. Materials shall comply with applicable ASTM standards and be UL listed.

1.04 Delivery, Storage and Handling.

A. Deliver materials in manufacturer's original, unopened packaging with all labels intact. Store and handle in such a way that materials remain undamaged.

1.05 Job Conditions.

A. Environmental Requirements: Follow manufacturer's recommendations for temperature requirements for all products used.

B. Compatibility. Verify compatibility between waterproofing products and sealants, etc. (i.e.. Bituthene by W.R. Grace & Co. is compatible with aged coal tar products. Bituthene may be incompatible with certain waterproofing products and joint sealants containing fresh tar or polysulfide polymer.) Contact manufacturer's rep. before applying in such applications.

Part 2: PRODUCTS

2.01 Roof Waterproofing Membrane.

A. Manufacturers. Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:

1. Bituthene, W.R. Grace & Co., Inc.

2. Weather Watch, G.A.F., Inc.

3. Polyken 660 Membrane, Kendall Co.

B. Primer

C. Sealant

D. Mastic

E. Protection Board

All materials needed to install membrane material shall be compatible with manufacturer's recommendations and instructions.

2.02 Bituminous Foundation Damproofing.

A. Cold applied Asphalt emulsion damproofing for exterior subgrade application to damp or dry substrates compounded to penetrate substrate and produce firm elastic coating. Product as manufactured by :

1. Celotex

2. Certainteed

3. Karnak

4. Sonneborn

B. Filter fabric on outside face of walls with two level perferated pipe drains.

Part 3: EXECUTION

3.01 Waterproofing Membrane. Waterproof underlayment for sloped-roofs on eaves and valleys as shown on drawings.

A. Inspection. Roof deck must be clean, dry, and free from debris or protrusions that could puncture the membrane.

B. Installation.

1. Membrane must be applied directly to the roof deck.

2. End laps must be at least 6", side laps at least 3 1/2".

3. Membrane must be promptly covered by finish roofing system.

4. Temperature application limits must be followed.

3.02 Bituminous Damproofing .

A. Inspection.

1. All concrete shall be cured a minimum of seven (7) days and be dry before application of damproofing.

B. Installation. Install in accordance with manufacturer's recommendations and instructions. No exceptions unless approved by Architect.

1. Apply to all subgrade concrete to be backfilled.

2. Extend downward from finish grade to top of footing. Cover top of footing and continue down onto side of footing.

3. Mask areas as required to protect adjoining work.

3.03 Underslab Waterproofing Membrane. Waterproof underlayment for use under concrete slabs.

A. Inspection: Sub base for concrete slab shall be tamped and level free of objects that could puncture membrane.

B. Installation.

1. Membrane must be applied over level well draining substrate.

2. End laps must be at least 9" and taped

3. Membrane must be promptly covered with well draining slab subbase material

4. Perimeter of barrier shall be permanently joined to inside face of perimeter frost wall. Follow architects detail.

5. Temperature application limits must be followed.

END OF SECTION 07100

SECTION 07200 - INSULATION

Part 1 GENERAL

1.01 Provide thermal insulation around the whole building and sound insulation around all rooms but closets.

Part 2 PRODUCTS

2.01 General: Provide preformed units in sizes to fit applications indicated, selected from manufacturer's standard thicknesses, widths and lengths.

A. Exterior walls: R-19, 6 1/4" unfaced batts.

B. Interior walls: 3 1/2" unfaced sound batts

D. At ceilings: 3 1/2" unfaced sound batts

C. Cap:. Batts or combination of batts and blown in insulation to achieve R38. Sprayed in place foam at junction of pitched roof and flat roof.

E. Flat roofs: Rigid, sloped styrofoam in thickness sufficient to provide adequate flow to roof drains. Sprayed in place foam under roof deck to achieve R38 minimum.

F. Foundation: 2" extruded polystyrene to 4' depth at foundation and edge of slab.

G. Penetrations in outside wall for elec fixtures, switches, outlets, pipes, etc.: Sprayed urethane foam.

H. Cavity at steel posts in exterior walls: rigid urethane, sprayed or cut to fit.

2.02 Mechanical Anchors: Type and size recommended by insulation manufacturer.

2.03 Auxiliary insulation Materials:

A. 6 mil. polyethylene vapor barrier with approved seam tape. in all exterior walls.

B. Kraft paper barrier in all caps except where foam is scheduled.

2.05 Venting:

A. Prop-a-Vent or equal at attic insulation

B. Continuous 2 " vent strip at eave

C. Continuous Ridge venting by roofing contractor

Part 3 EXECUTION

3.01 General: Comply with insulation manufacturer's instructions for particular conditions of installation in each case. The contractor is responsible for a complete thermal and acoustical envelope. Please report to the architect if any conditions exist to prohibit successful execution.

3.02 Inspection and Preparation.

A. Examine substrates and conditions under which insulation work is to be performed. If there are conditions harmful to insulation, report to construction manager and to architect.

B. Do not proceed with installation of insulation until unsatisfactory conditions have been corrected.

C. Clean substrates of substances harmful to insulation.

3.03 Support insulation units by adhesive or mechanical anchorage or both as applicable to location and conditions indicated. Where walls are not finished on both sides or insulation does not fill the cavity depth, supplementary support must be provided to hold product in place.

3.04 Insulation should fit snugly without sagging or gaps.

3.05 Fit and secure vapor barrier tightly to structure and penetrations with appropriate fasteners or adhesives. Repair tears or holes in vapor barrier prior to concealment.

3.06 Fit rigid insulation tightly to building at edge of slab conditions. Fasten securely prior to plywood.

3.07 **The contractor is responsible for creating a tight and continuous envelope around the heated portion of the building, and for insuring air passage from the eaves above the roof insulation. The CM shall call the architect for an inspection before insulation is covered.**

END OF SECTION 07200

SECTION 07410 - PREFORMED METAL ROOFING

Part 1 GENERAL

1.01 Scope: provide standing seam roof.

1.02 Performance Requirements: Provide preformed panel systems which comply with performance requirements indicated based on pre-testing of installed panels using the following methods.

A. Air Infiltration: ASTM E 283.

B. Water Penetration: ASTM E 331.

C. Structural Properties: ASTM E 72.

D. Thermal: ASTM C 236.

1.03 Submittals: Submit manufacturer's product data describing preformed roofing and siding panels and structural support system.

A. Submit shop drawings showing layout of panels on roofs and walls, and details of special and typical conditions.

B. Submit samples.

Part 2 PRODUCTS

2.01 Match existing roof.

2.03 Internal Panel Framing: Manufacturer's standard.

2.04 Fasteners: Manufacturer's standard, with heads gasketed where exposed on exterior.

2.05 Accessories: Provide manufacturer's standard and accessories as required for a complete installation including trim, copings, faciae, gravel stops, mullions, sills, flashing, corner units, ridge closures, clips, seam closures, battens, gutters, downspouts, louvers, gaskets, sealants, and similar items.

2.06 Metal Finishes: Apply coatings indicated either before or after forming and fabricating panels, as required by coating process or for maximum coating performance. Provide colors or color matches as indicated, or if not otherwise indicated, as selected by Architect from manufacturer's standard colors.

Fluoropolymer Coating: Baked-on fluoropolymer coating system consisting of epoxy or urethane primer and fluoropolymer topcoat formulated with "Kynar 500 resins, with dry film thickness of not less than 0.2 mil for primer and 1.0 mil for topcoat.

Part 3 EXECUTION

3.01 Fabricate and finish panels and accessories at factory to greatest extent possible, by manufacturer's standard procedures and processes to produce panels of type indicated and to comply with indicated profiles, and to dimensional performance requirements indicated.

3.02 Sandwich Panel Field Assembly: Assemble sandwich in place at project site; comply with exterior panel manufacturer's instructions for anchorage and support of components.

3.03 Installation:

Comply with panel mfr.'s. instructions for anchorage, joint sealers, flashing and trim for the proper and permanent installation of panels, with provisions for thermal expansion, erected in panel pattern indicated.

A. Conceal fasteners by use of laps and joint clips.

3.04 Separate aluminum sheets from contact with wood, masonry and steel (structure, panels or fasteners), by either a 15-mil coating of fibered asphalt paint or by tapes or gaskets of type recommended by panel manufacturer. Except as otherwise recommended by manufacturer, fasten aluminum work with non-magnetic stainless steel fasteners, gasketed where needed for waterproof or vapor proof performance.

END OF SECTION 07410

SECTION 07530 - ELASTOMERIC SHEET ROOFING

Part 1: GENERAL

1.01 Scope: Furnish and install EPDM rubber membrane roof system with all related items required for a complete job in compliance with the drawings on three decks.

1.02 Related sections:

A. 06100 - Rough Carpentry
B. 07200 - Insulation

1.03 Codes and Standards Requirements:

A. Materials shall conform to UL Class A fire resistance and I-90 wind resistance certification. Installation shall conform to all applicable building codes for roofing systems requirements and limitations.

1.04 Warranty: Roofing products shall have a minimum 10 year limited manufacturers warranty. Submit all necessary shop drawings if required by the manufacturer to gain such a warranty.

1.05 Product delivery, storage and handling:

A. Deliver materials in original unopened containers.

B. Containers are to be labeled with manufacturers name, installation instructions and identification of items.

C. All materials must be stored within installation temperatures. If material is outside range, restore to required temperature.

D. Protect all materials from moisture and direct sunlight. Damaged materials shall be replaced by roofing contractor.

1.06 Job Conditions: Read manufacturers safety instructions prior to installation.

1.07 Guarantee: The entire roofing job shall be the resposibility of a single contractor who shall be responsible for the water tightness and will guarentee work and materials selected in accordance with the spec's for a period of one year.

1.08 Submittals:

A. Product data for roof drains and all other components of the roofing system. Provide manufacturers technical product sheets, installation instructions and general recommendations for components of roofing system.

Part 2: PRODUCTS

2.01 Membrane: .060 thick, maximum 10'wide , EPDM compounded elastomer which meets ASTM D3253.

2.02 Fasteners shall be screws and disks penetrating the roof deck a min. of 1" and a maximum of 1 1/2". Pull out shall be a minimum of 360 lbs.

2.03 Accessory materials provided by the EPDM system manufacturer:

A. Bonding adhesive

B. Splicing cement

C. Lap sealant

D. Reinforced transition strips

Part 3: EXECUTION

3.01 Substrate preparation:

A. Repair any substrate cracks and junctions greater than 1/4" with manufacturers recommended sealant.

B. Substrate must be free of oils, grease, protrusions, loose areas and sharp edges.

3.02 Installation:

A. Execute work so that the membrane can be temporarily sealed on the downslope side at the end of a day's work with a sealing product recommended by the manufacturer.

1. Position membrane over acceptable substrate without stretching.

2. Allow membrane to relax approx. 1/2 hr. prior to installation.

3. Fold sheet back so that 1/2 of the sheet underside is exposed. Sheet fold shall be smooth and without wrinkles.

4. Apply bonding adhesive evenly, without globs or puddles with a short nap paint roller to the membrane and substrate at the manufacturer's recommended rate. Do not apply the bonding adhesive to the splice area.

5. Allow adhesive to dry until it is tacky, but will not stick to a finger touch.

6. Roll the coated membrane into the coated substrate while avoiding wrinkles.

7. Brush down the bonded half of the sheet immediately after rolling the sheet into the adhesive with a soft bristle broom to achieve maximum contact.

8. Fold back the unbonded half of the sheet and repeat the process.

9. Install adjoining sheets in the same manner, overlapping edges a minimum of 3".

3.03 Membrane and Flashing Splices (Repair Splice Similar):

1. Bond adjoining sheets in place and remove dirt and excess dust from the surfaces. If necessary, scrub sheets with warm soapy water and rinse with clean water.

2. Clean the dry splice area with clean natural fiber rags using the manufacturer's recommended cleaner. The cleaned surface shall be solid black in color.

3. Prepare splicing cement as per manufacturer's instructions.

4. Apply splicing cement to both mating surfaces with a 4" short nap roller. Apply cement at manufacturer's recommended rate to achieve 100% coverage, do not allow to glob or puddle. Allow cement to dry until tacky and will stick slightly to finger when touched.

5. Roll the top sheet toward the splice area until the cemented surface is nearly touching the cement on the bottom sheet along the entire length of the splice. Roll the top sheet onto the mating surface with hand pressure. Avoid stretching and wrinkling while brushing with a hand toward the splice edge.

6. Roll the splice with a 2" roller perpendicular to the splice. Do not roll parallel to the splice.

7. Wait at least 2 hours and check the splice for contaminants. If necessary, scrub sheets with warm soapy water and rinse with clean water. Clean at least 1" onto each side of the seam with a splice cleaner.

8. Apply a bead of lap sealant at a rate specified by the membrane manufacturer. Feather edges of the sealant with the specially designed tool or trowel. Complete lap sealnt application of all splices by the end of the working day.

3.04 Membrane flashing:

1. At walls, execute all flashings and terminations in accordance with the manufacturers recommended detail

END OF SECTION 07530

SECTION 07600 - FLASHING AND SHEET METAL

Part 1 GENERAL

1.01 Scope. Flashing of connections into head and sill details at windows and doors. Flashing roof penetrations. Flashing of wall vents.

1.02 Submittals.

A. Product data for Flashing, Sheet Metal, and Accessories: Manufacturer's technical product data, installation instructions and general recommendations for each specified sheet material and fabricated product.

1.03 Related Sections.

A. 06100 - Rough Carpentry

B. 07311 - Asphalt Shingles

C. 07460 - Siding

D. Div. 15 - Mechanical

Part 2: PRODUCTS

2.01 Sheet Metal Flashing and Trim Materials

A. Elastic Sheet Flashing/Membrane: Manufacturer's standard flexible, elastic, black, non-reinforced, flashing sheet of 50 to 60 mils thickness 50 to 70 Shore A hardness, 1200 psi tensile strength, minus 30 degrees F (minus 35 degrees C) brittleness. To be used at all locations shown on the drawings including eaves, valleys, and backup at exterior wall penetrations.

B. Fasteners: Same metal as flashing/sheet metal or, other non-corrosive metal as recommended by sheet manufacturer. If connections cannot be hidden, match finish of exposed heads with material being fastened.

C. Adhesives: Type recommended by flashing sheet manufacturer for waterproof/weather-resistant seaming and adhesive application of flashing sheet.

D. Accessories: Provide sheet metal clips, straps, anchoring devices, sealers mastics, adhesives, paper slip sheet, polyethylene, and similar accessory units as required for installation of work, matching or compatible with material being installed, non corrosive, size and gage required for performance, as recommended by manufacturer.

E. Aluminum brake metal flashing at window and door heads by window manufacturer.

Part 3 EXECUTION

3.01 Fabricated Units.

A. General Metal Fabrication: Shop-fabricate work to greatest extent possible. Comply with details shown, and with applicable requirements of SMACNA "Architectural Sheet Metal Manual" and other recognized industry practices. Fabricate for waterproof and weather-resistant performance; with expansion provisions for running work, sufficient to permanently prevent leakage, damage or deterioration of the work. Form work to fit substrates. Comply with material manufacturer instructions and recommendations for forming material. Form exposed sheet tool marks, true to line and levels indicated, with exposed edges folded back to form hems.

B. Seams: Fabricate non-moving seams in sheet metal with flat-lock seams. Form aluminum seams with epoxy seam sealer; rivet joints for additional strength where required.

C. Expansion Provisions: Where lapped or bayonet-type expansion provisions in work cannot be used, or would not be sufficiently water/weatherproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed without joints).

D. Sealant Joints: Where movable, non-expansion type joints are indicated or required for proper installation of elastomeric sealant, in compliance with SMACNA standards.

E. Separations: Provide for separation of metal from non compatible metal or corrosive substrates by coating concealed surfaces at locations of contact, with bituminous coating or other permanent separation as recommended by manufacturer/fabricator.

3.02 Installation

A. General: Except as otherwise indicated, comply with manufacturer's installation instructions and recommendations, and with SMACNA "Architectural Sheet Metal Manual." Anchor units of work securely in place by methods indicated, providing for thermal expansion of metal units; conceal fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints and seams which will be permanently watertight and weatherproof.

3.03 Cleaning and Protection

A. Clean exposed metal surfaces, removing substances which might cause corrosion of metal or deterioration of finishes.

B. Protection: Advise Contractor of required procedures for surveillance and protection of flashings and sheet metal work during construction, to ensure that work will be without damage or deterioration other than natural weathering at time of substantial completion.

END OF SECTION 07600

SECTION 07900 - JOINT SEALERS

Part 1 GENERAL

1.01 Scope: This section includes joint sealers for the following locations:

A. Exterior Caulking:

1. Intersections between exterior walls with metal frames, windows, louvers, metal fabrications, etc., and at all joints and openings where sealing is required to provide complete watertight installation and/or as shown on drawings.

2. Exterior thresholds and saddles.

B. Interior Caulking:

1. Joints and recesses at intersections between metal frames and adjacent surfaces.

2. Joints around access panels, electric panels, pipes, framing cracks, etc. to ensure tight light proof construction.

3. Caulking at counters, lavatories and other plumbing fixtures.

4. Interior thresholds, saddles and sills.

1.02 Sealing joints related to flashing and sheet metal for roofing is specified in Division 7 Section: "Flashing and Sheet Metal."

1.03 Sealants for glazing purposes are specified in Division 8 Section "Glass and Glazing."

1.04 System Performances: Provide joints sealers that have been produced and installed to establish and maintain watertight and airtight continuous seals.

1.05 Submittals:

A. Product Data from manufacturer's for each joint sealer product required, including instructions for joint preparation and joint sealer application.

B. Samples for Initial Selection Purposes:
Manufacturer's standard bead samples consisting of strips of actual products showing full range of colors available, for each product exposed to view.

C. Certificates from manufacturers of joint sealers attesting that their products comply with specification requirements and are suitable for the use indicated.

1.06 Delivery, Storage, and Handling:

A. Deliver materials to Project site in original unopened containers or bundles with labels informing about manufacturer, product name and designation, color, expiration period for use, pot life, curing time and mixing instructions for multi component materials.

B. Store and handle materials in compliance with manufacturer's recommendations to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

1.07 Project Conditions:

A. Environmental Conditions: Do not proceed with installation of joint sealers under the following conditions:

1. When ambient and substrate temperature conditions are outside the limits permitted by joint sealer manufacturer's.

2. When joint substrates are wet due to rain, frost, condensation or other causes.

B. Joint Width Conditions: Do not proceed with installation of joint sealers where joint widths are less than or greater than allowed by joint sealer manufacturer for application indicated.

C. Joint Substrate Conditions: Do not proceed with installation of joint sealers until contaminants capable of interfering with their adhesion are removed from joint substrates.

Part 2 PRODUCTS

2.01 General:

A. Compatibility: Provide joint sealers, joint fillers and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.

B. Colors: Provide color of exposed joint sealer indicated or, if not otherwise indicated, as selected by Architect from manufacturer's standard colors.

2.02 Elastomeric Joint Sealants:

A. Elastomeric Sealant Standard: Provide manufacturer's standard chemically curing, elastomeric sealant of base polymer indicated which complies with ASTM C 920 requirements, including those referenced for Type, Grade, Class and Uses.

B. Interior Caulking: One-part Nonsag Urethane Sealant for Use NT: Type S; Grade NS; Class 25; and Uses NT, M, A, and, as applicable to joint substrates indicated, O.

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

a. "Chem-Calk 900"; Bostik Construction Products Division.

b. "Chem-Calk 2639"; Bostik Construction Products Division.

c. "Vulkem 116"; Mameco International, Inc.

d. "Vulkem 921"; Mameco International, Inc.

e. "Dynatrol I"; Pecora Corp.

f. "Permapol RC-1"; Products Research & Chemical Corp.

g. "Sikaflex-1a"; Sika Corp.

h. "Sikaflex-15M"; Sika Corp.

i. "Sonolastic NP 1"; Sonneborn Building Products Div., Rexnord Chemical Products , Inc.

j. "Dymonic"; Tremco, Inc.

C. Exterior Caulking: One-Part Polysulfide Sealant: Type S; Grade NS; Class 1-1/2; Uses NT, M, G, A, and, as applicable to joint substrates indicated, O.

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

a. "Chem-Calk 100"; Bostik Construction Products Division.

b. "GC-9 Synthacalk"; Pecora Corp.

c. "PRC Rubber Calk 7000"; Product Research & Chemical Corp.

D. Sealant for Lavatories and other Plumbing Fixtures: Fungicidal one part silicone rubber sealant conforming to FS TT-S0001543 Class A or B, especially made for the specified use.

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

a. "Dow-Corning 786"; Dow Corning Corp.

b. "SCS 1702 Sanitary"; General Electric Co.

c. "863 # 345 White"; Rhone-Poulenc Inc.

d. "Proglaze White"; Tremco Corp.

e. "OmniPlus"; Sonneborn Building Products Div., Rexnord Chemical Products Inc.

2.03 Miscellaneous Joint Sealants:

A. Acoustical Sealant for Concealed Joints:
Manufacturer's standard, nondrying, non hardening, non skinning, non staining, gunnable, synthetic rubber sealant recommended for sealing interior concealed joints to reduce transmission of airborne sound.

B. Products: Subject to compliance with requirements, provide one of the following:

1. Acoustical Sealants For Concealed Joints:

2. "BA-98"; Pecora Corp.

3. "Tremco Acoustical Sealant"; Tremco Inc.

2.04 Fire-Resistant Joint Sealers:

A. General: Provide manufacturer's standard fire-stopping sealant, with accessory materials, having fire-resistance ratings indicated as established by testing identical assemblies per ASTM E 814 by Underwriters Laboratory, Inc. or other testing and inspecting agency acceptable to authorities having jurisdiction.

B. One-Part Fire-Stopping Sealant: One part elastomeric sealant formulated for use in a through-penetration fire-stop system for sealing openings around cables, conduit, pipes and similar penetrations through walls and floors.

C. Products: Subject to compliance with requirements, provide one of the following with a fire-resistant rating required to be 2 hours:

1. One-Part Fire-Stopping Sealant:

2. "Dow Corning Fire Stop Sealant"; Dow Corning Corp.

3. "3M Fire Barrier Caulk CP-25"; Electrical Products Div./3M.

4. "RTV 7403"; General Electric Co.

5. "Fyre Putty"; Standard Oil Engineered Materials Co.

2.05 Joint Sealant Backing:

A. General: Provide sealant backings of material and type which are non staining; are compatible with joint substrates, sealants, primers and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Plastic Foam Joint Fillers: Preformed, compressible, resilient, non waxing, non extruding strips of flexible, non gassing plastic foam of material indicated below; nonabsorbent to water and gas; and of size, shape and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

C. Accessory materials for Fire-Stopping Sealants: Provide forming, joint-fillers, packing and other accessory materials required for installation of fire-stopping sealants as applicable to installation conditions indicated.

Part 3 EXECUTION

3.01 Examination. Examine joints indicated to receive joint sealers, with Installer present, for compliance with requirements for joint configuration, installation tolerances and other conditions affecting joint sealer performance. Do not proceed with installation of joint sealers until unsatisfactory conditions have been corrected.

3.02 Preparation:

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealers to comply with recommendations of joint sealer manufacturer's.

B. Joint Priming: Prime joint substrates where indicated or where recommended by joint sealer manufacturer or based on prior experience. Apply primer to comply with joint sealer manufacturer's recommendations. Confine primers to areas of joint sealer bond, do not allow spillage or migration onto adjoining surfaces.

3.03 Installation of Joint Sealers:

A. General: Comply with joint sealer manufacturers' printed installation instructions applicable to products and applications indicated, except where more stringent requirements apply.

B. Elastomeric Sealant Installation Standard: Comply with recommendations of ASTM C 962 for use of joint sealants as applicable to materials, applications and conditions indicated.

C. Solvent-Release-Curing Sealant Installation Standard: Comply with requirements of ASTM C 804 for use of solvent-release-curing sealants.

D. Latex Sealant Installation Standard: Comply with requirements of ASTM C 790 for use of latex sealants.

E. Acoustical Sealant Application Standard: Comply with recommendations of ASTM C 919 for use of joint sealants in acoustical applications as applicable to materials, applications and conditions indicated.

F. Installation of Sealant Backings: Install sealant backings to comply with the following requirements:

1. Install joint-fillers of type indicated to provide support of sealants during application and at position required to produce the cross-sectional shapes and depths of installed sealants relative to joint widths which allow optimum sealant movement capability.

2. Do not leave gaps between ends of joint-fillers.

3. Do not stretch, twist, puncture or tear joint fillers.

4. Remove absorbent joint fillers which have become wet prior to sealant application and replace with dry material.

G. Install bond breaker tape between sealants and joint-fillers, compression seals or back of joints where adhesion of sealant to surfaces at back of joints would result in sealant failure.

H. Installation of Sealants: Install sealants by proven techniques that result in sealants directly contacting and fully wetting joint substrates, completely filling recesses provided for each joint configuration and providing uniform, cross-sectional shapes and depths relative to joint widths which allow optimum sealant movement capability.

J. Tooling of Non Sag Sealants:

1. Immediately after sealant application and prior to time skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated, to eliminate air pockets and to ensure contact and adhesion of sealant with sides of joint. Remove excess sealants from surfaces adjacent to joint. Do not use tooling agents which discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.

2. Provide concave joint configuration per Figure 6A in ASTM C 962, unless otherwise indicated.

3. Provide flush joint configuration per Figure 6B in ASTM C 962, where indicated.

4. Use masking tape to protect adjacent surfaces of recessed tooled joints.

5. Provide Recessed joint configuration per Figure 6C in ASTM C 962, of recess depth and at locations indicated.

K. Installation of Fire-Stopping Sealant: Install sealant, including forming, packing and other accessory materials to fill openings around mechanical and electrical services penetrating floors and walls to provide fire-stops with fire resistance ratings indicated for floor or wall assembly in which penetration occurs. Comply with installation requirements established by testing and inspecting agency.

3.04 Cleaning. Clean off excess sealants or sealant smears adjacent to joints as work progresses by methods and with cleaning materials approved by manufacturers of joint sealers and of products in which joints occur.

3.05 Protection. Protect joint sealers during and after curing period from contact with contaminating substances or from damage resulting from construction operations or other causes so that they are without deterioration or damage at the time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealers immediately and reseal joints with repaired areas indistinguishable from original work.

END OF SECTION 07900

SECTION 08110 - STEEL DOOR FRAMES

Part 1 GENERAL

1.01 Scope. Furnish and install new steel door frames for new interior doors.

1.02 Quality Standards: In addition to other specified requirements, comply with Steel Door Institute "Recommended Specification for Standard Steel Doors and Frames" (SDI-100), for the following classifications:

Part 2 PRODUCTS

2.01 Frames.

A. Comply with SDI-100, of the types and styles indicated, for materials quality, metal gages, and construction details.

B. Provide standard hollow metal frames for new doors. Provide double-rabbet, knock down frames with heavy reinforcements at mitered corners. Label construction for fire-rated doors. Frames reinforced for all hardware.

C. All frames shall be supplied with rubber installed at the factory; three per strike jamb.

2.02 Anchors and Accessories: Manufacturer's standard units.

2.03 Fabrication: Fabricate units to be rigid, neat in appearance, and free from defects, warp or buckle. Weld exposed joints continuously, grind, dress, and make smooth, flush and invisible.

2.04 Preparation.

A. Prepare frames to receive mortised and concealed finish hardware, including cutouts, reinforcing, drilling and tapping, complying with ANSI A 115 "Specifications for Door and Frame Preparation for Hardware".

B. Locate finish hardware as indicated or, if not indicated, per DHI "Recommended Locations for Builder's Hardware".

2.05 Shop paint: exposed surfaces of frame units, including galvanized surfaces, using manufacturer's standard baked-on rust-inhibitive primer.

Part 3 EXECUTION

3.01 Installation: Install hollow-metal units in accordance with manufacturer's instructions and final shop drawings (if any). Fit doors to frames and floors with clearances specified in SDI-100.

3.02 Install fire-rated units in accordance with NFPA Std. No. 80.

3.03 Finish hardware is specified in another Division-8 section.

3.04 Protection removal. Immediately prior to final inspection, remove protective plastic wrappings from prefinished doors.

3.05 Final adjustments. Check and re-adjust operating finish hardware items, leaving doors and frames undamaged and in complete and proper operating condition.

END OF SECTION 08110

SECTION 08211 - WOOD DOORS

Part 1 GENERAL

1.01 Scope. Furnish and install new doors to match existing in accordance to the door schedule.

1.02 Quality Standards: Comply with NWWDA I.S.1 and AWI "Architectural Woodwork Quality Standards".

Part 2 PRODUCTS

2.01 Manufacturers: Subject to compliance with requirements, provide wood doors by one of the following:

Algoma Hardwoods, Inc.
Buell Door Company.
Cal-Wood Door Div., Timberland Industries, Inc.
Chappell Door Company.
Doors, Incorporated.
Eggers Industries, Architectural Door Division.
Gay Doors, Inc.
Glen-Mar Door Mfg. Co.
Graham Manufacturing Corp.
Ipik Door Co., Inc.
Weyerhauser Company.

2.02 General Wood Door Product Requirements: Provide doors with same exposed surface material on both faces of each door, unless otherwise indicated.

2.03 Louver Doors: Morgan M-611 and Morgan M 1511 or approved equivalent
Material: solid pine, to be painted.

2.04 Interior Solid Core Doors for Transparent Finish: As follows:

A. Faces: Natural birch, plain sliced.

B. AWI Grade: Custom.

C. Construction: PC-5 or PC-7 (Particleboard core, 5- or 7-ply).

All doors are solid core, 3'-0" x 7" -0" unless otherwise noted.

2.06 Interior Fire-Rated Solid Core Doors: Labeled and listed for rating indicated, by testing and inspection agency acceptable to authorities having jurisdiction, complying with the following requirements:

A. Faces and AWI Grade: Match faces and of non-rated doors in same area of building, unless otherwise indicated.

B. Edge Construction: Manufacturer's standard laminated edge construction for improved screw-holding capability and split resistance.

C. Metal Frames for Light Openings in Fire Doors: Manufacturer's standard 18-gage cold-rolled steel frame, factory-primed, approved for use in door of fire-rating indicated.

D. Wood Beads for Light Openings in Fire Doors: Manufacturer's standard fire-rated wood-veneer beads matching veneer species of door faces.

Part 3 EXECUTION

3.01 Shop prime exposed portions of doors for field-applied opaque finish with one coat of wood primer specified in Division-9 section "Painting".

3.02 Shop seal faces and edges of doors for field-applied transparent finish with stain (if required) and other required pretreatments and first coat of finish as specified in Division-9 section "Painting".

3.03 At contractor's discretion doors may be ordered with factory transparent finish.

Transparent Finish: Comply with requirements indicated for grade, finish system, staining effect and sheen.

A. AWI Grade: Custom.

B. Finish: Manufacturer's standard finish with performance requirements comparable to either AWI System #2 catalyzed lacquer or AWI System #3 alkyd-urea conversion varnish.

C. Staining: None required.

D. Effect: Open grain finish.

E. Sheen: Satin-medium rubbed effect.

3.04 Install wood doors to comply with manufacturer's instructions and of referenced AWI standard and as indicated.

3.05 Install fire-rated doors in corresponding fire-rated frames in accordance with requirements of NFPA No. 80.

3.06 Align and fit doors in frames with uniform clearances and bevels. Machine doors for hardware. Seal cut surfaces after fitting and machining.

3.07 Prefit Doors: Fit to frames for uniform clearance at each edge.

3.08 Factory-Finished Doors: Restore finish before installation, if fitting or machining is required at the job site.

END OF SECTION 08211

SECTION 08620 -CLAD WINDOWS

Part 1: GENERAL

1.01 Scope.

A. Furnish and install vinyl clad wood windows, glass and glazing, operable hardware, weather stripping, and insect screens for operable units. Furnish all necessary anchorages, attachments and shims.

1.02 Related Sections

A. 07200 - Insulation

B. 06100 - Rough Carpentry

C. 06200 - Finish Carpentry

D. 08800 - Glass and Glazing

E. 09900 - Painting

1.03 Delivery and Storage of Materials. Deliver materials to job site in manufacturer's or distributor's packaging, undamaged, complete with installation instructions. Store off the ground, under cover, protected from weather and construction activities.

Part 2: PRODUCTS

2.01 Window specifications and sizes are based on Andersen windows. They must match existing. See window schedule drawings.

A. Factory-assembled vinyl or aluminum clad wood casement windows.

B. Glazing.

1. Low E insulating glass in all units by manufacturer. Tempered glass at all windows where required by code.

C. Screen. Extruded tubular aluminum frame and screen, finished to match unit, mounted to interior of all operating units.

D. Exterior Finish Color: white

E. Interior Finish. Factory finished. White.

F. Hardware. Provide with all standard steel operating hardware. White hardware finish.

G. Standard jambs by manufacturer appropriate to wall thickness (6" stud).

Part 3: EXECUTION

3.01 Install windows in accordance with manufacturer's recommendations, to achieve weather tight and freely operating installation. Maintain alignment with adjacent work. Secure assembly to framed openings, plumb, square, without distortion.

3.02 Place insulation in shim spaces around unit perimeter, to maintain continuity of building thermal barrier in accordance with Section 07200. Install sealant and related backing materials at perimeter of assembly as indicated in the drawings.

3.03 Clean window frames and glass. Remove labels and visible markings. Leave window units closed and locked.

END OF SECTION 08620

SECTION 08710 - FINISH HARDWARE

Part 1 GENERAL

1.01 Scope. Furnish and install hardware for the proper operation and installation of all doors.

1.02 Acceptable Manufacturers/Products: Acceptable manufacturers for various types of products are listed below. An asterisk (*) following a manufacturers name designates manufacturer whose products are indicated in Finish Hardware Schedule. Such products are listed in the schedule by specific reference to manufacturers catalog numbers. Except as otherwise indicated, products of equivalent quality, design and function by other listed manufacturers may be used, subject to approval of Architect.

1.03 Submit final hardware schedule organized by "hardware sets", to indicate specifically the product to be furnished for each item required on each door.

Furnish templates to each fabricator of doors and frames, as required for preparation to receive hardware.

1.04 Submit samples of hardware items, showing each required finish from each manufacturer (for acceptance of color and texture only).

1.05 Finish and base material designations are indicated in accordance with ANSI A156.18 or the nearest traditional U.S. commercial finish.

Where base material and quality of finish are not otherwise indicated, provide at least the commercially recognized quality specified in ANSI A156 series standards applicable to each particular type of hardware.

Part 2 PRODUCTS

2.01 Hinges and Pivots:

A. Mfrs. of Butts: Hager, Lawrence, McKinney, Henry Soss, Stanley*.

B. Provide full-mortise type hinges on each swinging door; pivot hinges for louver doors in hall closets; tracks and sliding hardware for closets in recovery room. Provide stainless steel pins, except steel pins with steel hinges; non-removable for exterior and public interior exposure, non-rising for non-security exposure, flat button with matching plugs.

C. Plain-bearing Function: Swaged, inner leaf beveled, rounded corners; except provide ball-bearing for doors equipped with closers.

2.02 Locks, Latches and Bolts:

A. Mfrs. of Lock/Latch Sets, Including Cylinders: Arrow, Corbin, Falcon, Kwikset, Russwin, Sargent, Schlage*, Yale.

B. Mfrs. of Exit Devices: Adams-Rite, Corbin, Jackson Exit Device, Monarch, Reed Exit Device/Scovill, Sargent, Von Duprin*, or Yale.

C. Mfrs. of Door Bolts: Builders BrassWorks, Ives*, Russwin, Sargent, Stanley.

D. Strikes: Wrought box strikes, with extended lip for latch bolts, except open strike plates may be used in wood frames. Provide dust-proof strikes for foot bolts.

E. Equip exit devices with dogging devices where door has closer, except when door is fire-rated.

F. Locks: Equip lock sets with 6-pin tumbler type lock cylinders, in a masterkey system, to be designated by Owner.

1. Construction Locks: Either temporary cylinders for construction period, or temporary construction keying which is automatically voided through use of Owners' keys.

2. Provide 3 change keys for each lock, plus 5 masterkeys for each master key system. Stamp keys "DO NOT DUPLICATE".

3. Provide key control system, including metal cabinet with 150% capacity, envelopes, labels, tags, clips, forms, card index and markers; standard system with keys installed and index prepared by key control manufacturer.

2.03 Door Control Devices:

A. Mfrs. of Overhead Closers: Corbin, Dorma, LCN*, Norton, S. Parker, Rixson-Firemark, Russwin, Sargent Yale.

B. Mfrs. of Holders, Stops, Bumpers: Baldwin, Brookline, Builders Brass Works, Cicpo, Corbin, Door Controls Int'l., Glynn-Johnson*, Ives, Liberty, S. Parker, Quality, Sargent, Stanley, or Triangle Brass.

1. Provide grey rubber exposed resilient parts.

C. Finish exposed metal to match hardware, except finish floor plates to match thresholds.

D. Size and mount units indicated or, if not indicated, to comply with mfr.'s recommendations for the exposure condition. Reinforce the substrate as recommended.

E. Where parallel-arm closers are indicated, provide units one size larger than recommended for standard-arm units.

2.04 Silencers: Provide silencers in metal door frames, unless not permitted for fire rating, or unless bumper-type weatherstripping is provided; 3 per single-door frame, 4 per double-door frame.

2.05 Mfrs. of Bi-fold Door Hardware Sets: Lawrence, or Stanley*.

Part 3 EXECUTION

3.01 Hardware Mounting Heights: Door and Hardware Institute "Recommended Locations for Builders Hardware for Standard Steel Doors and Frames", except as otherwise indicated.

3.02 Install each hardware item to comply with manufacturer's instructions and recommendations.

3.03 Hardware Adjustment: Return to project one month after Owner's occupancy, and adjust hardware for proper operation and function. Instruct Owner's personnel in proper maintenance and adjustment.

END OF SECTION 08710

SECTION 08800 - GLASS AND GLAZING

Part 1 GENERAL

1.01 Scope of work. Furnish and install glass and glazing for interior lights. Glass to be single pane, tempered where required by code.

1.02 Glazing Standard: Comply with FMGA "Glazing Manual" and "Sealant Manual".

1.03 Safety Glazing Standard: Comply with ANSI Z97.1 and testing requirements of 16 CFR Part 1201 for category II materials.

1.04 Fire Resistance Rated Wire Glass: Provide UL-labeled and listed products, identical with those tested per ASTM E 163 (UL 9).

Part 2 PRODUCTS

2.01 Glass Manufacturers: Subject to compliance with requirements, provide products by one of the following:
Advanced Coating Technology.
AFG Industries, Inc.
Cardinal IG
Environmental Glass Products Div.
Falconer Glass Industries.
Ford Glass Div.
Guardian Industries Corp.
Hordis Brothers, Inc.
Independent Insulating Glass.
Interpane Coatings, Inc.
Laminated Glass Corp.
LOF Glass, Inc.
Pilkington Sales (North America) Limited.
PPG Industries Inc.
Saint Gobain/Euroglass.
Spectrum Glass Prod. Div., H.H. Robertson Co.
Viracon, Inc.

2.02 Sizes: Fabricate glass of thicknesses indicated and to sizes required for glazing openings indicated, with edge clearances and tolerances complying with recommendations of glass manufacturer.

2.03 Primary Glass Products: Comply with ASTM C 1036 for the following: Clear Float Glass: Type I, class 1, quality q3.

2.04 Uncoated Heat-Treated Glass Products: Comply with ASTM C 1048 and with manufacturing process indicated for the following:

A. Clear Tempered Float Glass: Kind FT, Condition A, Type I, Class 1, Quality q3.

B. Clear Heat-Strengthened Float Glass: Kind HS, Condition A, Type I, Class 1, Quality q3.

2.07 Miscellaneous Glazing Materials.

A. Compatibility. Provide materials with proven record of compatibility with surfaces contacted in installation.

B. Cleaners, Primers, and Sealers. Type recommended by sealant or gasket manufacturer.

C. Setting Blocks. Neoprene, EPDM, or silicone blocks as required for compatibility with glazing sealants, 80 to 90 Shore A durometer hardness.

D. Spacers. Neoprene, EPDM or silicone blocks, or continuous extrusions, as required for compatibility with glazing sealant, of size, shape and hardness recommended by glass and sealant manufacturers for application indicated.

E. Edge Blocks. Neoprene, EPDM or silicone blocks as required for compatibility with glazing sealant, of size and hardness required to limit lateral movement (side-walking) of glass.

F. Compressible Filler Rods. Closed-cell or waterproof-jacketed rod stock of synthetic rubber or plastic foam, flexible and resilient, with 5-10 psi compression strength for 25 percent deflection.

Part 3 EXECUTION

3.01 General: Comply with referenced FGMA standards and instructions of manufacturers of glass, glazing sealants, and gaskets, to achieve airtight and watertight performance, and to minimize breakage.

3.02 Protect glass from edge damage during handling and installation. Inspect glass during installation and discard pieces with edge damage that could affect glass performance.

3.03 Set units of glass in each series with uniformity of pattern, draw, bow and similar characteristics.

3.04 Protect glass from contact with contaminating substances resulting from construction operations; remove any such substances by method approved by glass manufacturer.

3.05 Wash glass on both faces not more than 4 days prior to date scheduled for inspections intended to establish date of substantial completion. Wash glass by method recommended by glass manufacturer.

END OF SECTION 08800

SECTION 09250 - GYPSUM WALLBOARD

Part 1 GENERAL

1.01 Scope. Work includes sheetrock on all walls and ceilings as noted in plans and steel stud wall and soffit framing.

1.02 Related Sections.

A. 06100 - Rough Carpentry

B. 07200 - Insulation

C. 08110 - Steel Door Frames

D. 08211 - Flush Wood Doors

E. 13090 - Radiation Protection

1.03 Quality Assurance.

A. Fire-Resistance Ratings. Where indicated, provide materials and construction which are identical to those of assemblies whose fire resistance rating has been determined per ASTM E 119 by a testing and inspecting organization acceptable to authorities having jurisdiction.

B. Single-Source Responsibility. Obtain each type of gypsum board and related joint treatment materials from a single manufacturer.

1.04 Delivery, Storage, and Handling.

A. Deliver materials in original packages, containers or bundles bearing name and identification of manufacturer or supplier.

B. Store materials inside under cover and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic and other causes. Neatly stack gypsum boards flat to prevent sagging.

C. Handle gypsum boards to prevent damage to edges, ends and surfaces. Do not bend or otherwise damage metals corner beads and trim.

1.05 Project Conditions.

A. Environmental Conditions. Establish and maintain environmental conditions for application and finishing gypsum board to comply with ASTM C 840 and with gypsum board manufacturer's recommendations.

B. Minimum Room Temperatures. For nonadhesive attachment of gypsum board to framing, maintain not less than 40 deg F. For adhesive attachment and finishing of gypsum board maintain not less than 50 deg F for 48 hours prior to application and continuously thereafter until drying is complete.

C. Ventilate building spaces to remove water not required for drying joint treatment materials. Avoid drafts during dry, hot weather to prevent materials from drying too rapidly.

Part 2 PRODUCTS

2.01 Manufacturers. Subject to compliance with requirements, manufacturers offering products which may be incorporated in the Work include, but are not limited to, the following:

A. Steel Framing and Furring.

1. Bostwick Steel Framing Co.

2. Dale Industries, Inc.

3. Gold Bond Building Products Div., National Gypsum Co.

4. Incor, Inc.

5. Marino Industries Corp.

6. United States Gypsum Co.

C. Gypsum Boards and Related Products.

1. Centex American Gypsum Co.

2. Domtar Gypsum Co.

3. Georgia-Pacific Corp.

4. Gold Bond Building Products Div., National Gypsum Co.

5. United States Gypsum Co.

2.02 Steel Framing for Walls and Partitions.

A. Steel Studs and Runners. ASTM C 645, with flange edges of studs bent back 90 degrees and doubled over to form 3/16" minimum lip (return) and complying with the following requirements for minimum thickness of base (uncoated) metal and for depth:

1. thickness: 0.0179 inch, unless otherwise indicated

2. depths: 3-5/8 inches and 6 inches, unless otherwise indicated

B. Steel Rigid Furring Channels. ASTM C645, hat shaped, depth and minimum thickness of base (uncoated) metal as follows:

1. thickness: 0.0179 inch

2. depth: 7/8 inch

C. Furring Brackets. Serrated-arm type, adjustable, fabricated from corrosion-resistant steel sheet complying with ASTM C645, min. thickness of base (uncoated) metal of 0.0329 inch, designed for screw attachment to steel studs and steel rigid furring channels used for furring.

D. Z-Furring Members. Manufacturer's standard zee-shaped furring members with slotted or nonslotted web, fabricated from hot-dip galvanized steel sheet complying with ASTM A525, coating designation G60; with a minimum base metal (uncoated) thickness of 0.0179 inch, face flange of 1-1/4 inch, wall attachment flange of 7/8 inch, and of depth required to fit insulation thickness indicated.

E. Fasteners. Provide fasteners of type, material, size, corrosion resistance, holding power and other properties required to fasten steel framing and furring power members securely to substrates involved; complying with the recommendations of gypsum drywall manufacturers for applications indicated.

2.04 Gypsum Wallboard.

A. General. Provide gypsum board of types indicated in maximum lengths available to minimize end-to-end joints. Provide gypsum board in thicknesses indicated:

B. Types.

1. 5/8" typical

2. 1/2" at soffits and ceilings

3. 5/8" type X for fire-resistance -rated assembly at furnace room

4. Moisture-resistant for bathrooms.

C. Edges: tapered.

D. Thickness: as indicated on partition details.

E. Subject to compliance with requirements, products which may be incorporated in the work where Type X gypsum wallboard is indicated include, but are not limited to the following:

1. "Gyprock Fireguard 'C' Gypsum Board"; Domtar Gypsum Co.

2. "Fire-Shield G"; Gold Bond Building Products Div., National Gypsum Co.

3. "SHEETROCK Brand FIRECODE 'C' Gypsum Panels"; United States Gypsum Co.

2.05 Trim Accessories.

A. Cornerbead and Edge Trim for Interior Installation. Provide corner beads, edge trim and control joints which comply with ASTM C1047.

1. Material. Sheet steel zinc-coated by hot-dip process.

2. "LC" bead standard unless otherwise indicated.

3. 200A or 200B "L" bead where sheetrock meets disimilar material at stairs w/ 1/2 wall caps and steel railings

2.06 Gypsum Board Joint Treatment Materials.

A. General. Provide materials complying with ASTM C475, ASTM C840, and recommendations of manufacturer of both gypsum board and joint treatment materials for the application indicated.

B. Joint Tape. Paper reinforcing tape, unless otherwise indicated.

C. Setting-Type Joint Compounds. Factory-prepackaged, job-mixed, chemical-hardening powder products formulated for uses indicated.

1. Where setting-type joint compounds are indicated for use as taping and topping compounds, use formulation for each which develops greatest bond strength and crack resistance and is compatible with other joint compounds applied over it.

2. For profiling gypsum board joints, use formulation recommended by gypsum board manufacturer for this purpose.

3. For filling joints and treating fasteners of water-resistant gypsum backing board behind base for ceramic tile, use formulation recommended by gypsum board manufacturer for this purpose.

2.07 Miscellaneous Materials.

A. Laminating adhesive.

B. Spot Grout. ASTM C475 setting-type joint compound of type recommended for spot grouting hollow metal door frames.

C. Fastening adhesive for Wood.

D. Fastening adhesive for Metal.

E. Gypsum Board Screws.

F. Gypsum Board Nails.

G. Concealed Acoustical Sealant. Nondrying, non hardening, non skinning, non staining, non bleeding, gunnable sealant.

H. Thermal insulation.

I. Polyethylene Vapor Retarder. 6 mils.

J. Glass Mesh Mortar Unit Finishing Materials. Tape and joint compounds as recommended by manufacturer.

Part 3 EXECUTION

3.01 Installation Procedures. Erection procedures for the various gypsum drywall construction conditions, as set forth in the published Specifications of the National Gypsum Company, entitled Gypsum Wallboard Construction 1980, or the equivalent publications of the manufacturer of materials used shall govern the work of this Section, together with additional requirements specified hereunder and indicated on the Drawings.

A. Refer to the Drawings for details of various conditions and locations where required. Examine substrates to with drywall construction attaches or abuts for compliance with requirements for installation tolerances and other conditions affecting performance of drywall construction. Do not proceed with installation until unsatisfactory conditions have been corrected.

Note that fire partitions and sound partitions must extend from floor to underside of roof. All others except at closets extend from floor to bottom cord of trusses.

B. Install corner beads at all external corners of gypsum wallboard, and casing wherever gypsum wallboard abuts a dissimilar material. Use tape joint treatment for internal corners and for all joints.

Inside and outside corners in ceiling of Entry Hall must align.

C. Ensure that door frames are in proper positions before installing surrounding studs and gypsum board.

D. Provide cased and reinforced openings for all major items penetrating the gypsum board surfaces.

E. Insure sound batts against sagging by installing after one side of partition has been hung with gypsum board. Stapling at top if necessary.

F. Use joint compound for filling all screw head depressions and other depressions in the faces of the gypsum board, including surfaces which will be concealed by applied finishes. Sand all compound surfaces absolutely smooth and level with the board face.

G. Locate either edge or end joints over supports, except in horizontal applications or where intermediate supports or gypsum board back-blocking is provided behind end joints. Position boards so like edges abut. Do not place tapered edges against cut edges or ends. Stagger vertical joints over different studs on opposite sides of partitions.

H. Isolate perimeter of non-loading-bearing drywall partitions at structural abutments. Provide 1/4" to 1/2" space and trim edge with "U" bead edge trim. Seal joints with acoustical sealant.

3.02 Installation of Steel Framing.

A. Steel Framing Installation Standard. Install steel framing to comply with ASTM C754 and with ASTM C 840 requirements that apply to framing installation.

B. Install supplementary framing, blocking and bracing at termination in the work and for support of fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, and similar construction to comply with details indicated and with recommendations of gypsum board manufacturer, or if none available, with "Gypsum Construction Handbook" published by United States Gypsum Co.

C. Isolate steel framing from building structure to prevent transfer of loading imposed by structural movement, at locations indicated below to comply with details shown on Drawings:

1. Where edges of suspended ceilings abut building structure horizontally at ceiling perimeters or penetration of structural elements.

2. Where partitions and wall framing abuts overhead structure.

3. Provide slip or cushioned type joints to attain lateral support and avoid axial loading.

4. Do not bridge building expansion and control joints with steel framing or furring members; independently frame both sides of joints with framing or furring members.

D. Install runners (tracks) at floors, ceilings and structural walls and columns where gypsum drywall stud system abuts other construction. Where studs are installed directly against exterior walls, install asphalt felt strips between studs and walls.

E. Installation tolerances. Install each steel framing and furring member so that fastening surface do not vary more than 1/8 inch from plane of faces of adjacent framing.

F. Extend fire rated partitions and sound partitions to underside of roof. All others to bottom of structural supports, except at closets, where partitions may terminate at suspended ceilings. Continue framing over frames for doors and openings and frame around ducts penetrating partitions above ceiling to provide support for gypsum board.

G. Install steel studs and furring in sizes and at 16 inches on center for single and double layer construction, but not less than that required by referenced steel framing installation standard.

H. Install steel studs so that flanges point in the same direction and gypsum boards can be installed in the direction opposite to that of the flange.

I. Frame door openings to comply with details indicated, with GA-219 and with applicable published recommendations of gypsum board manufacturer. Attach vertical studs at jambs with screws either directly to frames or to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs. Extend vertical jamb studs through suspended ceilings and attach to underside of floor or roof structure above.

J. Frame openings other than door openings in same manner as required for door openings; and install framing below sills of openings to match framing required above door heads.

3.03 Repair any tears or punctures in vapor retarder on interior of framing members of exterior insulated walls if exposed during demolition.

3.04 During work progress the drywall contractor is to remove all excess materials and trash resulting from operations, which may disrupt the work of the other trades, and after completion leave the premise broom clean. The drywall contractor shall inspect all areas affected by his work to ascertain that all work is complete and has been accepted. Defective installations shall be corrected before finish surfaces are painted or sprayed.

3.05 Cutting and Patching. When directed by the Architect and prior to any finishing or painting of gypsum board surfaces, check all drywall throughout, and perform all cutting, patching and joint treatment required, in a manner satisfactory to the Architect.

3.06 Protection and Cleaning. During the operation of gypsum drywall work, protect the work of other trades against undue soilage and damage by the exercise of reasonable care and precautions. Repair and/or replace any work so damaged and soiled.

END OF SECTION 09250

SECTION 09512 - ACOUSTICAL TILE CEILINGS

Part 1 GENERAL

1.01 Scope. Furnish and install mineral fiber acoustical panels, installed in exposed metal grid system, with prefinished metal edge moldings, and all other related items, for ceiling areas designated on the Room Finish Schedule and the Reflected Ceiling plan.

1.02 Related Sections.

A. 09250 - Gypsum Wallboard

B. 10190 - Hospital Cubicles

C. 16400 - Electrical

1.03 Standards.

A. Acoustical Ceiling Unit Standard: ASTM E 1264.

B. Acoustical Suspension System Standard: ASTM C 635 for materials.

C. Surface Burning Characteristics: 25 or less for flame spread, 50 or less for smoke developed, per ASTM E 84.

D. Fire-Resistance-Ratings: As determined per ASTM E 119 and as indicated by reference to design designations in UL "Fire Resistance Directory".

1.04 Submittals.

A. Samples. Submit samples 6" x 6" in size of each ceiling type to Architect if requested. Submit representative sample of color and finish of all exposed materials.

B. Maintenance materials: Submit one percent of amount of ceiling components installed.

Part 2 PRODUCTS

2.01 Acoustical Panels: Armstrong Dune 2 x 2

2.02 Suspension and Grid Systems.

Tegular 15/16" white grid

Part 3 EXECUTION

3.01 Installation guidelines.

A. Install acoustical ceiling systems to comply with ASTM C 636, per manufacturer's instructions, and CISCA "Ceiling Systems Handbook."

B. Install acoustical ceilings under the recommendations of the Acoustical Materials Association, with regard to job conditions.

3.02 Refer to Reflected Ceiling Plan and Room Finish Schedule for locations and layouts of Acoustical Ceilings. Balance ceiling borders on opposite sides, using more-than-half-width acoustical units.

Pattern Direction: One-way, align joints.

3.03 Install suspension and grid systems in strict accordance with the recommendations of the systems manufacturer, with hangers spaced not more than 48 inches on centers in any direction, and as otherwise required to ensure deflection not exceeding 1/360 of the span of the members. Install edge moldings at all walls and other vertical penetrations of the ceiling. Ceiling plane shall be absolutely level.

3.04 Field Quality Control: Deflection on installed system: Maximum deflection shall not exceed 1/360 of the span.

3.05 Any panel that is marked or defaced in any way shall be cleaned entirely to remove the defect, or if the defect cannot be removed by the cleaning, the unit shall be replaced with a new panel at no additional cost.

3.06 Upon completion of work, furnish to the Owner one carton or package of each size acoustical panel specified and from the original manufacturer's run used on the project.

END OF SECTION 09512

SECTION 09650 - RESILIENT FLOORING

Part 1 GENERAL

1.01 Scope: Furnish and install 12 x 12 VCT tile flooring in 2 bathrooms; sheet vinyl in cast rooms; vinyl transition strips between resilient flooring and dissimilar flooring; primers, adhesives, and leveling materials; and perform all cleaning, finishing, and polishing of materials furnish and installed hereunder. New flooring to be laid over existing concrete.

1.02 Submittals: With manufacturer's product data and installation instructions, submit the following:

A. Samples of each type, color and pattern of resilient flooring and accessories; full size for tile, 6" x 9" for sheet flooring, and 2-1/2" long for accessories.

B. Maintenance instructions for each type of flooring.

1.03 Project Conditions:

A. Maintain minimum temperature of 65°F (18°C) in spaces to receive resilient flooring for at least 48 hours prior to installation, during installation, and for not less than 48 hours after installation. Store resilient flooring materials in spaces where they will be installed for at least 48 hours before beginning installation. Subsequently, maintain minimum temperature of 55°F (13°C) in areas where work is completed.

B. Install resilient flooring and accessories after other finishing operations, including painting, have been completed.

Part 2 PRODUCTS

2.01 Colors and Patterns: 2-color pattern to be selected by Architect from manufacturer's standard colors and patterns.

2.02 Vinyl Composition Tile: FS SS-T-312, Type IV, composition as indicated below; 12" x 12" x 1/8" gage unless otherwise indicated.

A. Composition 1 - asbestos free.

2.03 Transition Strips. Homogeneous vinyl, one by 3/32", tapering to feather edge, in colors as selected by the Architect.

2.04 Adhesives, Primers, and Leveling Materials: As recommended by the manufacturer.

2.05 Sheet vinyl: TBD

Part 3 EXECUTION

3.01 Pre-installation Conditions:

A. Inspect all surfaces and assure that they are in proper condition to receive work to be performed under this Section. New flooring is to be laid over existing VAT

flooring. Patching and leveling will be required where existing partitions were removed.

B. Perform all corrective and preparation work as required to bring existing surfaces into a proper condition to receive the work. Furnish and install leveling materials to insure proper adhesion and final tolerance level on finish flooring surface of not more than $^{1}/_{16}$" from level for 10 feet in any direction.

C. Fill all minor cracks in subfloors with mastic as recommended by the tile manufacturer.

D. A temperature of not less than 70° shall be maintained for not less than 48 hours before commencing installation of resilient materials and continued for 48 hours after completion.

E. No work shall start until samples have been submitted to and submitted by the Architect. All materials shall be labeled, stating colors, locations, type of adhesive and primer (if required), and the areas in which materials are to be used.

3.02 Installation:

A. All products covered by this Section shall be installed by qualified personnel in strict accordance with the manufacturer's written specifications and the additional provisions herein specified.

B. Resilient materials shall be laid so as to insure uniform contact with the backing surfaces, and with all finished surfaces smooth and in a plane, free from buckles, waves, or other imperfections. Resilient flooring shall be completely fitted and joints shall be as inconspicuous as possible.

C. Resilent flooring shall extend up to cabinets and under equipment shown on the drawings and into the wall lines, unless otherwise noted on the drawings. Resilient flooring shall be carried to fit neatly into breaks and recesses, against non-resilient bases, around pipes and under saddles. Flooring shall be cut to and around excessively weighty fixed objects. Lay tile with pattern running in one direction throughout.

D. Install vinyl bases, including job-formed internal and external corners, shall be firmly cemented to the vertical surfaces, including cabinet bases. External and internal corners shall be preformed by applying heat to a 24-inch length of base, bending the base at mid-point to a sharp 90 degree angle and immersing the base into cold water to set the heated material. Cove lip shall be clipped at bending point.

3.03 Cleaning and finishing. Not sooner than five days after installation, the finished resilient flooring, including bases, shall be cleaned with a cleaner recommended by the flooring manufacturer, followed by a thorough rinsing with clear water. After cleaning, all resilient flooring installed hereunder shall be finished with one coat of heavy-duty water emulsion finish of a type recommended by the flooring manufacturer. Buff all finish flooring with a mechanical buffer.

3.04 Adjustments. All tiles that have not seated in a level plane with surrounding tiles shall have heat applied locally and shall be reset to the surrounding level of floor tile. All tile showing broken corners or fracture lines, shall be warmed, carefully removed, and new tile of the same color and thickness shall be substituted at no additional cost.

3.05 Additional Materials. Upon completion of the resilient flooring work, furnish to the Owner: Replacement material in the amount of one box for every 50 installed for tile and 5 linear yards for sheet flooring, for each type, color and pattern.. Four end stops, in colors used, if used on project. Additional materials shall be taken from the same manufacturer's run used on the project, to avoid possible deviation in color.

END OF SECTION 09650

SECTION 09685 - CARPETING

Part 1 GENERAL

1.01 Scope. Furnish and install carpeting and pad, of the types specified, edging strips between dissimilar flooring, and all required installation accessories, for glued down installation.

1.02 Related Work.

A. 09300 -Tile

B. 09650 - Resilient Flooring

1.03 Quality Assurance. The work under this Section shall be performed by a carpet sub-contractor who has at least five years experience in the type of work specified herein. The actual work shall be done by qualified and experienced mechanics working under the Carpeting Sub-Contractor's supervision, or under the supervision of an experienced supervisor who has been doing this type of work for at least five years.

1.40 Submittals. Submit three copies of the carpet manufacturer's maintenance manual to the Owner.

1.05 Delivery and Storage. Deliver carpet to the site in manufacturer's original wrappings and packages clearly labeled with the manufacturer's name, brand name, size, and related information. Store in a safe, dry, clean, and well ventilated area. Store rolls flat, not standing on end. Do not open containers until needed for installation unless verification inspection is required.

1.06 Guarantee. In addition to the restretching and repairing specified hereunder, the Carpeting Sub-Contractor shall guarantee in writing all work under this Section for a period of one year from the date of Substantial Completion of the General Contract. Should any defects in materials or installation develop within this period, the Carpeting Sub-Contractor agrees to promptly make all necessary repairs or replacements, at no cost to the Owner, including further puckering, repair of seam and of any other defects. Said written guarantee shall further stipulate that the Carpeting Sub-Contractor shall remedy and correct any damage caused in making such necessary repairs and replacements.

Part 2 PRODUCTS

2.01 Carpet. Manufacturer and styles

2.02 Carpet Pad.

A. Foam cushion

1. Density: 22 pounds or greater

2. C.F.D. @ 25% - not less than 4 p.s.i.
C.F.D. @ 65% - not less than 20 p.s.i.

3. Thickness not to exceed 3/8"

B. Hair, jute or synthetic fiber felted cushion

1. Weight: min. 42 oz.

2. Thickness not to exceed 7/16"

2.03 Adhesives. As to recommendations of carpet manufacturer.

Part 3 EXECUTION

3.01 Inspection. Inspect surfaces to receive carpeting and the conditions under which the work has to be performed. Report in writing to the General Contractor any conditions which might adversely affect the installation. Do not proceed with the installation until defects have been corrected and conditions are satisfactory.

3.02 Field Measurements. Dimensions supplied on the drawings and hereunder are approximate. Carefully check all dimensions and other conditions for proper installation of carpet in areas designated.

3.03 Installation.

A. Ensure that floors are clean, and free of cracks and protrusions. Fill any gaps or cracks, more than 1/16" wide, with a good grade of latex base flashing compound, such as Lev-L-astic or approved equal. Sand down any protrusions, sweep and vacuum the floor to remove all dust and grit.

B. Perform spot checking of all floors, for moisture content, prior to commencing installation. Ensure that floor temperature is a minimum of 65°F at least 24 hours prior to installation and will be maintained same for 48 hours after installation.

C. Install carpet wall to wall in rooms and areas indicated on the drawings by the direct glue-down method in accordance with the carpet manufacturer's printed instructions. Installed carpet and pad shall be smooth, uniform and secure with a minimum of seams. Install breaths parallel with carpet pile in the same direction. Accurately match patterned goods. Fit cutouts, such as door jambs, and columns neatly and securely. Locate carpet seams at doorways perpendicular to door or at pivot points. Follow the wall line parallel to the carpet direction for seams at corridor changes of direction. Where carpet meets other flooring material, special care shall be taken to achieve the smoothest transition possible. Raw edges shall be secured with specified moldings.

D. Make all seams by butting and cementing properly prepared and treated edges of carpet to each other and to the floor, except as otherwise recommended by the manufacturer. Remove all selvage before seaming. Cut raw edges on a slight angle with surface yarns extending outward over the backing material so that when two edges are joined for seaming a neat mingling of surface yarns of both breadths can be achieved to produce neat, professional seams. Seams shall have a minimum breaking strength of 100 pounds per inch and shall be capable of withstanding all carpet cleaning processes.

3.04 Repairing. Remove bubbles and ripples, repair seams, joints and edges, if required, once after the original installation is completed. The exact time for this work shall be left to the discretion of Architect or General Contractor but shall be within 12 months after final approval of finished installation. Fourteen-day notice for this restretch will be given by the Architect, so that necessary arrangements can be made for same.

3.05 Clean-up. Upon completion of the installation, remove all waste and excess materials, and all tools and equipment.

3.06 Excess Carpet Pieces. Leave all usable pieces of carpet, not necessary to complete the work, on the job site and place in an orderly manner in an area designated by Owner.

3.07 Cleaning and Protection. After installation, remove all debris, mouldings, scraps, and other foreign matter. Remove any soiled spots or adhesive from the face of the carpet with the appropriate spot remover. Clip any protruding face yarn with sharp scissors. Vacuum the carpet clean. Carefully protect installed carpet from soiling and from damage with heavy, reinforced, nonstaining kraft building paper or polyethylene film of an approved quality and thickness. Lap and secure edges of covering widths. Keep covering in repair and replace damaged portions. Protective covering shall be removed or left in place as directed by the Architect.

3.08 Damage to Adjacent Surfaces. Arrange with the General Contractor to repair any damage or marks on other surfaces, which have been caused by the work of this Section, and bear costs for the same.

END OF SECTION 09685

SECTION 09900 - PAINTING

Part 1 GENERAL

1.01 This Section includes surface preparation and the application of paint materials to exposed interior and exterior items and surfaces scheduled.

Surface preparation, prime and finish coats specified are in addition to shop-priming and surface treatments.

1.02 Paint exposed surfaces whether or not colors are designated in "schedules," except where a surface or material is indicated not to be painted or is to remain natural. Where an item or surface is not mentioned, paint the same as similar adjacent materials or surfaces. If color or finish is not designated, the Architect will select from standard colors or finishes available.

1.03 Painting is not required on pre-finished items, finished metal surfaces, concealed surfaces, operating parts, on labels.

Labels: Do not paint over Underwriter's Laboratories, Factory Mutual or other code-required labels, or equipment name, identification, performance rating, or nomenclature plates.

1.04 "Paint" includes coating systems materials, primers, emulsions, enamels, stains, sealers and fillers, and other applied materials whether used as prime, intermediate or finish coats.

1.05 Submittals:

A. Product Data: Submit manufacturer's technical information, label analysis, and application instructions for each paint material proposed for use. Paint with any lead content will not be allowed.

1.06 Single Source Responsibility: Provide primers and undercoat paint produced by the same manufacturer as the finish coats.

1.07 Coordination of Work: Review sections in which primers are provided to ensure compatibility of the total systems for various substrates.

Notify the Architect of problems anticipated using the materials specified.

1.08 Material Quality.

A. Provide the manufacturer's best quality trade sale type paint material of the various coating types specified. Paint material containers not displaying manufacturer's product identification will not be acceptable.

B. Proprietary names used to designate colors or materials are not intended to imply that products named are required or to exclude of equal products of other manufacturers.

C. Products that comply with performance requirements of applicable Federal Specifications, yet differ in composition, may be considered for use when acceptable to the Architect. Furnish material data and manufacturer's certificate of performance to Architect for proposed substitutions.

1.09 Deliver materials to the job site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label with trade name and manufacturer's instructions.

1.10 Store materials not in use in tightly covered containers in a well ventilated area at a minimum ambient temperature of 45 deg F (7 deg C). Protect from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily.

1.11 Project Conditions: Do not apply paint in snow, rain, fog or mist, when the relative humidity exceeds 85 percent, at temperatures less than 5 deg F (3 deg C) above the dew point, or to damp or wet surfaces.

Part 2 PRODUCTS

2.01 Acceptable manufacturers
Benjamin Moore
Sherwin-Williams
Pittsburgh Paints
Glidden
Devoe
Pratt & Lambert

2.02 Required materials.

A. All gypsum walls are to be painted

1. primer - equal to Benjamin Moore Moorcraft Super-Hide Latex Primer-Undercoater (284)

2. 2 finish coats - equal to Benjamin Moore Moorcraft Super-Hide Latex Eggshell Enamel (286)

3. color -(off-white) to be specified by Architect

B. All gypsum ceilings are to be painted:

1. primer - equal to Benjamin Moore Moorcraft Super-Hide Latex Primer-Undercoater (284)

2. 2 finish coats - equal to Benjamin Moore Moorcraft Super-Hide Latex Flat (282)

3. color -(off-white) to be specified by Architect

C. Metal door frames, stair railings:

1. primer - equal to Benjamin Moore IronClad Retard-X Rust Inhibitive Latex Primer (162)

2. 2 finish coats - equal to Benjamin Moore Satin Impervo (235) or Moorcraft Super-Hide Latex Semi-Gloss Enamel (286)

3. color - to be specified by Architect

D. Trim -window and door trim:

1. 1st Coat - equal to Benjamin Moore Benwood Latex enamel underbody

2. 2 finish coats - equal to Benjamin Moore Regal Aqua Pearl

E. Natural finish wood: Interior wood doors (if not factory finished), chair rail, basetrim, planters, desk fronts, interior window frames, display shelves in exam rooms, counter edges, 1/2 wall caps:

1. 1st Coat - equal to Benjamin Moore Benwood Interior Wood Finishes Wood Grain Filler (238) ; omit for close grained wood

2. 2 finish coats - equal to Benjamin Moore Benwood Interior Wood Finishes Polyurethane

Part 3 EXECUTION

3.01 Examine substrates and conditions under which painting will be performed for compliance with requirements. Do not begin application until unsatisfactory conditions have been corrected.

3.02 Preparation.

A. Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and items in place that are not to be painted, or provide protection prior to surface preparation and painting. Remove items if necessary for complete painting of the items and adjacent surfaces. Following completion of painting, reinstall items removed using workmen skilled in the trades involved.

B. Clean surfaces before applying paint or surface treatments. Schedule cleaning and painting so dust and other contaminants will not fall on wet, newly painted surfaces.

3.03 Surface Preparation.

A. Clean and prepare surfaces to be painted in accordance with manufacturer's instructions for each particular substrate condition.

B. Notify Architect in writing of problems anticipated using specified finish coat material with substrates primed by others.

C. Wood: Clean surfaces of dirt, oil, or other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Sand surfaces exposed to view smooth, and dust off.

1. Scrape and clean, small, dry, seasoned knots and apply a thin coat of white shellac or other recommended knot sealer, before application of primer.

2. Prime, stain, or seal wood to be painted immediately upon delivery. Prime edges, ends, faces, undersides, and backsides of wood, including cabinets, counters, cases, and paneling.

3. Seal tops, bottoms, and cut-outs of unprimed wood doors with a heavy coat of varnish or sealer immediately upon delivery.

D. Ferrous Metal: Clean non-galvanized ferrous metal surfaces that have not been shop-coated; remove oil, grease, dirt, loose mill scale and other foreign

substances. Use solvent or mechanical cleaning methods that comply with recommendations of the Steel Structures Painting Council.

Touch-up shop-applied prime coats that have been damaged, and bare areas. Wire-brush, clean with solvents and touch-up with the same primer as the shop coat.

E. Galvanized Surfaces: Clean galvanized surfaces with non-petroleum based solvents so that surface is free of oil and surface contaminants. Remove pretreatment from galvanized sheet metal fabricated from coil stock, by mechanical methods.

3.04 Materials Preparation.

A. Mix and prepare paint in accordance with manufacturer's directions.

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

C. Use only thinners approved by manufacturer, and only within recommended limits.

3.05 Application: Apply paint in accordance with manufacturer's directions. Use applicators and techniques best suited for substrate and type of material being applied. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.

A. Paint colors, surface treatments, and finishes are indicated in "schedules."

B. Provide finish coats that are compatible with primers used.

C. The number of coats and film thickness required is the same regardless of application method. Do not apply succeeding coats until previous coat has cured. Sand between applications where required to produce a smooth, even surface.

D. Apply additional coats when undercoats or other conditions show through final coat, until paint film is of uniform finish, color, and appearance.

E. The term "exposed surfaces" includes areas visible when permanent or built-in items are in place. Extend coatings in these areas to maintain system integrity and provide desired protection.

F. Paint back sides of access panels and removable or hinged covers to match exposed surfaces.

G. Omit primer on metal surfaces that have been shop-primed.

3.06 Scheduling Painting: Apply first-coat to surfaces that have been cleaned, pretreated or otherwise prepared for painting as soon as practicable, and before subsequent surface deterioration. Allow sufficient time between successive coats to permit proper drying. Do not recoat until paint has dried.

3.07 Minimum Coating Thickness: Apply materials at the manufacturer's recommended spreading rate. Provide total dry film thickness of the system as recommended by the manufacturer.

3.08 Block Fillers: Apply block fillers at a rate to ensure complete coverage with pores filled.

3.09 Prime Coats.

A. Before application of finish coats, apply a prime coat as recommended by the manufacturer to material required to be painted or finished, and has not been prime coated by others.

B. Recoat primed and sealed substrates where there is evidence of suction spots or unsealed areas in the first coat to assure a finish coat with no burn-through or other defects due to insufficient sealing.

3.10 Brush Application.

A. Brush-out and work brush coats into surfaces in an even film. Eliminate cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections. Draw neat glass lines and color breaks.

B. Apply primers and first coats by brush unless manufacturer's instructions permit use of mechanical applicators.

3.11 Mechanical Applications.

A. Use mechanical methods for paint application when permitted by manufacturer's recommendations, governing ordinances, and trade union regulations.

B. Wherever spray application is used, apply each coat to provide the equivalent hiding of brush-applied coats. Do not double-back with spray equipment building-up film thickness of 2 coats in one pass, unless recommended by the manufacturer.

3.12 Completed Work: Match approved samples for color, texture and coverage. Remove, refinish or repaint work not in compliance with specified requirements.

3.13 Field Quality Control.

A. The Owner reserves the right to engage the services of an independent testing laboratory to sample paint material being used. Samples of material delivered to the project will be taken, identified, sealed, and certified in the presence of the Contractor.

B. The testing laboratory will perform appropriate tests as required by the Owner.

C. If tests show material being used does not comply with specified requirements, the Contractor may be directed to stop painting, and remove non-complying paint, pay for testing, repaint surfaces coated with rejected paint, remove rejected paint from previously painted surfaces if, upon repainting with specified paint, the two coatings are non-compatible.

3.14 Clean-Up.

A. At the end of each work day, remove empty cans, rags, rubbish, and other discarded paint materials from the site.

B. Upon completion of painting, clean glass and paint-spattered surfaces. Remove spattered paint by washing, scraping or other proper methods, using care not to scratch or damage adjacent finished surfaces.

3.15 Protect work of other trades, whether to be painted or not, against damage from painting. Correct damage by cleaning, repairing or replacing, and repainting, as acceptable to Architect.

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

3.17 At completion of construction activities of other trades, touch-up and restore damaged or defaced painted surfaces.

END OF SECTION 09900

SECTION 10520 - FIRE EXTINGUISHERS AND ACCESSORIES

Part 1 GENERAL

1.01 Furnish and install seven fire extinguishers in recessed cabinets for designated areas and wall mounted for mechanical room.

1.02 UL Listed Products: Provide new UL-listed fire extinguishers bearing UL "Listing Mark" for type, rating, and classification of extinguishers indicated.

1.03 Submittals: Submit product data and finish samples.

Part 2 PRODUCTS

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

A. J.L. Industries

B. Johnson-Lee, Div. of W.F. Lee Corp.

C. Larsen's Manufacturing Co.

D. Muckle Manufacturing, Division of Technico, Inc.

E. Waterous, Inc.

2.02 Fire Extinguishers: Provide fire extinguishers of types indicated: one for the North Corridor, two for the South Corridor, one for the furnace room. exact locations to be determined.

A. ABC Multi-Purpose Dry Chemical Type: UL-rated 2-A; 10-B:C, 5 lb. nominal capacity, in enameled steel container.

2.03 Mounting Brackets: Manufacturer's standard, of proper size for type and capacity of extinguisher indicated. Provide brackets for extinguishers not located in cabinets.

2.04 Fire Extinguisher Cabinets: Manufacturer's standard units of suitable size for housing fire extinguishers of type and capacity indicated and as follows.

A. Semi-Recessed Cabinet Type: Cabinet box partly recessed in wall.

B. Exposed Trim: One-piece combination trim and perimeter door frame overlapping surrounding wall surface.

1. Rolled-Edge Trim: Rounded edges with 1-1/4" backbend.

C. Door Material: Aluminum.

D. Door Style: Full-glass panel with 1/8" float glass.

E. Factory Finishing of Fire Extinguisher Cabinets: Comply with NAAMM "Metal Finishes Manual" to provide uniformly finished products. Provide color as indicated, or if not indicated, as selected from manufacturer's standard colors.

2.05 Additional signage. Provide angled wall sign above cabinets. EMED Inc. or equal. [EMED Inc. 1-800-442-3633.]

Part 3 EXECUTION

3.01 Installation: In accordance with manufacturer's directions for type of mounting required at height and locations indicated, or if not indicated, to comply with applicable regulations of governing authorities.

3.02 Identify Fire Extinguisher in Cabinets with lettering spelling "FIRE EXTINGUISHER" printed on door by process indicated below, as selected by Architect from manufacturer's standard letter sizes, styles, colors and layouts. Application Process: Silkscreen.

3.03 Identify bracket-mounted extinguishers with red letter decals spelling "FIRE EXTINGUISHERS" applied to wall surface. Letter size, style and location selected by Architect.

END OF SECTION 10520

SECTION 10800 - TOILET AND BATH ACCESSORIES

Part 1 GENERAL

1.01 Scope. Provide toilet and bath accessories as indicated or scheduled for bathrooms, exam rooms and other patient rooms. Install units at locations and heights as indicated, plumb and level, firmly anchored, in accordance with manufacturer's instructions.

1.02 Submittals: Manufacturer's data and installation instructions with sizes and locations.

Part 2 PRODUCTS

2.01 Manufacturers offering products to comply with requirements for general toilet and bath accessories include the following:

A & J Washroom Accessories.
American Specialties, Inc.
Bobrick Washroom Equipment, Inc.
Bradley Corporation.
Franklin Brass Mfg. Co.
Hallmark-Nutone/Div. Scovill.
G. M. Ketcham Co., Inc.
McKinney/Subsidiary Kidde, Inc.
Parker-Scovill.
Watrous, Inc.

2.02 Materials:

A. Stainless Steel: AISI Type 302/304, with polished No. 4 finish, 22 gage minimum, unless otherwise indicated.

B. Galvanized Steel Mounting Devices: ASTM A 153, hot-dip galvanized after fabrication.

2.03 Fasteners: Screws, bolts, and other devices of same material as accessory unit or of galvanized steel where concealed.

2.04 Fabrication:

A. General: Stamped names or labels on exposed faces of toilet and bath accessory units are not permitted, however unobtrusive labels indicating manufacturer and model number are required on surface not exposed to view. Wherever locks are required for particular type of accessory, provide same keying throughout project. Furnish two keys for each lock, properly identified.

B. Surface-Mounted Accessories: Fabricate units with tight seams and joints, exposed edges rolled. Hang doors or access panels with continuous piano hinge or minimum of two 1-1/2" pin hinges of same metal as unit cabinet. Provide concealed anchorage wherever possible.

C. Recessed Accessories: Fabricate units of all welded construction, without mitered corners. Hang doors or access panels with full-length stainless steel piano hinge. Provide anchorage which is fully concealed when unit is closed.

2.05 Accessories.

A. Toilet Tissue Dispensers. Single-Roll Dispenser: Size to accommodate core tissue to 5" diameter, with metal paper roller equipped with heavy-duty internal spring and finished to match base unit.

B. Grab Bars. Stainless Steel Type: Provide grab bars with wall thickness not less than 18 gage and as follows:

1. Mounting: Concealed.

2. Gripping Surfaces: Manufacturer's standard non-slip texture.

3. Size: Outside diameter 1-1/4".

C. Mirrors. Provide one 18" x 36" for each lav. w/ beveled edges, to be applied to wall w/ mastic and held in place at top w/ kerfed wood trim.

D. Paper Towel Holder / Dispenser.

1. Surfaced-Mounted Towel Dispensers: Fabricate of stainless steel with hinged front equipped with tumbler lockset and spring latch bolt. Provide pierced slots at sides as refill indicator.

2. Capacity: Not less than either 300 C-fold or 400 multifold paper towels.

E. Soap dispensers. Liquid Soap Dispenser, Horizontal Tank Type: Fabricate for surface mounting, sized for 40 fl. oz. minimum capacity. Provide stainless steel piston, springs, and internal parts designed to dispense soap in measured quantity by pump action. Provide cover in stainless steel, with unbreakable window-type refill indicated. Equip units with push type valve for dispensing soap in liquid form.

Part 3 EXECUTION

3.01 General: Install toilet accessory units in accordance with manufacturer's instructions, using fasteners appropriate to substrate and recommended by manufacturer of unit. Install units plumb and level, firmly anchored in locations indicated.

3.02 Adjust toilet accessories for proper operation and verify that mechanisms function smoothly.

3.03 Clean and polish all exposed surfaces after removing protective coatings.

END OF SECTION 10800

SECTION 12500 - WINDOW TREATMENT

Part 1 GENERAL

1.01 Scope. Furnish and install blinds for all windows.

1.02 Submittals: In addition to manufacturer's product data and installation instructions, submit the following:

A. Samples of materials and finishes.

B. Furnish small-size operating units when requested by Architect.

C. Shop drawings for installations not fully detailed in product data.

1.03 Quality Assurance: Provide complete assemblies produced by one manufacturer for each type required, including hardware, accessory items, mounting brackets, and fastenings.

Part 2 PRODUCTS

2.01 Match existing products

Part 3 EXECUTION

3.01 Fabrication: Fabricate units to completely fill openings as indicated, from head-to-sill and jamb-to-jamb. For continuous window wall installations, fabricate units so that ends occur only over mullions or other defined vertical separations, unless otherwise indicated.

3.02 Installation: Install units to comply with manufacturer's instructions for type of mountings and operations required. Provide units plumb and true, securely anchored in place with recommended hardware and accessories to provide smooth, easy operation.

END OF SECTION 12500

SECTION 15000 - MECHANICAL

Part 1 GENERAL

1.01 A more complete mechanical spec will be coming from Russ Martin. Included here are an outline spec and an equipment schedule.

Maine Orthopaedics
Frost Street, Portland, Maine
October 1, 2004

OUTLINE SPECIFICATION - MECHANICAL

1. Intent of Outline Specification: The intent of this Outline Specification is to enable Contractors to obtain and develop budgets for Mechanical systems, to enable the building Owners / Tenants to review and approve the proposed systems, and to facilitate coordination among the design team. The documents are not sufficiently developed, nor intended to serve as construction documents. The Outline Specification establishes minimum criteria and does not relax any applicable codes or standards. The Mechanical Engineer will complete the project design in accordance with the concepts of this Outline Mechanical Specification and produce detailed construction drawings.

2. Codes & standards: All applicable shall apply including, but not limited to, the following:

a) State of Maine Plumbing, Ventilation, Energy, Oil/Gas Burners/Boilers
b) BOCA Basic Building Code – latest version adopted by Portland
c) NFPA 54, 90A, etc.
d) City of Portland requirements
e) ASHRAE standards 62-2001(IAQ) and 90.1-2001(Energy)
f) ASHRAE Applications Handbook (2003) Chapter 7 - Health Care Facilities
g) AIA Guidelines for Design and Construction of Hospital and Health Care Facilities

3. HVAC:

a. Scope –
   1. Install equipment and ductwork to provide proper zoning, noise, and comfort levels. Provide systems to meet current codes and standards including filtration and indoor air quality. Obtain proper building and space pressurization. The systems must be convenient to operate by the building occupants.
   2. Provide 2" thick filtration (MERV 11 per ASHRAE Standard 52.2) for both units. Provide minimum 6 air changes per hour in all exam rooms and offices. Provide 20% minimum ventilation air to meet code.
   3. Maintain 30-60% RH and 72-76 deg. F.
   4. Provide 25 foot separation between intake openings and exhausts, stacks, etc.
   5. Provide exhaust systems for Toilets (150 cfm per water closet), Janitor's Rooms (150 cfm), Lunch Rooms (12 Ac/hour on speed switch), and other spaces as appropriate. Toilet exhaust systems shall operate when any system is in the occupied mode.

Architect: Whipple-Callender Architects, Portland, Maine
Mechanical Consultant: Russell A. Martin, PE, PA
6 Whispering Pines, Freeport, Maine 04032
207-865-0753

b) Equipment

1. Provide new natural gas service for new boiler serving second floor systems. Extend existing natural gas service serving Maine Orthopaedics to new boiler for Maine Orthopaedics. Coordinate with gas company.

2. Provide boiler/burner units and hot water piping. Provide fuel, combustion air, ventilation, chimney systems, boiler accessories, safety devices, to meet current codes. Provide boilers and boiler room piping with capacities indicated.

3. Pumps : Provide Taco or Bell & Gossett inline, cross connected for backup capabilities.

4. Heating pipe and insulation: Type L copper (soldered) and/or schedule 40 steel (screwed) valves and fittings; insulation per ASHRAE 90 (1-1/2", 1"). Ball valves for both isolation and throttling service.

5. Hydronic heating specialties(as necessary): Inline air scoop with float type air vent and diaphragm-type compression tank, no automatic air vents outside of Mech. Room (due to leaks); manual air vents at all system high points, hose-end drains at all low points. Flo Control or Taco circuit setters at each heating coil and pump. Provide pressure gages and thermometers at pumps and boilers.

6. Supplemental hydronic heating elements: Unit heaters (unfinished basement)

7. **Air Handling Equipment**
8. Air handling units: Single zone blower coil cooling units with outside air/ return air mixing box, full economizer cycle, 2"x MERV 11 filters, hot water heating coil with 3-way valve control, direct expansion cooling coil, centrifugal fan - belt driven with adjustable sheave, full insulated drain pan, insulated casing with solid inner wall or exposed non-glass fiber insulation, internal spring vibration isolators, high-efficiency ODP motor(208V/3ph). Trane or equal by Carrier or York.
9. Separate air-cooled condensing unit, with unloading required for VAV, integral electric cabinet with starters. By the same manufacturer as the blower coil unit. Manufacturer shall provide combination ratings and refrigerant piping diagram indicating pipe sizes, accessories, etc.

10. Variable Air Volume (VAV) boxes with Hot Water Reheat coils: Horizontal, concealed above ceilings, acoustically lined casing.

Architect: Whipple-Callender Architects, Portland, Maine
Mechanical Consultant: Russell A. Martin, PE, PA
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11. Add Alternate: Humidifiers: Central (electric or gas) units in accessible spaces discharging into supply duct, Dri-steam or equal, sensing return air RH (30% setpoint), high limit and air flow switch. Provide one unit for each blower coil system.

12. Exhaust fans: Acme, Penn, or Cook, mount in accessible locations, inline units with backdraft dampers, speed switches where appropriate. Provide a separate for each group of toilets. Units shall discharge through the building sidewall.

13. Grilles, registers, and ceiling diffusers: Anemostat, Kruegar, or Titus, white, lay-in diffusers with equalizing grids. Provide ducted ceiling return grilles in all rooms exceeding 100 square feet area.

14. Ductwork and insulation: Ductwork per SMACNA standards, galvanized. Insulate all supply ducts and exhaust ducts between backdraft dampers and the exterior with min. 1-1/2" foil faced blanket wrap. Do not use internal duct liners. Provide type B (blades out of airstream) fire dampers wherever ducts penetrate rated assemblies or chases. Provide duct access doors at all box discharges, coils, and dampers. Provide discharge duct smoke detectors (coordinate with Electrical contractor). Provide combustion and ventilation air for boilers per codes.

15. Automatic temperature controls: System shall be DDC except as specifically noted below. System shall be by Trane or equal by Maine Controls. ATC contractor shall show evidence of minimum 5 years experience of design and installation of systems comparable in size and scope.

    System shall include time scheduling, alarm management, data logging and reporting capabilities.

    Cabinet and unit heaters and exhaust fans (where applicable) shall be activated by line voltage, electrical thermostats.

    Space sensors with local adjustment and override capabilities shall control VAV dampers and reheat coil valves. Provide VAV bypass dampers for air handling systems. Control AHU(s) heating/cooling VAV with full air economizer (and humidification – add alternate). Units shall run constantly in the occupied mode and cycle on demand to meet setback space temperatures. Provide reset boiler water setpoint to reset heating water temperature according to outside air temperature. Shut down heating pumps when outside air temperature is above 65°F.

Units shall be on a 7-day program capable of being reset by zone at each zone sensor.

ATC system shall be laid out and submitted for approval before beginning installation.

Installation

1. Provide mechanical equipment submittals to Mechanical consultant for review and comment before ordering or fabricating equipment..

2. Piping : insulate heating water. Include piping, fittings, and valve bodies.

3. Provide ductwork per ASHRAE and SMACNA. Run ductwork below building insulation and above conditioned space ceilings. Provide sufficient lengths of duct and elbows to adequately attenuate noise before connecting to terminal outlets. Provide duct-balancing dampers as necessary. Splitter dampers are not acceptable. Utilize radius elbows or single blade extended edge turning vanes for all elbows. Provide flexible connections at all fans. Pay strict attention to the proper installation of smoke or fire dampers and flexible ductwork. Limit flexible duct lengths to 5 feet maximum.

4. Provide air and water Testing and Balancing in accordance with ASHRAE, AABC, or NEBB. Submit agency qualifications for approval. Submit a preliminary balancing report before final inspection / beneficial occupancy for review and comment. Make required adjustments and provide 3 copies of final typewritten report.

5. All hydronic heating/cooling elements shall have an isolation valve on the inlet connection; a isolation/balancing valve and flow metering connection on the outlet connection; manual air vent on the high point; and hose-end drain on the low point.

6. Provide O&M manuals and record drawings and CAD files. Provide minimum of 4 hours instructions to Owner/tenant.

d.) Preliminary zoning

AC System	Room Number/Name	Zone number
1	B101	1-1
1	108	1-2
1	109, 110, 111, 112, 113	1-3
1	114, 115, 117 part., 128 part	1-4
1	129, 130, 131	1-5
1	102, 126, 127, 128	1-6
1	104, 107, 108, 116, 117, 118, 119, 120, 121, 122, 123, 125, 128, 132	1-7
2	Business, Exam 1,2,3,4,5	2-1
2	Part Corr., Spare, Office	2-2
2	Lunch	2-3
2	Office, Office, Waiting	2-4
2	Reception, Secretary, Corridors, Files, Toilets, Computer	2-5

PORTLAND ORTHOPAEDICS

SYSTEM TAG	AC-1	AC-2
SERVES	1ST FLOOR	2ND FLOOR
MANUFACTURER	TRANE	TRANE
AHU TAG	AHU-1	AHU-2
LOCATION	BASEMENT	BASEMENT
MODEL NO.	BCHC90	BCHC90
CFM	3600	3500
ESP*	1.5	1.5
RPM	1094	1094
MIN OUTSIDE AIR	720	680
VOLTS-PH	208-230/60/3	208-230/60/3
HP	3	3
ACCESSORIES	ECONOMIZER/MIXING BOX	ECONOMIZER/MIXING BOX
FILTERS	2" PLEATED	2" PLEATED
ACCU TAG	ACCU-1	ACCU-1
MODEL NO.	TTA120B3	TTA120B3
SIZE (TONS)	10	10
SEER	11.5	11.5
VOLTS-PH	208-230/60/3	208-230/60/3
KW	10.94	10.94
MCA (AMPS)	47.9	47.9
MAX FUSE	60	60
HACR BREAKER	60	60
10/1 STATUS	PRELIM	PRELIM
MBCA: MINIMUM BRANCH CIRCUIT AMPACITY CALC. IN ACCORDANCE WITH NEC.		
* ESP IS EXTERNAL TO WETCOILS & FILTERS		

PORTLAND ORTHOPAEDICS

BOILER SCHEDULE							
TAG	MAKE	MODEL	SIZE	INPUT	OUTPUT	H	W
B-1	LAARS	ENDURANCE	EBP 110	61.8 to 108.2	52.7 to 94.0	60	18
B-2	LAARS	ENDURANCE	EBP 110	61.8 to 108.2	52.7 to 94.0	60	18

PORTLAND ORTHOPAEDICS

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SECTION 16000 - ELECTRICAL

Part 1 GENERAL

1.01 Scope: The work covered by this specification shall include furnishing all labor, material, equipment, and services to construct and install the complete and operating electrical system. The drawings will show switching and fixtures and outlets and alarms. It will be the responsibility of this contractor to design and engineer the circuits, follow all codes, gain approvals from pertinent authorities for alarm and detection systems. The work shall include:

A. Feeders and ducts for telephone and electrical service distribution.

B. Complete system for lighting and power, include feeders, panel boards, branch circuits, main panels and light fixtures.

C. Installing and wiring of controls for mechanical equipment. This work shall include the wiring of all electric temperature controls, wiring for furnace, and power and controls for air conditioning system to be located in attic.

D. Ducting from range hood, dryer and all bathroom fans to exterior.

E. Coordinate work with Security System Contractor (if security system is installed).

F. All permits, fees and inspections that may be required.

1.02 Standards: All materials and equipment shall be new and of the type approved and labeled by *Underwriters Laboratories Inc.* and shall be in strict conformity with the latest standards of the following where such standards normally apply:

A. Underwriters Laboratories, Inc.

B. National Board of Fire Underwriters

C. National Fire Protection Association

D. Insulated Power Cables Engineers Association

E. American Institute of Electrical Engineers

F. National Electrical Manufacturers Association

G. Federal Bureau of Standards

H. American Standards Association

I. Illuminating Engineers Association

J. Electrical Testing Laboratories

K. Illumination Testing Laboratories

1.03 Description: Examine all other sections of the specifications for requirements which affect the work of this section, whether or not such requirements are directly referenced in this Section. Cooperate and coordinate with all other trades in executing work described in this Section and on the drawings to assure the steady progress of all work.

1.04 Product Delivery, Storage and Protection:

A. All products and materials brought to the site shall be properly protected to prevent damage due to environmental or working conditions, in order to ensure proper installation and acceptable finish quality. The Electrical Contractor shall be responsible for the work and equipment until finally inspected, tested and accepted by the G. C.

B. The E.C. shall protect work and material of other trades from damage that might be caused by electrical work or workers, and shall make good damage thus caused.

C. Close open ends of work with temporary covers or plugs during construction to prevent entry of obstructing material.

1.05 Temporary Electrical Service:

A. The Electrical Contractor shall:

1. Provide temporary electrical service;

2. Provide temporary lighting throughout the building;

3. Supply and install any required temporary load centers and/or power outlets for all contractors for the proper conduct of their work;

4. Be responsible for the maintenance of the temporary system until removed;

5. Remove all temporary facilities at the discretion of the G.C. All equipment used for temporary facilities becomes the property of the electrical contractor.

B. All work shall comply with the State Safety Code and S.S.H.A. requirements, including ground fault protection.

1.06 Guarantee:

A. All materials and items of equipment furnished under this contract shall be guaranteed to be free from defects in material and workmanship for a period of one year.

B. All work performed by E.C., including work subcontracted for by the E.C., shall be guaranteed to be free from defects.

C. Any fault due to defective material or workmanship which may develop within the guarantee period shall be made good by the owner of the project, including all other damage done to areas, materials and other systems resulting from this failure.

1.07 Cleanup and Repair: At the completion of each workday, the area shall be left clean. Any damage caused to work of other trades by E.C. shall be repaired at the expense of the E.C.

1.08 Drawings: The Electrical Contractor shall refer to the Electrical Drawings and Drawings for the other trades for a full comprehension of the extent and detail of the work to be performed. Drawings are diagrammatic, intended to show general arrangement and extent of the work to be done. Any obvious errors or omissions shall be clarified with the Architect before a proposal is submitted. If any departures from the drawings are deemed necessary by the Contractor, details of such departures shall be submitted to the Architect for approval within 30 days after the award of contract.

1.09 All work in this Section shall conform to all National, State and Local codes, special safety or protective codes and requirements as applicable to this project. The *National Electrical Code,* applicable *NEMA* standards and applicable *UL* standards shall establish minimum requirements.

1.10 Performance. All Work shall be performed in a neat and workmanlike manner by persons duly licensed by the State of Maine.

1.11 Related Sections:

A. 02000 - Site Earthwork

B. 06100 - Rough Carpentry

C. 15000 - Mechanical

Part 2 PRODUCTS

2.01 Electric Service:

A. Extend existing. Provide separate meters for owner (first floor, basement and lunch room), and tenant (second floor). HVAC equipment to be wired accordingly.

B. Conductors:

1. Primary - provided and installed by the Utility Company;

2. Secondary - Type THWN copper;

3. Grounding - Bare copper in code size.

2.02 Conduits, Fittings and Installation:

A. All products are to meet or exceed code requirements for commercial construction, and be UL listed.

2.03 Conduit Supports and Hangers: All conduits shall be substantially supported with approved clips or hangers spaced not to exceed ten feet on centers except 1/2" rigid conduit and 1/2" and 3/4" EMT shall have supports not to exceed six feet.

2.04 Wire and Cable:

A. All wire and cable shall comply with the latest requirements and specifications of the NFPA and/or the "Insulated Power Cable Engineers Association" (IPCEA) and shall be as manufactured by:

"Triangle";
"General Cable";
"General Electric";
"Carol";
"American";

or other approved manufacturers. All wire and cable shall be stamped approximately every two feet to indicate voltage, type, temperature rating, UL listing, manufacturer's name, size, etc.

2.05 Outlets and boxes shall be stamped, one piece, galvanized steel; be of proper size and shape for conduits entering them; be UL and "National Electrical Code" approved; be installed so that device and/or cover plates shall be tight and plumb with wall finish; have unused openings closed with "knock-out" closures; be weatherproof for exterior or wet locations; be securely fastened in position. Non-metallic boxes may be used on this project. Outlet boxes in wet locations or exterior locations shall be threaded cast device boxes complete with vapor-proof gaskets.

2.06 Switches, Receptacles, and Wiring Devices

A. Wiring devices shall be as manufactured by "Arrow-Hart", unless otherwise noted. E.C. may substitute devices as manufactured by "Bryant", "Hubbell" or "Leviton" if approved by the Architect.

B. All switches shall be single or double pole, three-way or four-way as indicated on the Drawings. All switches shall be of the same manufacturer. Switches shall be as manufactured by "Hubbell", "Pass and Seymour", "General Electric", "Leviton" or approved substitute. Color: off-white.

C. Receptacles shall be duplex, specification grade, three wire, grounding type for parallel-blade two or three prong attachment caps. All shall be as manufactured by "Hubbell", "Pass and Seymour", "General Electric", "Leviton" or approved substitute. Color: off-white.

D. Plates for switches, receptacles, junction boxes, etc., shall be smooth line plastic design #7000 series for flush mounting, off-white.

2.07 Service Main Circuit Breaker Disconnect

A. Circuit breaker shall be manually operated, trip free and be designed so that all poles open simultaneously. Circuit breaker shall be located where indicated. Tripping mechanism shall be thermally-magnetically operated, open instantaneously on short circuits and have time delay on overloads. Circuit breaker shall be "Westinghouse", "Square D", "Arrow-Hart" or "General Electric" rated for service characteristics of equipment and fixtures shown on drawings.

2.08 Light Fixtures: E.C. shall furnish and install fixtures listed on Electrical Fixture Schedule, including all trim kits, bulbs and other accessories required.

2.09 Telephones: The E.C. shall include the conduit, junction boxes, pull wire, plywood panel board, and 120 volt receptacle for the telephone system. The E.C. shall furnish and install conduit, boxes, cable, and connector cover plates as indicated. Locations as shown on drawings are approximate and shall be verified before installation.

2.10 Data: EC to provide conduit and pull strings to data terminals as indicated in plans. Coordinate with information technology supplier.

2.11 Security System: Provided by others.

Part 3 EXECUTION

3.01 Standards, Codes and Fees

A. All materials and workmanship shall comply with all applicable codes, specifications, local ordinances, industry standards, utility company and fire insurance carrier's requirements.

B. In case of differences between and of the above standards of codes, the most stringent shall govern.

C. Should the E.C perform any work that does not comply with the requirements of 16000.3.1 above, they shall bear the cost of correcting any such deficiencies.

D. The electrical contractor shall provide the Architect with a Certification of Inspection.

3.02 Tests

A. Insulation Tests. As the various parts of the work are completed, the E.C. shall make preliminary insulation resistance tests to insure that the system is free from short circuits and accidental grounds and that all connections, switches, controls, and equipment are in proper operating condition.

B. As soon as electric power is available and connected to serve the equipment in the building, and everything is ready for final testing and placing into service, a complete operational test shall be made.

C. The E.C. shall furnish all necessary instruments and equipment and make all tests, adjustments and trial operations required to place the system in satisfactory operating condition.

D. The E.C. shall furnish all necessary assistance and instructions to properly instruct the Owner in the operation and care of the system.

E. All systems shall be tested and reworked until free from all defects. Such tests to be made in the presence of the General Contractor or his representative.

F. Wiring shall be installed with identification of insulation type and conductor size and material in position for inspection without twisting installed work.

3.03 The E.C. shall balance all loads between phases in all panels, etc. Where common neutral is run for branch circuits, the phase wires of the home run shall be connected to separate phase legs in order that the neutral will carry only the unbalanced current in the phase circuits.

3.04 The E.C. shall schedule his work to coordinate with the work of other trades and to cause no delays. He shall insure that all phones are pre-wired.

3.05 Receptacles, switches, and lights shall match heights and alignments carefully where appropriate for the intended use of each room and questions about their positioning should be referred to Architect.

3.06 E.C. shall furnish and install on each panel, main switch, disconnect switch a name plate of engraved plastic material inscribed with the purpose of that piece of equipment. Circuit shall be identified in neat printing.

3.07 E.C. shall furnish and install foam gaskets on all outlets and switch covers in the outside wall for the purpose of reducing air infiltration.

3.08 The E.C. shall fully and clearly label all equipment or areas served by each circuit on the panel.

END OF SECTION 16000