Project Manual

Island View Apartments

Portland, Maine
December 20, 2000

Development Team

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AIA Document A101

Standard Form of Agreement Between Owner and Contractor

where the basis of payment is a

STIPULATED SUM

1987 EDITION

THIS DOCUMENT HAS IMPORTANT LEGAL CONSEQUENCES; CONSULTATION WITH AN ATTORNEY IS ENCOURAGED WITH RESPECT TO ITS COMPLETION OR MODIFICATION.

The 1987 Edition of AIA Document A201, General Conditions of the Contract for Construction, is adopted in this document by reference. Do not use with other general conditions unless this document is modified.

This document has been approved and endorsed by The Associated General Contractors of America.

AGREEMENT

made as of the day of in the year of
Nineteen Hundred and

BETWEEN the Owner:
(Name and address)

and the Contractor:
(Name and address)

The Project is:
(Name and location)

The Architect is:
(Name and address)

The Owner and Contractor agree as set forth below.

ARTICLE 1
THE CONTRACT DOCUMENTS

The Contract Documents consist of this Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to execution of this Agreement, other documents listed in this Agreement and Modifications issued after execution of this Agreement; these form the Contract, and are as fully a part of the Contract as if attached to this Agreement or repeated herein. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations or agreements, either written or oral. An enumeration of the Contract Documents, other than Modifications, appears in Article 9.

ARTICLE 2
THE WORK OF THIS CONTRACT

The Contractor shall execute the entire Work described in the Contract Documents, except to the extent specifically indicated in the Contract Documents to be the responsibility of others, or as follows:

ARTICLE 3
DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

3.1 The date of commencement is the date from which the Contract Time of Paragraph 3.2 is measured, and shall be the date of this Agreement, as first written above, unless a different date is stated below or provision is made for the date to be fixed in a notice to proceed issued by the Owner.

(Insert the date of commencement, if it differs from the date of this Agreement or, if applicable, state that the date will be fixed in a notice to proceed.)

Unless the date of commencement is established by a notice to proceed issued by the Owner, the Contractor shall notify the Owner in writing not less than five days before commencing the Work to permit the timely filing of mortgages, mechanic's liens and other security interests.

3.2 The Contractor shall achieve Substantial Completion of the entire Work not later than

(Insert the calendar date or number of calendar days after the date of commencement. Also insert any requirements for earlier Substantial Completion of certain portions of the Work, if not stated elsewhere in the Contract Documents.)

, subject to adjustments of this Contract Time as provided in the Contract Documents.

(Insert provisions, if any, for liquidated damages relating to failure to complete on time.)

ARTICLE 4
CONTRACT SUM

4.1 The Owner shall pay the Contractor in current funds for the Contractor's performance of the Contract the Contract Sum of Dollars ($), subject to additions and deductions as provided in the Contract Documents.

4.2 The Contract Sum is based upon the following alternates, if any, which are described in the Contract Documents and are hereby accepted by the Owner:

(State the numbers or other identification of accepted alternates. If decisions on other alternates are to be made by the Owner subsequent to the execution of this Agreement, attach a schedule of such other alternates showing the amount for each and the date until which that amount is valid.)

4.3 Unit prices, if any, are as follows:

ARTICLE 5
PROGRESS PAYMENTS

5.1 Based upon Applications for Payment submitted to the Architect by the Contractor and Certificates for Payment issued by the Architect, the Owner shall make progress payments on account of the Contract Sum to the Contractor as provided below and elsewhere in the Contract Documents.

5.2 The period covered by each Application for Payment shall be one calendar month ending on the last day of the month, or as follows:

5.3 Provided an Application for Payment is received by the Architect not later than the day of a month, the Owner shall make payment to the Contractor not later than the day of the month. If an Application for Payment is received by the Architect after the application date fixed above, payment shall be made by the Owner not later than days after the Architect receives the Application for Payment.

5.4 Each Application for Payment shall be based upon the Schedule of Values submitted by the Contractor in accordance with the Contract Documents. The Schedule of Values shall allocate the entire Contract Sum among the various portions of the Work and be prepared in such form and supported by such data to substantiate its accuracy as the Architect may require. This Schedule, unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment.

5.5 Applications for Payment shall indicate the percentage of completion of each portion of the Work as of the end of the period covered by the Application for Payment.

5.6 Subject to the provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

5.6.1 Take that portion of the Contract Sum properly allocable to completed Work as determined by multiplying the percentage completion of each portion of the Work by the share of the total Contract Sum allocated to that portion of the Work in the Schedule of Values, less retainage of percent (%). Pending final determination of cost to the Owner of changes in the Work, amounts not in dispute may be included as provided in Subparagraph 7.3.7 of the General Conditions even though the Contract Sum has not yet been adjusted by Change Order;

5.6.2 Add that portion of the Contract Sum properly allocable to materials and equipment delivered and suitably stored at the site for subsequent incorporation in the completed construction (or, if approved in advance by the Owner, suitably stored off the site at a location agreed upon in writing), less retainage of percent (%);

5.6.3 Subtract the aggregate of previous payments made by the Owner; and

5.6.4 Subtract amounts, if any, for which the Architect has withheld or nullified a Certificate for Payment as provided in Paragraph 9.5 of the General Conditions.

5.7 The progress payment amount determined in accordance with Paragraph 5.6 shall be further modified under the following circumstances:

5.7.1 Add, upon Substantial Completion of the Work, a sum sufficient to increase the total payments to percent (%) of the Contract Sum, less such amounts as the Architect shall determine for incomplete Work and unsettled claims; and

5.7.2 Add, if final completion of the Work is thereafter materially delayed through no fault of the Contractor, any additional amounts payable in accordance with Subparagraph 9.10.3 of the General Conditions.

5.8 Reduction or limitation of retainage, if any, shall be as follows:

(If it is intended, prior to Substantial Completion of the entire Work, to reduce or limit the retainage resulting from the percentages inserted in Subparagraphs 5.6.1 and 5.6.2 above, and this is not explained elsewhere in the Contract Documents, insert here provisions for such reduction or limitation.)

ARTICLE 6
FINAL PAYMENT

Final payment, constituting the entire unpaid balance of the Contract Sum, shall be made by the Owner to the Contractor when (1) the Contract has been fully performed by the Contractor except for the Contractor's responsibility to correct nonconforming Work as provided in Subparagraph 12.2.2 of the General Conditions and to satisfy other requirements, if any, which necessarily survive final payment; and (2) a final Certificate for Payment has been issued by the Architect; such final payment shall be made by the Owner not more than 30 days after the issuance of the Architect's final Certificate for Payment, or as follows:

ARTICLE 7
MISCELLANEOUS PROVISIONS

7.1 Where reference is made in this Agreement to a provision of the General Conditions or another Contract Document, the reference refers to that provision as amended or supplemented by other provisions of the Contract Documents.

7.2 Payments due and unpaid under the Contract shall bear interest from the date payment is due at the rate stated below, or in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.

(Insert rate of interest agreed upon, if any.)

(Usury laws and requirements under the Federal Truth in Lending Act, similar state and local consumer credit laws and other regulations at the Owner's and Contractor's principal places of business, the location of the Project and elsewhere may affect the validity of this provision. Legal advice should be obtained with respect to deletions or modifications, and also regarding requirements such as written disclosures or waivers.)

7.3 Other provisions:

ARTICLE 8
TERMINATION OR SUSPENSION

8.1 The Contract may be terminated by the Owner or the Contractor as provided in Article 14 of the General Conditions.

8.2 The Work may be suspended by the Owner as provided in Article 14 of the General Conditions.

ARTICLE 9
ENUMERATION OF CONTRACT DOCUMENTS

9.1 The Contract Documents, except for Modifications issued after execution of this Agreement, are enumerated as follows:

9.1.1 The Agreement is this executed Standard Form of Agreement Between Owner and Contractor, AIA Document A101, 1987 Edition.

9.1.2 The General Conditions are the General Conditions of the Contract for Construction, AIA Document A201, 1987 Edition.

9.1.3 The Supplementary and other Conditions of the Contract are those contained in the Project Manual dated , and are as follows:

Document	Title	Pages

9.1.4 The Specifications are those contained in the Project Manual dated as in Subparagraph 9.1.3, and are as follows:

(Either list the Specifications here or refer to an exhibit attached to this Agreement.)

Section	Title	Pages

9.1.5 The Drawings are as follows, and are dated unless a different date is shown below:

(Either list the Drawings here or refer to an exhibit attached to this Agreement.)

Number	Title	Date

9.1.6 The Addenda, if any, are as follows:

Number	Date	Pages

Portions of Addenda relating to bidding requirements are not part of the Contract Documents unless the bidding requirements are also enumerated in this Article 9.

9.1.7 Other documents, if any, forming part of the Contract Documents are as follows:

(List here any additional documents which are intended to form part of the Contract Documents. The General Conditions provide that bidding requirements such as advertisement or invitation to bid, Instructions to Bidders, sample forms and the Contractor's bid are not part of the Contract Documents unless enumerated in this Agreement. They should be listed here only if intended to be part of the Contract Documents.)

This Agreement is entered into as of the day and year first written above and is executed in at least three original copies of which one is to be delivered to the Contractor, one to the Architect for use in the administration of the Contract, and the remainder to the Owner.

OWNER	CONTRACTOR
_____	_____
(Signature)	*(Signature)*
_____	_____
(Printed name and title)	*(Printed name and title)*

AIA Document A201

General Conditions of the Contract for Construction

THIS DOCUMENT HAS IMPORTANT LEGAL CONSEQUENCES; CONSULTATION WITH AN ATTORNEY IS ENCOURAGED WITH RESPECT TO ITS MODIFICATION

1987 EDITION

TABLE OF ARTICLES

This document has been approved and endorsed by the Associated General Contractors of America.

Work without the specific written consent of the Owner and Architect. The Contractor, Subcontractors, Sub-subcontractors and material or equipment suppliers are granted a limited license to use and reproduce applicable portions of the Drawings, Specifications and other documents prepared by the Architect appropriate to and for use in the execution of their Work under the Contract Documents. All copies made under this license shall bear the statutory copyright notice, if any, shown on the Drawings, Specifications and other documents prepared by the Architect. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with this Project is not to be construed as publication in derogation of the Architect's copyright or other reserved rights.

1.4 CAPITALIZATION

1.4.1 Terms capitalized in these General Conditions include those which are (1) specifically defined, (2) the titles of numbered articles and identified references to Paragraphs, Subparagraphs and Clauses in the document or (3) the titles of other documents published by the American Institute of Architects.

1.5 INTERPRETATION

1.5.1 In the interest of brevity the Contract Documents frequently omit modifying words such as "all" and "any" and articles such as "the" and "an," but the fact that a modifier or an article is absent from one statement and appears in another is not intended to affect the interpretation of either statement.

ARTICLE 2

OWNER

2.1 DEFINITION

2.1.1 The Owner is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The term "Owner" means the Owner or the Owner's authorized representative.

2.1.2 The Owner upon reasonable written request shall furnish to the Contractor in writing information which is necessary and relevant for the Contractor to evaluate, give notice of or enforce mechanic's lien rights. Such information shall include a correct statement of the record legal title to the property on which the Project is located, usually referred to as the site, and the Owner's interest therein at the time of execution of the Agreement and, within five days after any change, information of such change in title, recorded or unrecorded.

2.2 INFORMATION AND SERVICES REQUIRED OF THE OWNER

2.2.1 The Owner shall, at the request of the Contractor, prior to execution of the Agreement and promptly from time to time thereafter, furnish to the Contractor reasonable evidence that financial arrangements have been made to fulfill the Owner's obligations under the Contract. *[Note: Unless such reasonable evidence were furnished on request prior to the execution of the Agreement, the prospective contractor would not be required to execute the Agreement or to commence the Work.]*

2.2.2 The Owner shall furnish surveys describing physical characteristics, legal limitations and utility locations for the site of the Project, and a legal description of the site.

2.2.3 Except for permits and fees which are the responsibility of the Contractor under the Contract Documents, the Owner shall secure and pay for necessary approvals, easements, assessments and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities.

2.2.4 Information or services under the Owner's control shall be furnished by the Owner with reasonable promptness to avoid delay in orderly progress of the Work.

2.2.5 Unless otherwise provided in the Contract Documents, the Contractor will be furnished, free of charge, such copies of Drawings and Project Manuals as are reasonably necessary for execution of the Work.

2.2.6 The foregoing are in addition to other duties and responsibilities of the Owner enumerated herein and especially those in respect to Article 6 (Construction by Owner or by Separate Contractors), Article 9 (Payments and Completion) and Article 11 (Insurance and Bonds).

2.3 OWNER'S RIGHT TO STOP THE WORK

2.3.1 If the Contractor fails to correct Work which is not in accordance with the requirements of the Contract Documents as required by Paragraph 12.2 or persistently fails to carry out Work in accordance with the Contract Documents, the Owner, by written order signed personally or by an agent specifically so empowered by the Owner in writing, may order the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent required by Subparagraph 6.1.3.

2.4 OWNER'S RIGHT TO CARRY OUT THE WORK

2.4.1 If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a seven-day period after receipt of written notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may after such seven-day period give the Contractor a second written notice to correct such deficiencies within a second seven-day period. If the Contractor within such second seven-day period after receipt of such second notice fails to commence and continue to correct any deficiencies, the Owner may, without prejudice to other remedies the Owner may have, correct such deficiencies. In such case an appropriate Change Order shall be issued deducting from payments then or thereafter due the Contractor the cost of correcting such deficiencies, including compensation for the Architect's additional services and expenses made necessary by such default, neglect or failure. Such action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Architect. If payments then or thereafter due the Contractor are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner.

ARTICLE 3

CONTRACTOR

3.1 DEFINITION

3.1.1 The Contractor is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The term "Contractor" means the Contractor or the Contractor's authorized representative.

.3 Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum and not in the allowances;

.4 whenever costs are more than or less than allowances, the Contract Sum shall be adjusted accordingly by Change Order. The amount of the Change Order shall reflect (1) the difference between actual costs and the allowances under Clause 3.8.2.2 and (2) changes in Contractor's costs under Clause 3.8.2.3.

3.9 SUPERINTENDENT

3.9.1 The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the Project site during performance of the Work. The superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the Contractor. Important communications shall be confirmed in writing. Other communications shall be similarly confirmed on written request in each case.

3.10 CONTRACTOR'S CONSTRUCTION SCHEDULES

3.10.1 The Contractor, promptly after being awarded the Contract, shall prepare and submit for the Owner's and Architect's information a Contractor's construction schedule for the Work. The schedule shall not exceed time limits current under the Contract Documents, shall be revised at appropriate intervals as required by the conditions of the Work and Project, shall be related to the entire Project to the extent required by the Contract Documents, and shall provide for expeditious and practicable execution of the Work.

3.10.2 The Contractor shall prepare and keep current, for the Architect's approval, a schedule of submittals which is coordinated with the Contractor's construction schedule and allows the Architect reasonable time to review submittals.

3.10.3 The Contractor shall conform to the most recent schedules.

3.11 DOCUMENTS AND SAMPLES AT THE SITE

3.11.1 The Contractor shall maintain at the site for the Owner one record copy of the Drawings, Specifications, addenda, Change Orders and other Modifications, in good order and marked currently to record changes and selections made during construction, and in addition approved Shop Drawings, Product Data, Samples and similar required submittals. These shall be available to the Architect and shall be delivered to the Architect for submittal to the Owner upon completion of the Work.

3.12 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

3.12.1 Shop Drawings are drawings, diagrams, schedules and other data specially prepared for the Work by the Contractor or a Subcontractor, Sub-subcontractor, manufacturer, supplier or distributor to illustrate some portion of the Work.

3.12.2 Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams and other information furnished by the Contractor to illustrate materials or equipment for some portion of the Work.

3.12.3 Samples are physical examples which illustrate materials, equipment or workmanship and establish standards by which the Work will be judged.

3.12.4 Shop Drawings, Product Data, Samples and similar submittals are not Contract Documents. The purpose of their submittal is to demonstrate for those portions of the Work for which submittals are required the way the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents. Review by the Architect is subject to the limitations of Subparagraph 4.2.7.

3.12.5 The Contractor shall review, approve and submit to the Architect Shop Drawings, Product Data, Samples and similar submittals required by the Contract Documents with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of the Owner or of separate contractors. Submittals made by the Contractor which are not required by the Contract Documents may be returned without action.

3.12.6 The Contractor shall perform no portion of the Work requiring submittal and review of Shop Drawings, Product Data, Samples or similar submittals until the respective submittal has been approved by the Architect. Such Work shall be in accordance with approved submittals.

3.12.7 By approving and submitting Shop Drawings, Product Data, Samples and similar submittals, the Contractor represents that the Contractor has determined and verified materials, field measurements and field construction criteria related thereto, or will do so, and has checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

3.12.8 The Contractor shall not be relieved of responsibility for deviations from requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data, Samples or similar submittals unless the Contractor has specifically informed the Architect in writing of such deviation at the time of submittal and the Architect has given written approval to the specific deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples or similar submittals by the Architect's approval thereof.

3.12.9 The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples or similar submittals, to revisions other than those requested by the Architect on previous submittals.

3.12.10 Informational submittals upon which the Architect is not expected to take responsive action may be so identified in the Contract Documents.

3.12.11 When professional certification of performance criteria of materials, systems or equipment is required by the Contract Documents, the Architect shall be entitled to rely upon the accuracy and completeness of such calculations and certifications.

3.13 USE OF SITE

3.13.1 The Contractor shall confine operations at the site to areas permitted by law, ordinances, permits and the Contract Documents and shall not unreasonably encumber the site with materials or equipment.

3.14 CUTTING AND PATCHING

3.14.1 The Contractor shall be responsible for cutting, fitting or patching required to complete the Work or to make its parts fit together properly.

3.14.2 The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner or separate contractors by cutting, patching or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter such construction by the

tractor, Subcontractors, or their agents or employees, or of any other persons performing portions of the Work.

4.2.4 Communications Facilitating Contract Administration. Except as otherwise provided in the Contract Documents or when direct communications have been specially authorized, the Owner and Contractor shall endeavor to communicate through the Architect. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and material suppliers shall be through the Contractor. Communications by and with separate contractors shall be through the Owner.

4.2.5 Based on the Architect's observations and evaluations of the Contractor's Applications for Payment, the Architect will review and certify the amounts due the Contractor and will issue Certificates for Payment in such amounts.

4.2.6 The Architect will have authority to reject Work which does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable for implementation of the intent of the Contract Documents, the Architect will have authority to require additional inspection or testing of the Work in accordance with Subparagraphs 13.5.2 and 13.5.3, whether or not such Work is fabricated, installed or completed. However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, material and equipment suppliers, their agents or employees, or other persons performing portions of the Work.

4.2.7 The Architect will review and approve or take other appropriate action upon the Contractor's submittals such as Shop Drawings, Product Data and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Architect's action will be taken with such reasonable promptness as to cause no delay in the Work or in the activities of the Owner, Contractor or separate contractors, while allowing sufficient time in the Architect's professional judgment to permit adequate review. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Architect's review of the Contractor's submittals shall not relieve the Contractor of the obligations under Paragraphs 3.3, 3.5 and 3.12. The Architect's review shall not constitute approval of safety precautions or, unless otherwise specifically stated by the Architect, of any construction means, methods, techniques, sequences or procedures. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

4.2.8 The Architect will prepare Change Orders and Construction Change Directives, and may authorize minor changes in the Work as provided in Paragraph 7.4.

4.2.9 The Architect will conduct inspections to determine the date or dates of Substantial Completion and the date of final completion, will receive and forward to the Owner for the Owner's review and records written warranties and related documents required by the Contract and assembled by the Contractor, and will issue a final Certificate for Payment upon compliance with the requirements of the Contract Documents.

4.2.10 If the Owner and Architect agree, the Architect will provide one or more project representatives to assist in carrying out the Architect's responsibilities at the site. The duties, responsibilities and limitations of authority of such project representatives shall be as set forth in an exhibit to be incorporated in the Contract Documents.

4.2.11 The Architect will interpret and decide matters concerning performance under and requirements of the Contract Documents on written request of either the Owner or Contractor. The Architect's response to such requests will be made with reasonable promptness and within any time limits agreed upon. If no agreement is made concerning the time within which interpretations required of the Architect shall be furnished in compliance with this Paragraph 4.2, then delay shall not be recognized on account of failure by the Architect to furnish such interpretations until 15 days after written request is made for them.

4.2.12 Interpretations and decisions of the Architect will be consistent with the intent of and reasonably inferable from the Contract Documents and will be in writing or in the form of drawings. When making such interpretations and decisions, the Architect will endeavor to secure faithful performance by both Owner and Contractor, will not show partiality to either and will not be liable for results of interpretations or decisions so rendered in good faith.

4.2.13 The Architect's decisions on matters relating to aesthetic effect will be final if consistent with the intent expressed in the Contract Documents.

4.3 CLAIMS AND DISPUTES

4.3.1 Definition. A Claim is a demand or assertion by one of the parties seeking, as a matter of right, adjustment or interpretation of Contract terms, payment of money, extension of time or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. Claims must be made by written notice. The responsibility to substantiate Claims shall rest with the party making the Claim.

4.3.2 Decision of Architect. Claims, including those alleging an error or omission by the Architect, shall be referred initially to the Architect for action as provided in Paragraph 4.4. A decision by the Architect, as provided in Subparagraph 4.4.4, shall be required as a condition precedent to arbitration or litigation of a Claim between the Contractor and Owner as to all such matters arising prior to the date final payment is due, regardless of (1) whether such matters relate to execution and progress of the Work or (2) the extent to which the Work has been completed. The decision by the Architect in response to a Claim shall not be a condition precedent to arbitration or litigation in the event (1) the position of Architect is vacant, (2) the Architect has not received evidence or has failed to render a decision within agreed time limits, (3) the Architect has failed to take action required under Subparagraph 4.4.4 within 30 days after the Claim is made, (4) 45 days have passed after the Claim has been referred to the Architect or (5) the Claim relates to a mechanic's lien.

4.3.3 Time Limits on Claims. Claims by either party must be made within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later. Claims must be made by written notice. An additional Claim made after the initial Claim has been implemented by Change Order will not be considered unless submitted in a timely manner.

4.5.2 Rules and Notices for Arbitration. Claims between the Owner and Contractor not resolved under Paragraph 4.4 shall, if subject to arbitration under Subparagraph 4.5.1, be decided by arbitration in accordance with the Construction Industry Arbitration Rules of the American Arbitration Association currently in effect, unless the parties mutually agree otherwise. Notice of demand for arbitration shall be filed in writing with the other party to the Agreement between the Owner and Contractor and with the American Arbitration Association, and a copy shall be filed with the Architect.

4.5.3 Contract Performance During Arbitration. During arbitration proceedings, the Owner and Contractor shall comply with Subparagraph 4.3.4.

4.5.4 When Arbitration May Be Demanded. Demand for arbitration of any Claim may not be made until the earlier of (1) the date on which the Architect has rendered a final written decision on the Claim, (2) the tenth day after the parties have presented evidence to the Architect or have been given reasonable opportunity to do so, if the Architect has not rendered a final written decision by that date, or (3) any of the five events described in Subparagraph 4.3.2.

4.5.4.1 When a written decision of the Architect states that (1) the decision is final but subject to arbitration and (2) a demand for arbitration of a Claim covered by such decision must be made within 30 days after the date on which the party making the demand receives the final written decision, then failure to demand arbitration within said 30 days' period shall result in the Architect's decision becoming final and binding upon the Owner and Contractor. If the Architect renders a decision after arbitration proceedings have been initiated, such decision may be entered as evidence, but shall not supersede arbitration proceedings unless the decision is acceptable to all parties concerned.

4.5.4.2 A demand for arbitration shall be made within the time limits specified in Subparagraphs 4.5.1 and 4.5.4 and Clause 4.5.4.1 as applicable, and in other cases within a reasonable time after the Claim has arisen, and in no event shall it be made after the date when institution of legal or equitable proceedings based on such Claim would be barred by the applicable statute of limitations as determined pursuant to Paragraph 13.7.

4.5.5 Limitation on Consolidation or Joinder. No arbitration arising out of or relating to the Contract Documents shall include, by consolidation or joinder or in any other manner, the Architect, the Architect's employees or consultants, except by written consent containing specific reference to the Agreement and signed by the Architect, Owner, Contractor and any other person or entity sought to be joined. No arbitration shall include, by consolidation or joinder or in any other manner, parties other than the Owner, Contractor, a separate contractor as described in Article 6 and other persons substantially involved in a common question of fact or law whose presence is required if complete relief is to be accorded in arbitration. No person or entity other than the Owner, Contractor or a separate contractor as described in Article 6 shall be included as an original third party or additional third party to an arbitration whose interest or responsibility is insubstantial. Consent to arbitration involving an additional person or entity shall not constitute consent to arbitration of a dispute not described therein or with a person or entity not named or described therein. The foregoing agreement to arbitrate and other agreements to arbitrate with an additional person or entity duly consented to by parties to the Agreement shall be specifically enforceable under applicable law in any court having jurisdiction thereof.

4.5.6 Claims and Timely Assertion of Claims. A party who files a notice of demand for arbitration must assert in the demand all Claims then known to that party on which arbitration is permitted to be demanded. When a party fails to include a Claim through oversight, inadvertence or excusable neglect, or when a Claim has matured or been acquired subsequently, the arbitrator or arbitrators may permit amendment.

4.5.7 Judgment on Final Award. The award rendered by the arbitrator or arbitrators shall be final, and judgment may be entered upon it in accordance with applicable law in any court having jurisdiction thereof.

ARTICLE 5

SUBCONTRACTORS

5.1 DEFINITIONS

5.1.1 A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site. The term "Subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Subcontractor or an authorized representative of the Subcontractor. The term "Subcontractor" does not include a separate contractor or subcontractors of a separate contractor.

5.1.2 A Sub-subcontractor is a person or entity who has a direct or indirect contract with a Subcontractor to perform a portion of the Work at the site. The term "Sub-subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Sub-subcontractor or an authorized representative of the Sub-subcontractor.

5.2 AWARD OF SUBCONTRACTS AND OTHER CONTRACTS FOR PORTIONS OF THE WORK

5.2.1 Unless otherwise stated in the Contract Documents or the bidding requirements, the Contractor, as soon as practicable after award of the Contract, shall furnish in writing to the Owner through the Architect the names of persons or entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for each principal portion of the Work. The Architect will promptly reply to the Contractor in writing stating whether or not the Owner or the Architect, after due investigation, has reasonable objection to any such proposed person or entity. Failure of the Owner or Architect to reply promptly shall constitute notice of no reasonable objection.

5.2.2 The Contractor shall not contract with a proposed person or entity to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection.

5.2.3 If the Owner or Architect has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner or Architect has no reasonable objection. The Contract Sum shall be increased or decreased by the difference in cost occasioned by such change and an appropriate Change Order shall be issued. However, no increase in the Contract Sum shall be allowed for such change unless the Contractor has acted promptly and responsively in submitting names as required.

5.2.4 The Contractor shall not change a Subcontractor, person or entity previously selected if the Owner or Architect makes reasonable objection to such change.

ARTICLE 7

CHANGES IN THE WORK

7.1 CHANGES

7.1.1 Changes in the Work may be accomplished after execution of the Contract, and without invalidating the Contract, by Change Order, Construction Change Directive or order for a minor change in the Work, subject to the limitations stated in this Article 7 and elsewhere in the Contract Documents.

7.1.2 A Change Order shall be based upon agreement among the Owner, Contractor and Architect; a Construction Change Directive requires agreement by the Owner and Architect and may or may not be agreed to by the Contractor; an order for a minor change in the Work may be issued by the Architect alone.

7.1.3 Changes in the Work shall be performed under applicable provisions of the Contract Documents, and the Contractor shall proceed promptly, unless otherwise provided in the Change Order, Construction Change Directive or order for a minor change in the Work.

7.1.4 If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are so changed in a proposed Change Order or Construction Change Directive that application of such unit prices to quantities of Work proposed will cause substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted.

7.2 CHANGE ORDERS

7.2.1 A Change Order is a written instrument prepared by the Architect and signed by the Owner, Contractor and Architect, stating their agreement upon all of the following:

.1 a change in the Work;

.2 the amount of the adjustment in the Contract Sum, if any; and

.3 the extent of the adjustment in the Contract Time, if any.

7.2.2 Methods used in determining adjustments to the Contract Sum may include those listed in Subparagraph 7.3.3.

7.3 CONSTRUCTION CHANGE DIRECTIVES

7.3.1 A Construction Change Directive is a written order prepared by the Architect and signed by the Owner and Architect, directing a change in the Work and stating a proposed basis for adjustment, if any, in the Contract Sum or Contract Time, or both. The Owner may by Construction Change Directive, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions or other revisions, the Contract Sum and Contract Time being adjusted accordingly.

7.3.2 A Construction Change Directive shall be used in the absence of total agreement on the terms of a Change Order.

7.3.3 If the Construction Change Directive provides for an adjustment to the Contract Sum, the adjustment shall be based on one of the following methods:

.1 mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;

.2 unit prices stated in the Contract Documents or subsequently agreed upon;

.3 cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or

.4 as provided in Subparagraph 7.3.6.

7.3.4 Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved and advise the Architect of the Contractor's agreement or disagreement with the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum or Contract Time.

7.3.5 A Construction Change Directive signed by the Contractor indicates the agreement of the Contractor therewith, including adjustment in Contract Sum and Contract Time or the method for determining them. Such agreement shall be effective immediately and shall be recorded as a Change Order.

7.3.6 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the method and the adjustment shall be determined by the Architect on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, a reasonable allowance for overhead and profit. In such case, and also under Clause 7.3.3.3, the Contractor shall keep and present, in such form as the Architect may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Subparagraph 7.3.6 shall be limited to the following:

.1 costs of labor, including social security, old age and unemployment insurance, fringe benefits required by agreement or custom, and workers' or workmen's compensation insurance;

.2 costs of materials, supplies and equipment, including cost of transportation, whether incorporated or consumed;

.3 rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;

.4 costs of premiums for all bonds and insurance, permit fees, and sales, use or similar taxes related to the Work; and

.5 additional costs of supervision and field office personnel directly attributable to the change.

7.3.7 Pending final determination of cost to the Owner, amounts not in dispute may be included in Applications for Payment. The amount of credit to be allowed by the Contractor to the Owner for a deletion or change which results in a net decrease in the Contract Sum shall be actual net cost as confirmed by the Architect. When both additions and credits covering related Work or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase, if any, with respect to that change.

7.3.8 If the Owner and Contractor do not agree with the adjustment in Contract Time or the method for determining it, the adjustment or the method shall be referred to the Architect for determination.

7.3.9 When the Owner and Contractor agree with the determination made by the Architect concerning the adjustments in the Contract Sum and Contract Time, or otherwise reach agreement upon the adjustments, such agreement shall be effective immediately and shall be recorded by preparation and execution of an appropriate Change Order.

Owner a Certificate for Payment, with a copy to the Contractor, for such amount as the Architect determines is properly due, or notify the Contractor and Owner in writing of the Architect's reasons for withholding certification in whole or in part as provided in Subparagraph 9.5.1.

9.4.2 The issuance of a Certificate for Payment will constitute a representation by the Architect to the Owner, based on the Architect's observations at the site and the data comprising the Application for Payment, that the Work has progressed to the point indicated and that, to the best of the Architect's knowledge, information and belief, quality of the Work is in accordance with the Contract Documents. The foregoing representations are subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to minor deviations from the Contract Documents correctable prior to completion and to specific qualifications expressed by the Architect. The issuance of a Certificate for Payment will further constitute a representation that the Contractor is entitled to payment in the amount certified. However, the issuance of a Certificate for Payment will not be a representation that the Architect has (1) made exhaustive or continuous on-site inspections to check the quality or quantity of the Work, (2) reviewed construction means, methods, techniques, sequences or procedures, (3) reviewed copies of requisitions received from Subcontractors and material suppliers and other data requested by the Owner to substantiate the Contractor's right to payment or (4) made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum.

9.5 DECISIONS TO WITHHOLD CERTIFICATION

9.5.1 The Architect may decide not to certify payment and may withhold a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Architect's opinion the representations to the Owner required by Subparagraph 9.4.2 cannot be made. If the Architect is unable to certify payment in the amount of the Application, the Architect will notify the Contractor and Owner as provided in Subparagraph 9.4.1. If the Contractor and Architect cannot agree on a revised amount, the Architect will promptly issue a Certificate for Payment for the amount for which the Architect is able to make such representations to the Owner. The Architect may also decide not to certify payment or, because of subsequently discovered evidence or subsequent observations, may nullify the whole or a part of a Certificate for Payment previously issued, to such extent as may be necessary in the Architect's opinion to protect the Owner from loss because of:

.1 defective Work not remedied;

.2 third party claims filed or reasonable evidence indicating probable filing of such claims;

.3 failure of the Contractor to make payments properly to Subcontractors or for labor, materials or equipment;

.4 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;

.5 damage to the Owner or another contractor;

.6 reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or

.7 persistent failure to carry out the Work in accordance with the Contract Documents.

9.5.2 When the above reasons for withholding certification are removed, certification will be made for amounts previously withheld.

9.6 PROGRESS PAYMENTS

9.6.1 After the Architect has issued a Certificate for Payment, the Owner shall make payment in the manner and within the time provided in the Contract Documents, and shall so notify the Architect.

9.6.2 The Contractor shall promptly pay each Subcontractor, upon receipt of payment from the Owner, out of the amount paid to the Contractor on account of such Subcontractor's portion of the Work, the amount to which said Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of such Subcontractor's portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to Sub-subcontractors in similar manner.

9.6.3 The Architect will, on request, furnish to a Subcontractor, if practicable, information regarding percentages of completion or amounts applied for by the Contractor and action taken thereon by the Architect and Owner on account of portions of the Work done by such Subcontractor.

9.6.4 Neither the Owner nor Architect shall have an obligation to pay or to see to the payment of money to a Subcontractor except as may otherwise be required by law.

9.6.5 Payment to material suppliers shall be treated in a manner similar to that provided in Subparagraphs 9.6.2, 9.6.3 and 9.6.4.

9.6.6 A Certificate for Payment, a progress payment, or partial or entire use or occupancy of the Project by the Owner shall not constitute acceptance of Work not in accordance with the Contract Documents.

9.7 FAILURE OF PAYMENT

9.7.1 If the Architect does not issue a Certificate for Payment, through no fault of the Contractor, within seven days after receipt of the Contractor's Application for Payment, or if the Owner does not pay the Contractor within seven days after the date established in the Contract Documents the amount certified by the Architect or awarded by arbitration, then the Contractor may, upon seven additional days' written notice to the Owner and Architect, stop the Work until payment of the amount owing has been received. The Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shut-down, delay and start-up, which shall be accomplished as provided in Article 7.

9.8 SUBSTANTIAL COMPLETION

9.8.1 Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so the Owner can occupy or utilize the Work for its intended use.

9.8.2 When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall prepare and submit to the Architect a comprehensive list of items to be completed or corrected. The Contractor shall proceed promptly to complete and correct items on the list. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents. Upon receipt of the Contractor's list, the Architect will make an inspection to determine whether the Work or desig-

ARTICLE 10

PROTECTION OF PERSONS AND PROPERTY

10.1 SAFETY PRECAUTIONS AND PROGRAMS

10.1.1 The Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the performance of the Contract.

10.1.2 In the event the Contractor encounters on the site material reasonably believed to be asbestos or polychlorinated biphenyl (PCB) which has not been rendered harmless, the Contractor shall immediately stop Work in the area affected and report the condition to the Owner and Architect in writing. The Work in the affected area shall not thereafter be resumed except by written agreement of the Owner and Contractor if in fact the material is asbestos or polychlorinated biphenyl (PCB) and has not been rendered harmless. The Work in the affected area shall be resumed in the absence of asbestos or polychlorinated biphenyl (PCB), or when it has been rendered harmless, by written agreement of the Owner and Contractor, or in accordance with final determination by the Architect on which arbitration has not been demanded, or by arbitration under Article 4.

10.1.3 The Contractor shall not be required pursuant to Article 7 to perform without consent any Work relating to asbestos or polychlorinated biphenyl (PCB).

10.1.4 To the fullest extent permitted by law, the Owner shall indemnify and hold harmless the Contractor, Architect, Architect's consultants and agents and employees of any of them from and against claims, damages, losses and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work in the affected area if in fact the material is asbestos or polychlorinated biphenyl (PCB) and has not been rendered harmless, provided that such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself) including loss of use resulting therefrom, but only to the extent caused in whole or in part by negligent acts or omissions of the Owner, anyone directly or indirectly employed by the Owner or anyone for whose acts the Owner may be liable, regardless of whether or not such claim, damage, loss or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity which would otherwise exist as to a party or person described in this Subparagraph 10.1.4.

10.2 SAFETY OF PERSONS AND PROPERTY

10.2.1 The Contractor shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury or loss to:

.1 employees on the Work and other persons who may be affected thereby;

.2 the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody or control of the Contractor or the Contractor's Subcontractors or Sub-subcontractors; and

.3 other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction.

10.2.2 The Contractor shall give notices and comply with applicable laws, ordinances, rules, regulations and lawful orders of public authorities bearing on safety of persons or property or their protection from damage, injury or loss.

10.2.3 The Contractor shall erect and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards, promulgating safety regulations and notifying owners and users of adjacent sites and utilities.

10.2.4 When use or storage of explosives or other hazardous materials or equipment or unusual methods are necessary for execution of the Work, the Contractor shall exercise utmost care and carry on such activities under supervision of properly qualified personnel.

10.2.5 The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in Clauses 10.2.1.2 and 10.2.1.3 caused in whole or in part by the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Clauses 10.2.1.2 and 10.2.1.3, except damage or loss attributable to acts or omissions of the Owner or Architect or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Paragraph 3.18.

10.2.6 The Contractor shall designate a responsible member of the Contractor's organization at the site whose duty shall be the prevention of accidents. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Owner and Architect.

10.2.7 The Contractor shall not load or permit any part of the construction or site to be loaded so as to endanger its safety.

10.3 EMERGENCIES

10.3.1 In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury or loss. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Paragraph 4.3 and Article 7.

ARTICLE 11

INSURANCE AND BONDS

11.1 CONTRACTOR'S LIABILITY INSURANCE

11.1.1 The Contractor shall purchase from and maintain in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located such insurance as will protect the Contractor from claims set forth below which may arise out of or result from the Contractor's operations under the Contract and for which the Contractor may be legally liable, whether such operations be by the Contractor or by a Subcontractor or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable:

.1 claims under workers' or workmen's compensation, disability benefit and other similar employee benefit acts which are applicable to the Work to be performed;

11.3.5 If during the Project construction period the Owner insures properties, real or personal or both, adjoining or adjacent to the site by property insurance under policies separate from those insuring the Project, or if after final payment property insurance is to be provided on the completed Project through a policy or policies other than those insuring the Project during the construction period, the Owner shall waive all rights in accordance with the terms of Subparagraph 11.3.7 for damages caused by fire or other perils covered by this separate property insurance. All separate policies shall provide this waiver of subrogation by endorsement or otherwise.

11.3.6 Before an exposure to loss may occur, the Owner shall file with the Contractor a copy of each policy that includes insurance coverages required by this Paragraph 11.3. Each policy shall contain all generally applicable conditions, definitions, exclusions and endorsements related to this Project. Each policy shall contain a provision that the policy will not be cancelled or allowed to expire until at least 30 days' prior written notice has been given to the Contractor.

11.3.7 Waivers of Subrogation. The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents and employees, each of the other, and (2) the Architect, Architect's consultants, separate contractors described in Article 6, if any, and any of their subcontractors, sub-subcontractors, agents and employees, for damages caused by fire or other perils to the extent covered by property insurance obtained pursuant to this Paragraph 11.3 or other property insurance applicable to the Work, except such rights as they have to proceeds of such insurance held by the Owner as fiduciary. The Owner or Contractor, as appropriate, shall require of the Architect, Architect's consultants, separate contractors described in Article 6, if any, and the subcontractors, sub-subcontractors, agents and employees of any of them, by appropriate agreements, written where legally required for validity, similar waivers each in favor of other parties enumerated herein. The policies shall provide such waivers of subrogation by endorsement or otherwise. A waiver of subrogation shall be effective as to a person or entity even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, did not pay the insurance premium directly or indirectly, and whether or not the person or entity had an insurable interest in the property damaged.

11.3.8 A loss insured under Owner's property insurance shall be adjusted by the Owner as fiduciary and made payable to the Owner as fiduciary for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause and of Subparagraph 11.3.10. The Contractor shall pay Subcontractors their just shares of insurance proceeds received by the Contractor, and by appropriate agreements, written where legally required for validity, shall require Subcontractors to make payments to their Sub-subcontractors in similar manner.

11.3.9 If required in writing by a party in interest, the Owner as fiduciary shall, upon occurrence of an insured loss, give bond for proper performance of the Owner's duties. The cost of required bonds shall be charged against proceeds received as fiduciary. The Owner shall deposit in a separate account proceeds so received, which the Owner shall distribute in accordance with such agreement as the parties in interest may reach, or in accordance with an arbitration award in which case the procedure shall be as provided in Paragraph 4.5. If after such loss no other special agreement is made, replacement of damaged property shall be covered by appropriate Change Order.

11.3.10 The Owner as fiduciary shall have power to adjust and settle a loss with insurers unless one of the parties in interest shall object in writing within five days after occurrence of loss to the Owner's exercise of this power; if such objection be made, arbitrators shall be chosen as provided in Paragraph 4.5. The Owner as fiduciary shall, in that case, make settlement with insurers in accordance with directions of such arbitrators. If distribution of insurance proceeds by arbitration is required, the arbitrators will direct such distribution.

11.3.11 Partial occupancy or use in accordance with Paragraph 9.9 shall not commence until the insurance company or companies providing property insurance have consented to such partial occupancy or use by endorsement or otherwise. The Owner and the Contractor shall take reasonable steps to obtain consent of the insurance company or companies and shall, without mutual written consent, take no action with respect to partial occupancy or use that would cause cancellation, lapse or reduction of insurance.

11.4 PERFORMANCE BOND AND PAYMENT BOND

11.4.1 The Owner shall have the right to require the Contractor to furnish bonds covering faithful performance of the Contract and payment of obligations arising thereunder as stipulated in bidding requirements or specifically required in the Contract Documents on the date of execution of the Contract.

11.4.2 Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of obligations arising under the Contract, the Contractor shall promptly furnish a copy of the bonds or shall permit a copy to be made.

ARTICLE 12

UNCOVERING AND CORRECTION OF WORK

12.1 UNCOVERING OF WORK

12.1.1 If a portion of the Work is covered contrary to the Architect's request or to requirements specifically expressed in the Contract Documents, it must, if required in writing by the Architect, be uncovered for the Architect's observation and be replaced at the Contractor's expense without change in the Contract Time.

12.1.2 If a portion of the Work has been covered which the Architect has not specifically requested to observe prior to its being covered, the Architect may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, costs of uncovering and replacement shall, by appropriate Change Order, be charged to the Owner. If such Work is not in accordance with the Contract Documents, the Contractor shall pay such costs unless the condition was caused by the Owner or a separate contractor in which event the Owner shall be responsible for payment of such costs.

12.2 CORRECTION OF WORK

12.2.1 The Contractor shall promptly correct Work rejected by the Architect or failing to conform to the requirements of the Contract Documents, whether observed before or after Substantial Completion and whether or not fabricated, installed or completed. The Contractor shall bear costs of correcting such rejected Work, including additional testing and inspections and compensation for the Architect's services and expenses made necessary thereby.

12.2.2 If, within one year after the date of Substantial Completion of the Work or designated portion thereof, or after the date

The Owner shall bear such costs except as provided in Subparagraph 13.5.3.

13.5.3 If such procedures for testing, inspection or approval under Subparagraphs 13.5.1 and 13.5.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, the Contractor shall bear all costs made necessary by such failure including those of repeated procedures and compensation for the Architect's services and expenses.

13.5.4 Required certificates of testing, inspection or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the Architect.

13.5.5 If the Architect is to observe tests, inspections or approvals required by the Contract Documents, the Architect will do so promptly and, where practicable, at the normal place of testing.

13.5.6 Tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work.

13.6 INTEREST

13.6.1 Payments due and unpaid under the Contract Documents shall bear interest from the date payment is due at such rate as the parties may agree upon in writing or, in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.

13.7 COMMENCEMENT OF STATUTORY LIMITATION PERIOD

13.7.1 As between the Owner and Contractor:

.1 **Before Substantial Completion.** As to acts or failures to act occurring prior to the relevant date of Substantial Completion, any applicable statute of limitations shall commence to run and any alleged cause of action shall be deemed to have accrued in any and all events not later than such date of Substantial Completion;

.2 **Between Substantial Completion and Final Certificate for Payment.** As to acts or failures to act occurring subsequent to the relevant date of Substantial Completion and prior to issuance of the final Certificate for Payment, any applicable statute of limitations shall commence to run and any alleged cause of action shall be deemed to have accrued in any and all events not later than the date of issuance of the final Certificate for Payment; and

.3 **After Final Certificate for Payment.** As to acts or failures to act occurring after the relevant date of issuance of the final Certificate for Payment, any applicable statute of limitations shall commence to run and any alleged cause of action shall be deemed to have accrued in any and all events not later than the date of any act or failure to act by the Contractor pursuant to any warranty provided under Paragraph 3.5, the date of any correction of the Work or failure to correct the Work by the Contractor under Paragraph 12.2, or the date of actual commission of any other act or failure to perform any duty or obligation by the Contractor or Owner, whichever occurs last.

ARTICLE 14

TERMINATION OR SUSPENSION OF THE CONTRACT

14.1 TERMINATION BY THE CONTRACTOR

14.1.1 The Contractor may terminate the Contract if the Work is stopped for a period of 30 days through no act or fault of the Contractor or a Subcontractor, Sub-subcontractor or their agents or employees or any other persons performing portions of the Work under contract with the Contractor, for any of the following reasons:

.1 issuance of an order of a court or other public authority having jurisdiction;

.2 an act of government, such as a declaration of national emergency, making material unavailable;

.3 because the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Subparagraph 9.4.1, or because the Owner has not made payment on a Certificate for Payment within the time stated in the Contract Documents;

.4 if repeated suspensions, delays or interruptions by the Owner as described in Paragraph 14.3 constitute in the aggregate more than 100 percent of the total number of days scheduled for completion, or 120 days in any 365-day period, whichever is less; or

.5 the Owner has failed to furnish to the Contractor promptly, upon the Contractor's request, reasonable evidence as required by Subparagraph 2.2.1.

14.1.2 If one of the above reasons exists, the Contractor may, upon seven additional days' written notice to the Owner and Architect, terminate the Contract and recover from the Owner payment for Work executed and for proven loss with respect to materials, equipment, tools, and construction equipment and machinery, including reasonable overhead, profit and damages.

14.1.3 If the Work is stopped for a period of 60 days through no act or fault of the Contractor or a Subcontractor or their agents or employees or any other persons performing portions of the Work under contract with the Contractor because the Owner has persistently failed to fulfill the Owner's obligations under the Contract Documents with respect to matters important to the progress of the Work, the Contractor may, upon seven additional days' written notice to the Owner and the Architect, terminate the Contract and recover from the Owner as provided in Subparagraph 14.1.2.

14.2 TERMINATION BY THE OWNER FOR CAUSE

14.2.1 The Owner may terminate the Contract if the Contractor:

.1 persistently or repeatedly refuses or fails to supply enough properly skilled workers or proper materials;

.2 fails to make payment to Subcontractors for materials or labor in accordance with the respective agreements between the Contractor and the Subcontractors;

.3 persistently disregards laws, ordinances, or rules, regulations or orders of a public authority having jurisdiction; or

.4 otherwise is guilty of substantial breach of a provision of the Contract Documents.

14.2.2 When any of the above reasons exist, the Owner, upon certification by the Architect that sufficient cause exists to jus-

MAINE STATE HOUSING AUTHORITY

Supplemental Construction Standards

I. Standards for Construction and Contractor's Warranty

The Development shall be constructed according to accepted working drawings and specifications, and in full compliance with applicable building codes and regulations. All materials and equipment shall be new, unless otherwise specified, and all construction shall be of good quality, free from faults and defects.

The Contractor warrants to the Developer, the Architect, and in consideration of the permanent financing of the Development by the Maine State Housing Authority, to the Authority that all construction will be accomplished in compliance with the Standards for Construction stated above.

II. Construction Contract Retainage

For construction contracts less than $450,000 of Stipulated Sum or Guaranteed Maximum Cost there shall be a 10% retainage on all progress payments made to the Contractor during construction.

For construction contracts from $450,000 to $900,000, there shall be a 10% retainage on all progress payments until the total amount of retainage equals $45,000.

For construction contracts greater than $900,000, there shall be a 10% retainage on all progress payments until construction is 50% complete.

The Bank or the Maine State Housing Authority may determine that sufficient reasons or circumstances exist with respect to a particular Development as to require greater retainage.

The retainage shall be held by the Bank until the Development is substantially complete and until any incomplete work escrows have been funded as provided in Paragraph VIII hereof.

III. Required On-site Facilities

The Contractor shall provide the following on-site facilities:

a) A site office of sufficient size for the review and discussion of the construction documents.

b) A site phone

c) A site toilet

d) A current set of signed drawings, specifications, and other documents as amended and as accepted by MSHA for the use of MSHA's inspector at all times.

e) A project sign which designates the project as an Equal Housing Opportunity project and includes references to the Project Name, Developer, Architect,

ii. slab vapor barrier,

iii. perimeter insulations, and

iv. reinforcing steel.

5. Close in: A "close in" inspection is required prior to the concealment of all building systems. The following construction shall be completed and visible for inspection:

i. the structure shall be enclosed with all wall, ceiling and roof framing exposed;

ii. masonry veneer, if applicable, shall not be installed;

iii. interior wall and ceiling finish material and insulation shall not be installed, but roofing may be applied;

iv. plumbing, mechanical and electrical work shall be roughed in; and

v. footings and foundations for stoops, porches and terraces before backfilling, with any required reinforcing and flashing for slabs in place, before pouring slabs, if not inspected during previous inspections.

6. Final Inspection: At final inspection, all required construction shall be completed and ready for inspection. The Contractor shall arrange to have the building(s) open for the MSHA Inspector. The following items shall be completed and ready for inspection:

i. the dwelling structure completed, cleaned and ready for occupancy. This shall include the installation and operation of permanent equipment, and on-site improvements except for those items specified and accepted as suitable for deferred completion in accordance with the provisions of an Incomplete Work Escrow (paragraph VIII).

ii. finish grading, seeding, sodding, and landscape planting; completed;

iii. paving of walks and drives, including their extension to the public walk, curb or pavement, and utilities installed including their extension and connection to off-site public mains;

iv. fences, garden walls, retaining walls, and other accessory structures;

v. off-site improvements, if any;

The one-year period referred to in § 13.2.2 of the General Conditions of the Contract for Construction for correction of the work shall commence no earlier than the date of issuance by MSHA of a certificate of Occupancy for the Development.

VI. Change Orders

Any modifications, including but not limited to additions, variations, substitutions, or revisions to the MSHA accepted Working Drawings and Specifications shall be submitted to MSHA, the Architect, Developer and the Bank for review and acceptance prior to the execution of those changes. All change orders shall be prepared utilizing the appropriate A. I. A. Change Order Form and shall be accompanied by adequate information describing the proposed changes including drawings and description of materials when needed. MSHA may request such additional information as it deems reasonably necessary under the circumstances.

VII. Contract Administration

It is the responsibility of the Bank and the Architect to administer the construction loan and, in addition, to determine that work conforms to the accepted plans and specifications and applicable building codes and regulations.

VIII. Incomplete Work Escrow

When completion of site improvements is prevented by seasonal conditions or other considerations acceptable to MSHA as being beyond the control of the Contractor, the final inspection shall not include the incomplete work provided MSHA finds that the development can be occupied without hazards caused by such incomplete work.

MSHA will require a detailed written description of the incomplete work, the holding in escrow of a sum of money equal to not less than one and one-half times the MSHA's estimated cost of completion, and establishment of a suitable date of completion for the incomplete work items. MSHA will require an inspection of the deferred work upon completion and prior to the release of any escrow amount.

Final Payment is not due the Contractor until completion of all deferred work which is the Contractor's responsibility under the Construction Contract.

IX. Interpretation

To the extent that these Supplemental Construction Standards may be inconsistent with any other provisions of the Construction Contract, these Supplemental Construction Standards shall prevail.

End of document

MAINE STATE HOUSING AUTHORITY
CHANGE ORDER FORM

PROJECT:
(name & address) _____

_____

_____

CONTRACTOR:
(name & address) _____

_____

_____

_____

Change Order Number: _____

Initiation Date: _____

Contract For: _____

Contract Date: _____

You are directed to make the following changes in this Contract:

Provide labor and materials as per quote dated: _____

_____ $ _____

_____ $ _____

Total $ _____

Not valid until signed by the Owner, Architect and Construction Manager (when applicable), and MSHA Inspector.
Signature of the Contractor indicates agreement herewith, including any adjustment in the Contract Sum or Contract Time.

The original Contract Sum was $ _____

Net change by previously authorized Change Orders $ _____

The Contract Sum prior to this Change Order was $ _____

The Contract Sum cost will be: ____increased ____decreased ____unchang $ _____

The new Contract Sum including this Change Order will be $ _____

The contract time will be : ____increased ____decreased ____unchanged by _____ Days

The date of substantial completion as of the date of this Change Order therefore is _____

Recommended:

_____
Construction Manager

_____
Address

_____

By: _____
Signature Date

Approved:

_____
Architect

_____
Address

_____

By: _____
Signature Date

Agreed To:

_____
Contractor

_____
Address

_____

By: _____
Signature Date

Agreed To:

_____
Owner

_____
Address

_____

By: _____
Signature Date

MSHA APPROVAL: _____
Inspector

_____
Date

CONTINUATION SHEET

MSHA DOCUMENT R102

PAGE OF PAGES

MSHA Document R101, APPLICATION AND CERTIFICATE FOR PAYMENT, containing Contractor's/Owner's signed Certification, must be attached.
In tabulations below, amounts are to be stated to the nearest dollar.
Use Column I on Contracts where variable retainage for line items may apply.

APPLICATION NO.:
APPLICATION DATE:
PERIOD TO:
MSHA PROJECT NO.:

A	B	C	D	E	F	G		H	I
			WORK COMPLETED						
ITEM NO.	DESCRIPTION OF WORK	SCHEDULED VALUE	FROM PRIOR APPLICATION (D+ E)	THIS PERIOD	MATERIALS PRESENTLY STORED (NOT IN D OR E)	TOTAL COMPLETED AND STORED TO DATE (D + E + F)	% (G ÷ C)	BALANCE TO FINISH (C - G)	RETAINAGE (IF VARIABLE RATE)

Continuation sheet MSHA Document R102 checked by _____ inspector

MSHA

MAINE STATE HOUSING AUTHORITY
353 Water Street
Augusta, Maine 04330-4633
1-800-452-4668

APPLICATION AND CERTIFICATE FOR PAYMENT

MSHA DOCUMENT R101 page one of pages

TO: OWNER

PROJECT:

APPLICATION NO.: Distribution to
PERIOD TO: Owner:
PROJECT NO.: Architect:
Contractor:

FROM: CONTRACTOR

VIA ARCHITECT:

CONTRACT DATE: MSHA:

CONTRACT FOR:

CONTRACTOR'S APPLICATION FOR PAYMENT

Application is made for payment, as shown below, in connection with the Contract.
Continuation Sheet, MSHA Document R102, must be attached.

1. **ORIGINAL CONTRACT SUM**..... $_____
2. **Net change by Change Orders**..... $_____
3. **CONTRACT SUM TO DATE**(Line 1+/-2)..... $_____
4. **TOTAL COMPLETED & STORED TO DATE**.... $_____
   (Column G on R102)
5. **RETAINAGE:**
   a. _____% Of Completed Work $_____
   (Columns D + E on R102)
   b. _____% Of Stored Material $_____
   (Column F on R102)
   Total Retainage (Line 5a + 5b or
   Total in Column I of R102)..... $_____
6. **TOTAL EARNED LESS RETAINAGE:**..... $_____
   (Line 4 less Line 5 Total)
7. **LESS PREVIOUS CERTIFICATES FOR PAYMENT:**... $_____
   (Line 6 from prior Certificate)
8. **CURRENT PAYMENT DUE:**..... $_____
9. **BALANCE TO FINISH, INCLUDING RETAINAGE:**.... $_____
   (Line 3 less Line 6)

CHANGE ORDER SUMMARY	AMOUNT	DATE APPROVED
Change order #	$_____	_____
Change order #	$_____	_____
Change order #	$_____	_____
Change order #	$_____	_____
NET CHANGES by Change Order	$_____	

CONTRACTOR'S STATEMENT

The undersigned Contractor certifies that to the best of the Contractor's knowledge, information and belief the Work covered by this Application for Payment has been completed in accordance with the Contract Documents, that all amounts have been paid by the Contractor for Work which previous Certificates of Payment were issued and payments received from the Owner, and that current payment shown herein is now due.

CONTRACTOR:

By:_____ Date:_____

OWNER'S CERTIFICATE FOR PAYMENT

In accordance with the Contract Documents, based on on-site observation and the data comprising this application, the Owner certifies to MSHA that to the best of the Owner's knowledge, information and belief the work has progressed as indicated, the quality of the work is in accordance with the Contract Documents, and the Contractor is entitled to payment of the Amount Certified.

AMOUNT CERTIFIED.....$_____(A)

OWNER

By:_____Date_____

MSHA APPROVAL

If applicable, reason(s) for difference between amount (A) and amount (B)

_____

_____

CURRENT PAYMENT DUE.....$_____(B)

TECHNICAL SERVICES INSPECTOR:

By:_____Date_____

MAINE STATE HOUSING AUTHORITY

CONTRACTOR'S FINAL CERTIFICATE

Any material supplier or subcontractor who supplied material or labor with a value greater than or equal to $2,000 must complete this form.

PROJECT: _____ Contract Date: _____

ADDRESS: _____ Contract Amount: _____

_____ Contract For: _____

1. The undersigned certifies that there is due and payable under the above contract a final payment of $_____.

2. The undersigned certifies that all work required under this contract has been performed in accordance with the terms of the contract and was completed on _____.

3. The undersigned certifies, that except as set forth above, there are no unpaid claims for materials, supplies or equipment and no claims of laborers or mechanics for unpaid wages arising out of the performance of the contract.

4. The undersigned releases any and all claims, other than for the final payment set forth above, arising under or by virtue of the contract and agrees to indemnify the Maine State Housing Authority and the owner against any such claims.

5. The undersigned certifies that lead-based paints have not been used in the painting of any interior surfaces or those exterior surfaces which are readily accessible to children under seven (7) years of age. Lead-based paints are defined as those paints containing more than 0.5% lead by weight in the non-volatile content of the paint.

6. The undersigned has attached to this certificate all manufacturers' and suppliers' written guarantees and warranties covering materials and equipment furnished under the contract.

Date: _____ Contractor: _____

Signature: _____

State of Maine
County of _____, ss. Date: _____

Personally appeared the above-named _____ and gave oath to the foregoing.

Before me,

_____
Notary Public of Maine/Attorney-at-Law
My Commission Expires: _____

MAINE STATE HOUSING AUTHORITY
OWNER/AGENCY CERTIFICATE OF COMPLETION

Owner(s): _____

Property Address: _____

_____

Project #: _____ Number of Units After Rehabilitation: _____

The undersigned Owner(s) certifies as follows:

1. The loan funds I have received from the Maine State Housing Authority to undertake property improvements have now been spent.

2. The improvements for which I used the money have been completed to my satisfaction and are the same improvements listed in my Maine State Housing Authority Program Application and contractor estimates, or as amended with the prior written consent of the Maine State Housing Authority.

The undersigned Owner(s) swears under penalty of law that he/she/they have read and understood this Certificate and that to the best of his/her/their knowledge and belief it is true.

OWNER:

By: _____ Date: _____
Name:

By: _____ Date: _____
Name:

APPROVAL BY MSHA:

By: _____ Date: _____
Name:
Its:

MAINE STATE HOUSING AUTHORITY USE ONLY

For purposes of the Financial Assistance Agreement, the Qualified Project Period begins on: _____
Date

GEOTECHNICAL INVESTIGATION
for
PROPOSED ISLAND VIEW APARTMENTS

SILVER STREET DEVELOPMENT
PORTLAND, MAINE

Submitted to:

Silver Street Development
100 Silver Street
Portland, Maine 04101

Prepared by:

Jacques Whitford Company, Inc.
27 Congress Street
PO Box 4696
Portsmouth, New Hampshire 03802

July 10, 2000

JWC File No. NHP00217

TABLE OF CONTENTS

INTRODUCTION

As requested, Jacques Whitford Company, Inc. (JWC) has performed a geotechnical investigation for the proposed Island View Apartments in Portland, Maine. The purpose of the investigation was to evaluate the subsurface conditions at the site and to provide preliminary geotechnical recommendations for the design and construction of the proposed structures. This report has been prepared specifically and solely for the project described above: it contains all of our findings, and includes recommendations for the design and construction of the foundations and earthworks.

SITE AND GEOLOGY

The site of the proposed development is located just north of the intersection of North and Walnut Streets in Portland, Maine. The general location of the site is shown on the appended Site Location Map, Figure 1. A 25 to 30-foot soil berm/embankment is located along the northern and western portions of the property. The majority of the berm and adjacent areas are lightly vegetated with grass and/or shrubs. A 2.2 million gallon underground concrete water storage tank is located to the south of the berm in the approximate center of the property. Tennis courts (no longer in service) and a perimeter chain-link fence are located over the top of the underground tank. The southern end of the property is paved, but the majority of the parking lot has not been maintained in recent years. Existing ground surface elevations vary from approximately 122 to 158 feet in the vicinity of the soil berm and from roughly 134 to 145 feet across the remainder of the property.

Based on our conversations with the Portland Water District, the existing soil berm is what remains of a larger berm that encircled an open water reservoir in the center of the property until approximately 1971. At that time, the berm was removed from the southern and eastern portions of the property, and the underground water storage tank was constructed. Subsequently, the tennis courts and paved parking areas were constructed in 1974.

Surficial geologic maps compiled by the Maine Geological Survey characterize the site soils as glacial till (heterogeneous mixture of sand, silt, clay, and stones). The glacial till deposit may include many boulders. Stratification within the deposit is rare but beds and lenses of washed and stratified sediments may be found. Two varieties of the till are common. Basal till is fine grained and very compact with low permeability and poor drainage. Ablation till is loose, sandy and gravelly with moderate permeability and fair to good drainage. The glacial till unit generally overlies bedrock (Thompson and Prescott, Jr., 1977).

FIELD PROCEDURES

Dig Safe was contacted a minimum of 72 hours in advance of the drilling investigation in order to identify subsurface utilities in the vicinity of the proposed borehole locations.

Our field work was performed on June 22, 2000. Six test boreholes (B-1 through B-6) and two auger probes (AP-1 and AP-2) were drilled to depths ranging from 10 to 22 feet below the ground surface using a truck-mounted drill rig supplied by Great Works Pump & Test Boring, Inc Boreholes B-1 through B-4 were completed around the perimeter of the existing soil berm in the vicinity of the proposed 3-story apartment building. Boreholes B-5 and B-6 were completed in the vicinity of the planned townhouse apartments. The two auger probes were completed in the proximity of proposed drainage lines/structures. The borehole and auger probe locations are shown on the appended Figure 2, Borehole Location Plan.

The boreholes and auger probes were advanced through overburden soils using solid-stem augers. In Boreholes B-1 through B-6, standard Penetration Tests (SPTs) were performed and soil samples were obtained using a 2-inch outside diameter split-spoon sampler. A JWC engineer supervised the drilling work, collected soil samples and logged the subsurface conditions encountered. Several of the boreholes were left open for the duration of the drilling operation in order to record groundwater levels. At the end of the day, each borehole was backfilled with soil cuttings.

All soil samples were stored in moisture tight containers and returned to our laboratory for further classification and testing. Samples will be kept in storage for a period of six months from the date of issue of this report. After this time, the samples will be discarded unless we are instructed otherwise.

The specific number, locations, and depths of our explorations were selected in relation to the existing and proposed site features, under the constraints of surface access and underground utility conflicts We estimated the relative location of each borehole by measuring from current site features and scaling these measurements onto site plans provided to us by Silver Street Development and Mitchell & Associates. The ground surface elevations at the borehole locations were estimated by interpolating between the contour intervals shown on the plans. Consequently, the locations depicted on the appended Borehole Location Plan and the elevations referenced on the appended Borehole Records should be considered accurate only to the degree permitted by our data sources and implied by our measuring methods.

SOIL AND BEDROCK PROFILE

A 6 to 9 inch layer of topsoil/rootmat currently covers the majority of the proposed development area. A 3-inch layer of asphaltic concrete was encountered in the existing parking lot at the southern end of the property. In general, the subsurface soils consist of a granular fill over silty sand (Glacial till). Bedrock was not encountered in any of the boreholes.

The principal strata are described in the following paragraphs and on the appended Borehole Records. Soil classification was based on visual/manual methods and a limited amount of laboratory testing. For an explanation of the descriptions used on the boring logs, reference should be made to the Symbols and Terms used on Borehole and Test Pit Records included in Appendix A.

Fill

In Boreholes B-1 through B-6 inclusive, and in Auger Probes AP-1 and AP-2, granular fill consisting of brown, grayish brown and dark yellowish brown silty sand with gravel (SM) was encountered. Occasional cobbles, weathered rock fragments and rootlets were encountered within the fill deposit. Trace amounts of broken glass were observed in Borehole B-6. The overall thickness of the granular fill ranged from approximately 2.5 feet in Borehole B-3 to about 7 feet in Borehole B-5.

The results of a grain-size analysis completed for sample 2 of Borehole B-1 (at a depth of 2.6 feet) are included in Appendix B. The results indicate 21.3% gravel, 66.0% sand, and 12.7% silt/clay. Therefore, this sample was classified as a silty sand with gravel (SM). The moisture contents of selected samples ranged from 5% to 9%.

SPT N-values within the granular fill deposit were highly variable ranging from 10 to in excess of 50. These N-values indicate that the relative compactness of the granular fill is compact to very dense.

Compact to Very Dense Silty SAND (SM) (Glacial Till)

Olive gray to dark gray silty SAND (SM) was encountered directly beneath the granular fill in each of the boreholes. A few gravel-sized particles and trace to little amounts of clay were encountered throughout the deposit. Occasional moderate to highly weathered rock fragments were also observed. The overall thickness of the silty SAND deposit was not determined as each of the boreholes was terminated within the stratum at depths ranging from 17 to 22 feet below the ground surface.

Two grain-size analyses were completed for selected samples of silty SAND and are included in Appendix B. The grain-size analysis results for sample 2 from Borehole B-3 (at a depth of 6 feet) indicate 8.5% gravel, 54.3% sand, and 37.2% silt/clay. The results for sample 4 from Borehole B-6 (at a depth of 11 feet) indicate 13.6% gravel, 48.7% sand, and 37.7 % silt/clay. Therefore, these samples were classified as silty SAND (SM).. Natural moisture contents of selected samples ranged from 8% to 13%.

SPT N-values ranged from 17 to in excess of 50 and indicate that the relative compactness of the silty SAND deposit is compact to very dense.

Bedrock

Bedrock was not encountered in any of the completed boreholes or auger probes

GROUNDWATER CONDITIONS

Measurements completed in the open boreholes at the end of the drilling operation indicated the presence of groundwater at depths ranging from 10 to 19 feet below the ground surface in Boreholes B-1 and B-6 respectively. This translates to a groundwater elevation of 123.5 feet for Borehole B-1 and 124.7 feet for Borehole B-6. Groundwater was also measured in Borehole B-3 at a depth of 12.5 feet below the ground surface (elevation 110.0 feet). Groundwater levels should be expected to fluctuate in response to precipitation events, seasonal variations and site use.

DISCUSSION AND RECOMMENDATIONS

Development plans call for the construction of a new, three-story 56-unit apartment building and 16 townhouse apartments. The recommendations given in this report are limited to the design and construction of these.

Site plans indicate that the three-story, wood-framed building is planned in the vicinity of the existing soil berm along the northern edge of the property. Existing ground surface elevations within the footprint of the building vary from approximately 158 to 121 feet. We understand that the northeastern wing of the building will have a full basement and a finish-floor slab-on-grade elevation of 125 feet. Cuts and fills on the order of 12 feet and 4 feet, respectively, are anticipated for this portion of the building. The remainder of the building is planned at a finish-floor elevation of 135 feet. Cuts and fills on the order of 23 feet and 3 feet, respectively, are anticipated in this area. Grading and drainage plans indicate that the exterior grades planned adjacent to the basement will vary from 134 to 125 feet and that exterior grades for the remainder of the 3-story building will vary from 134 to 127 feet.

Site plans indicate that the 16 wood-framed townhouse apartments are planned along North Street in the vicinity of the existing soil berm at the western edge of the property. Existing ground surface elevations within the footprint of the townhouse apartments vary from approximately 158 to 142 feet. We understand that finish-floor elevations for the townhouses will vary from approximately 143.5 to 138 feet (from south to north). Excavations of up to 20 feet will be required in this area.

Foundation loads for the 3-story apartment building were provided by Becker Structural Engineers. Loads for interior and exterior bearing walls are anticipated at 4.6 kips/linear foot and 2.3 kips/linear foot, respectively. Foundation loads for the townhouse apartments have been assumed to be on the order of 1.6 kips/linear foot.

Based on our understanding of the project and the soil and groundwater conditions encountered at the site, conventional shallow foundations and slab-on-grade construction can be utilized to provide support for the proposed structures. However, due to the potential variability of the existing fill, JWC does not recommend that footings be founded on or above existing fill materials. Foundation subgrade improvements will require the excavation of all existing fill within the influence zone of the footings and replacement with compacted structural fill. Excavation and replacement (with compacted structural fill) will also be required for existing fill materials within 2 feet of the slab-on-grade subgrade elevation.

The following sections give our recommendations for site preparation and foundation design.

Site Preparation

The construction area beneath the proposed structures should be cleared and stripped of all asphaltic concrete, vegetation, topsoil, rootmat, debris, and other deleterious materials. Our explorations indicate that an average thickness of 6 to 9 inches of topsoil/rootmat and 3 inches of asphaltic concrete will be encountered across the site. Roots and stumps from plants and small trees will extend deeper and should be completely removed.

After clearing and stripping is complete, foundation subgrade improvements, as outlined in the Spread Footings section of this report, will necessitate the excavation and replacement (with structural fill) of the existing granular fill beneath the foundations of the proposed structures.

Some of the existing granular fill may remain in place beneath the proposed slab-on-grade floors provided that a minimum of 2 feet of the existing fill is excavated from below the underside of the slab-on-grade base material and replaced in compacted lifts. The excavated fill can be re-used provided the moisture content of the material is conducive to achieving 95% of the Modified Proctor Maximum Dry Density (MPMDD) throughout the thickness of each lift. This fill should be placed and compacted in accordance with the Structural Fill section of this report. We also recommend that the base of this excavation be compacted with a 15-ton highway roller to achieve 95% of the MPMDD to a minimum depth of 12 inches. Any soft areas revealed during compaction of the base of the excavation should be excavated and replaced with structural fill as described in the Structural Fill section of this report. Additionally, fill placement necessary to raise existing site grades to the underside of the required base course gravel layer (for slabs-on-grade) should be completed in accordance with the Structural Fill section of this report.

At the northeast wing of the 3-story apartment building, the subgrade should be compacted to achieve 95% of the MPMDD to a minimum depth of 12 inches. Over-excavation, other than that required for the moisture barrier requirements, will not be necessary where foundation/slab-on-grade excavations extend into the native dense to very dense soils encountered at the site.

Spread Footings

We recommend that the apartment buildings be supported on conventional strip/spread footings founded on native olive gray to dark gray silty SAND (Glacial till) or upon compacted structural fill placed atop the native silty SAND. In order to improve foundation subgrade conditions, all existing fill and other deleterious materials within the influence zone of the spread footings should be excavated and replaced with structural fill. The excavation for the footings should be taken down to the native silty SAND and extend beyond the perimeter of the footings a distance sufficient to accommodate a 45-degree splay of bearing. Our explorations indicate that up to 4 feet of granular fill may be encountered in building areas along the perimeter of the existing soil berm and that up to 7 feet of fill may be encountered in the proximity of the townhouses at the southern end of the site.

Significant variations should be anticipated. Following excavation and prior to backfilling, the exposed subgrade should be proof-rolled under the supervision of a geotechnical engineer to a compact and unyielding condition. Structural fill should then be placed in accordance with the Structural Fill section of this report to achieve the planned foundation elevations.

Footings founded directly on the native silty SAND deposit or upon compacted structural fill placed atop the native silty SAND can be proportioned for a maximum net allowable bearing pressure of 4000 pounds per square foot (psf). The recommended allowable bearing pressure is valid for strip footings at least 18 inches wide and for isolated column footings at least 30 inches wide.

All footing bearing surfaces should consist of undisturbed, non-yielding silty SAND (Glacial till) or compacted structural fill. Footings should never be cast on loose, soft, or frozen soil, slough, debris, existing uncontrolled fill, or surfaces covered by standing water. We recommend that a qualified geotechnical engineer observe all footing bearing surfaces prior to concrete placement.

We estimate that total post-construction settlements of properly designed footings bearing on properly prepared subgrades will not exceed 1 inch. Differential settlements between adjacent footings could approach three-fourths of the actual total settlement.

For frost protection, the base of all exterior footings should bear at least 4 feet below adjacent exterior grades. Within heated interior spaces, the bottoms of footings should bear at least 24 inches below the finish-floor level of the surrounding slab-on-grade. In order to protect foundation components from adfreezing, backfill used against foundations to a depth of 4 feet should consist of non frost-susceptible granular backfill material placed and compacted in accordance with the Structural Fill section of this report. Lightweight compaction equipment should be utilized within 5 feet of foundation walls.

Foundation wall backfill should meet the specifications of MEDOT 703.06, Type B or the gradation specifications for Type 2 Fill included in Appendix C. Where foundation walls are only backfilled on one side, they should be designed to resist lateral earth pressures. We recommend designing for an "at-rest" condition using, as a minimum, a lateral earth pressure coefficient (K_o) of 0.5. . Full hydrostatic conditions should be considered in retaining wall design when retaining wall backfill is exposed to precipitation conditions. Otherwise an inclined drainage layer of washed uniform stone should be provided from the heel of the retaining wall footing to the ground surface at an angle of 50° from vertical. The drainage layer should extend along the length of the wall, have a minimum thickness of 12 inches, and be enveloped in a geotextile filter fabric to prevent the migration of fine grained soils into the drainage stone that could lead to clogging. An alternative to providing the drainage layer is to provide a positive system which prevents rain water infiltration into the retaining wall backfill. This is often accomplished by providing a low permeable barrier at the ground surface which slopes away from the building at a grade of at least 2%. The low permeable material should be at least 12 inches thick and have a design hydraulic conductivity of 1×10^{-7} cm/sec.

Around the basement area of the 3-story apartment building we recommend providing a perimeter drainage system. The drain should consist of a minimum 4-inch diameter perforated pipe within an envelope of pea gravel or washed stone. The drain pipe should be enveloped in 12 inches of drainage stone all the way around the pipe. The gravel/stone should be wrapped with a geotextile filter fabric to prevent the infiltration of fine-grained soils which could clog the system. As a minimum, the foundation drain should have a slope of 1%. However, a slope on the order of 2% or more will likely improve the long-term performance of the drain. An additional drop on the order of 1/2 inch should be provided near each bend/corner of the drainage pipe. The drain invert should be installed no more than 8 inches below the base of the perimeter footings.

The remainder of the building areas do not require a perimeter drainage system provided that exterior grades are on the order of 6 inches below the finished-floor elevation and that the grades are designed to direct storm water away from the building.

Slabs-On-Grade

We recommend the installation of a vapor barrier directly below concrete slabs-on-grade. Plastic sheeting (such as Moistop) should be placed atop a 6-inch layer of compacted stone placed directly over the improved subgrade as outlined previously in this report. The stone should meet the gradation requirements of No. 67 stone specified in ASTM C33.

Slabs-on-grade constructed as recommended above may be designed using a soil modulus of subgrade reaction, k, of 200 tons per cubic foot. Separation between slabs-on-grade and all load bearing walls and columns should be accommodated.

REFERENCES

Thompson, W.B. and Prescott, Jr., G.C., 1977, "Reconnaissance Surficial Geology of the Portland East Quadrangle, Maine," Maine Geological Survey, Department of Conservation, Open-File No. 77-40, scale 1:24,000.

Thompson, W.B. and Borns, Jr., H.W., 1985, "Surficial Geologic Map of Maine," Maine Geological Survey, Department of Conservation, scale 1:500,000.

Structural Fill

Structural fill refers to the backfill materials placed under foundations and slabs-on-grade as noted in this report. Structural fill materials should be placed in horizontal lifts not exceeding 12 inches in loose thickness and compacted to at least 95% of the MPMDD.

Regardless of material or location, all structural fill should be placed over undisturbed and compact subgrades. A geotechnical engineer should verify the condition of all subgrades prior to the placement of fill. In the event of winter construction, structural fill should be placed and compacted in an unfrozen condition. In addition, the compaction of structural fill should be verified by means of in-place density testing during fill placement.

General Construction Considerations

The limited scope of work the 1-day field investigation did not enable a thorough investigation of the fill materials that comprise the existing soil berm along the northern and western portions of the site. Based on visual observations of the exposed soils along the top and sides of the berm and on the granular fill encountered in the boreholes along the perimeter of the berm, the berm materials should be suitable for re-use as structural fill on the site. The on-site fill materials and the native silty SAND (Glacial till) encountered during our explorations can be re-used for foundation subgrade and slab-on-grade subgrade preparation provided that the natural moisture content at the time of placement and compaction is at or slightly below optimum moisture as determined by the MPMDD. In addition, the on-site soils must be free of all organic materials, vegetation, rootlets, debris and deleterious materials. The soils encountered at the site should not be utilized as backfill against foundations or as slab-on-grade base material due to moisture sensitivity and frost-susceptibility.

The on-site soils contain significant percentages of silt, clay, and fine sand. They will be easily disturbed by construction equipment and may degrade to a slurry-like consistency when subjected to construction traffic or other disturbance in wet conditions.

Based on the groundwater conditions observed at the time of drilling, we do not anticipate that groundwater will present any difficulty during most foundation excavations. However, groundwater may be encountered during the 10 to 15-foot excavations required for the basement/foundations in the northeast wing of the three-story apartment building. If groundwater is observed during the excavations, we anticipate that excavation dewatering can be accomplished with sump holes with pumps in the excavation.

The contractor should be responsible for slope stability during on-site excavations. As a minimum, excavations should be sloped in accordance with OSHA safety requirements. If an excavation cannot be properly sloped or benched, the contractor should install a temporary engineered shoring system.

Excavation slopes should be checked regularly for signs of instability and flattened as required. Temporary slopes should be protected from surface-runoff erosion by means of berms and swales located along the top of the slope and by means of plastic sheeting placed over the slope.

CLOSURE

The recommendations given in this report are in accordance with our present understanding of the project. A soils investigation is a random sampling of a site. Should any conditions at the site be encountered which differ from those at the test locations, we require that we be notified immediately in order to permit reassessment of our recommendations.

We trust that this report meets your requirements at this time. Please contact us if you have any questions or if we can be of further assistance.

Respectfully submitted,

JACQUES WHITFORD COMPANY, INC.

Travis C. Carpenter
Geotechnical Engineer

Craig R. Gendron, P.E.
Area Manager

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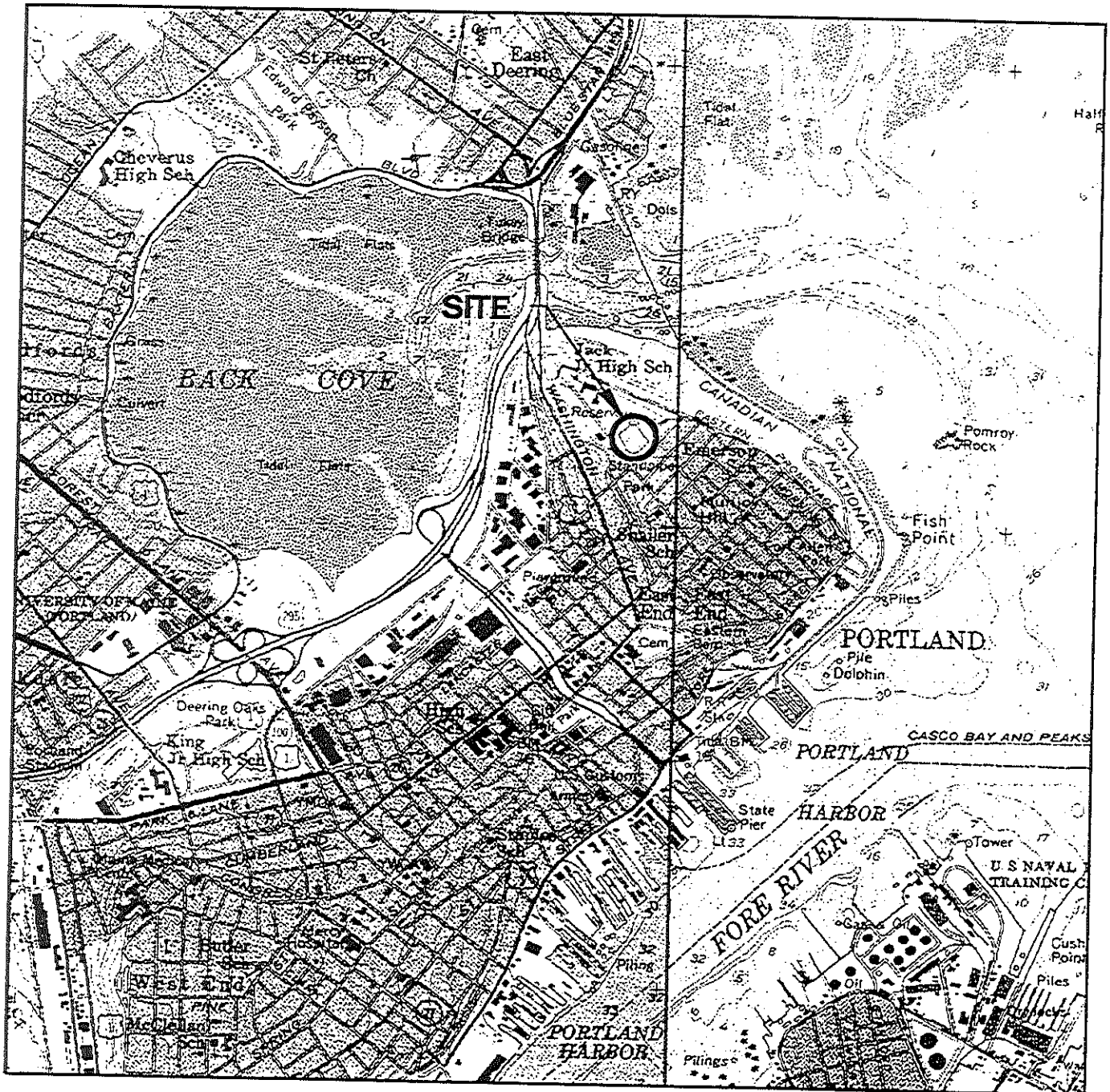


MAP SOURCE: DELORME
3-D TOPO QUADS
PORTSMOUTH, MAINE

NORTH

2000 0 2000
Scale in feet

Jacques Whitford Company, Inc.

JACQUES WHITFORD LOCATION: PORTSMOUTH, NEW HAMPSHIRE					DRAWING TITLE: SITE LOCATION MAP NORTH & WALNUT STREETS PORTLAND, MAINE
DATE PREPARED: 06-28-00	DESIGNED BY: TCC	DRAWN BY: LJT	CHECKED BY: TCC	REVIEWED BY: CRG	
REVISION DATE:	REVISION NO:	DRAWN BY:	CHECKED BY:	REVIEWED BY:	
PROJECT NAME/FILE NAME: ISLAND VIEW/LOCUS		PROJECT NUMBER/PHASE: NHP00217/1	SCALE: 1:24000	PREPARED FOR: SILVER STREET DEVELOPEMENT	FIGURE NO. 1

SYMBOLS AND TERMS USED ON BOREHOLE AND TEST PIT RECORDS

SOIL DESCRIPTION

Terminology describing common soil genesis:

Topsoil	-	mixture of soil and humus capable of supporting good vegetative growth
Peat	-	fibrous aggregate of visible and invisible fragments of decayed organic matter
Till	-	unstratified glacial deposit which may range from clay to boulders
Fill	-	any materials below the surface identified as placed by humans (excluding buried services)

Terminology describing soil structure:

Desiccated	-	having visible signs of weathering by oxidation of clay minerals, shrinkage cracks, etc.
Fissured	-	having cracks, and hence a blocky structure
Varved	-	composed of regular alternating layers of silt and clay
Stratified	-	composed of alternating successions of different soil types, e.g. silt and sand
Layer	-	>75 mm
Seam	-	2 mm to 75 mm
Parting	-	< 2 mm
Well Graded	-	having wide range in grain sizes and substantial amounts of all intermediate particle sizes
Uniformly Graded	-	predominantly of one grain size

Terminology describing soils on the basis of grain size and plasticity is based on the Unified Soil Classification System (USCS) (ASTM D-2488). The classification excludes particles larger than 3 inches (76 mm). This system provides a group symbol (e.g. SM) and group name (e.g. silty sand) for identification.

Terminology describing materials outside the USCS, (e.g. particles larger than 3 inches, visible organic matter, construction debris) is based upon the proportion of these materials present:

Trace, or occasional	Less than 10%
Some	10-20%
Frequent	Greater than 20%

The standard terminology to describe cohesionless soils includes the compactness (formerly "relative density"), as determined by laboratory test or by the Standard Penetration Test 'N' - value.

Relative Density	'N' Value	Compactness %
Very Loose	<4	<15
Loose	4-10	15-35
Compact	10-30	35-65
Dense	30-50	65-85
Very Dense	>50	>85

The standard terminology to describe cohesive soils includes the consistency, which is based on undrained shear strength as measured by insitu vane tests, penetrometer tests, unconfined compression tests, or occasionally by standard penetration tests.

Consistency	Undrained Shear Strength		'N' Value
	kips/sq.ft.	kPa	
Very Soft	< 0.25	< 12.5	< 2
Soft	0.25 - 0.5	12.5 - 25	2-4
Firm	0.5 - 1.0	25 - 50	4 - 8
Stiff	1.0 - 2.0	50 - 100	8 - 15
Very Stiff	2.0 - 4.0	100 - 200	15 - 30
Hard	> 4.0	> 200	> 30

ROCK DESCRIPTION

Rock Quality Designation (RQD)

The classification is based on a modified core recovery percentage in which all pieces of sound core over 100 mm long are counted as recovery. The smaller pieces are considered to be due to close shearing, jointing, faulting, or weathering in the rock mass and are not counted. RQD was originally intended to be done on N-size (45 mm) core; however, it can be used on different core sizes if the bulk of the fractures caused by drilling stresses are easily distinguishable from *in situ* fractures.

RQD	ROCK QUALITY
90 - 100	Excellent, intact, very sound
75 - 90	Good, massive, moderately jointed or sound
50 - 75	Fair, blocky and seamy, fractured
25 - 50	Poor, shattered and very seamy or blocky, severely fractured
0 - 25	Very poor, crushed, very severely fractured

Terminology describing rock mass:

Spacing (mm)	Bedding, Laminations, Bands	Discontinuities
2000-6000	*Very Thick*	*Very Wide*
600-2000	*Thick*	*Wide*
200-600	*Medium*	*Moderate*
60-200	*Thin*	*Close*
20-60	*Very Thin*	*Very Close*
<20	*Laminated*	*Extremely Close*
<6	*Thinly Laminated*	

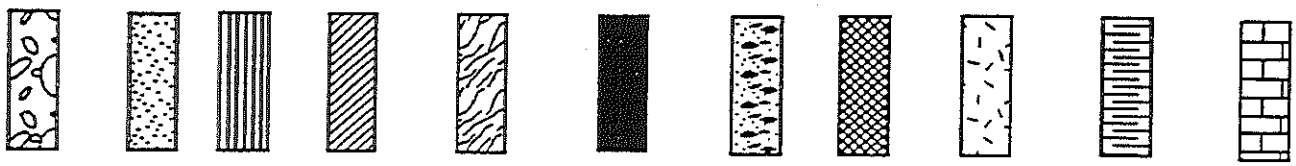
Strength Classification	Uniaxial Compressive Strength (MPa)
Very Weak	1 - 25
Weak	25 - 50
Strong	50 - 100
Very Strong	100 - 250
Extremely Strong	> 250

Terminology describing weathering:

Slight - Weathering limited to the surface of major discontinuities. Typically iron stained
Moderate - Weathering extends throughout rock mass. Rock is not friable.
High - Weathering extends throughout rock mass. Rock is friable.

STRATA PLOT

Strata plots symbolize the soil or bedrock description. They are combinations of the following basic symbols:



Boulders, Cobbles, Gravel | Sand | Silt | Clay | Organics | Asphalt | Concrete | Fill | Igneous Bedrock | Metamorphic Bedrock | Sedimentary

WATER LEVEL MEASUREMENT

Borehole or Standpipe

Piezometer

SAMPLE TYPE

SS	Split spoon sample (obtained by performing the standard Penetration Test)	AS	Auger Sample
		BS	Bulk Sample
		WS	Wash Sample
ST	Shelby tube or thin wall tube	HQ, NQ, BQ, etc.	Rock core samples obtained with the use of standard size diamond drilling bits
PS	Piston sample		

N-VALUE

Numbers in this column are the results of the Standard Penetration Test: the number of blows of a 140 pound (64 kg) hammer falling 30 inches (760 mm), required to drive a 2 inch (50.8 mm) O.D. split spoon sampler one foot (305 mm) into the soil. For split spoon samples where insufficient penetration was achieved and 'N' values cannot be presented, the number of blows are reported over sampler penetration in inches (e.g. 50/5").

OTHER TESTS

Symbols in this column indicate that the following laboratory tests have been carried out and the results are presented separately.

S	Sieve analysis	H	Hydrometer analysis
G_s	Specific gravity of soil particles	γ	Unit weight
k	Permability (cm/sec)	C	Consolidation
	Single packer permeability test; test interval from depth shown to bottom of borehole.	CD	Consolidated drained triaxial
		CU	Consolidated undrained triaxial with pore pressure measurements
	Double packer permeability test; test interval as indicated	UU	Unconsolidated undrained triaxial
	Falling head permeability test using casing	DS	Direct shear
		Q_u	Unconfined compression
		I_p	Point Load Index (I_p on Borehole Record equals I_p (50); the index corrected to a reference diameter of 50 mm)
	Falling head permeability test using well point or piezometer		

Jacques Whitford Company, Inc.

BOREHOLE RECORD

B-1

CLIENT Silver Street Development

PROJECT No. NHP00217

LOCATION Island View Apartments - North & Walnut Streets - Portland, Maine

BOREHOLE No. B-1

DATES: BORING 06/22/00 WATER LEVEL 06/21/00

DATUM MSL

DEPTH (ft)	ELEVATION (ft)	SOIL DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY	SAMPLES N-VALUE OR RQD	OTHER TESTS
							ins		
0	133.5								
	133.0	Topsoil/rootmat							
1		Compact to very dense, brown to dark yellowish brown, silty sand with gravel (SM), occasional weathered rock fragments, moist: FILL			SS	1	14	19	
2					SS	2	9	89/3"	S
3									
4	129.5	- trace rootlets to 1.5'							
5		Dense to very dense, olive gray, silty SAND (SM), few gravel-sized particles, occasional weathered rock fragments, trace to little clay, moist							
6					SS	3	24	49	
7									
8									
9									
10				▽	SS	4	4	50/1"	
11		- cobble at 10.6'							
12									
13									
14									
15									
16					SS	5	23	31	
17	116.5								
		End of borehole							
18									
19									
20									
21									
22									
23									
24									
25									

STRENGTH TESTS - ksf

1 2 3 4

WATER CONTENT & ATTERBERG LIMITS W_P W W_L

STANDARD PENETRATION TEST, BLOWS/1 ft. ●

10 20 30 40 50 60 70 80

△ Undisturbed Field Vane Test
★ Pocket Penotrometer
□ Torvane Test

Jacques Whitford Company, Inc.

BOREHOLE RECORD

B-2

CLIENT Silver Street Development

LOCATION Island View Apartments - North & Walnut Streets - Portland, Maine

DATES: BORING 06/22/00 WATER LEVEL Not observed

PROJECT No. NHP00217

BOREHOLE No. B-2

DATUM MSL

DEPTH (ft)	ELEVATION (ft)	SOIL DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY ins	SAMPLES N-VALUE OR RQD	OTHER TESTS
0	130.0								
	129.5	Topsoil/rootmat							
1		Compact to dense, brown to dark yellowish brown, silty sand with gravel (SM), occasional weathered rock fragments, moist: FILL			SS	1	8	10	
2									
3					SS	2	7	49	
4	125.8	- trace rootlets to 4.0'							
		- occasional cobbles from 2.5' to 4.5'							
5									
6		Dense, olive gray to dark gray, silty SAND (SM), few gravel-sized particles, occasional weathered rock fragments, trace to little clay, moist			SS	3	21	39	
7									
8									
9		- 2" seam of oxide mottled brown weathered rock at 6.5'							
10									
11					SS	4	16	43	
12		- 3" seam of gray weathered rock at 11.5'							
13									
14									
15									
16					SS	5	19	39	
17	113.0								
		End of borehole							
18									
19									
20									
21									
22									
23									
24									
25									

STRENGTH TESTS - ksf

1 2 3 4

WATER CONTENT & ATTERBERG LIMITS Wp W WL

STANDARD PENETRATION TEST, BLOWS/1 ft. ●

10 20 30 40 50 60 70 80

△ Undisturbed Field Vane Test

★ Pocket Penotrometer

□ Torvane Test

Sheet 1 of 1

Jacques Whitford Company, Inc.

BOREHOLE RECORD

B-3

CLIENT Silver Street Development — PROJECT No. NHP00217

LOCATION Island View Apartments - North & Walnut Streets - Portland, Maine — BOREHOLE No. B-3

DATES: BORING 06/22/00 — WATER LEVEL 06/21/00 — DATUM MSL

DEPTH (ft)	ELEVATION (ft)	SOIL DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY	SAMPLES N-VALUE OR RQD	OTHER TESTS
	122.5						ins		
0	121.8	Topsoil/rootmat			SS	1	9	43	
1		Dense, brown to dark yellowish brown, silty sand with gravel (SM), occasional cobbles and weathered rock fragments, moist: FILL							
2		- trace rootlets to 1.5'							
3	119.3	- cobble at 1.5'							
4		Very dense, olive gray to dark gray, silty SAND (SM), few gravel-sized particles, occasional weathered rock fragments, trace to little clay, moist							
5					SS	2	20	90	S
6									
7									
8									
9									
10					SS	3	16	96	
11									
12		- becomes wet at 12'		▽					
13									
14									
15									
16					SS	4	20	57	
17									
18									
19									
20									
21					SS	5	24	67	
22	100.5	- 3" seam of gray sand at 21.5'							
23		End of borehole							
24									
25									

STRENGTH TESTS - ksf

1 2 3 4

WATER CONTENT & ATTERBERG LIMITS W_P W W_L

STANDARD PENETRATION TEST, BLOWS/1 ft. ●

10 20 30 40 50 60 70 80

△ Undisturbed Field Vane Test
★ Pocket Penotrometer
□ Torvane Test

Jacques Whitford Company, Inc.

BOREHOLE RECORD

B-4

CLIENT Silver Street Development

LOCATION Island View Apartments - North & Walnut Streets - Portland, Maine

DATES: BORING 06/22/00 WATER LEVEL Not observed

PROJECT No. NHP00217

BOREHOLE No. B-4

DATUM MSL

DEPTH (ft)	ELEVATION (ft)	SOIL DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY	SAMPLES N-VALUE OR RQD	OTHER TESTS
							ins		
0	133.5								
	132.8	Topsoil/rootmat							
1		Compact to dense, grayish brown, silty sand with gravel (SM), occasional weathered rock fragments, moist: FILL			SS	1	18	24	
2									
3	130.5	- trace rootlets to 3'			SS	2	14	32	
4		Compact to very dense, olive gray to dark gray, silty SAND (SM), few gravel-sized particles, occasional weathered rock fragments, trace to little clay, moist							
5					SS	3	16	20	
6									
7									
8									
9									
10									
11		- 3" seam of orange brown oxide mottled weathered rock at 11'			SS	4	17	17	
12		- inclusion of olive gray clay at 11.5'							
13									
14									
15									
16		- inlclusion of olive gray clay at 15.5'			SS	5	20	31	
17									
18									
19									
20									
21					SS	6	22	60	
22	111.5								
		End of borehole							
23									
24									
25									

STRENGTH TESTS - ksf

1 2 3 4

WATER CONTENT & ATTERBERG LIMITS Wp W WL

STANDARD PENETRATION TEST, BLOWS/1 ft. ●

10 20 30 40 50 60 70 80

△ Undisturbed Field Vane Test
★ Pocket Penotrometer
□ Torvane Test

Jacques Whitford Company, Inc.

BOREHOLE RECORD

B-5

CLIENT Silver Street Development

LOCATION Island View Apartments - North & Walnut Streets - Portland, Maine

DATES: BORING 06/22/00 WATER LEVEL Not observed

PROJECT No. NHP00217

BOREHOLE No. B-5

DATUM MSL

DEPTH (ft)	ELEVATION (ft)	SOIL DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY	SAMPLES N-VALUE OR RQD	OTHER TESTS
0	143.7						ins		
	143.5	Asphaltic concrete							
1		Compact to very dense, brown to dark yellowish brown, silty sand with gravel (SM), occasional cobbles and weathered rock fragments, moist: FILL			SS	1	12	24	
2									
3					SS	2	1	50/0"	
4		- cobble at 2.75'							
5									
6		- cobble at 5.5'			SS	3	9	50/4"	
7	136.7								
8		Very dense, olive gray to dark gray, silty SAND (SM), few gravel-sized particles, occasional weathered rock fragments, trace to little clay, moist							
9									
10									
11					SS	4	24	92	
12									
13									
14									
15									
16					SS	5	24	69	
17	126.7								
		End of borehole							
18									
19									
20									
21									
22									
23									
24									
25									

STRENGTH TESTS - ksf

1 2 3 4

WATER CONTENT & ATTERBERG LIMITS W_P W W_L

STANDARD PENETRATION TEST, BLOWS/1 ft. ●

10 20 30 40 50 60 70 80

△ Undisturbed Field Vane Test

★ Pocket Penotrometer

□ Torvane Test

Jacques Whitford Company, Inc.

BOREHOLE RECORD

B-6

CLIENT Silver Street Development

PROJECT No. NHP00217

LOCATION Island View Apartments - North & Walnut Streets - Portland, Maine

BOREHOLE No. B-6

DATES: BORING 06/22/00 WATER LEVEL 06/21/00

DATUM MSL

DEPTH (ft)	ELEVATION (ft)	SOIL DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY	SAMPLES N-VALUE OR RQD	OTHER TESTS
	143.7						ins		
0	143.2	Topsoil/rootmat							
1		Dense, dark grayish brown, silty sand with gravel (SM), occasional weathered rock fragments, dry to moist: FILL - trace rootlets and glass fragments to 2.5'			SS	1	13	39	
2									
3	140.7				SS	2	8	49	
4									
5		Dense to very dense, olive gray to dark gray, silty SAND (SM), few gravel-sized particles, occasional weathered rock fragments, trace to little clay, moist - trace oxide mottling to 12'			SS	3	22	23	
6									
7									
8									
9									
10									
11					SS	4	24	32	S
12									
13									
14									
15									
16					SS	5	21	61	
17									
18									
19				▽					
20		- becomes wet							
21					SS	6	24	44	
22	121.7								
		End of borehole							
23									
24									
25									

STRENGTH TESTS - ksf

1 2 3 4

WATER CONTENT & ATTERBERG LIMITS W_P W W_L

STANDARD PENETRATION TEST, BLOWS/1 ft. ●

10 20 30 40 50 60 70 80

△ Undisturbed Field Vane Test

★ Pocket Penotrometer

□ Torvane Test

Jacques Whitford Company, Inc.

BOREHOLE RECORD

AP-1

CLIENT Silver Street Development — PROJECT No. NHP00217

LOCATION Island View Apartments - North & Walnut Streets - Portland, Maine — BOREHOLE No. AP-1

DATES: BORING 06/22/00 — WATER LEVEL Not observed — DATUM MSL

DEPTH (ft)	ELEVATION (ft)	SOIL DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY ins	SAMPLES N-VALUE OR RQD	OTHER TESTS
0	134.5								
0	133.8	Topsoil/rootmat							
1–4		Brown to dark yellowish brown, silty sand with gravel (SM), occasional cobbles and weathered rock fragments, moist: FILL							
5	129.5								
5–9		Olive gray, silty SAND (SM), few gravel-sized particles, occasional weathered rock fragments, trace to little clay, moist							
10	124.5								
10		End of borehole							

STRENGTH TESTS - ksf

1 2 3 4

WATER CONTENT & ATTERBERG LIMITS W_P W W_L

STANDARD PENETRATION TEST, BLOWS/1 ft. ●

10 20 30 40 50 60 70 80

△ Undisturbed Field Vane Test

★ Pocket Penotrometer

□ Torvane Test

Jacques Whitford Company, Inc.

BOREHOLE RECORD

AP-2

CLIENT Silver Street Development — PROJECT No. NHP00217

LOCATION Island View Apartments - North & Walnut Streets - Portland, Maine — BOREHOLE No. AP-2

DATES: BORING 06/22/00 — WATER LEVEL Not observed — DATUM MSL

DEPTH (ft)	ELEVATION (ft)	SOIL DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES TYPE	SAMPLES NUMBER	SAMPLES RECOVERY	SAMPLES N-VALUE OR RQD	OTHER TESTS
	142.0						ins		
0	141.8	Asphaltic concrete							
1–3		Brown, silty sand with gravel (SM), occasional cobbles and weathered rock fragments, moist: FILL							
3	139.0								
4–14		Olive brown to olive gray, silty SAND (SM), few gravel-sized particles, occasional weathered rock fragments, trace to little clay, moist							
15	127.0								
15		End of borehole							
16–25									

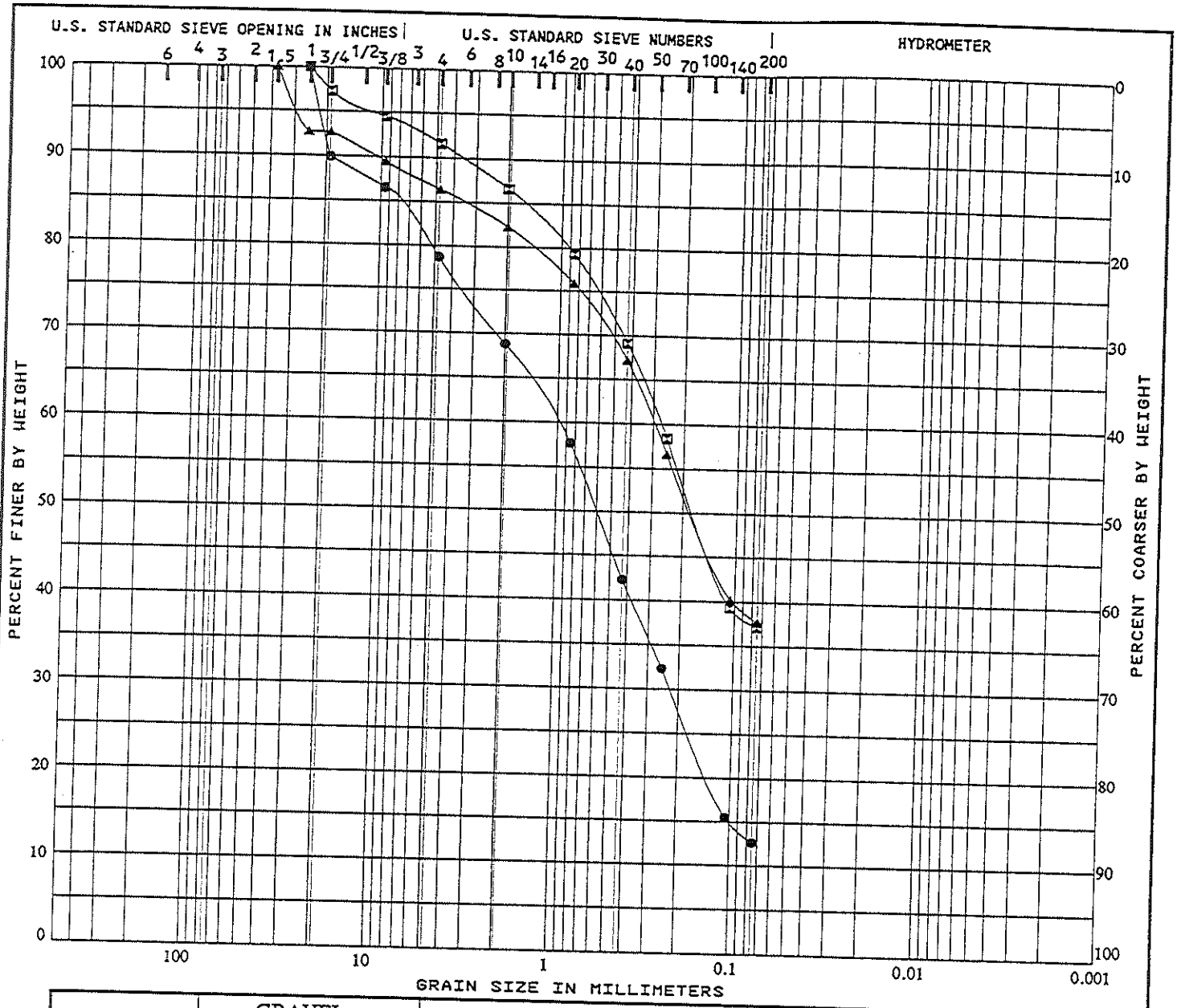
STRENGTH TESTS - ksf (1, 2, 3, 4)

WATER CONTENT & ATTERBERG LIMITS (Wp, W, WL)

STANDARD PENETRATION TEST, BLOWS/1 ft. ●

10 20 30 40 50 60 70 80

△ Undisturbed Field Vane Test
★ Pocket Penotrometer
□ Torvane Test



COBBLES	GRAVEL		SAND			SILT and CLAY
	coarse	fine	coarse	medium	fine	

	Source	Depth	Classification	WC%	LL	PL	PI	Cc	Cu
●	B-1	2.6	silty SAND with gravel (SM)	6					
☒	B-3	6.0	silty SAND (SM)	8					
▲	B-6	11.0	silty SAND (SM)	10					

	Source	Depth	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	B-1	2.6	25.00	1.02	0.222		21.3	66.0	12.7	
☒	B-3	6.0	25.00	0.27			8.5	54.3	37.2	
▲	B-6	11.0	37.50	0.30			13.6	48.7	37.7	

Project:	SSD - Island View Apartments	Location:	Portland, ME
Job No.:	NHP00217	Notes:	North & Walnut Streets
Date:	06/27/00		GRADATION CURVES

TYPE 2 FILL - GRANULAR FILL

Sieve Size		Percent Passing
5"	(125 mm)	100
4"	(100 mm)	95-100
3"	(75 mm)	82-100
2"	(50 mm)	62-100
1"	(25 mm)	39-100
3/4"	(19 mm)	30-94
3/8"	(9.5 mm)	22-80
No.4	(4.75 mm)	16-66
No.8	(2.36 mm)	12-55
No.16	(1.18 mm)	9-44
No.50	(300 μm)	4-25
No.200	(75 μm)	0-5

NOTE

Fill Materials shall be hard, durable pit gravel or quarried rock, free from silt, clay, slate, friable particles, cementation, frozen material, organic matter and other deleterious substances.

Jacques, Whitford
and Associates Limited

Consulting Engineers
Environmental Scientists
Risk Consultants

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Alberta • British Columbia • Saskatchewan • Ontario • Quebec • New Brunswick • Nova Scotia • Prince Edward Island • Newfoundland & Labrador
Maine • New Hampshire • Vermont • New York • Trinidad • Russia • Argentina

October 20, 2000

Bob Metcalf
Mitchell & Associates Landscape Architects
The Staples School
70 Center Street
Portland, Maine, 04101

Project No. NHP00217-2

Dear Bob:

Re: Detention/Wetpond Retaining Wall, Island View Apartment Development. Portland Maine

As requested, Jacques Whitford Company, Inc. (JWC) has performed a test pit investigation for the proposed Island View Apartments development in Portland, Maine. The purpose of the investigation was to evaluate the subsurface conditions at the site of the proposed detention/wetpond and provide geotechnical input for the design and construction of the proposed retaining wall structure.

Jacques Whitford has undertaken the current work subsequent to an initial soils investigation reported on July 10, 2000. Reference should be made to this report for a site description and regional geological conditions.

SOIL AND GROUNDWATER CONDITIONS

Detailed logs of the strata encountered during this investigation are given on the attached Test Pit Records. Soil classification was based on visual/manual methods and a limited amount of laboratory testing. For an explanation of the descriptions used on the soil logs, reference should be made to the attached Symbols and Terms used on Borehole and Test Pit Records.

On October 16, 2000, three test pits were excavated within the area of the proposed detention/wetpond to depths ranging between 11 feet and 12.5 feet (approximately to elevations 122 to 124 feet). The locations of the test pits are shown on the attached Test Pit Location Plan (Figure 2) In general, the soils encountered were silty to clayey sands with varying amounts of gravel. In the upper 3 to 4 feet the soil generally had more gravel and occasional cobbles. Below the top 3 to 4 feet the soil was finer grained. Granite curb stones were also encountered to a depth of 11 feet which indicates the soils encountered within the detention/wetpond area are fill materials.

During the field work, the test pits were left open for a short period of time to observe water conditions. During the short time the test pits were open, no groundwater conditions were observed.

For more detail on the classification and occurrence of the strata encountered, reference should be made to the attached Test Pit Records. Laboratory test results for selected samples are also attached.

The specific number, locations, and depths of our explorations were selected in relation to the existing and proposed site features, and under the constraints of surface access and underground utility conflicts. We estimated the relative location of each test pit by measuring from current site features and scaling these measurements onto site plans provided to us by Silver Street Development and Mitchell & Associates. The ground surface elevations at the test pit locations were estimated by interpolating between the contour intervals shown on the plans. Consequently, the locations depicted on the attached Test Pit Location Plan (Figure 2) and the elevations referenced on the attached Test Pit Records should be considered accurate only to the degree permitted by our data sources and implied by our measuring methods

DISCUSSION AND RECOMMENDATIONS

Based on discussions with you, and your memorandum of October 10, 2000, we understand the following regarding the proposed detention/wetpond for the Island View Apartment development:

- the approximate dimensions of the detention/wetpond will be 30'x120'x6',
- the detention/wetpond was designed to handle a 25 year storm event,
- the sides of the detention/wetpond will be constructed using the Anchor Diamond wall block system as manufactured by Genest Concrete in Sanford, Maine,
- the detention/wetpond can be completed drained in approximately four hours from the full condition,
- there is an adjacent car port on the north east side of the proposed detention/wetpond some 25 feet away,
- the car port is parallel with the proposed location of the detention/wetpond, and
- the floor of the car port is approximately 6 feet lower than the floor of the proposed detention/wetpond.

Based on our understanding of the project, and based on the concerns outlined in your October 10, 2000, memorandum, we present Figure 1 attached to address the geotechnical aspects of the work. Figure 1 summarizes our recommendations for geotechnical considerations. We recommend installing an inclined drainage system rather than the vertical drainage system initially proposed. By design, an inclined drainage system eliminates pore water pressure effects on a retaining structure. A vertical drain at the back side of a retaining wall does provide drainage, however, there is still a water pressure component that has to be accounted for in the stability of the wall. The proposed retaining wall should be designed based on the lateral pressure diagram given on Figure 1. We assume that the retaining wall design is being done by others.

The soils encountered at the site are dominantly sands and given the close proximity of the neighboring car port, there is a possibility of seepage to the car port from the detention/wetpond. We

therefore, recommend that the detention/wetpond be lined with compacted clay as detailed on Figure 1 attached. The clay liner should be at least 2 feet in thickness. A thinner liner would be susceptible to degradation from freeze-thaw cycles. We also recommend that a cut-off wall be constructed as outlined on Figure 1. The cut-off wall should also be constructed of compacted clay.

The permeability of the in-situ compacted clay should be less than $1x10^{-7}$ cm/sec. In order to achieve this permeability in the field, permeability test results on laboratory samples should be $1x10^{-8}$ cm/sec. Clay should also be compacted within 1% to 3% wet of the optimum moisture content for a range of maximum dry densities (i.e. standard Proctor and modified Proctor effort). Field densities of the clay vs. moisture content should plot in the range given on Figure 1.

CLOSURE

The recommendations given in this report are in accordance with our present understanding of the project. A soils investigation is a random sampling of a site. Should any conditions at the site be encountered which differ from those at the test locations, we require that we be notified immediately in order to permit reassessment of our recommendations.

We trust that this report meets your requirements at this time. Please contact us if you have any questions or if we can be of further assistance.

Respectfully submitted,

JACQUES WHITFORD ASSOCIATES LIMITED

Chris R. Carr, P. Eng.

SYMBOLS AND TERMS USED ON BOREHOLE AND TEST PIT RECORDS

SOIL DESCRIPTION

Terminology describing common soil genesis:

Topsoil	-	mixture of soil and humus capable of supporting good vegetative growth
Peat	-	fibrous aggregate of visible and invisible fragments of decayed organic matter
Till	-	unstratified glacial deposit which may range from clay to boulders
Fill	-	any materials below the surface identified as placed by humans (excluding buried services)

Terminology describing soil structure:

Desiccated	-	having visible signs of weathering by oxidation of clay minerals, shrinkage cracks, etc.
Fissured	-	having cracks, and hence a blocky structure
Varved	-	composed of regular alternating layers of silt and clay
Stratified	-	composed of alternating successions of different soil types, e.g. silt and sand
Layer	-	>75 mm
Seam	-	2 mm to 75 mm
Parting	-	< 2 mm
Well Graded	-	having wide range in grain sizes and substantial amounts of all intermediate particle sizes
Uniformly Graded	-	predominantly of one grain size

Terminology describing soils on the basis of grain size and plasticity is based on the Unified Soil Classification System (USCS) (ASTM D-2488). The classification excludes particles larger than 76 mm (3 inches). This system provides a group symbol (e.g. SM) and group name (e.g. silty sand) for identification.

Terminology describing materials outside the USCS, (e.g. particles larger than 76 mm, visible organic matter, construction debris) is based upon the proportion of these materials present:

Trace, or occasional	Less than 10%
Some	10-20%
Frequent	Greater than 20%

The standard terminology to describe cohesionless soils includes the compactness (formerly "relative density"), as determined by laboratory test or by the Standard Penetration Test 'N' - value.

Relative Density	'N' Value	Compactness %
Very Loose	<4	<15
Loose	4-10	15-35
Compact	10-30	35-65
Dense	30-50	65-85
Very Dense	>50	>85

The standard terminology to describe cohesive soils includes the consistency, which is based on undrained shear strength as measured by insitu vane tests, penetrometer tests, unconfined compression tests, or occasionally by standard penetration tests.

Consistency	Undrained Shear Strength		'N' Value
	kips/sq.ft.	kPa	
Very Soft	< 0.25	< 12.5	< 2
Soft	0.25 - 0.5	12.5 - 25	2-4
Firm	0.5 - 1.0	25 - 50	4 - 8
Stiff	1.0 - 2.0	50 - 100	8 - 15
Very Stiff	2.0 - 4.0	100 - 200	15 - 30
Hard	> 4.0	> 200	> 30

ROCK DESCRIPTION

Rock Quality Designation (RQD)

The classification is based on a modified core recovery percentage in which all pieces of sound core over 100 mm long are counted as recovery. The smaller pieces are considered to be due to close shearing, jointing, faulting, or weathering in the rock mass and are not counted. RQD was originally intended to be done on N-size (45 mm) core; however, it can be used on different core sizes if the bulk of the fractures caused by drilling stresses are easily distinguishable from *in situ* fractures.

RQD	ROCK QUALITY
90 - 100	Excellent, intact, very sound
75 - 90	Good, massive, moderately jointed or sound
50 - 75	Fair, blocky and seamy, fractured
25 - 50	Poor, shattered and very seamy or blocky, severely fractured
0 - 25	Very poor, crushed, very severely fractured

Terminology describing rock mass:

Spacing (mm)	Bedding, Laminations, Bands	Discontinuities
2000-6000	*Very Thick*	*Very Wide*
600-2000	*Thick*	*Wide*
200-600	*Medium*	*Moderate*
60-200	*Thin*	*Close*
20-60	*Very Thin*	*Very Close*
<20	*Laminated*	*Extremely Close*
<6	*Thinly Laminated*	

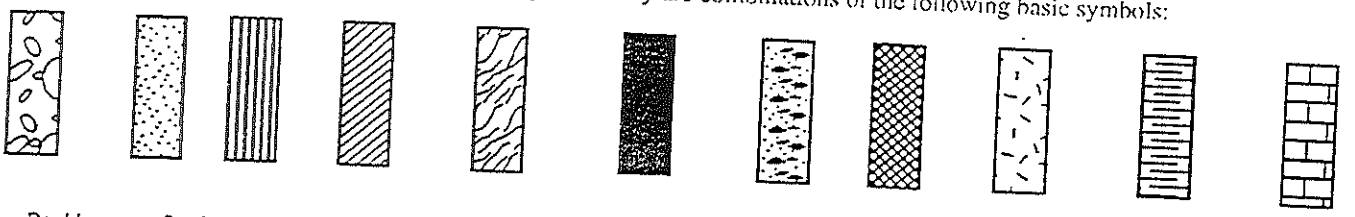
Strength Classification	Uniaxial Compressive Strength (MPa)
Very Weak	1 - 25
Weak	25 - 50
Strong	50 - 100
Very Strong	100 - 250
Extremely Strong	> 250

Terminology describing weathering:

Slight - Weathering limited to the surface of major discontinuities. Typically iron stained.
Moderate - Weathering extends throughout rock mass. Rock is not friable.
High - Weathering extends throughout rock mass. Rock is friable.

STRATA PLOT

Strata plots symbolize the soil or bedrock description. They are combinations of the following basic symbols:



Boulders, Cobbles, Gravel | Sand | Silt | Clay | Organics | Asphalt | Concrete | Fill | Igneous Bedrock | Metamorphic Bedrock | Sedimentary

WATER LEVEL MEASUREMENT

Borehole or Standpipe

Piezometer

SAMPLE TYPE

SS	Split spoon sample (obtained by performing the standard Penetration Test)
ST	Shelby tube or thin wall tube
PS	Piston sample
AS	Auger Sample
BS	Bulk Sample
WS	Wash Sample
HQ, NQ, BQ, etc.	Rock core samples obtained with the use of standard size diamond drilling bits

N-VALUE

Numbers in this column are the results of the Standard Penetration Test: the number of blows of a 140 pound (64 kg) hammer falling 30 inches (760 mm), required to drive a 2 inch (50.8 mm) O.D. split spoon sampler one foot (305 mm) into the soil. For split spoon samples where insufficient penetration was achieved and 'N' values cannot be presented, the number of blows are reported over sampler penetration in millimeters (e.g. 50/75).

OTHER TESTS

Symbols in this column indicate that the following laboratory tests have been carried out and the results are presented separately.

S	Sieve analysis
G_s	Specific gravity of soil particles
k	Permeability (cm/sec)
	Single packer permeability test; test interval from depth shown to bottom of borehole.
	Double packer permeability test; test interval as indicated
	Falling head permeability test using casing
	Falling head permeability test using well point or piezometer
H	Hydrometer analysis
γ	Unit weight
C	Consolidation
CD	Consolidated drained triaxial
CU	Consolidated undrained triaxial with pore pressure measurements
UU	Unconsolidated undrained triaxial
DS	Direct shear
Q_u	Unconfined compression
I_p	Point Load Index (I_p on Borehole Record equals I_p (50); the index corrected to a reference diameter of 50 mm)

JACQUES WHITFORD
& ASSOCIATES LIMITED

TEST PIT RECORD

TP-1

CLIENT Mitchell & Associates Landscape Architects

LOCATION Proposed Wetpond, Island View Apartments, Portland, Maine

PROJECT No. NHP00217-2

DATES: DUG Oct 16, 2000 WATER LEVEL Not Encountered

TP DIMENSIONS

DATUM Assumed

DEPTH (ft)	ELEVATION (ft)	SOIL DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES TYPE	SAMPLES NUMBER	VOC's	REMARKS
0	134.3							
	133.8	TOPSOIL/ROOTMAT						
		Dense brown to dark yellowish brown silty sand with gravel, occasional cobbles: FILL			BS	1		
	131.3	Compact olive to dark grey silty sand, with some granite curb stones: FILL						
5		- some gravel						
					BS	2		
	125.3	Compact greyish brown clayey silty sand: FILL						
10		- trace of gravel						
	121.8				BS	3		
		End of Test Pit						
15								

JACQUES WHITFORD
& ASSOCIATES LIMITED

TEST PIT RECORD

TP-2

CLIENT Mitchell & Associates Landscape Architects

PROJECT No. NHP00217-2

LOCATION Proposed Wetpond, Island View Apartments, Portland, Maine

TP DIMENSIONS

DATES: DUG Oct 16, 2000 WATER LEVEL Not Encountered

DATUM Assumed

DEPTH (ft)	ELEVATION (ft)	SOIL DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES TYPE	SAMPLES NUMBER	VOC's	REMARKS
0	133.8							
	133.3	TOPSOIL/ROOTMAT						
		Dense brown to dark yellowish brown silty sand with gravel, occasional cobbles: FILL						
	130.8	Compact brown sandy silty clay to silty/clayey sand: FILL						
5		- trace of gravel			BS	1		
10	122.3	End of Test Pit						
15								

JACQUES WHITFORD
& ASSOCIATES LIMITED

TEST PIT RECORD

TP-3

CLIENT Mitchell & Associates Landscape Architects

PROJECT No. NHP00217-2

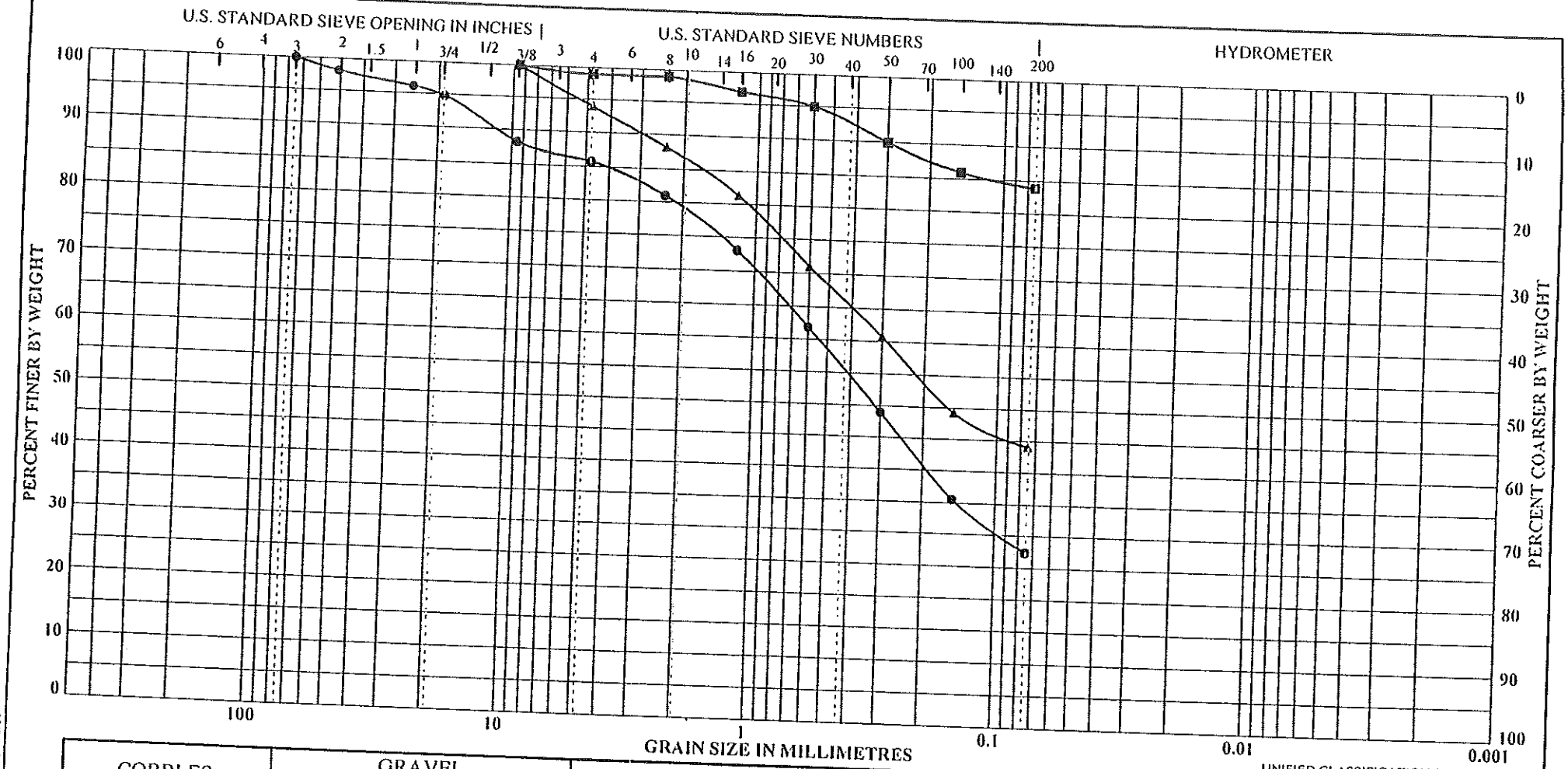
LOCATION Proposed Wetpond, Island View Apartments, Portland, Maine

TP DIMENSIONS

DATES: DUG Oct 16, 2000 WATER LEVEL Not Encountered

DATUM Assumed

DEPTH (ft)	ELEVATION (ft)	SOIL DESCRIPTION	STRATA PLOT	WATER LEVEL	SAMPLES TYPE	SAMPLES NUMBER	VOC's	REMARKS
0	134.9							
	134.4	TOPSOIL/ROOTMAT						
		Dense brown to dark yellowish brown silty sand with gravel, occasional cobbles and granite curb stones: FILL						
	130.9							
5		Compact olive to dark grey silty clayey sand: FILL						
		- trace of gravel			BS	1		
	126.4							
		Compact greyish brown clayey to silty sand with some gravel, and occasional granite curb stones: FILL						
10					BS	2		
	123.9							
		End of Test Pit						
15								



COBBLES	GRAVEL		SAND			SILT and CLAY	
	coarse	fine	coarse	medium	fine	SILT	CLAY

UNIFIED CLASSIFICATION SYSTEM

Sample #	Depth (ft)	Material Source	W%	W_L	W_P	I_P	C_C	C_U	%Gravel	%Sand	%Silt	%Clay
● TP-1	2.0	Silty SAND with gravel (SM)							14.2	58.4	27.4	
■ TP-2	4.5	SILTY CLAY with SAND (CL-ML)		24	18	6			1.0	15.1	83.9	
▲ TP-3	5.0	SILTY, CLAYEY SAND(SC-SM)		19	13	6			6.1	49.8	44.1	

JACQUES, WHITFORD & ASSOC.

Project: Proposed Wetpond, Island View Apartments

Project No.: NHP00217-2

Date: 2000-10-20

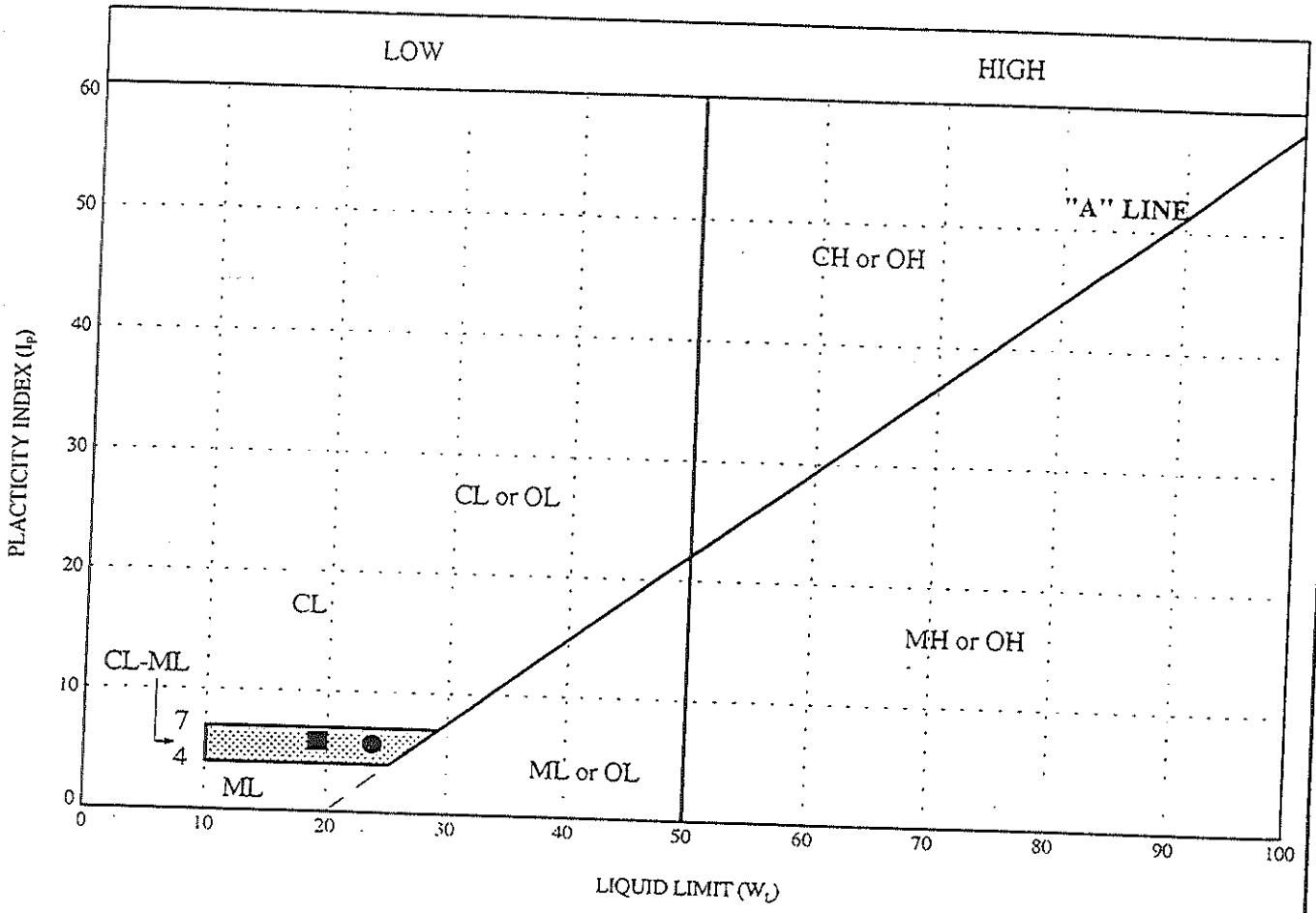
Location: Portland, Maine

Notes:

GRADATION CURVES

PLASTICITY CHART

UNIFIED CLASSIFICATION SYSTEM
ASTM D2487



SYM.	SOURCE	Depth (ft)	LL	PL	I_p	W%	CLASSIFICATION
●	TP-2	4.5	24	18	6		SILTY CLAY with SAND (CL-ML)
■	TP-3	5.0	19	13	6		SILTY, CLAYEY SAND(SC-SM)

Letter Designation

Primary
M: Silt
C: Clay
O: Organic Soil

Secondary
L: Of Low plasticity (LL < 50)
H: Of High plasticity (LL > 50)

JACQUES, WHITFORD & ASSOC.

Project:	Proposed Wetpond, Island View Apartments, Portland, Maine
Project No.:	NHP00217-2
Date:	2000-10-20
Notes:	SOIL PLASTICITY

JACQUES WHITFORD

Consulting Engineers
Environmental Scientists

424 - 7th Street South
Suite 100
Lethbridge, Alberta
Canada, T1J 2G6

Tel: 403 382-3580
Fax: 403 382-3589

LETTER OF TRANSMITTAL

Date: October 23, 2000

Project No: NHP00217-2

TO: Bob Metcalf
Mitchell & Associates Landscape Architects
The Staples School
70 Center Street
Portland, Maine, 04101

RE: Detention/Wetpond Retaining Wall
Island View Apartment Development
Portland, Maine

WE ARE SENDING YOU:

- ☐ Attached
- ☐ Under separate cover via _____
- ☐ Draft Report
- ☐ Copy of Letter
- ☐ Plans
- ☐ Samples
- ☐ Specifications
- ■ Final Report (Rev.)
- ☐ Prints
- ☐ Change Order
- ☐ Other _____

COPIES	DATE	NO.	DESCRIPTION
2	10/23/00	217-2	Copy of Report

THESE ITEMS ARE TRANSMITTED:

- ☐ For Approval
- ■ For Your Use
- ☐ As Requested
- ☐ Approved as Submitted
- ☐ Approved as Noted
- ☐ For Review & Comment
- ☐ Other _____

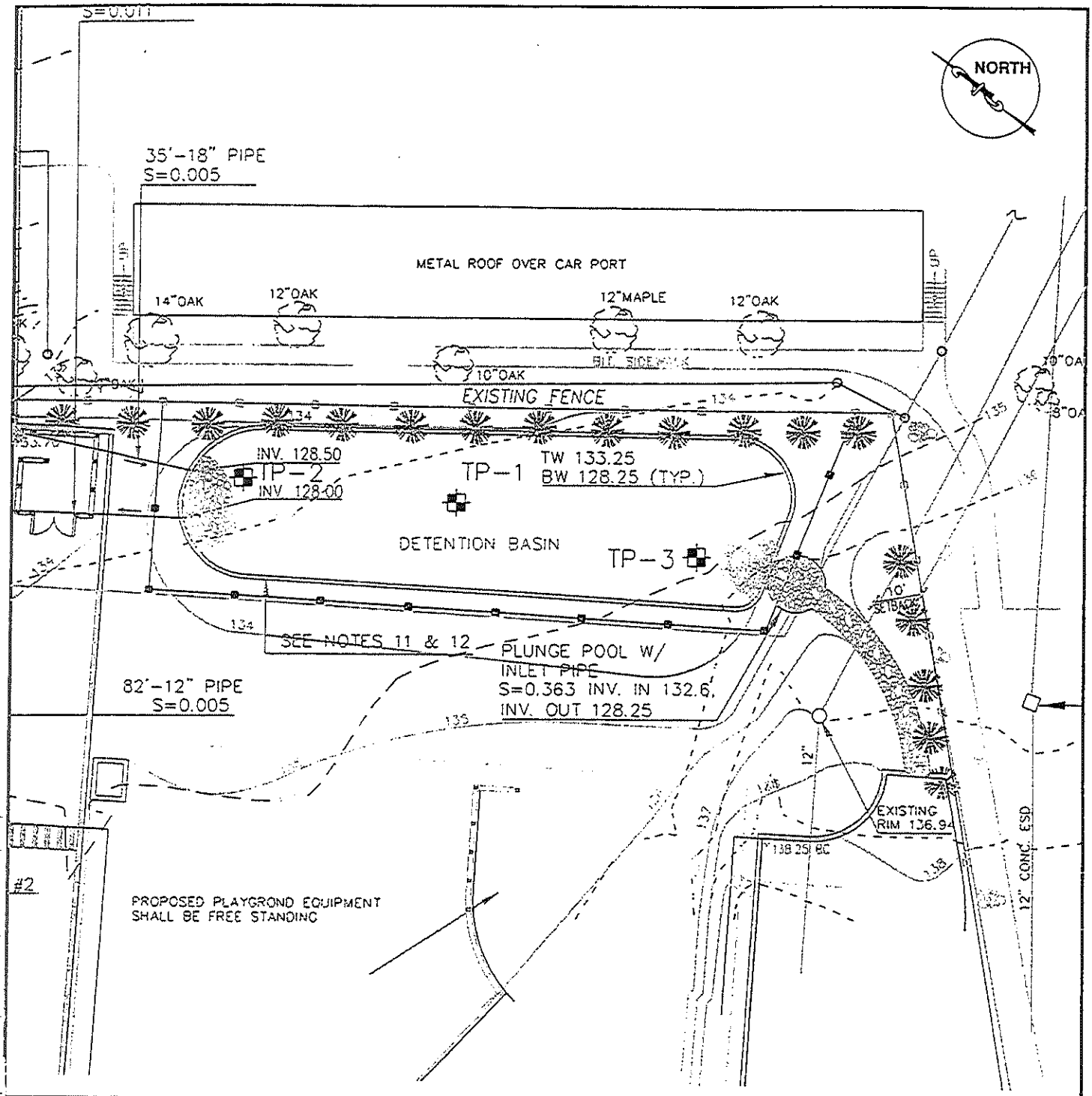
REMARKS:

COPY TO: Travis C. Carpenter

P:\Portsmouth Projects\nhp00217\TRANSMI1.WPD

SIGNED: D. Kinnell

1- COPY - T. CARPENTER.



Legend

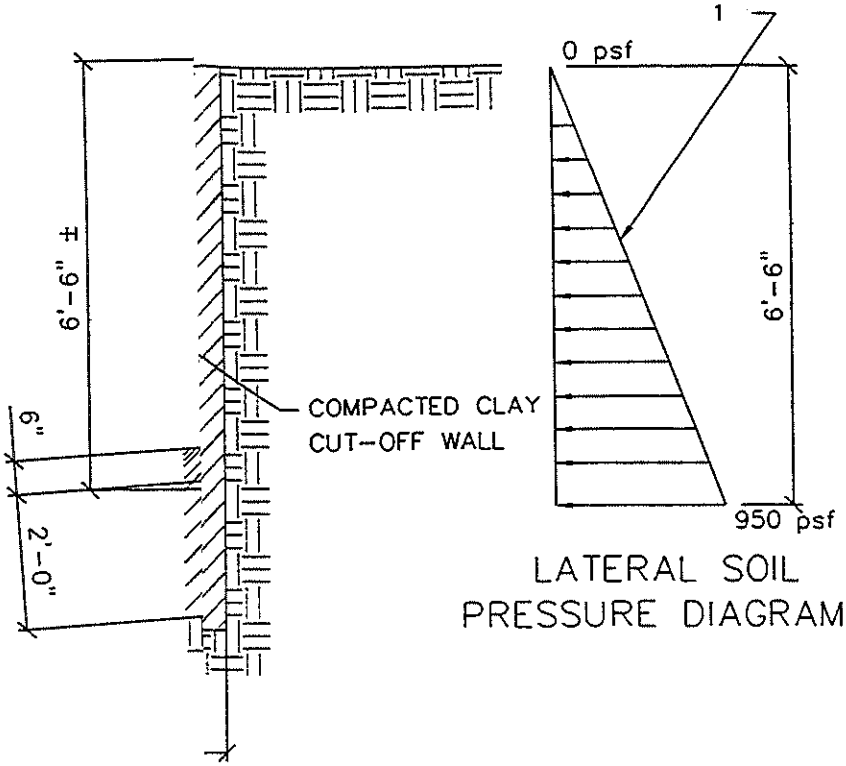
TP-2 *TEST PIT LOCATION*

30 0 30

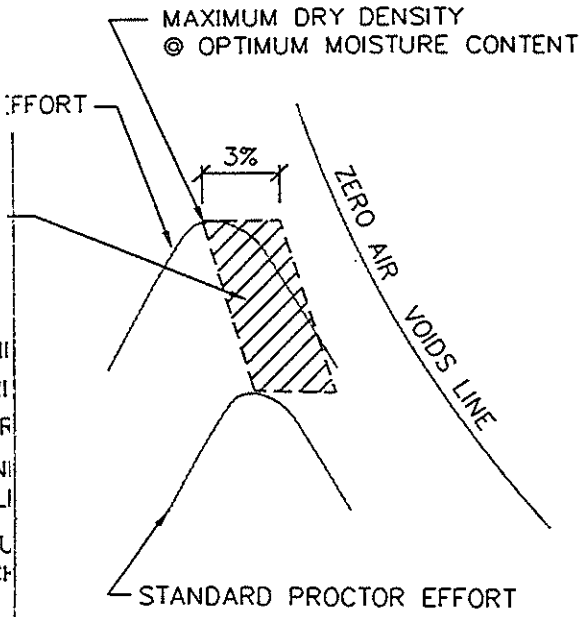
SCALE IN FEET

Jacques Whitford Company, Inc.

JACQUES WHITFORD LOCATION: PORTSMOUTH, NEW HAMPSHIRE					DRAWING TITLE: TEST PIT LOCATION PLAN
DATE PREPARED: 10-20-00	DESIGNED BY: KM	DRAWN BY: BSB	CHECKED BY: KM	REVIEWED BY: CC	PROPOSED DETENTION/WETPOND
REVISION DATE:	REVISION NO:	DRAWN BY:	CHECKED BY:	REVIEWED BY:	ISLAND VIEW APARTMENTS – PORTLAND MAINE
PROJECT NAME/FILE NAME: ISLAND/BOREHOLELOCA		PROJECT NUMBER/PHASE: NHP00217	SCALE: 1"=30'	PREPARED FOR: MITCHELL & ASSOCIATES, LANDSCAPE ARCHITECTS	FIGURE NO. 2



LATERAL SOIL
PRESSURE DIAGRAM



NOTES:

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COMPACTION CRITERIA GRAPH.

N.T.S.

GEOTECH ISLAND DE PC	DATE: 00 10 19	SCALE: 1/4" = 1'-0"
	PROJECT: NHP 00217-2	FIGURE: 1

BECKER
structural engineers

December 18, 2000

Robert B. Metcalf
Mitchell & Associates Landscape Architects
The Staples School
70 Center Street
Portland, ME 04101

WO605.10
Island View Apartments Detention/Wetpond Retaining Wall
Portland, ME

Dear Mr. Metcalf,

In accordance with your request, we are submitting this letter engineering report summarizing our findings and opinions regarding the potential structural impact of the proposed detention/wetpond on the existing carport on the Promenade East Property. Our findings are based on visual observations of the proposed site, existing carport and review of the geotechnical report prepared by Jacques, Whitford & Associates (dated 10/20/2000) and the preliminary retaining wall design (dated 10/16/2000) prepared by Anchor Wall Systems.

We discussed the site conditions and geotechnical report recommendations with Mr. Chris Carr, P. Eng. of the Alberta office of Jacques, Whitford & Associates. Their recommendations include the use of a 2'-0" thick compacted clay liner beneath the detention/wet pond and a 3'-0" wide vertical clay cutoff wall to extend a minimum of 1'-0" below the bottom of the retaining wall. The cutoff wall is to be located as close to the retaining wall as possible without hampering or interfering with the geogrid tiebacks. In addition, an inclined drain 12" thick shall be installed around the perimeter of the detention/wet pond to reduce lateral pressure on the retaining wall caused by saturated soil behind the wall. The inclined drain would be tied to a perimeter drain system. The report states the existing carport is located approximately 25'-0" from the new detention/wet pond. We clarified with Mr. Carr the design loads noted on his Figure 1. The 950 psf soil pressure is intended to represent the lateral thrust on the retaining wall based on a saturated soil unit weight of 130 pcf, a Rankine k_a of 0.33 and a 6'-6" height of wall.

Our review of the design recommendations presented by Jacques, Whitford & Associates finds their design has provided for control of infiltration to existing sandy soils by the use of the clay liner below the detention/wet pond. The drain

time for the pond in a 25-year storm is estimated at four hours. With this drain time, the clay liner will prevent seepage below the wall. Furthermore, the use of the vertical clay cutoff wall provides a secondary means of preventing seepage from impacting the existing carport structure. The retaining wall will make use of the Vertica Block by Anchor Wall Systems. A Registered Engineer will provide the final wall design based on the recommendations of the geotechnical report.

Our review of the existing conditions at the Promenade East Carport indicates the carport structure appears to be distressed in its current state. The concrete retaining wall at the rear of the carport is severely cracked and appears to be out of plumb. The steel columns at the driveway side also appear to be out of plumb by several inches. These conditions indicate the existing structure is failing due to the lateral pressures being exerted on the wall by the existing soils. Based on the existing conditions and date of construction, it seems unlikely that any tieback or dead man system was used in the construction of the existing carport.

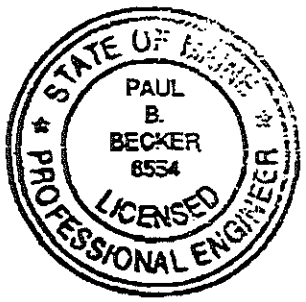
Closing

Based on our review of the design recommendations provided by Jacques, Whitford & Associates it is our opinion that construction of the detention/wetpond, will not have any adverse effect on the existing carport structure. It is our opinion that the existing carport structure is distressed and should be reviewed for structural integrity, irrespective of the proposed detention/wet pond construction.

We trust this overview of the structural impact of the detention/wet pond construction addresses your concerns at this time and will be helpful in your planning needs. This letter report should be understood in the context it is provided. It is based upon our limited site observations and review of existing engineering reports and documentation. It has been prepared to provide an overview of the structural issues associated with construction of the proposed detention/wet pond. Please call if you have any questions. We are available to answer any questions, which you may have.

Sincerely,
Becker Structural Engineers, Inc.

Paul B. Becker, P.E.
Principal



Part II
Division 1

General Requirement

SECTION 01001

BASIC REQUIREMENTS

1 PART 1 GENERAL

1.1 SECTION INCLUDES

A. Summary of Work: Contract, work by owner, contractor use of premises, future work.

B. Contract Considerations: Cash allowances, contingency allowance, inspection and testing allowances, schedule of values, applications for payment, change procedures, alternates.

C. Coordination and Meetings: Coordination, field engineering, cutting and patching, meetings, progress meetings, equipment electrical characteristics and components, examination, preparation, cutting and patching.

D. Submittals: Submittal procedures, construction progress schedules, proposed products list, shop drawings, product data, samples, manufacturers' installation instructions, manufacturers' certificates.

E. Quality Control: Quality assurance - control of installation, Tolerances, References, Mock-ups, Inspection and testing laboratory services, Manufacturers' field services and reports.

F. Construction Facilities and Temporary Controls: Temporary electricity, temporary lighting for construction purposes, temporary heat, temporary ventilation, telephone service, temporary water service, temporary sanitary facilities, barriers and fencing, water control, exterior enclosures, interior enclosures, protection of installed work, security, access roads, parking, progress cleaning and waste removal, project identification, field offices and sheds, removal of utilities, facilities, and controls.

G. Material and Equipment: Products, transportation, handling, storage, and protection, products options, substitutions.

H. Starting of Systems: Starting systems, demonstration and instructions, testing, adjusting and balancing.

I. Contract Closeout: Contract closeout procedures, final cleaning, adjusting, project record documents, operation and maintenance data, spare parts and maintenance materials, warranties.

1.2 WORK BY OWNER

A. Items noted as NIC (Not in Contract), will be furnished and installed by Owner beginning at Substantial Completion.

1.3 CONTRACTOR USE OF PREMISES

A. Limit use of premises to allow:
   1. Owner occupancy.
   2. Work by others and work by owner.
   3. Use of premises by public.

1.9 PRECONSTRUCTION PREINSTALLATION MEETINGS

A. Owner will schedule a preconstruction meeting for all affected parties.

B. When required in individual specification section, convene a preinstallation meeting at Project site prior to commencing work of the section.

1.10 PROGRESS MEETINGS

A. Schedule and administer meetings throughout progress of the Work at maximum monthly intervals.

B. Preside at meetings, record minutes, and distribute copies within two days to those affected by decisions made.

1.11 EQUIPMENT ELECTRICAL CHARACTERISTICS AND COMPONENTS

A. Motors: NEMA MG1 Type; specific motor type is specified in individual specification sections.

B. Wiring Terminations: Terminal lugs to match branch circuit conductor; size terminal lugs to NFPA 70.

C. Cord and Plug: Minimum 6 foot cord and plug including grounding connector; cord of longer length is specified in individual sections.

1.12 CUTTING AND PATCHING

A. Employ original installer to perform cutting and patching new Work; restore Work with new Products.

B. Submit written request in advance of cutting or altering structural or building enclosure elements.

C. Execute cutting, fitting, and patching including excavation and fill, to complete Work, and to:

1. Fit the several parts together, to integrate with other Work.
2. Uncover Work to install or correct ill-timed Work.
3. Remove and replace defective and non-conforming Work.
4. Remove samples of installed Work for testing.
5. Provide openings in elements of Work for penetrations of mechanical and electrical Work.

D. Cut masonry and concrete materials using masonry saw or core drill. Restore Work with new Products in accordance with requirements of Contract Documents.

E. Cut from finished side of surfaces to concealed side.

F. Protect existing construction from damage during cutting and patching.

G. Fit Work tight to adjacent elements. Maintain integrity of wall, ceiling, or floor construction; completely seal voids.

H. Fit Work tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

A. Within 15 days after date of Owner-Contractor Agreement, submit list of major subcontractors/suppliers proposed, with indication of trade/product type.

1.17 PRODUCT DATA

A. Product Data For Review:

1. Submitted to Architect/Engineer for review for the limited purpose of checking for conformance with information given and the design concept expressed in the contract documents.

2. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article above and for record documents purposes described in CONTRACT CLOSEOUT.

B. Product Data For Information:

1. Submitted for the Architect/Engineer's benefit as contract administrator or for the Owner.

C. Product Data For Project Close-out:

1. Submitted for the Owner's benefit during and after project completion.

D. Submit the number of copies which the Contractor requires, plus three copies which will be retained by the Architect/Engineer.

E. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information unique to this project.

1.18 SHOP DRAWINGS

A. Shop Drawings For Review:

1. Submitted to Architect/Engineer for review for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents.

2. After review, produce copies and distribute in accordance with the SUBMITTAL PROCEDURES article above and for record documents purposes described in CONTRACT CLOSEOUT.

B. Shop Drawings For Information:

1. Submitted for the Architect/Engineer's benefit as contract administrator or for the Owner.

C. Shop Drawings For Project Close-out:

1. Submitted for the Owner's benefit during and after project completion.

D. Submit the number of opaque reproductions which Contractor requires, plus three copies which will be retained by Architect/Engineer.

1.19 SAMPLES

C. Comply with specified standards as minimum quality for the Work except when more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

1.23 EXAMINATION

A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent Work. Beginning new Work means acceptance of existing conditions.

B. Verify that utility services are available, of the correct characteristics, and in the correct location.

1.24 PREPARATION

A. Clean substrate surfaces prior to applying next material or substance.

B. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying new material or substance in contact or bond.

1.25 TOLERANCES

A. Monitor fabrication and installation tolerance control of installed Products over suppliers, manufacturers, Products, site conditions, and workmanship, to produce acceptable Work. Do not permit tolerances to accumulate.

B. Comply fully with manufacturers' tolerances.

1.26 REFERENCES

A. Conform to reference standards by date of issue current as of date of Contract Documents. .

B. Should specified reference standard conflict with Contract Documents, request clarification from Architect/Engineer before proceeding.

C. Reference Standards have the same force and effect as if bound herein and include publications of the following:

1. American National Standards Institute (ANSI).
2. American Concrete Institute (ACI).
3. American Institute of Steel Construction (AISC).
4. American Plywood Association (APA).
5. American Society for Testing and Materials (ASTM).
6. American Society of Civil Engineers (ASCE).
7. American Society of Heating, Refrigeration and Air Conditioning Engineers, Inc. (ASHRAE).
8. American Society of Mechanical Engineers (ASME).
9. Americans with Disabilities Act (ADA).
10. American Water Works Association (AWWA).
11. American Welding Society (AWS).
12. Building Officials and Code Administrators International Inc. (BOCA).
13. Consumer Product Safety Commission (CSPC).
14. Factory Mutual (FM).
15. National Electric Manufacturers Association (NEMA).
16. National Fire Protection Association (NFPA).
17. Underwriters Laboratories, Inc. (UL).

B. Pay cost of energy used.

C. Provide and pay for operation, maintenance, and regular replacement of filters and worn or consumed parts.

D. Maintain minimum ambient temperature of 50 degrees F in areas where construction is in progress, unless indicated otherwise in specifications.

1.33 TEMPORARY VENTILATION

A. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.

1.34 TELEPHONE SERVICE

A. Provide, maintain and pay for telephone and telephone facsimile service to field office at time of project mobilization. Allow Owner, Architect/Engineer and inspecting authorities incidental use.

1.35 TEMPORARY WATER SERVICE

A. Provide, maintain and pay for suitable quality water service required for construction operations.

1.36 TEMPORARY SANITARY FACILITIES

A. Provide and maintain required facilities and enclosures. New facilities may not be used.

B. Maintain in clean and sanitary condition.

1.37 BARRIERS AND FENCING

A. Provide barriers and/or fencing to prevent unauthorized entry to construction areas and to protect existing facilities and adjacent properties from damage.

B. Construction: Contractor's option, as allowed by authorities having jurisdiction.

1.38 WATER CONTROL

A. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.

B. Provide erosion control in accordance with environmental regulations and approvals.

1.39 EXTERIOR ENCLOSURES

A. Provide temporary insulated weather tight closures to exterior openings to permit acceptable working conditions and protection of the Work.

1.40 PROTECTION OF INSTALLED WORK

A. Protect installed Work and provide special protection where specified in individual specification sections.

B. Prohibit traffic or storage upon waterproofed or roofed surfaces.

B. Do not use materials and equipment removed from existing premises, except as specifically identified or allowed by the Contract Documents.

C. Provide interchangeable components of the same manufacture for components being replaced.

D. Provide Products of the same type from the same manufacturer.

1.49 TRANSPORTATION, HANDLING, STORAGE AND PROTECTION

A. Transport, handle, store, and protect Products in accordance with manufacturer's instructions.

1.50 PRODUCT OPTIONS

A. Products Specified by Reference Standards or by Description Only: Any Product meeting those standards or description.

B. Products Specified by Naming One or More Manufacturers: Products of manufacturers named and meeting specifications, no options or substitutions allowed.

C. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions (or equal clause): Submit a request for substitution for any manufacturer not named.

1.51 SUBSTITUTIONS

A. Architect/Engineer will consider requests for Substitutions only within 15 days after date of Owner-Contractor Agreement. .

B. Document each request with complete data substantiating compliance of proposed Substitution with Contract Documents.

C. Submit three copies of request for Substitution for consideration. Limit each request to one proposed Substitution.

D. Conditions: Substitutions will be considered under the following conditions:

1. Revisions to the Contract Documents are not required.
2. Proposed changes are in keeping with the intent of the Contract Documents.
3. The specified product or construction method cannot be provided within the Contract Time, if not due to failure by the Contractor to pursue the work promptly.
4. The specified product or construction method cannot receive approval by governing authorities, and the substitution can be approved.
5. A substantial advantage is offered to the Owner in terms of cost, time or maintenance.
6. The specified product or construction method is not compatible with other materials, and the substitution is compatible.
7. The specified product or construction method cannot receive a required warranty, and the substitution can be warranted.
8. The Contractor will bear the impact of additional cost or time needed to provide the substitution, including design services.
9. The Contractor will be responsible for coordinating the substitution with other Work.

D. Replace filters of operating equipment.

E. Remove waste and surplus materials, rubbish, and construction facilities from the site.

1.57 ADJUSTING

A. Adjust operating Products and equipment to ensure smooth and unhindered operation.

1.58 PROJECT RECORD DOCUMENTS

A. Maintain on site one set of Contract Documents to be utilized for record documents.

B. Record actual revisions to the Work. Record information concurrent with construction progress.

C. Specifications: Legibly mark and record at each Product section a description of actual Products installed.

D. Record Documents and Shop Drawings: Legibly mark each item to record actual construction.

E. Submit original and two photocopies of record documents to Owner with claim for final Application for Payment.

1.59 OPERATION AND MAINTENANCE DATA

A. Submit two sets prior to final inspection, bound in 8-1/2 x 11 inch text pages, three D side ring binders with durable covers.

B. Prepare binder cover with printed title "OPERATION AND MAINTENANCE INSTRUCTIONS" and title of project.

C. Internally subdivide the binder contents with permanent page dividers, logically organized, with tab titles clearly printed under reinforced laminated plastic tabs.

1.60 SPARE PARTS AND MAINTENANCE MATERIALS

A. Provide Products, spare parts, maintenance and extra materials in quantities specified in individual specification sections.

B. Deliver to Project site and place in location as directed obtain receipt prior to final payment.

1.61 WARRANTIES

A. Provide duplicate notarized copies.

B. Execute and assemble transferable warranty documents from Subcontractors, suppliers, and manufacturers.

C. Submit prior to final Application for Payment.

2 PART 2 PRODUCTS

Not Used.

Part II
Division 2

Excavation

SECTION 02020

EROSION AND SEDIMENTATION CONTROL PLAN

This Plan has been developed as a strategy to control soil erosion and sedimentation during and after construction of the proposed Island View Apartment project located at North and Walnut Streets in Portland. This plan is based on the Maine Erosion and Sedimentation Control Handbook for Construction, Best Management Practices (March, 1991).

A. PROPOSED DEVELOPMENT

The project consist of the construction of a 70 unit apartment complex on a 3.96 acre site located on North Street in Portland. Access to the site will be from North Street with an emergency egress connection to Walnut Street. The proposed development consists of a 3 story 54 unit garden apartment structure and 16 two story townhouse units in two attached 8 unit buildings. Total impervious cover attributable to paving and buiding is 1.97 ± acres.

The site having been a former open water reservoir, has a significant earthen berm that surrounds two sides of the property. Prior to development of the site, pregrading activities will occur to remove the excess overburden. The building, parking, circulation area, and their associated grading define the limits of proposed earth movement for the proposed development. The horizontal and vertical placement of the buildings, circulation and parking has been designed to maximize the topographic opportunities available and to minimize the impact of steep slopes associated with the required cut and fill necessary to the function of the site. Final grading has been designed to minimize potential for erosion and sedimentation.

B. EROSION CONTROL PRACTICES / TEMPORARY MEASURES

The following temporary measures to control erosion and sedimentation shall be utilized:

1. Each ground area, opened or exposed, whether directly or indirectly due to the development, shall be minimized and shall be stabilized within 15 days of initial disturbance of soil and shall be permanently stabilized within seven days of final grading. Exposed areas shall be stabilized prior to a rain event.

2. Temporary soil stabilization shall be either by temporary mulching, temporary seeding, permanent base gravel, or asphalt binder course as follows:

1. Excessively steep slopes shall be protected as shown on the plan, by erosion control excelsior blanket with biodegradable plastic or approved equal after seeding. Slopes shall have pinned down mulch or matting if the slope exceeds 15% at anytime. After October 1st, slopes exceeding 8% shall be stabilized as above. (Winter Construction)

2. Permanent seeding shall be performed during construction operations (February – December 2001) as each disturbed area has been brought to finish grade. Should the project be phased over more then one year, permanent seeding shall occur during the normal growing season. Permanent seedings shall be made as dormant seeding after the first killing frost (October 10th). Dormant seeding and mulch should be used at two times the permanent seeding rate shown below for both lawn as well as embankments. Seed, loam, lime, fertilizer and mulch are to be as follows:

   Seed. The seed mixture shall consist of seeds proportioned by weight. All seed shall be fresh, clean, "new crop" seed. Harmless inert matter and weed seeds shall be permitted up to one percent of the gross weight of each variety of seed. All seed supplied shall be packed in approved containers bearing the manufacturer's name and analysis of contents. Contractor shall submit seed analysis certification to the landscape architect or owner's representative prior to seeding operations. The following materials and application rates shall be required for permanent seeding:

Lawn	
Creeping red fescue:	0.69#/1000 SF
Kentucky bluegrass:	0.57#/1000 SF
Perennial ryegrass:	0.46#/1000 SF
Redtop:	0.12#/1000 SF
Total:	1.84#/1000 SF

Embankments	
Creeping red fescue:	0.50#/1000 SF
Redtop:	0.07#/1000 SF
Tall fescue:	1.38#/1000 SF
Total:	1.95#/1000 SF

5. Temporarily stabilize disturbed areas by mulching all exposed soil within 15 days of initial disturbance.

6. Install stormwater system.
   a. Catchbasins, Drain Manholes, Outlet Control Structure and Vortech Structure
   b. Rip-Rap and and Headwall outlet areas
   c. Low point sediment control barriers
   d. Install detention basin
   e. Stabilize drainage ways - stone check dams

7. Complete site construction work.
   a. Structures
   b. Utility Infrastructure
   c. Circulation/parking
   d. Walkways
   e. Retaining Walls

8. Install permanent vegetation on all exposed areas within 15 days of final grading.

9. Perform continuing maintenance on all erosion and sedimentation control devices and measures.

E. SITE INSPECTION & MAINTENANCE

Weekly inspections, as well as routine inspections following rain falls, shall be conducted by the General 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. All turf areas shall have a minimum of a 75% catch prior to acceptance. Until final inspection, all erosion and sedimentation control measures shall be maintained, immediately be cleaned, and repaired by the General Contractor as required. Disposal of all temporary erosion control devices shall be the responsibility of the General Contractor. Removal of temporary erosion control devices shall not occur until permanent vegetative stabilization has taken hold.

Continued temporary maintenance and long term provisions for permanent maintenance of all erosion and sedimentation control facilities after acceptance of the project shall be the responsibility of Silver Street Development Corporation.

SECTION 02100

CLEARING AND GRUBBING

PART 1. GENERAL

1.1 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. Erosion and Sediment Control – Section 02020

c. Site Earthwork – Section 02200.

d. Geotechnical Report prepared by Jacques – Whitford Company, Inc.

PART 2. PRODUCTS

2.1 Materials

a. Seed for erosion control and temporary seeding – Aroostock rye applied at 2.6#/1,000 square feet.

b. Mulch shall be hay or straw and free of weed seeds.

PART 3. EXECUTION

3.1 Protections

a. Provide temporary fences, barricades, coverings or other protections to preserve existing vegetation to remain. The activity over the existing Portland Water District be limited to the H-20 weight load standards and or provisions of the Portland Water District. No storing of material shall occur over the reservoir.

b. Provide video recording of existing on-site conditions and existing conditions of adjacent carport for Promenade East prior to commencing any on-site earthwork activity.

SECTION 02200

SITE EARTHWORK

PART 1. GENERAL

1.1 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. Erosion and Sedimentation Control - Section 02020

c. Site Drainage - Section 02400

d. Detention Basin – Section 02410

e. Site Utilities - Section 02420

f. Retaining Walls - Section 02462

g. Geotechnical Investigation Report prepared by Jacques-Whitford Company, Inc.

h. Geotechnical Report, Detension Basin/Wetpond, prepared by Jacques-Whitford Company, Inc.

i. 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.

1.2 Utility Easements

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

1.3 Standards

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

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

1.9 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

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

f. 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.

g. 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.

h. Provide fence and gate(s) for controlled access to the site during construction.

1.12 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, Section - 02020 Erosion and Sedimentation Control 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.

1.13 Removals

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

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

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

j. Retaining Wall Backfill – M.D.O.T. 703.06, Type E.

k. Rip-Rap/Stone Ditch Protection – rock used for ditch protection and drainage outlets shall consists of sound, durable rock which will not disintergrate by exposure to water or weather and conforms to M.D.O.T. 703.29.

l. 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 back fill against foundations or as slab-on-grade base material.

m. Reservoir Clay-Cap Material - Physical characteristics shall be as follows:

1. Liquid Limit >30%, plasticity index > 10%, percent passing No. 200 sieve > 85%. The clay should have a minimum thickness of 12 inches placed in a single lift at a water content of plus 2 or minus 2 percent of optimum and compacted to at least 95% of the maximum density as determined by ASTM D698.

n. Detention Basin Clay Liner and Drainage Cut-off Wall shall be as follows:

1. Detention basin liner and Cut-off wall material shall consist of a compacted clay with a permeability less than 1×10^{-7} cm/sec. Laboratory sample permeability should be 1×10^{-6} cm/sec. Clay should be compacted to within 1% to 3% wet of the optimum moisture content for a range of maximum dry densities (i.e. standard proctor and modified proctor effort). Field densities of clay vs. moisture content should plot in the range given on attached Figure 1.

(1) Mirafi 600x
(2) Phillips 66 Supac 6WS
(3) Dupont Typar 3401 and 3601
(4) Trevira S1114 and S1120
(5) AMOCO 2006
(6) Tensar SS-1 and SS-2
(7) Exxon GTF-200 or 350
(8) Conwed Stratagrid GB-5033
(9) Miragrid 3xT

b. Filter/Drainage Geotextiles:

(1) Mirafi 160N or equal

c. Silt Fencing Geotextiles:

(1) Mirafi 100x or equal

PART 3. EXECUTION

3.1 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

work under construction or completed. Temporary dewatering shall be directed to a sediment basin constructed in the detention basin or suitable area contained on-site.

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 (refer to attached geotechnical report). 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 contractors 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.

3.4 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.

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) Sanitary Sewer: Elevations and grades as indicated on Drawings. Note: Pipe with less then five (5) feet of cover in pavement areas or four (4) feet in landscaped areas, provide 2 inches of rigid insulation as shown on detail. (See Detail Sheet 6).

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

(4) Electrical Conduits: 40 inches minimum to top of conduit for primary and 30 inches to top of conduit for secondary or as required by NEC 300-5, NE 710-36 codes, or the local utility company requirements, whichever is deeper. Conduit to be encased in concrete under paved areas.

(5) TV Conduits: 18 inches minimum to top of conduit or as required by the local utility company, whichever is deeper.

(6) Telephone Conduits: 18 inches minimum to top of conduit, or as required by the local utility company, whichever is deeper.

3.7 Sheeting and Bracing

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. However, if rock blasting 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 negotiated with Contractor at the time of discovery.

(2) Payment for rock trench excavation shall be calculated to depths of four (4) 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.

(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.

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.

c. Fills placed under footings, floor slabs, roads, parking areas, walks and headwalls 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 D.1557 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

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

SECTION 02220

EXCAVATION, BACKFILLING AND COMPACTING FOR UTILITIES

PART 1. GENERAL

1.1 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 Drainage - Section 02400

d. Site Utilities - Section 02420

e. Construction Drawings

1.2 Utility Easements

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

PART 2. PRODUCTS

2.1 Materials

a. Bedding and Backfill Material for Pipes

(1) Bedding Material

a. The refilling of all excavation below the bottom of pipes and below the spring of the pipes, shall be made with screened gravel and/or crushed stone, meeting the following criteria:

Screen Size Square Openings	% by Weight Passing
1"	100
3/4"	90 - 100
3/8"	20 - 55
No. 4	0 - 10
No. 8	0 - 5

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.

3.2 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 to prevent, slides, or cave-ins.

b. Remove excavated materials not required or not suitable for backfill or embankments and waste as specified. Any inactive 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.

3.3 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.

SECTION 02400

SITE DRAINAGE

PART 1. GENERAL

1.1 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. Excavating, Backfilling and Compacting for Utilities- Section 02220

d. Construction Drawings

1.2 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.

1.3 Submittals

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

(1) Shop Drawings of pipe and precast units, catch basins, manholes and outlet control structures.

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

(3) Shop Drawings for vortech structure based upon stormwater design prepared by BH2M Engineers.

(4) Source and gradation reports, for soil materials.

(5) Frames and Grates to conform to AASHTO M-105, Class 30, of gray cast iron by Neenah, Flockhart or Etheridge. 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 grounwater, provide 1/4 inch perforations along the top of pipe. Refer to project details and plans.

(7) Votechnic's Model #2000 as manufactured by Vortechnics, Inc. Portland, Maine.

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

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.

3.2 Catchbasin, Outlet Control Structure 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. Outlet control structure frames shall be cast into concrete structure.

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.

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.

e. 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.

f. 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.

3.5 Foundation Drain Pipe

a. Bed all foundation drains in Drainage Stone, wrapped in Mirafi 160 N geotextile filter faric 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.

3.6 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 three (3) feet of cover between the top of pipe and original ground grade, for storm drain or less than four (4) feet of cover on sewer lines.

SECTION 02410

DETENTION BASIN

PART 1. GENERAL

1.01 Related Work Specified Elsewhere

a. The general provisions 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. Site Drainage - Section 02400

e. Retaining Wall – Section 02462

f. Construction Drawings

g. Geotechnical Report, Detention/Wetpond prepared by Jacques-Whitford, Company Inc.

1.02 Submittals

a. Submit engineered shop drawings for detention basin wall stamped by a licensed Maine Engineer.

1.03 Delivery, Storage and Handling

a. Deliver, store and handle all products, materials and equipment safely and without damaging property or items.

1.04 Construction Schedule

a. The excavation of the detention basin and installation of required structure, pipe and retaining wall shall be coordinated as part of initial site work.

SECTION 02420

SITE UTILITIES

PART 1. GENERAL

1.1 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. Excavation, Backfilling and Compacting for Utilities – Section 02220

d. Site Drainage - Section 02400

e. Construction Drawings

1.2 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 owners 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.

1.3 Submittals

a. Refer to Section 02400, Paragraph 1.3.

b. All materials including pipe, valves, etc. shall be subject to approval by the city plumbing inspector and or designated authority.

1.4 Delivery, Storage and Handling

a. Refer to Section 02400, Paragraph 1.4.

(1) Ductile Iron Water Pipe: In accordance with ANSI A21.51, fittings shall be either mechanical joint or push-on joint complying with ANSI A21.10 or ANSI 21.11 (AWWA C-151) (CLASS 52).

(2) PVC Pressure (water pipe): class 200 SDR 21 Pipe shall conform to ASTM D2241, PVC resin compound shall conform to ASTM D1784 and Rubber Gasketts shall conform to ASTM D1869 and F477. Pipe shall be 20'-0" nominal lengths.

c. Water pipe accessories, such as tapping sleeves with valves and valve boxes, gate valves with valve boxes, post indicator valves, check valves, and fire hydrants, shall have ductile iron mechanical joint, 175 lb working pressure and shall meet or exceed AWWA Specifications. All work shall conform to the standards of the Portland Water District.

PART 3. EXECUTION

3.1 Trenches

a. Pipe trench excavation and backfill shall be as specified in Section 02220 – Excavation, Backfilling and Compacting for Utilities.

3.2 Pipe Jointing and Pipe Laying: Sanitary Sewer

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 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.

3. A minimum of two connecting hoses to link the air inlet test plug with an above ground test monitoring panel must be provided.

   a. One hose is to induce air through the test plug and into the test chamber.

   b. The second hose is for the purpose of monitoring the test pressure from within the enclosed pipe.

4. UNDER NO CIRCUMSTANCES ARE WORKERS TO BE ALLOWED IN THE CONNECTING MANHOLES WHILE A PRESSURE TEST IS BEING CONDUCTED.

5. Add air slowly into the test section. After an internal pressure of 4.0 PSI is obtained, allow internal temperature to stabilize.

6. After stabilization period, adjust the internal air pressure to 3.5 PSI, disconnect the air supply and begin timing the test.

7. Refer to the air test table to determine the length of time (minutes) the section under test must sustain while not losing in excess of 1 PSI as monitored by the test gauge.

8. Sections so determined to have lost 1 PSI or less during the test period will have passed the leakage test. Those sections losing in excess of 1 PSI during the test period will have failed the leakage test.

9. Appropriate repairs must then be completed and the line retested for acceptance.

   (a) The Table below shows the required test time, T, in minutes/100 ft. of pipe for each nominal pipe size. Test times are for an 1.0-psi (7-kp) pressure drop from 3.5 to 2.5 psi (24 to 17 kPa).

3.6 Lines and Grades

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

3.7 Excavation

a. Excavation for trenches for the placing of water mains, valves, hydrants 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.

3.8 Pipe Laying

a. All pipe shall be laid to line as indicated on the plans. Pipes shall be laid with a minimum of 5 1/2 feet of cover over the pipe. Insulation may be placed over pipe with less than 5 1/2 feet cover if approved by Engineer but in no case shall the cover be less 4 feet. This depth of cover shall be measured from finished grade. Pipe, fittings, valves and hydrants 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. Valves fitting and hydrants shall be installed at locations on the plans. All valves shall be set plumb and provided with a valve box unless the plans and specifications indicate the construction of a valve manhole. The valve shall be centered within the valve box and with the box cover flush with a surfaced street or 3 inches below the level of an unimproved street, unless otherwise directed by the project engineer.

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 waterline. 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.

3.15 Gas

a. The Contractor shall be responsible for the coordination of natural gas service with Bay State Gas and Northern Utilities.

3.16 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.

3.17 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.

SECTION 02460

SITE IMPROVEMENTS

PART 1. GENERAL

1.1 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.

PART 2. PRODUCTS

2.1 Materials

a. Concrete Pavers - Paving stone for handicap curb ramp, shall be 4" x 8" nominal. All 4"x 8" pavers shall be 2-3/8" thick, with average minimum compressive strength of 8,000 psi with no individual unit under 7,200 psi, and absorption rate of 5 percent, with no unit greater than 7 percent (ASTM C 140) when tested in accordance with ASTM 936-82. Paver for the handicap ramps shall be Holland stone with a Score, color "Smoke". All pavers as manufactured by Duracon Paving Systems, Wilson Street, P.O. Box 151, Sanford, Maine 04073 or approved equal.

b. Signage - Provide traffic control signs complying with U.S. Department of Transportation, Federal Highway Administrations Manual "Uniform Traffic Control Devices"; local codes, and as specified. See Drawings for type, location, and quantity of sign required.

To be painted with reflective baked - enamel finish with following colors:

(1) "HANDICAPPED PARKING ONLY" Sign: 12" x 18" white legend on blue background. ("Van Accessible" where required)

(2) "STOP" signs shall be 24" x 24" octagon, reflectorized copy and border.

c. Removable Bollard - The Contractor shall provide lockable, removable steel bollards in the quantities and location as shown on the drawings.

g. Concrete Pads, Bases, Stairs and Footings - All concrete to meet the requirements specified in Section 03300 of Architectural Specifications.

h. Playground Equipment – Playground equipment as manufactured by Game Time, selected by Owner. Coordinate ordering and scheduling with owner.

i. Site Fencing – The Contractor shall provide site fencing as follows:

(1) Playground Area Fence - four (4) foot high aluminum fence, as manufactured by Jerith Manufacturing Co., Inc. and distributed by Gorham Fence – Tel. (207) 839-6781. Model # 202, Industrial Style, Color – Black or approved equal.

(2) Detention Pond Fence - six (6) foot high aluminum fence with an eight (8) foot double gate, as manufactured by Jerith Manufacturing Co., Inc. and distributed by Gorham Fence (207) 839-6781. Model #202, Industrial Style, Color – Black or approved equal.

j. Stamped Bituminous Pavement - The Contractor shall provide stamped (imprinted) bituminous pavement in areas denoted on the Drawings and specified herein.

1. Refer to plans for location and quantities.

2. Stamped bituminous pavement – shall consist of stamped brick running bond pattern, two coats of Street Bond traffic formula, one coat of Street Bond Sealer Concentrate, as provided by "Street Print Pavement Texturing", process as provided by Mark Hagar, Inc. Damariscotta, ME 04543, Tel. (207) 563-8588.

3. The paving pattern shall be a brick running bond as delineated on Drawings. Color shall be brick red.

4. Bituminous pavement as specified herein.

k. Bike Rack – The Contractor shall provide a ground (embedded) mountain bike rack, constructed of 2-3/8" O.D. 2" I.D. x 0.154" wall ASTM A53 schedule 40 steel pipe. Finish to powder coat "green". As manufactured by Mardrax, 2210 Pinehurst Drive, Middleton, WI (800) 448-7931 or approved equal.

l. Handrails - The Contractor shall provide exterior handrails, hot dipped galvanized as shown on the drawings. Railings shall conform to state

b. Set posts vertical and plumb. Mount sign in accordance with manufacturer's instructions.

3.3 Removable Bollard

a. Contractor shall install bollards as shown on the Drawings, per the manufacturer's detailed specifications and in conformance with the City of Portland Fire Prevention department. Contractor shall coordinate location of bollards with the Fire Prevention department prior to installation.

3.4 Paving Rings

a. Contractor shall supply and install paving rings in quantities and location as shown on the Drawings and specified herein. Install per construction detail and manufacturer recommendations.

3.5 Site Lighting

a. Mount fixtures in true vertical and horizontal alignment and in accordance with manufacturers requirements.

b. Grounding:

(1) Ground all fixture assemblies

(2) Ground exterior metallic poles by connecting the equipment ground conductor to each pole grounding terminal.

(3) Final locations of lighting fixtures are subject to approval of Landscape Architect.

3.6 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.

c. Protect stamped pavement areas during the required curing time. Install barriers where necessary to prevent vehicular and pedestrian traffic. Restricted access for a minimum of 24 hours.

3.11 Bike Rack

a. Contractor shall install bike rack as shown on drawings in accordance with manufacturer's requirements.

b. Protect finish surface of bike rack during installation and placement of concrete pad.

3.12 Handrails

a. Contractor shall install handrails for exterior concrete stairs as shown and detailed on drawings.

3.13 Gazebo

a. The Contractor shall install concrete pad/base as detailed on Architectural Drawings and in conformance with manufactures requirements.

b. Install gazebo as provided by manufacturer and assemble per manufacturer's specifications.

c. Benches as provided by manufacturer shall be secured to concrete pad/base with stainless steel brackets anchored to concrete according to manufacturer's requirements.

d. Paint gazebo as per Architect's exterior paint finish schedule.

SECTION 02462

RETAINING WALLS

PART 1. GENERAL

1.1 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. Detention Basin - Section 02410

d. Construction Drawings.

e. Geotechnical Report "Detention/Wetpond" Report, prepared by Jacques-Whitford, Inc.

1.2 Submittals

a. Design Drawings of Geosynthetic-Reinforced Segmental Retaining Wall shall be prepared and stamped by a registered Professional Engineer, licensed in the State of Maine, for the retaining wall shown on the Layout, Lighting and Planting Plan. The submittal shall include all design information, design parameters and related information in accordance with recommendations of the Geotechnical Report and the block manufactures specifications. Appropriate typical wall profiles, wall cross sections and wall details shall be included in the submittal.

1.3 Reference Standards

a. American Society of Testing and Materials
   1. ASTM C90-90; Hollow Load Bearing Masonry Units
   2. ASTM C666-90 (Mod.); Test method for Resistance of Concrete to Rapid Freezing and Thawing (modified to 50 cycles)
   3. ASTM C698-91; Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort
   4. ASTM D1557-91; Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort
   5. ASTM D448-86; Standard Classification for Sizes of Aggregate for Road and Bridge Construction
   6. ASTM D4523, D4254; Standard Test Methods for Maximum and Minimum Index Density

c. Acceptable Materials

(1) Anchor Vertica Block Retaining Wall Units as distributed by:
Duracon - A Division of Genest Concrete
Wilson Street
P.O. Box 151
Sanford, ME 04073
(207) 324-3250
In Maine 1-800-649-4773

d. Geogrid - Miragrid 3xT as manufactured by Mirafi, or approved equal.

e. Paver Bond - Paver Bond as manufactured by Surebond, Inc. or approved equal.

f. Base Material - Material for Retaining Wall footings shall consist of ¾ inch crushed stone compacted as shown on the Drawings. A minimum of twelve (12) inches of compacted base is required.

g. Unit Fill - Fill between units shall consist of free-draining, granular fill. Gradation shall include material with fines limited to 5 percent passing the #200 sieve and less than 50 percent passing the #40 sieve.

h. Drainage Layer – An inclined drainage layer at least 12 inches thick, wrapped in geotextile fabric (Mirafi 160N or equal), shall be placed directly behind the modular block segmental wall units as shown on the Drawings. The drainage layer shall extend from the base of the wall to within six (6) inches of final grade. Drainage layer material shall consist of 3/4 inch crushed stone.

i. Retaining Wall Backfill - Segmental Retaining Wall (SRW) backfill extending from the drainage layer to at least 5 feet behind the face of the wall or the width of geosynthetic reinforcement, whichever is greater, shall consist of compacted Free Draining Fill (MDOT 703.06. (b) Type E) with a maximum particle size of 3 inches. SRW backfill shall be compacted to at least 95 percent of maximum ASTM D-1557 dry density. Wall backfill placed within 5 feet of the wall shall be compacted with hand-operated compactors.

j. Geotextile Fabric - shall be Mirafi 160N or approved equal.

k. Geogrid – Miragrid 3 x T

l. Perforated Drain Pipe - Shall be four (4) inch perforated PVC pipe having a SDR of 35 or equivalent. Pipe shall be lead to daylight and as shown on plans and details.

(3) If groundwater is encountered above the wall foundation subgrade elevation, the groundwater level shall be lowered at least one (1) foot below the subgrade surface prior to placement of Base Material.

(4) Base shall be prepared to ensure complete contact of retaining wall unit with base. Gaps shall not be allowed.

d. Unit Installation

(1) First course of concrete wall units shall be placed on the prepared base. The units shall be checked for level and alignment. The first course is the most important to ensure accurate and acceptable results.

(2) Ensure that units are in full contact with base.

(3) Units are placed end to end for full length of wall alignment. Alignment shall be done by using a string line or offset from a base line. Contractor shall follow manufacturer's installation instruction when making radius curves.

(4) Fill and compact voids in block units.

(5) Compact SRW fill behind wall units as specified here in and placed in max lifts of 6 inches.

(6) Sweep all excess material from the top of the units and install next course. Fill all voids.

(7) Install each succeeding course so the side slots are in contact with the locator. Pull units forward until the side slot of the unit touches the back of the locator of the previous course. Backfill and compact soil as each course is completed. Repeat procedure to the extent of wall height.

(8) Install cap unit using Powerseal adhesive. Cut cap stone as necessary to provide tight joints along top of wall.

e. Tracked construction equipment shall not be operated directly on the geogrid. A minimum backfill thickness of six (6) inches is required prior to operation of tracked vehicles over the geogrid. Turning of tracked vehicles should be kept to a minimum to prevent tracks from displacing the fill and damaging the geogrid.

f. Rubber-tired equipment may pass over the geogrid reinforcement at slow speeds, less than 10 MPH. Sudden braking and sharp turning shall be avoided.

3.5 Stormdrain Pipe Installation

a. Wall units shall be cut to fit securely around all pipe entry/exit locations. Refer to drawings and requirements of structural engineer. Adjustment to geogrid reinforcement placement due to pipe conflict shall be approved by the Structural Engineer.

3.6 Retaining Wall Backfill Drain Installation

a. Install 4 inch PVC SDR 35 drain pipe for all wall installations as shown on drawings. Positive drainage to designated outlet locations shall be maintained.

3.7 Adjusting and Cleaning

a. Replace units damaged during installation with new units.

b. Remove debris caused by this construction and leave adjacent paved areas broom clean.

SECTION 02470

BITUMINOUS CONCRETE PAVING

PART 1. GENERAL

1.1. 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.

1.2 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

2.1 Materials

a. Bituminous Concrete (roadway and parking) - An approved hot plant mix conforming to MeDOT Standard Specifications (latest revision). Use Grading B mix for binder and C mix for surface.

b. Bituminous Concrete (Sidewalks) - An approved hot plant mix conforming to MeDOT Standard Specifications (latest revision). Using grading B mix for binder and D mix for surface.

PART 3. EXECUTION

3.1 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.

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 manuvering 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.

3.3 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 1" 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.

SECTION 02480

CURBING

PART 1. GENERAL

1.1 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

1.2 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

2.1 Materials

a. Vertical and Sloped Granite Curb: Vertical and sloped granite curb shall conform to M.D.O.T. specifications for TYPE I and TYPE V. Curb shall be acceptable granite from approved quarries.

b. Tip-Down and Transition Granite Curb: All granite curb shall conform to the following standards.

(1) All granite curb shall be basically light gray in color, free from seams and other structural imperfection or flaws which would impair its structural integrity, and of a smooth splitting appearance. Natural color variation characteristic of the deposit from which the curbing is obtained will be permitted.

(2) The exposed face shall be smooth quarry split to an approximately true plane having no projections or depressions which will cause over one (1) inch to show between a two (2) foot straight-edge and the face when the straight-edge is placed as closely as possible on any part of the face.

PART 3. EXECUTION

3.1 Granite Curb

a. Contractor shall install, backfill and protect all granite curb in accordance with M.D.O.T. Subsection 609.03 and as detailed on the Drawings. Provide approved granite tip-down curbs at all curb end sections. Provide approved granite transition curb where curb type and or material changes occur.

3.2 Bituminous Concrete Cape Cod Curb

a. Place curb by machine in locations shown on Drawings. Use bituminous pad beneath curb at all locations.

3.3 Precast Concrete Curb

a. Contractor shall install, backfill and protect all concrete curb in accordance with M.D.O.T. Subsection 609.05 and as detailed on the drawings.

3.4 Protection

a. The Contractor shall provide temporary barriers to protect newly formed bituminous curbing from damage during construction. All damaged curbing shall be repaired or replaced as necessary without additional expense to owner and inspected and approved by the Owner's Representative.

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

SECTION 02500

LANDSCAPING

PART 1. GENERAL

1.1 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 Drainage - Section 02400

d. Site Improvements - Section 02460

e. Construction Drawings

1.2 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.

1.3 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.

1.4 Standards

a. All plant stock shall conform to ANSI Z260.1 - Nursery Stock, latest edition, of the American Association of Nurserymen, Inc.

(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.

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 manufacturers analysis printed on the bag (see plans).

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.

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.

3.2 Staking and Guying

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

3.3 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 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.

3.4 Loaming and Seeding

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

b. Prior to placing loam, scarify subgrade areas; remove all rocks 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 one (1) 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.

c. Apply additives (lime, fertilizer, etc.) as per the recommendation of the testing lab. Apply additives and harrow into top two (2) inches of the seed bed.

d. 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.

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

f. 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.

3.5 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.

(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. If planting is done after the lawn preparation, proper protection to lawn areas shall be provided. Any damage resulting from planting operations shall be promptly repaired. **(Exception: the use of fertilizer with compounds, that if found in drinking water, would not meet federal and state safe drinking water standards, is prohibited from the area over the existing reservoir. The use of pesticides and herbicides are restricted from this area).**

(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. **(See exception above.)**

(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 11 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, refertilizing, 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.

Part II
Division 3

Concrete

SECTION 03300

CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. The drawings and general conditions of the contract including General and Supplementary Conditions and other Division 1 Specification sections apply to work of this section.

B. Examine all other sections of the Specifications for requirements which affect work of this Section whether or not such work is specifically mentioned in this Section.

C. Coordinate work with that of all trades affecting or affected by work of this Section. Cooperate with such trades to assure the steady progress of all work under the Contract.

1.02 DESCRIPTION OF WORK:

A. Work included:Provide labor, materials, and equipment necessary to complete the work of this Section and, without limiting the generality thereof, furnish and include the following:

1. The extent of cast-in-place concrete work is shown on drawings and includes (but not by way of limitation) formwork, reinforcing, cast-in-place concrete,accessories, and casting in of items specified under other Sections of the Specifications or furnished by Owner that are required to be built-in with the concrete.

2. Equipment support pads indicated on mechanical drawings to be installed by the Building Contractor.

3. Cast-in-place retaining walls, exterior slabs on grade and other concrete shwon on site drawings.

1.03 RELATED WORK:

A. Metal Fabrications: Section 05500

1. Expansion Anchors - Section 05500

2. Embedded Items - Section 05500

B. Anchor Bolts: Section 05120

C. Joint Sealants: Section 07900

reinforcement required at openings through concrete structures. Include supplemental reinforcing and bar supports necessary to support reinforcing steel at proper location within forms or slabs.

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

D. Laboratory Test Reports: Submit laboratory test reports for concrete materials and mix design test if trial batch method is used for proportioning concrete mixes.

E. Strength Tests: Provide required records of strength tests if field experience method is used for proportioning concrete mixes.

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 thickness to withstand pressure of newly-placed concrete without bow or deflection.

1. Use plywood complying with U.S. Product Standard PS-1 "B-B (Concrete Form) Plywood", Class I, Exterior Grade or better, mill-oiled and edge-sealed, with piece bearing legible inspection trademark.

B. Forms for Unexposed Finish Concrete: Form concrete surfaces which will be unexposed in finished structure with plywood, lumber, metal or other acceptable material. Provide lumber dressed on at least 2 edges and one side for tight fit.

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.

2.02 REINFORCING MATERIALS:

A. Reinforcing Bars: ASTM A 615, Grade 60, deformed.

B. Fiber Reinforcing: ASTM C 1116, Type III virgin polypropylene fibers as manufactured by FIBERMESH or approved alternate.

1. The Fiber size (length) required shall be based on the largest size of the coarse aggregate in the concrete mix and determined by the manufacturer. Manufacturer shall submit written confirmation as to size of fibers which will be used based on concrete mix specified.

C. Welded Wire Fabric: ASTM A 185, welded steel wire fabric. Provide welded wire fabric in flat sheets.

B. Non-Shrink Cement-based Grout: Provide grout consisting of premeasured, prepackaged materials supplied by the manufacturer requiring only the addition of water. Manufacturer's instructions must be printed on the outside of each bag.

1. Non-shrink: No shrinkage (0.0%) and a maximum 4.0% expansion when tested in accordance with ASTM C-827. No shrinkage (0.0%) and a maximum of 0.2% expansion in the hardened state when tested in accordance with CRD-C-621.

2. Compressive strength: A minimum 28 day compressive strength of 5000 psi when tested in accordance with ASTM C-109.

3. Setting time: A minimum initial set time of 60 minutes when tested in accordance with ASTM C-191.

4. Composition: Shall not contain metallic particles or expansive cement.

C. Absorptive Cover: Burlap cloth made from jute or kenaf, weighing approximately 9 oz. per sq. yd., complying with AASHTO M182, Class 2.

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

1. Waterproof paper.

2. Polyethylene film.

3. Polyethylene-coated burlap.

E. Liquid Membrane-Forming Curing Compound: Liquid type membrane forming curing compound complying with ASTM C 309, Type I, Class A unless other type acceptable to Architect. Curing compound shall not impair bonding of any material to be applied directly to the concrete. Demonstrate the non-impairment prior to use.

F. Preformed Expansion Joint Formers:

1. Bituminous Fiber Type, ASTM D 1751.

2. Felt Void, Poly-Styrene Cap with removable top as manufactured by SUPERIOR.

G. Slab Joint Filler: Multi-component polyurethane sealant (self-leveling type).

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. Use material, including all admixtures, proposed for use on the project. If trial batch method used, use an independent testing facility acceptable to Architect for preparing and reporting proposed

2.06 CONCRETE MIXING:

A. Job-Site Mixing: Will not be permitted.

B. Ready-Mix Concrete: Must comply with the requirements of ASTM C 94, and as herein specified. Provide batch ticket for each batch discharged and used in work, indicating project name, mix type, mix time and quantity.

1. During hot weather, or under conditions contributing to rapid setting of concrete, a shorter mixing time than specified in ASTM C 94 may be required by Engineer.

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

B. Design, construct, erect, maintain, and remove forms for cast-in-place concrete work in compliance with ACI 347.

C. Design formwork to be readily removable without impact, shock or damage to cast-in-place concrete surfaces and adjacent materials.

D. Construct forms to sizes, shapes, lines and dimensions shown, and to obtain accurate alignment, location, grades, level and plumb work in finished structures. Provide for openings, offsets, sinkages, keyways, recesses, moldings, rustications, reglets, chamfers, blocking, screeds, bulkheads, anchorages and inserts, and other features required in work. Use selected materials to obtain required finishes. Solidly butt joints and provide backup at joints to prevent leakage of cement paste.

E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces where slope is too steep to place concrete with bottom forms only. Kerf wood inserts for forming keyways, reglets, recesses, and the like to prevent swelling and for easy removal.

F. Provide temporary openings where interior area of formwork is inaccessible for clean out, for inspection before concrete placement and for placement of concrete. Securely brace temporary openings and set tightly to forms to prevent loss of concrete mortar. Locate temporary openings on forms at inconspicuous locations.

3.03 JOINTS:

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 Architect. Submit plan indicating proposed location of construction joints for review prior to beginning work.

1. Provide keyways at least 1-1/2" deep in construction joints in walls, and slabs; accepted bulkheads designed for this purpose may be used for slabs.

2. Roughened surfaces shall be used between walls and footings unless shown otherwise on the drawings. The footing surface shall be roughened to at least an amplitude of 1/4" for the width of the wall before placing the wall concrete.

3. Place construction joints perpendicular to the main reinforcement. Continue reinforcement across construction joints.

4. Joints in slabs on grade shall be located and detailed as indicated on the drawings. If saw-cut joints are required or permitted, cutting shall be timed properly with the set of the concrete: cutting shall be started as soon as the concrete has been hardened sufficiently to prevent aggregate being dislodged by the saw, and shall be completed before shrinkage stresses become sufficient to produce cracking.

3.04 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 items to be attached thereto. Notify other trades to permit installation of their work.

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.

3.05 INSTALLATION OF GROUT

A. Place grout for base plates in accordance with manufacturer's recommendations.

B. Grout below setting plates as soon as practicable to facilitate erection of steel and prior to removal of temporary bracing and guys. If leveling bolts or shims are used for erection grout shall be installed prior to addition of any column load.

C. 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.

3.06 PREPARATION OF FORM SURFACES:

c. Pumping or pneumatic conveying equipment shall be of suitable kind with adequate pumping capacity. Pneumatic placement shall be controlled so that segregation is not apparent in the discharged concrete.

d. Concrete shall not be conveyed through pipe made of aluminum alloy. Standby equipment shall be provided on the site.

e. Tined rakes are prohibited as a means of conveying fiber reinforced concrete.

4. Do not use reinforcement as bases for runways for concrete conveying equipment or other construction loads.

C. Placing Concrete in Forms: Deposit concrete in forms in horizontal layers not deeper than 18 inches and in a manner to avoid inclined construction joints. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints.

1. 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.

2. Use vibrators designed to operate with vibratory equipment submerged in concrete, maintaining a speed of not less than 8000 impulses per minute and of sufficient amplitude to consolidate the concrete effectively. 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, generally at points 18 inches maximum apart. Place vibrators to rapidly penetrate placed layer and at least 6 inches into the preceding layer. Do not insert vibrators into lower layers of concrete that have begun to set. At each insertion maintain the duration of vibration for the time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing segregation of mix, generally from 5 to 15 seconds. A spare vibrator shall be kept on the job site during all concrete placing operation.

D. Placing Concrete Slabs: Deposit and consolidate concrete slabs in a continuous operation, within limits of construction joints, until the placing of a panel or section is completed.

1. Consolidate concrete using internal vibrators during placing operations so that concrete is thoroughly worked around reinforcement and other embedded items and into corners.

2. Bring slab surfaces to correct level with straightedge and strikeoff. Use bull floats or darbies to smooth surface, free of humps or hollows. Do not disturb slab surfaces prior to beginning finishing operations. Do not sprinkle water on plastic surface.

3. Maintain reinforcing in proper position during concrete placement operations.

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 as-cast concrete surface shall be 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. Grout Cleaned Finish: Provide grout cleaned finish to scheduled concrete surfaces which have received smooth form finish treatment. Combine one part Portland cement to 1-1/2 parts fine sand by volume and mix with water to consistency of thick paint. Proprietary additives may be used at Contractor's option. Blend standard Portland cement and white Portland cement, amounts determined by trial patches, so that final color of dry grout will closely match adjacent surfaces.

1. Thoroughly wet concrete surfaces and apply grout to coat surfaces and fill small holes. Remove excess grout by scraping and rubbing with clean burlap. Keep damp by fog spray for at least 36 hours after rubbing.

D. Related Unformed Surfaces: At tops of walls and grade beams, horizontal offset surfaces occurring adjacent to formed surfaces, strike-off, smooth and finish with a texture matching adjacent uniformed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

3.09 MONOLITHIC SLAB FINISHES:

A. Scratch Finish: Apply scratch finish to monolithic slab surfaces that are to receive concrete floor topping or mortar setting beds, and as otherwise indicated.

1. After placing slabs, plane surface to a tolerance not exceeding 1/2 in. in 10 ft. when tested with a 10-ft. straightedge. Slope surfaces uniformly to drains where required. After leveling, roughen surface before final set with stiff brushes, brooms or rakes.

B. Float Finish: Apply float finish to monolithic slab surfaces to receive trowel finish and other finishes as hereinafter specified, and slab surfaces which are to be covered with membrane or elastic waterproofing, and as otherwise indicated.

1. 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 by hand-floating if area is small or inaccessible to power units. Check and level surface plane to a minimum flatness F-Number F20, minimum levelness F-Number, F17. Cut down high spots and fill low spots. Uniformly slope surfaces to drains. Immediately after leveling, refloat surface to a uniform, smooth, granular texture.

C. Trowel Finish: Apply trowel finish to monolithic slab surfaces indicated, including slab surfaces to be covered with carpet, resilient flooring, paint or other thin-film finish coating system.

taken to prevent exposure of the concrete to exhaust gases which contain carbon dioxide.

b. Keep protections in place and intact at least 24 hours after artificial heat is discontinued. Avoid rapid dry-out of concrete due to overheating and avoid thermal shock due to sudden cooling or heating.

c. Changes in temperature of the air immediately adjacent to the concrete during and immediately following the curing period shall be kept as uniform as possible and shall not exceed 5 deg.F in any 1 hour or 50 deg.F in any 24 hour period.

B. Curing Methods: Perform curing of concrete by moist curing, by moisture-retaining cover curing, by curing compound, and by combinations thereof, as herein specified.

1. Provide moisture curing by 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-in. lap over adjacent absorptive covers.

2. Provide moisture-cover curing as follows:

a. Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width with sides and ends lapped at least 3 in. and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

3. Provide curing compound to slabs as follows:

a. Apply specified curing and sealing compound to concrete slabs as soon as final finishing operations are complete (within 2 hours). Apply uniformly incontinuous operation by power-spray or roller in accordance with manufacturer's directions. Recoat areas subjected to heavy rainfall within 3 hours after initial application. Maintain continuity of coating and repair damage during curing period.

b. Do not use membrane curing compounds on surfaces which are to be covered with coating material applied directly to concrete, liquid floor hardener or with a covering material bonded to concrete such as concrete, waterproofing, damp-proofing, membrane roofing, flooring, painting, and other coatings and finish materials, unless otherwise acceptable to Architect.

place, and cure concrete as herein specified, to blend with in-place construction. Provide other miscellaneous concrete filling shown or required to complete work.

3.14 CONCRETE SURFACE REPAIRS:

A. Patching Defective Areas: Repair and patch defective areas with cement mortar immediately after removal of forms, when acceptable to the Architect.

1. Cut out honeycomb, rock pockets, voids over 1/4 inch 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 inch. 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.

2. 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.

B. Repair of Formed Surfaces: Remove and replace concrete having defective surfaces if defects cannot be repaired to satisfaction of Architect. 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.

1. Repair concealed formed surfaces, where possible, that contain defects that affect the durability of concrete. If defects cannot be repaired, remove and replace concrete.

2. Correct high areas in unformed surfaces by grinding after concrete has cured at least 14 days.

3. 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. Proprietary patching compounds may be used when acceptable to Architect.

4. Repair defective areas, except random cracks and single holes not exceeding 1 inch in diameter, by cutting out and replacing with fresh concrete. Remove defective areas to sound concrete with clean, square cuts and expose reinforcing steel with at least 3/4 inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding 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 the same manner as adjacent concrete.

5. Compressive Strength Tests: ASTM C 39; one set for each 50 cu. yds. or fraction thereof, of each concrete class placed in any one day or for each 4,000 sq. ft. of surface area placed; 1 specimen tested at 7 days, 2 specimens tested at 28 days,and 1 specimen retained in reserve for later testing if required.

   a. 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 used.

   b. When total quantity of a given class of concrete is less than 50 cu. yds., strength test may be waived, if in the Architect's judgement, adequate evidence of satisfactory strength is provided.

   c. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, evaluate current operations and provide corrective procedures for protecting and curing the in-place concrete.

   d. Strength level of concrete will be considered satisfactory if averages of sets of three consecutive strength test results equal or exceed specified compressive strength and no individual strength test result falls below specified compressive strength by more than 500 psi.

   e. Test results will be reported in writing to Architect and Contractor on the day after tests are made. Reports of compressive strength tests shall contain the project identification name and number, date of concrete placement, name of concrete testing service, concrete type and class, location of concrete batch in structure, design compressive strength at 28 days, concrete mix proportions and materials compressive breaking strength, and type of break for both 7-day tests and 28-day tests.

6. Pumped concrete shall be tested at point of discharge per ACI 301.

D. Additional Tests: The testing service will make additional tests of in-place concrete when test results indicate specified concrete strengths and other characteristics have not been attained in the structure, as directed by the Architect. Testing service may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42, or by other methods, as directed. Contractor shall pay for such tests conducted, and any other additional testing as may be required, when unacceptable concrete is verified.

END OF SECTION

Part II
Division 4

Masonry

SECTION 04100

MORTAR AND MASONRY GROUT

1 PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract including General and Supplementary Conditions and Division 1 specification sections apply to Work of this section.

1.2 SECTION INCLUDES

A. Mortar and grout for masonry.

1.3 SUBMITTALS

A. Samples: Submit two samples of mortar, illustrating mortar color and color range.

1.4 QUALITY ASSURANCE

A. Perform Work in accordance with ACI 530 and ACI 530.1.

1.5 ENVIRONMENTAL REQUIREMENTS

A. Cold Weather Requirements: IMIAC - Recommended Practices and Guide Specifications for Cold Weather Masonry Construction.

B. Hot Weather Requirements: IMIAC - Recommended Practices and Guide Specifications for Hot Weather Masonry Construction.

2 PART 2 PRODUCTS

2.1 MATERIALS

A. Portland Cement: ASTM C150, Type I, gray color.

B. Mortar Aggregate: ASTM C144, standard masonry type.

C. Hydrated Lime: ASTM C207, Type S.

D. Grout Aggregate: ASTM C404.

E. Water: Clean and potable.

F. Bonding Agent: Epoxy type.

2.2 MORTAR MIXES

A. Mortar for Load Bearing Walls and Partitions: ASTM C270, Type S using the Property Method.

SECTION 04300

UNIT MASONRY SYSTEM

1 PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract including General and Supplementary Conditions and Division 1 specification sections apply to Work of this section.

1.2 SECTION INCLUDES

A. Concrete masonry and brick units, reinforcement, anchorage, and accessories.

1.3 SUBMITTALS

A. Product data: Submit product data for masonry items, indicating compliance with requirements.

1.4 REGULATORY REQUIREMENTS

A. Conform to applicable code for requirements for fire rated masonry construction.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with ACI 530 and ACI 530.1.

1.6 ENVIRONMENTAL REQUIREMENTS

A. Cold Weather Requirements: IMIAC - Recommended Practices and Guide Specifications for Cold Weather Masonry Construction.

B. Hot Weather Requirements: IMIAC - Recommended Practices and Guide Specifications for Hot Weather Masonry Construction.

2 PART 2 PRODUCTS

2.1 CONCRETE MASONRY UNITS

A. Hollow Load Bearing Block Units: ASTM C90, Type I - Moisture Controlled; normal weight.

B. Solid Load-Bearing Block Units: ASTM C90, Type I - Moisture Controlled; normal weight.

2.2 REINFORCEMENT AND ANCHORAGE

A. Reinforcing Steel: ASTM A615, 60 ksi yield grade, deformed billet bars, galvanized finish.

2.3 MORTAR AND GROUT

A. Mortar and Grout: As specified in Section 04100.

C. Lap end joints and seal watertight.

D. Turn flashing, fold, and seal at corners, bends, and interruptions.

3.7 TOLERANCES

A. Maximum Variation from Plumb: 1/4 inch per story non-cumulative; 1/2 inch in two stories or more.

B. Maximum Variation from Level Coursing: 1/8 inch in 3 ft and 1/4 inch in 10 ft; 1/2 inch in 30 ft.

3.8 CUTTING AND FITTING

A. Cut and fit for chases, pipes, conduit, and sleeves. Coordinate with other sections of work to provide correct size, shape, and location.

3.9 CLEANING

A. Remove excess mortar and mortar smears as work progresses.

B. Clean soiled surfaces with cleaning solution.

...END OF SECTION

Part II
Division 5

Metals

SECTION 05120

STRUCTURAL STEEL

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. The drawings and general conditions of the contract including General and Supplementary Conditions and other Division 1 Specification sections apply to work of this section.

B. Examine all other sections of the Specifications for requirements which affect work of this Section whether or not such work is specifically mentioned in this Section.

C. Coordinate work with that of all trades affecting or affected by work of this Section. Cooperate with such trades to assure the steady progress of all work under the Contract.

1.02 DESCRIPTION OF WORK:

A. Extent of structural steel work is shown on drawings, including schedules, notes and details to show size and location of members, typical connections, and type of steel required.

B. Structural steel is that work defined in AISC "Code of Standard Practice" and as otherwise shown on drawings.

C. Miscellaneous Metal Fabrications are specified elsewhere in Division 5.

1.03 QUALITY ASSURANCE:

A. Codes and Standards: Comply with provisions of the following, except as otherwise indicated:

1. AISC "*Code of Standard Practice for Steel Buildings and Bridges-March 7, 2000*".

2. AISC "*Specification for Structural Steel Buildings - Allowable Stress Design and Plastic Design*", June 1, 1989 including "Commentary" and Supplements issued thereto. .

3. AISC "*Specifications for Structural Joints using ASTM A 325 or A 490 Bolts*" approved by the Research Council on Structural Connections of the Engineering Foundation.

4. AISC "Seismic Provisions for Steel Buildings", April 15, 1997.

5. AWS D1.1 - 98 "Structural Welding Code" - Steel.

2. Connection Design: Submit design calculations prepared and stamped by a Professional Engineer registered in the State of Maine for all beam connections not tabulated in the AISC "Manual of Steel Construction" (ASD or LRFD). Submit design for all building braced frames where applicable, as indicated on design drawings.

3. Shop Drawing Review: Review of the shop drawings will be made for the size and arrangement of members and the strength of connections. Conformance of the Shop Drawings to the Contract Documents remains the responsibility of the General Contractor. This review in no way relieves the General Contractor of this responsibility.

4. Test Reports: Submit copies of reports of tests conducted on shop and field bolted and welded connections. Include data on type(s) of test conducted and test results.

1.05 DELIVERY, STORAGE AND HANDLING:

A. Deliver materials to site at such intervals to insure uninterrupted progress of work.

B. 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.

C. Store materials to permit easy access for inspection and identification. Keep steel members off ground, using pallets, platforms, or other supports. Protect steel members and packaged materials from corrosion and deterioration.

D. 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. Structural Steel Shapes, Plates and Bars: ASTM A 36 or ASTM A572 Grade 50 where indicated on the drawings.

B. Cold-Formed Steel Tubing: ASTM A 500, Grade B, Fy = 46 ksi.

C. Steel Pipe: ASTM A 53, Grade B.

D. Anchor Bolts:

1. ASTM A 307, headed type unless otherwise indicated.

E. Unfinished Threaded Fasteners: ASTM A 307, Grade A, regular low-carbon steel bolts and nuts.

1. Provide hexagonal heads and nuts for all connections.

C. High-Strength Bolted Connection: Install high-strength threaded fasteners in accordance with AISC "Specification for Structural Joints using ASTM A 325 or A 490 Bolts". Unless otherwise indicated, all bolted connections are to be tightened to the snug tight condition as defined by AISC.

D. Welded Construction: Comply with AWS Codes for procedures, appearance and quality of welds, and methods used in correcting welding work.

E. Holes for Other Work: 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.

F. 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 priming of all structural steel is required. Top coat is required only for steel permanently exposed to weather or view or as otherwise indicated on the drawings.

B. Surface Preparation: After inspection and before shipping, clean steel work to be painted. Remove loose mill scale, splatter, slag or flux deposits. Clean steel in accordance with Steel Structures Painting Council (SSPC) SP-2 "Hand Tool Cleaning," unless shown otherwise on drawings.

C. Painting: Immediately after surface preparation, apply structural steel primer paint in accordance with manufacturer's instructions. Apply primer at a rate to provide dry film thickness given in this specification. Use painting methods which result in full coverage of joints, corners, edges and exposed surfaces.

PART 3 EXECUTION

3.01 ERECTION:

A. General: Comply with AISC Specifications for bearing, adequacy of temporary connections, alignment, and removal of paint on surfaces adjacent to field welds.

B. Surveys: Check elevations of concrete and masonry bearing surfaces, and locations of anchor bolts and similar devices, before erection work proceeds, and report discrepancies to Architect. Do not proceed with erection until corrections have been made, or until compensating adjustments to structural steel work have been approved by Engineer of Record. Refer to Section 3.03 B.

C. 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.

H. Gas Cutting: Do not use gas cutting torches in field for correcting fabrication errors in primary structural framing. Cutting will be permitted only on secondary members which are not under stress, as acceptable to the Engineer of Record. Finish gas-cut sections equal to a sheared appearance when permitted.

I. Paint Damage: Touch up shop applied paint whenever damaged or bare. Clean surface and touch up with shop primer noted in Section 2.01 H and top coat, if required.

3.02 QUALITY CONTROL:

A. General: Contractor is responsible for maintaining quality control in the field and for providing a structure that is in strict compliance with the contract documents.

1. Required inspection and testing services are intended to assist the Contractor in complying with the Contract Documents. These specified services, however, do not relieve the Contractor of his responsibility for compliance, nor are they intended to limit the Contractor's quality control efforts in the field.

B. Testing: Owner shall engage an independent testing agency to inspect all high-strength bolted and welded connections, to perform tests and prepare reports of their findings. All connections must pass these inspections prior to the installation of subsequent work which they support.

1. Testing agency shall conduct tests and state in each report which specific connections were examined or tested, whether the connections comply with requirements, and specifically state any deviations therefrom.

2. Contractor shall provide access for testing agency to places where structural steel work is being fabricated, produced or erected so that required inspection and testing can be accomplished.

3. Testing agency may inspect structural steel at plant before shipment. The Engineer, however, reserves right, at any time before final acceptance, to reject material not complying with specified requirements.

C. Inspection Requirements:

1. Bolted Connections: Inspect all bolted connections in accordance with procedures outlined in the AISC "Specification for Structural Joints using ASTM A325 or A490 Bolts."

a. Snug Tight Connections:

1. The inspector shall monitor the installation of bolts to determine that all plies of connected material have been drawn together and that the selected procedure is used to tighten all bolts.

2. If the inspector does not monitor the installation of bolts, he shall visually inspect the connection to determine that all plies of

SECTION 05500

METAL FABRICATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This section includes the following metal fabrications:

1. Loose bearing and leveling plates.
2. Miscellaneous framing and supports for the following:

a. Applications where framing and supports are not specified in other sections.

3. Steel ladders.
4. Steel pipe railings.

B. Related Sections: The following sections contain requirements that relate to this section:

1. Division 5 Section "Structural Steel" for structural steel framing system components.

1.3 SYSTEM PERFORMANCE REQUIREMENTS

A. Structural Performance: Design, engineer, fabricate, and install the following metal fabrications to withstand the following structural loads without exceeding the allowable design working stress of the materials involved, including anchors and connections. Apply each load to produce the maximum stress in each respective component of each metal fabrication.

B. Top Rail of Guardrail Systems: Capable of withstanding the following loads applied as indicated:

C. Concentrated load of 200 lb applied at any point and in any direction.

1. Uniform load of 50 lb per linear ft. applied horizontally and simultaneous uniform load of 100 lb per linear foot applied vertically downward at the top of the guard.

D. Handrails Not Serving as Top Rails: Capable of withstanding the following loads applied as indicated:

1. Concentrated load of 200 lb applied at any point and in any direction.

2. Uniform load of 50 lb per linear foot applied in any direction.

3. Concentrated and uniform loads above need not be assumed to act concurrently.

1. Mount handrails only on completed construction. Do not support handrails temporarily by any means not satisfying structural performance requirements.

PART 2 - PRODUCTS

2.1 FERROUS METALS

A. Metal Surfaces, General: For metal fabrications exposed to view upon completion of the Work, provide materials selected for their surface flatness, smoothness, and freedom from surface blemishes. Do not use materials whose exposed surfaces exhibit pitting, seam marks, roller marks, rolled trade names, roughness, and, for steel sheet, variations in flatness exceeding those permitted by reference standards for stretcher-leveled sheet.

B. Steel Plates, Shapes, and Bars: ASTM A 36.

C. Steel Tubing: Product type (manufacturing method) and as follows:

1. Cold-Formed Steel Tubing: ASTM A 500, grade as indicated below:

a. Grade B, unless otherwise indicated or required for design loading.

2. Hot-Formed Steel Tubing: ASTM A 501.

D. Brackets, Flanges and Anchors: Cast or formed metal of the same type material and finish as supported rails, unless otherwise indicated.

E. Concrete Inserts: Threaded or wedge type; galvanized ferrous castings, either malleable iron, ASTM A 47, or cast steel, ASTM A 27. Provide bolts, washers, and shims as required, hot-dip galvanized per ASTM A 153.

F. Welding Rods and Bare Electrodes: Select in accordance with AWS specifications for the metal alloy to be welded.

2.2 GROUT AND ANCHORING CEMENT

A. Nonshrink Nonmetallic Grout: Premixed, factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with CE CRD-C 621. Provide grout specifically recommended by manufacturer for interior and exterior applications of type specified in this section.

B. Erosion-Resistant Anchoring Cement: Factory-prepackaged, nonshrink, nonstaining, hydraulic controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound. Provide formulation that is resistant to erosion from water exposure without need for protection by a sealer or waterproof coating and is recommended for exterior use by manufacturer.

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

1. Nonshrink Nonmetallic Grouts:

a. "Bonsal Construction Grout"; W. R. Bonsal Co.
b. "Diamond-Crete Grout"; Concrete Service Materials Co.
c. "Euco N-S Grout"; Euclid Chemical Co.
d. "Kemset"; Chem-Masters Corp.
e. "Crystex"; L & M Construction Chemicals, Inc.

2.6 FABRICATION, GENERAL

A. Form metal fabrications from materials of size, thickness, and shapes indicated but not less than that needed to comply with performance requirements indicated. Work to dimensions indicated or accepted on shop drawings, using proven details of fabrication and support. Use type of materials indicated or specified for various components of each metal fabrication.

B. Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges.

C. Shear and punch metals cleanly and accurately. Remove burrs.

D. Ease exposed edges to a radius of approximately 1/32 inch, unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

E. Remove sharp or rough areas on exposed traffic surfaces.

F. Weld corners and seams continuously to comply with AWS recommendations and the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.

2. Obtain fusion without undercut or overlap.

3. Remove welding flux immediately.

4. At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing and contour of welded surface matches those adjacent.

G. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of type indicated or, if not indicated, Phillips flat-head (countersunk) screws or bolts. Locate joints where least conspicuous.

H. Provide for anchorage of type indicated; coordinate with supporting structure. Fabricate and space anchoring devices to provide adequate support for intended use.

I. Shop Assembly: Preassemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

J. Cut, reinforce, drill and tap miscellaneous metal work as indicated to receive finish hardware, screws, and similar items.

2.7 ROUGH HARDWARE

A. Furnish bent or otherwise custom fabricated bolts, plates, anchors, hangers, dowels, and other miscellaneous steel and iron shapes as required for framing and supporting woodwork, and for anchoring or securing woodwork to concrete or other structures. Straight bolts and other stock rough hardware items are specified in Division 6 sections.

B. Fabricate items to sizes, shapes, and dimensions required.

E. Provide wall returns at ends of wall-mounted handrails, unless otherwise indicated.

F. Close exposed ends of pipe by welding 3/16 inch thick steel plate in place or by use of prefabricated fittings.

G. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, end closures, flanges, miscellaneous fittings, and anchors for interconnections of pipe and attachment of railings and handrails to other work. Furnish inserts and other anchorage devices for connecting railings and handrails to concrete or masonry work.

H. For railing posts set in concrete fabricate sleeves from steel pipe not less than 6 inches long and with an inside diameter not less than 1/2 inch greater than the outside diameter of post, with steel plate closure welded to bottom of sleeve.

I. Fillers: Provide steel sheet or plate fillers of thickness and size indicated or required to support structural loads of handrails where needed to transfer wall bracket loads through wall finishes to structural supports. Size fillers to suit wall finish thicknesses. Size fillers to produce adequate bearing to prevent bracket rotation and overstressing of substrate.

2.12 PIPE BOLLARDS

A. Fabricate pipe bollards from Schedule 80 steel pipe. Fill bollards with 3000 psi strength concrete. Shape top of concrete into half sphere shape.

2.13 FINISHES, GENERAL

A. Comply with NAAMM "Metal Finishes Manual" for recommendations relative to application and designations of finishes.

B. Finish metal fabrications after assembly.

2.17 STEEL AND IRON FINISHES

A. Preparation for Shop Priming: Prepare uncoated ferrous metal surfaces to comply with minimum requirements indicated below for SSPC surface preparation specifications and environmental exposure conditions of installed metal fabrications:

1. Exteriors (SSPC Zone 1B): SSPC-SP6 "Commercial Blast Cleaning."
Interiors (SSPC Zone 1A): SSPC-SP3 "Power Tool Cleaning:

B. Apply shop primer to uncoated surfaces of metal fabrications, except those with galvanized finish or to be embedded in concrete, sprayed-on fireproofing, or masonry, unless otherwise indicated. Comply with requirements of SSPC-PA1 "Paint Application Specification No. 1" for shop painting.

PART 3 - EXECUTION

3.1 PREPARATION

A. Coordinate and furnish anchorages, setting drawings, diagrams, templates, instructions, and directions for installation of anchorages, including concrete inserts, sleeves, anchor bolts, and miscellaneous items having integral anchors that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to project site.

3.4 INSTALLATION OF STEEL PIPE RAILINGS AND HANDRAILS

A. Adjust railings prior to anchoring to ensure matching alignment at abutting joints. Space posts at spacing indicated, or if not indicated, as required by design loadings. Plumb posts in each direction. Secure posts and railing ends to building construction.

B. Secure handrails to wall with wall brackets and end fittings. Provide bracket with 1-1/2 inch clearance from inside face of handrail and finished wall surface. Locate brackets as indicated, or if not indicated, at spacing required to support structural loads. Secure wall brackets and wall return fittings to building construction.

C. For steel framed gypsum board assemblies, fasten brackets directly to steel framing or concealed anchors using self-tapping screws of size and type required to support structural loads.

D. Set handrail and guardrail posts in sleeves cast into concrete, and fill annular space around posts with non-shrink non-metallic grout.

3.5 INSTALLATION OF BOLLARDS

A. Anchor bollards in concrete footings set below frost level.

3.6 ADJUSTING AND CLEANING

A. Touch-Up Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting to comply with SSPC-PA 1 requirements for touch-up of field painted surfaces.

B. Apply by brush or spray to provide a minimum dry film thickness of 2.0 mils.

C. For galvanized surfaces clean welds, bolted connections and abraded areas and apply galvanizing repair paint to comply with ASTM A 780.

...END OF SECTION 05500

Part II
Division 6

Carpentry

SECTION 06100
ROUGH CARPENTRY

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. The drawings and general conditions of the contract including General and Supplementary Conditions and other Division 1 Specification sections apply to work of this section.

B. Examine all other sections of the Specifications for requirements which affect work of this Section whether or not such work is specifically mentioned in this Section.

C. Coordinate work with that of all trades affecting or affected by work of this Section. Cooperate with such trades to assure the steady progress of all work under the Contract.

1.02 - DESCRIPTION OF WORK:

Work Included: Provide labor, materials, and equipment necessary to complete the work of this Section, and without limiting the generality thereof furnish and install the following:

1. Wood framing, including joists, rafters, outriggers, scabons, headers, stringers, posts, studs, plates, truss bracing and similar members.
2. Wood grounds, nailers, blocking and sleepers.
3. Wood furring.
4. Plywood roof and wall sheathing, subfloor, underlayment, attic subfloor.
5. Miscellaneous carpentry as indicated or required and not specified under other Sections of the Specifications.
6. Fasteners and accessories as indicated and required for rough carpentry.
7. Treated wood as specified.

B. Related Work Specified Elsewhere:

1. Finish carpentry: SECTION 06200.
2. Prefabricated wood trusses: SECTION 06190.
3. Metal studs: Section 09250.
4. Gypsum wall sheathing section 09250.
5. Underlayment paper below wood shingles: SECTION 07130 - WOOD SHINGLES.
6. Furnishing and installing of doors and frames: DIVISION 8.

2.01 LUMBER MATERIALS

A. Lumber, General: Factory-mark each piece of lumber with type, grade, mill and grading agency, except omit marking from surfaces to be exposed with transparent finish or without finish.

B. Nominal sizes are indicated, except as shown by detail dimensions. Provide actual sizes as required by PS 20, for moisture content specified for each use.

1. Provide dressed lumber, 54S, unless otherwise indicated.
2. Provide seasoned lumber with 19% maximum moisture content at time of dressing.

C. For structural framing (6" and wider and from 2" to 4" thick), provide the following grade and species:

1. Spruce-Pine-Fir(SPF) #1/2 or better, unless noted otherwise on Structural Drawings
2. See structural drawings for grades and bending stress at specific locations.

D. Miscellaneous Lumber: Provide wood for support or attachment of other work including cant strips, bucks, nails, blocking, furring, grounds, stripping and similar members. Provide lumber of sizes indicated, worked into shapes shown, and as follows:

3. Moisture content: 15% maximum for lumber items not specified to receive wood preservative treatment.

4. Grade: Construction Grade light framing size lumber of any species or board size lumber as required. Provide construction grade boards (NELMA, or WCLB) or No.2 boards (SPIB, NELMA, or WWPA).

2.02 SHEATHING LOCATIONS

A. Roof Sheathing: APA rated, CDX, 3/4 inch thick, 48 x 96 inch sized sheets, square edges.

B. Wall Sheathing: APA rated, CDX, 5/8 inch thick, 48 x 96 inch sized sheets, square edges.

C. Backing Panels: For mounting electrical or telephone equipment, provide fire-retardant-treated plywood panels with grade C-D, plugged, exposure 1, in 3/4 inch thickness. Paint as required by electrical code.

2.03 ENGINEERED WOOD PRODUCTS

A. General: Provide engineered wood products acceptable to authorities having jurisdiction and for which, current model code research or evaluation reports exist that evidence compliance with building code in effect for Project.

1. Allowable Design Stresses: Provide engineered wood products with allowable design stresses, as published by manufacturer, that meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis, and demonstrated by comprehensive testing performed by a qualified independent testing agency.

B. Laminated-Veneer Lumber: Lumber manufactured by laminating wood veneers in a continuous press using an exterior-type adhesive complying with ASTM D *2559* to produce members with grain of veneers parallel to their lengths and complying with the following requirements:

C. Place horizontal members, crown side up.

D. Construct load bearing framing members fill length without splices.

E. Double members at openings over 24 inches wide. Space short studs over and under opening to stud spacing.

F. Construct double joist headers at floor and ceiling openings and under wall stud partitions that are parallel to floor joists. Frame rigidly into joists.

G. Bridge joists and framing in excess of 8 foot span at mid-span. Fit solid blocking at ends of members.

H. Place sill gasket directly on cementitious foundation. Puncture gasket clean and fit tight to protruding foundation anchor bolts.

I. Coordinate installation of wood decking, wood chord metal joists, glue laminated structural units, prefabricated wood trusses, and plywood web joists.

J. Curb roof openings except where prefabricated curbs are provided. Form corners by alternating lapping side members.

K. Coordinate curb installation with installation of decking and support of deck openings, and roofing vapor retardant.

L. Rough Carpentry Fastening Schedule: Unless otherwise indicated on the drawings, provide minimum nailing and fastening per BOCA Table 2305.2

3.02 SHEATHING

A. Secure roof sheathing with longer edge perpendicular to framing members and with ends staggered and sheet ends over bearing provide gap between panels as recommended by manufacturer.

B. Secure wall sheathing with long dimension perpendicular to wall studs, with ends over firm bearing and staggered.

C. Place building paper horizontally over wall sheathing; weather lap edges and ends.

D. Install telephone and electrical panel backboards with plywood sheathing material where required. Size as indicated or 6 inch larger than panel space required.

3.03 TOLERANCES

A. Framing Members: 1/4 inch from true position, maximum.

END OF SECTION

SECTION 06190

METAL PLATE CONNECTED PRE-FABRICATED WOOD TRUSSES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

The drawings and general conditions of the contract including General and Supplementary Conditions and other Division 1 Specification sections apply to work of this section.

B. Examine all other sections of the Specifications for requirements which affect work of this Section whether or not such work is specifically mentioned in this Section.

C. Coordinate work with that of all trades affecting or affected by work of this Section. Cooperate with such trades to assure the steady progress of all work under the Contract.

1.02 DESCRIPTION OF WORK:

A. Definition: Prefabricated wood trusses include planar structural units consisting of metal plate connected members which are fabricated from dimension lumber and which have been cut and assembled prior to delivery to the job site.

B. Types of fabricated wood trusses are indicated on the drawings.

1.03 RELATED WORK SPECIFIED ELSEWHERE:

A. Section 06100 - Rough Carpentry

1.04 QUALITY ASSURANCE:

A. TPI Standards: Comply with applicable requirements and recommendations of the following Truss Plate Institute (TPI) publications:

1. ANSI/TPI 1-1995 "National Design Standard for Construction. Metal Plate Connected Wood Truss."

2. "Commentary and Appendices to ANSI/TPI 1-1995 for Bracing Wood Trusses."

3. HIB-91 "Commentary and Recommendations for Handling, Installing and Bracing Metal Plate Connected Wood Trusses."

4. DSB-89 "Recommended Design Specification for Temporary Bracing of Metal Plate Connected Wood Trusses."

5. "Quality Control Manual."

B. Wood Structural Design Standard: Comply with applicable requirements of "National Design Specification for Wood Construction", published by American Forest and Paper Association.

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

2.01 ACCEPTABLE MANUFACTURERS:

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

Gang Nail Systems, Inc.
Hydro-Air Engineering, Inc.
Inter-Lock Steel Co., Inc.
Link-Wood Construction Systems
Robbins Manufacturing Co.
Tee-Lok Corp.
Truss Connectors of America
Truswall Systems Corp.

2.02 MATERIALS:

A. Lumber:

1. Factory mark each plate of lumber with type, grade, mill and grading agency.

2. Nominal sizes are 2x6 min chords and 2x4 minimum webs. Provide actual sizes as required by PS 20 for dressed limber, S4S, unless otherwise indicated.

   a. Provide seasoned lumber with a maximum moisture content of 19% at time of dressing.

3. Lumber Species: Eastern Woods(Spruce) graded by NELMA or NHPMA. Southern Pine graded by SPIB.

4. Lumber Grade: Provide No.2 or better visually graded lumber for all webs. MSR 1650f-1.5E lumber for all chords.

5. Stress Rating: Provide lumber which has been either graded or tested and certified, at indicated moisture content, to have the following minimum values:

   MSR: Fb = 1650 psi , Ft = 1020 psi, Fc = 1700 psi, E = 1,500,000 psi
   N0.2: Fb = 875 psi , Ft = 450 psi, Fc = 1150 psi, E = 1,200,000 psi

B. Metal Connector Plates, Fasteners and Anchorages:

1. Connector Plate Material: Metal complying with following requirements, unless otherwise indicated: not less that "0.036" thick, coated thickness (Contractor's option if more than one metal indicated).

   a. Galvanized Sheet Steel: ASTM A 446, Grade A, Coating G60.

   b. Electrolitic Zinc Coated Steel Sheet: ASTM A 591, Coating Class C, with minimum structural quality equivalent to ASTM A 446, Grade A.

SECTION 06200

FINISH CARPENTRY

1 PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract including General and Supplementary Conditions and Division 1 specification sections apply to Work of this section.

1.2 SUMMARY

A. Finish carpentry items, other than shop prefabricated casework; hardware and attachment accessories.

1.3 QUALITY ASSURANCE

A. Perform work in accordance with AWI Quality Standards, Custom Grade.

2 PART 2 PRODUCTS

2.1 LUMBER MATERIALS

A. Softwood Lumber: PS 20; Graded in accordance with AWI Custom ; clear Eastern White Pine species, plain sawn, maximum moisture content of 11 percent.

B. Hardwood Lumber: Graded in accordance with AWI Custom ; Red Oak species, plain sawn, maximum moisture content of 11 percent; of quality suitable for transparent finish.

2.2 ACCESSORIES

A. Fasteners: Size and type to suit application; hot dipped galvanized steel for exterior, high humidity and treated wood locations, plain finish elsewhere.

B. Primer: Alkyd primer sealer type.

2.3 FABRICATION

A. Fabricate to AWI Custom standards.

3 PART 3 EXECUTION

3.1 EXAMINATION AND PREPARATION

A. Prime paint back surfaces of items or assemblies, before installation. Where transparent finish is scheduled, back prime with spar varnish.

Part II
Division 7

Thermal and Moisture Protection

SECTION 07210

BUILDING INSULATION

1 PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract including General and Supplementary Conditions and Division 1 specification sections apply to Work of this section.

1.2 SECTION INCLUDES

A. Board thermal insulation at foundation wall perimeter.

B. Batt thermal insulation and vapor retarder in exterior wall and roof construction.

1.3 SYSTEM DESCRIPTION

A. System performance to provide continuity of thermal barrier and vapor retarder at building enclosure elements.

1.4 ENVIRONMENTAL REQUIREMENTS

A. Install insulation adhesives in accordance with manufacturer's instructions.

2 PART 2 PRODUCTS

2.1 INSULATION MATERIALS

A. Extruded Polystyrene Insulation: ASTM C578, cellular type, conforming to the following:

1. Thermal Resistance: R of 5.0 .
2. Thickness: Thickness indicated.
3. Compressive Strength: Minimum 30 psi .
4. Water Absorption: In accordance with ASTM D2842 0.3 percent by volume maximum.
5. Edges: Square edges.

B. Batt Insulation: ASTM C665, preformed glass fiber batt, conforming to the following:

1. Thermal Resistance: R of 19 for walls, 38 for ceilings.
2. Facing: Unfaced.

C. Ventilation Baffles: Formed plastic used with attic insulation.

2.2 ADHESIVES

A. Adhesive: Type recommended by insulation manufacturer for application.

SECTION 07270

FIRESTOPPING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to work of this section.

1.2 SECTION INCLUDES

A. Firestopping materials and accessories.

1.3 SYSTEM DESCRIPTION

A. Firestopping Materials: Complete systems of materials tested under ASTM E119 ASTM E814 UL 263 UL 1479 to achieve a fire rating as noted on Drawings.

B. Surface Burning: ASTM E84 UL 723 with a flame spread / smoke developed rating of 0/0

C. Firestop all interruptions to fire rated assemblies, materials and components.

1.4 SUBMITTALS

A. Product Data: Provide data on product characteristics, performance and limitation criteria.

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

C. Schedule: Provide a schedule of openings and penetrations requiring firestopping and firesafing. Correlate with products submitted, fire ratings, and testing agency test results.

PART 2 PRODUCTS

2.1 FIRESTOPPING MATERIALS

A. Manufacturers:

1. Isolatek International (Cafco Products).
2. Specified Technologies Inc.
3. 3M Fire Protection Products.
4. United States Gypsum Co.

B. Firestopping Material: Mineral fiber stuffing insulation.

1. USG Thermafiber Safing Insulation.

a. Density: 4.0 lb/cu ft.

C. Firestopping Material: Single component mortar compound.

SECTION 07311

ASPHALT SHINGLES

1 PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract including General and Supplementary Conditions and Division 1 specification sections apply to Work of this section.

1.2 SECTION INCLUDES

A. Granular surfaced asphalt shingle roofing, underlayment, eave, valley, and ridge protection, metal flashings.

1.3 SUBMITTALS

A. Product Data: Provide data indicating material characteristics, and limitations.

B. Samples: Shingle samples for selection.

1.4 QUALITY ASSURANCE

A. Perform Work in accordance with NRCA Steep Roofing Manual.

1.5 WARRANTY

A. Provide 25 year warranty under provisions of Section 01001.

2 PART 2 PRODUCTS

2.1 ASPHALT SHINGLES

A. Manufacturers:

1. IKO Product Renaissance XL

B. Asphalt Shingles: ASTM D225, Type I uniform non-uniform thickness; UL Rating of C and Wind Resistance Label, organic felt base, mineral granule surfaced type; 248 lb/100 sq. ft. weight; self sealing type; square tab; color as selected.

2.2 SHEET MATERIALS

A. Eave (Ice Dam) Protection: Sheet barrier of rubberized asphalt bonded to sheet polyethylene, 40 mil total thickness, with strippable treated release paper; Ice & Water Shield manufactured by WR Grace.

B. Underlayment: No. 15 unperforated asphalt saturated felts.

3.3 INSTALLATION - PROTECTIVE UNDERLAYMENT

A. Place one ply of underlayment over area not protected by eave protection, with ends and edges weather lapped and nailed. Stagger end laps of each consecutive layer.

B. Install perpendicular to slope of roof.

C. Weather lap and seal watertight with plastic cement, items projecting through or mounted on roof.

3.4 INSTALLATION - VALLEY PROTECTION

A. Place rubberized asphalt/polyethylene sheet centered over valleys. Weather lap joints and nail in place.

B. Extend shingles on both slopes across valley in a weave pattern and fasten. Extend shingles beyond valley centerline to achieve woven valley, concealing the valley protection.

3.5 INSTALLATION - METAL FLASHING

A. Weather lap joints and seal weather tight with plastic cement. Secure in place with concealed fastenings. Extend bottom of step flashings to daylight.

B. Flash and seal work projecting through or mounted on roofing with plastic cement, weather tight.

3.6 INSTALLATION - ASPHALT SHINGLES

A. Install shingles in accordance with manufacturer's instructions.

B. Provide double course of shingles at eaves.

C. Place shingles in straight coursing pattern with required weather exposure to produce double thickness over full roof area.

D. Extend shingles 1/2 inch beyond face of gable edge fascia boards.

E. Cap hips and ridges with individual shingles, maintaining weather exposure. Place to avoid exposed nails.

F. Complete installation to provide weather tight service.

3.7 INSTALLATION – RIDGE VENT

A. Install ridge vent in accordance with manufacturer's instructions.

B. Center ridge vent over continuous 2" opening in sheathing and secure to sheathing.

C. Cap ridge vent with shingles.

...END OF SECTION

SECTION 07460

SIDING

1 PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract including General and Supplementary Conditions and Division 1 specification sections apply to Work of this section.

1.2 SECTION INCLUDES

A. Solid vinyl siding for walls and soffits.

B. Related trim, flashings, accessories, and fastenings.

1.3 SUBMITTALS

A. Product Data: Provide data indicating materials, component profiles, fastening methods, jointing details, sizes, surface texture, finishes, and accessories.

B. Samples: Submit samples for selection of surface texture and color.

1.4 WARRANTY

A. Provide limited lifetime warranty under provisions of Section 01001.

2 PART 2 PRODUCTS

2.1 SIDING MATERIALS

A. Manufacturers:

1. Alcoa.
2. Alside.
3. Bird.
4. CertainTeed.
5. Wolverine Technologies.

B. Extruded Polyvinyl Chloride: Minimum 0.044 inches thick; without integral backing material; smooth; double 4 inch clapboard pattern; with integral color; as selected, manufactured to comply with the requirements of ASTM D 3679.

C. Cast Polypropylene Cedar Shingle Siding: Minimum 0.100 inches thick, cedar shingle pattern cast in, with integral color as selected. Tensile strength: 3,500 psi, ASTM D 638; tensile modulus 180,000 psi, ASTM D638; fexural modulus: 180,000 psi. ASTM D 790.

2.2 ACCESSORIES

A. Nails: Hot dipped galvanized type, non-staining.

SECTION 07530

SINGLE PLY MEMBRANE ROOFING

1 PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes single-ply membrane roofing systems, including roof insulation.

B. Types of roofing systems specified in this section utilizing single ply roofing membranes include the following:

1. Fully adhered systems.

C. Single ply roofing membranes include the following:

1. Ethylene propylene diene monomer (EPDM)

D. Wood nailers, blocking, and other related items are specified in Division 6.

1.3 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

B. Product data, installation instructions, and general recommendations from manufacturer of single ply membrane system for types of roofing required. Include data substantiating that materials comply with

C. requirements.

D. Shop drawings showing roof configuration, sheet layout, seam locations, details at perimeter, and special conditions.

E. Pre-roofing Conference records.

F. Test data for pullout resistance of fastening systems.

1.4 QUALITY ASSURANCE

A. Manufacturer: Obtain primary flexible sheet roofing from a single manufacturer. Provide only secondary materials as recommended by manufacturer of primary materials.

B. Installer: Engage an experienced Installer to apply single ply membrane roofing who has specialized in application of roofing systems similar to those required for this project. Installer must be acceptable to or licensed by manufacturer of primary roofing material.

3.6 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. 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 optimum density in accordance with ASTM D 698 (or 92% of optimum density in accordance with ASTM D1557).

For utility trenches located in pavement, sidewalk or patio area, place backfill in eight (8) inch maximum loose lifts and compaction to 95% of ASTM D.1557 maximum dry density.

3.7 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 following densities unless otherwise specified in the project specifications.

(1)	Bedding material and trench sand	95%
(2)	Suitable backfill material under paved or shoulder areas	95%
(3)	Gravel base:	
	a. Under paved areas	95%
	b. In shoulder areas	95%
(4)	Loam areas	90%
(5)	All other areas	85%