SECTION 01570 - TRAFFIC CONTROL

PART 1 - GENERAL

1.01 DESCRIPTION OF REQUIREMENTS:

A. Regulate traffic when working within the R.O.W. of municipal roadways.

B. Perform work in a manner to provide safe passage for the public at all times with a minimum of obstruction to traffic.

C. The local police department, fire department, M.D.O.T. and the Engineer will determine if safe passage is being maintained. Perform additional work required by them to maintain safe passage.

D. Provide all signs, barricades, flags, traffic guards, and warning devices required.

E. Provide access for residents and abutting land owners along the project to driveways and other normal outlets from their property.

PART 2 - PRODUCTS

2.01 SIGNS, BARRICADES, AND WARNING DEVICES

A. General: Comply with requirements in "Manual on Uniform Traffic Control Devices" published by Dept. of Transportation, Federal Highway Administration and requirements of Maine Dept. of Transportation.

PART 3 - EXECUTION

3.01 MAINTENANCE OF TRAFFIC

A. General: Maintain at least one-way traffic through the work area during working hours and two-way traffic during the night and on weekends and holidays.

3.02 DETOURS

A. General: Detours will not be allowed.

3.03 SCHEDULING OF WORK:

A. Schedule all work within the rights-of-way so as not to congest rush hour traffic.

B. Revise the plan of work if, in the opinion of the Engineer, it will create an unreasonably long delay.

3.04 SIGNS, BARRICADES, AND WARNING DEVICES:

A. Provide adequate warning signs, barricades, signal lights, and take other necessary precautions for the safety of the public.

B. Provide and illuminate suitable warning signs to show where construction, barricades, or detours exist.

C. Signal lights: Illuminate at all barricades and obstructions from sunset to sunrise.

D. Maintain necessary signs, and signs required by the Maine D.O.T., barricades, lights, and other safety precautions during authorized suspension of the work, weekends, holidays, or other times when construction work is not in progress.

3.05 UNIFORMED TRAFFIC GUARDS:

A. Uniformed Traffic Guards: Provide uniformed traffic guards when required by police or the Owner and when two-way undelayed traffic cannot be maintained.

3.06 EXISTING SIGNS:

A. Temporarily Reset and Maintain street directory and regulatory signs which must be moved during construction. Relocate signs so that no traffic hazards are created.

B. Permanently reset signs at designated locations prior to completion of work.

END OF SECTION

SECTION 02050 - DEMOLITION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS: The general provisions of the contract, including General and Supplementary Conditions and General Requirements (if any) apply to the work specified in this Section.

1.02 RELATED WORK SPECIFIED IN OTHER SECTIONS:

A. The following items of related work are specified and included in other sections of the specifications.

1. Erosion and Sedimentation Control - Section 02270
2. Earthwork - Section 02200
3. Shoring and Bracing - Section 02150
4. Bituminous Concrete Paving - Section 02510

1.03 SUMMARY OF WORK:

A Demolition includes:

1. Removal and disposal of existing bituminous pavement in the areas indicated on the Drawings.

2. Removal and disposal of existing foundations in building areas, to subgrade level and within all trenching operations and utility installations.

3. Removal of concrete slabs, catch basin and storm lines, guardrails, granite curbing, sidewalks, and other items as indicated on the Drawings.

4. Disconnections and capping of all water, sanitary and electrical services as indicated on the Drawings.

5. Removal of existing trees.

1.04 SUBMITTALS:

A. Schedule: Submit proposed methods and sequence for demolition to Site Engineer for review prior to start of work. Include in schedule coordination with Owner for shut-off, capping and continuation of utility services as required.

1.05 JOB CONDITIONS:

A. Condition of Structures: The Owner assumes no responsibility for actual condition of structures to be demolished.

1. Conditions existing at time of inspection for bidding purposes will be maintained by Owner insofar as practicable.

B. Explosives: Use of explosives will not be permitted.

C. Traffic: Conduct demolition operations and removal of debris to ensure minimum interference with other adjacent occupied or used facilities.

Do not close or obstruct streets, walks or other occupied or used facilities without permission from authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways.

1.06 PROTECTIONS:

A. Existing Work: Protect existing work which is to remain in place or that is to be reused by temporary fencing, covers, shoring, bracing and supports. Items which are to remain and which are damaged during performance of the work shall be repaired to their original condition or replaced with new. Do not overload structural elements. Provide new supports and reinforcement for existing construction weakened by demolition or removal work.

B. Facilities: Protect all existing utility services. Where removal of existing utilities and pavement is specified or indicated, provide approved barricades, temporary covering of exposed areas, and temporary services or connections for required utilities.

PART 2 - EXECUTION

2.01 DEMOLITION:

A. Pollution Controls: Use water sprinkling, temporary enclosures, and other suitable methods to limit dust and dirt rising and scattering in air to lowest practical level. Comply with governing regulations pertaining to environmental protection.

B. Utility Disconnections:

1. Provide all necessary labor, materials and equipment to make necessary disconnections on or adjacent to the site as shown on the drawings.

2. Prior to making any disconnections, notify the owner and appropriate utility companies in advance of intent to disconnect. Be responsible for coordinating all disconnections to utilities controlled by utility companies or municipal authority.
3. Terminate and cap water and sewer services at the main in accordance with requirements of local utility company. Remove water gate valves of

removed service. Utility lines can be abandoned in place. Contact utility company prior to disconnections.

C. Paving and Foundations:

1. Remove foundations and asphaltic concrete paving as indicated or as required to perform work. Foundations encountered in paved areas shall be removed to the proposed subgrade elevation for that area as shown on the Drawings.

2. Paving and foundations encountered in landscape areas shall be removed to 12" below finish grade.

3. Paving and foundations encountered in trenching operations and utility installation shall be removed within limits of work as shown on Plans.

4. Foundations encountered in building footprint shall be removed in their entirety.

D. Miscellaneous:

1. Remove metal guardrails, granite curbing, concrete slabs, steps, and other designated materials as indicated on the Drawings.

2. Remove trees and stumps in their entirety.

2.02 DISPOSAL OF DEMOLISHED MATERIALS:

A. General: Remove from site debris, rubbish and other materials resulting from demolition operations.

Burning of removed materials from demolished structures will not be permitted on site.

B. Removal:

1. Dispose of materials from demolished structures off site in accordance with all applicable standards.

2. Granite curbs in the public right-of-way which are removed and not reused in the right-of-way shall remain City of Portland property. The Contractor shall deliver this material to the City's Hanover Street stockyard.

END OF SECTION

SECTION 02100 - EROSION AND SEDIMENTATION CONTROL

PART 1 - GENERAL

1.01 RELATED DOCUMENTS: The general provisions of the Contract, including General and Supplementary Conditions and General Requirements (if any) apply to the work specified in this Section.

1.02 RELATED WORK SPECIFIED ELSEWHERE:

A. Earthwork: Section 02200
B. Contract Drawings

1.03 DESCRIPTION OF WORK:

A. The Contractor shall provide all materials, equipment, and labor necessary for the diversion of surface water from the construction area and provision of temporary and permanent erosion and sedimentation control structures and measures as shown on the plans and/or set forth in these Specifications, and as designated in the "Erosion and Sediment Control Plan" as shown on the Contract Drawings.

B. Erosion and sedimentation controls shall be provided in accordance with these Specifications for all areas within the limits of this Contract where existing earth and vegetation will be disturbed by construction.

1.04 EROSION AND SEDIMENTATION CONTROL GUIDELINES:

A. Cumberland County Soil & Water Conservation District, Department of Environmental Protection publication dated March 1991, "Maine Erosion and Sediment Control Handbook for Construction: Best Management Practices".

1.05 CONFORMANCE WITH ENVIRONMENTAL LICENSING REQUIREMENTS:

A. All construction under this project shall be subject to review and/or inspection by local, State, and Federal agencies for the adequacy of erosion and sedimentation control measures. The Contractor shall conform to the conditions of environmental permits or licenses which are applicable to the project.

1.06 SUBMITTALS:

A. Prior to installation, the Contractor shall submit two copies of manufacturer's specifications with application and installation instructions for proprietary materials and items, including silt fencing, erosion control mesh, and others as requested by the Engineer.

PART 2 - MATERIALS

2.01 GENERAL: Seed, fertilizer and lime shall be as specified under Erosion Control Notes provided on Contract Drawings.

2.02 MULCH: Mulch shall meet the requirements of Maine Department of Transportation (MDOT) Standard Specification, Section 619.

2.03 EROSION CONTROL MESH: Erosion control mesh shall be in accordance with details provided on Contract Drawings.

2.04 SILTATION FENCE:

A. Siltation Fence: Fencing shall be "Propex Silt Stop" as manufactured by Amoco Fabrics Company or Engineer approved equal.

B. Support Fence: Siltation fabric shall be attached to metal or wooden posts. Fence with an integral support mesh and posts may be used.

PART 3 - EXECUTION

3.01 GENERAL REQUIREMENTS:

A. Prior to grubbing, stripping, excavation, placement of fill, temporary or permanent placement of excavated materials, or other earthwork within the limits of this Contract, the Contractor shall implement erosion and sedimentation control measures as specified and/or as shown on the drawings.

B. Temporary measures for controlling erosion and sedimentation may include, but are not limited to, the following:

1. Siltation fencing around the downslope periphery of areas to be disturbed by construction.

2. Temporary seeding and mulching of soil stockpiles or disturbed areas.

3. Other temporary practices as approved by the Engineer.

C. Permanent measures for controlling erosion and sedimentation shall be provided as shown on the plans or required by these Specifications.

D. Where disturbed areas cannot be permanently stabilized within 14 days of exposure of the soil, the areas shall be temporarily seeded and mulched as specified under Section 02900, or otherwise stabilized as approved by the Engineer.

E. Permanent soil stabilization measures for all slopes, channels, ditches, or any disturbed land area shall be completed within 7 calendar days after final grading has been completed. Where such permanent erosion control measures are not possible or practical to implement, and upon approval by the Engineer, temporary stabilization practices shall be applied as in 3.01.D above.

F. All temporary and permanent control measures shall be periodically inspected and maintained by the Contractor for the duration of the construction and warranty period of this Contract. Sediment collection devices shall be cleaned periodically as required, and the removed material reused or disposed of at an approved disposal area.

3.02 DIVERTING SURFACE WATER:

A. Build, maintain, and operate all cofferdams, channels, flumes, sumps, and other temporary diversion and protection works needed to divert stream flow and other surface water through or around the construction site and away from the construction work while construction is in progress.

B. Outlet diverted stormwater to sedimentation trap or basin or other approved sedimentation control measure.

3.03 SILTATION FENCE:

A. Construct siltation fences at the locations and to the dimensions shown on the Drawings, and as required to meet specified criteria. A berm of erosion control mix shall be placed on the upslope side of all silt fence locations shown on the plans in accordance with the details.

B. Prior to removal of the silt fence, all retained soil or other material shall be removed and disposed of at an approved disposal area.

3.04 CATCH BASIN HAY BALE DIKE:

A. Construct hay bale dikes at all catch basin locations and to the dimensions shown on the Engineering drawings and as required to meet specified criteria.

B. Bales (straw or hay) shall be placed around the catch basin grate with ends tightly abutting the adjacent bales.

C. Each bale shall be embedded in the soil a minimum of 4 inches.

D. Bales shall be securely anchored in place by stakes or rebars driven through the bales. The first stake in each bale shall be angled toward the previously laid bale to force bales together.

E. Bales shall be removed and/or replaced when they have served their usefulness so as not to obstruct storm flow or drainage.

3.05 REMOVAL OF TEMPORARY WORKS:

A. Upon completion of all work, Contractor shall remove to level and grade to the extent required to present a sightly appearance and to prevent any obstruction of the flow of water or any other interference with the operation of or access to the permanent works.

END OF SECTION

SECTION 02150 - SHORING AND BRACING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS: The general provisions of the Contract, including General and Supplementary Conditions and General Requirements (if any) apply to the work specified in this Section.

1.02 RELATED WORK SPECIFIED IN OTHER SECTIONS:

A. Earthwork: Section 02200

1.03 SUMMARY OF WORK:

A. Work included:

Shoring and bracing necessary to protect existing buildings, utilities, and other improvements and excavation against caving; and to meet OSHA safety requirements of shoring and bracing. Shoring and bracing to provide cofferdams. Removal of bracing, as required.

B. Shoring and bracing systems include, but are not limited to, the following:

Steel sheet piling
Movable box

C. Steel sheet piling: Provide steel sheet piling, to be removed following completion of Work, where shown on the drawings or where directed by the Site Engineer. Payment will be incidental to installation of piping, manholes and pump stations. Piling is to remain in place when directed by the Site Engineer. Payment for piling to remain in place will be made by change order.

Steel sheet piling may be left in place at the Contractor's option if approved by the Site Engineer. No additional payment will be made for this piling.

No payment will be made for steel sheet piling used for the Contractor's convenience.

D. Movable box: Provide where a shoring system is required but sheet piling is not called for. Cost of movable box system is incidental to other work items.

1.04 QUALITY ASSURANCE:

A. Design: Assign design of shoring and bracing to a registered Professional Site Engineer.

B. Regulations: Comply with local codes and OSHA requirements.

1.05 SUBMITTALS:

A. Design Documents: Submit design calculations and drawings for shoring and bracing system and other data prepared and sealed by a registered Professional Site Engineer, prior to commencing work on any built in place shoring and bracing system.

1.06 JOB CONDITIONS:

A. Before starting work, check and verify governing dimensions and elevations. Survey condition of adjoining properties with Site Engineer. Take photographs, recording any prior settlement or cracking of structures, pavements and other improvements. Prepare a list of such damages, verified by dated photographs, and signed by Contractor, Site Engineer and others conducting the investigation.

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

C. During excavation, resurvey benchmarks weekly, employing licensed Land Surveyor or registered Professional Site Engineer. Maintain accurate log of surveyed elevations for comparison with original elevations. Notify Site Engineer if changes in elevations occur or if cracks, sags or other damage is evident.

PART 2 - PRODUCTS

2.01 MATERIALS:

A. General: Provide suitable shoring and bracing materials which will support loads imposed. Materials need not be new, but should be in serviceable condition.

B. Steel sheet piling and shapes (corners, etc.): Continuous interlocking type; section modules and type of section as required by design.

C. Bracing members: Wood timbers or A36 steel members.

D. Bolts: ASTM A307.

PART 3 - EXECUTION

3.01 GENERAL:

A. Provide system to resist earth and hydrostatic pressures, including surcharges from surface loads.

B. Locate shoring and bracing to clear permanent construction and to permit forming and finishing of concrete.

C. Maintain shoring and bracing while excavation is open.

D. Removal of systems: Remove systems in stages to prevent disturbance of soils and damage to structures and improvements. Fill voids as soon as sheeting is withdrawn.

3.02 STEEL SHEET PILING AND BRACING:

A. Drive sheet piling prior to excavation where possible. Fill and compact voids outside sheeting to hold sides of excavation in place.

B. Brace as required to prevent distortion of piling and other bracing members. If necessary to move a brace, install new bracing prior to removal of original brace.

C. Cut off sheet piling to be left in place at least two feet below finish grade.

END OF SECTION

SECTION 02200 - EARTHWORK

PART 1 - GENERAL

1.01 RELATED DOCUMENTS: The general provisions of the Contract, including General and Supplementary Conditions and General Requirements (if any) apply to the work specified in this Section.

1.02 RELATED WORK IN OTHER SECTIONS:

A. Shoring and Bracing: Section 02150
B. Erosion and Sedimentation Control: Section 02100
C. Contract Drawings

1.03 SUMMARY OF WORK:

A. Work included: All excavating, filling, backfilling and removal of materials.

1.04 PROTECTION:

A. Paved surfaces: Do not operate equipment on paved surfaces which will damage these surfaces.

B. Maintain excavations with approved barricades, lights and signs to protect life and property until excavation is filled and graded to a condition acceptable to the Site Engineer.

C. Protect structures, utilities, sidewalks, pavements and other facilities from damage caused by settlement, lateral movement, undermining, washout and other hazards created by earthwork operations.

1.05 QUALITY ASSURANCE:

A. Standards:

"Standard Specification for Highways and Bridges" revision of April 1995, Maine Department of Transportation (abbreviated as MDOT "Standard Specification").

B. Testing and Inspection: See General Conditions and Division 01410 for general requirements. Contractor will pay for all aggregate gradation testing. Owner will pay for moisture maximum density tests and field compaction tests as stated in Section 01400, except as otherwise noted in this section.

1.06 SUBMITTALS:

A. Test Reports: Submit the following:

1. Reports on material gradations.

1.07 JOB CONDITIONS:

A. Site Information: Data on indicated subsurface conditions are not intended as representations or warranties of accuracy or continuity between soil borings. It is expressly understood that Owner will not be responsible for interpretations or conclusions drawn therefrom by Contractor. Data are made available for the convenience of Contractor.

Additional test borings and other exploratory operations may be made by Contractor at no cost to Owner.

PART 2 - MATERIALS

2.01 MATERIALS:

A. General

1. Suitable materials: As shown on the Drawings or as specified.

2. Unsuitable materials: Material containing excessive plastic clay, vegetation, organic matter, debris, pavement, stones or boulders over 6 inches in greatest dimension, and frozen material. Material which, in the opinion of the Site Engineer, will not provide a suitable foundation or subgrade.

3. On-Site Material: Any suitable material from on-site excavation.

4. Material for embankments and general fills may contain pieces of excavated ledge having a greatest dimension of up to 12 inches if approved by the Site Engineer.

5. Testing: The Site Engineer may inspect off-site sources of materials and order tests of these materials to verify compliance with these specifications. Provide a gradation analysis on any imported material or material processed on site.

B. Base and Subbase:

1. Aggregate Subbase Material: Shall meet the requirements of Maine Department of Transportation Standard Specifications Section 703.06(b), Type D.

2. Aggregate Base Materials: Shall meet the requirements of MDOT Standard Specifications Section 703.06(a), Type B.

C. Sand: Sieve analysis by weight:

Sieve Size	Max % Passing by Weight
3/8"	100
No. 4	95 – 100
No. 16	50 - 85
No. 100	2 - 10

D. 3/4" Crushed Stone: Durable, clean angular rock fragments obtained by breaking and crushing rock material. 3/4" crushed stone for underdrain shall be durable, washed angular rock fragments. Sieve analysis by weight.

Sieve Size	Max % Passing by Weight
1"	100
3/4"	95 – 100
1/2"	35 - 70
3/8"	0 - 25

E. Crushed Stone at Floor Slabs and Footings: Durable, washed angular rock fragments obtained by breaking and crushing rock material. Reference geotechnical report for gradations requirements.

F. Pea Stone: Naturally round aggregate, ¼" nominal size. Sieve analysis by weight:

Sieve Size	Max % Passing by Weight
3/8"	100
No. 10	0 - 10
No. 200	0 - 2

G. Refill Material: Crushed stone for refilling excavation below grade or rock excavation unless otherwise directed by the Site Engineer.

H. Common Borrow: Earth suitable for embankment construction free from frozen material, perishable rubble, peat and other unsuitable material.

I. Select Backfill: As specified in geotechnical report.

J. Structural Fill: Hard, durable gravel containing only particles passing the 6" sieve. As specified in geotechnical report.

PART 3 - EXECUTION

3.01 EXCAVATION:

A. General: Remove all materials encountered to the limits shown on the drawings, or designated in the Specifications.

B. Classifications:

1. The following classifications of excavation may be made which will be paid for on a unit cost basis:

   a. Rock and Boulder Excavation
   b. Excavation Below Normal Grade
   c. Miscellaneous Common Borrow

2. Measurement and payment for these classifications are described in Division 1.

3. Do not perform excavation of unsuitable materials until material to be excavated has been cross-sectioned and classified by Site Engineer.

C. Earth Excavation: Removal and disposal of pavements and other obstructions visible on ground surface, underground structures and utilities indicated to be demolished and removed, and other materials encountered that are not classified as rock excavation or unauthorized excavation.

D. Excavation for Structures:

1. Conform to elevations and dimensions shown within a tolerance of plus or minus 0.10', and extending a sufficient distance from footings and foundations to permit placing and removal of concrete formwork, installation of services, other construction, and for inspection.

2. In excavating for footings and foundations, take care not to disturb bottom of excavation. Final excavation to subgrade level in the silty clay shall be made with excavation equipment fitted with smooth edged bucket. Excavate by hand to final grade just before concrete reinforcement is placed. Trim bottoms to required lines and grades to leave solid base to

receive other work. Any loose, softened or disturbed material due to construction traffic or replacement of reinforcement shall be removed prior to placement of concrete.

E. Excavation in Paved Areas:

1. Saw cut pavement prior to excavation to provide a clean, uniform edge. Minimize disturbance of remaining pavement. Cut and remove the minimum amount of pavement required to do the work.

2. Use shoring and bracing where sides of excavation will not stand without undermining pavement.

F. Excavation for Trenches:

1. Excavate to widths shown on the Drawings.

2. Produce an evenly graded flat trench bottom at the subgrade elevation required for installation of pipe and bedding material.

3. Load excavated material directly into trucks unless otherwise permitted by the Site Engineer.

4. Place backfill material directly into trench or excavation. Do not stockpile material to be used as backfill in roadways.

G. Unauthorized Excavation: Removal of materials beyond indicated subgrade elevations or dimensions without specific direction of Site Engineer. Unauthorized excavation, as well as remedial work directed by Site Engineer including refilling, is at Contractor's expense.

H. Refilling Unauthorized Excavation:

1. Trenches: Use crushed stone or gravel as directed by Site Engineer.

2. Elsewhere: Backfill and compact unauthorized excavations as specified for authorized excavations of same classification, unless otherwise directed by Site Engineer.

I. Excavation of Unsuitable Materials:

1. When excavation has reached required subgrade elevations, notify Site Engineer who will make an inspection of conditions. If unsuitable bearing materials are encountered at required subgrade elevations, carry

excavations deeper as directed by Site Engineer and replace excavated material with gravel or crushed stone.

2. Removal of unsuitable material and its replacement as directed will be paid for as detailed in the contract.

J. Material Storage:

1. Stockpile and maintain suitable surplus excavated materials for re-use as backfill anywhere within the project limits as directed by the Site Engineer. Place, grade and shape stockpiles for proper drainage.

2. Locate and retain soil materials away from edge of excavations.

3.02 STABILITY OF EXCAVATIONS

A. General: Slope sides of excavations to comply with OSHA regulations and local codes. Shore and brace where sloping is not possible because of space restrictions or stability to material excavated.

Maintain sides and slopes of excavations in a safe condition until completion of backfilling.

B. Refer to Section 02150 for shoring and bracing requirements.

3.03 DEWATERING:

General: Perform all work in the dry. Prevent surface water and subsurface or groundwater from flowing into excavations and from flooding project site and surrounding area.

Do not allow water to accumulate in excavations. Provide and maintain pumps, dewatering system components necessary to convey water away from excavations.

Convey water removed from excavations and rain water to collecting or runoff areas. Establish and maintain temporary drainage ditches and other diversions outside excavation limits for each structure. Do not use trench excavations as temporary drainage ditches. Any material removed off site must have erosion control measures approved by the Site Engineer.

3.04 BACKFILL AND FILL:

A. General: Place acceptable soil material in layers to required subgrade elevations as shown on the Drawings and as listed below.

Fill, backfill and compact to produce minimum subsequent settlement of the material and provide adequate support for the surface treatment or structure to be placed on the material. Place material in approximately horizontal layers of beginning at lowest area to be filled. Do not impair drainage.

B. Ground Surface Preparation: Remove vegetation, debris, unsatisfactory soil materials, obstructions and deleterious materials from ground surface prior to placement of fills. Scarify surfaces so that fill material will bond with existing surface.

When existing ground surface has a density less than that specified under "Compaction" for particular area classification, break up ground surface, pulverize, moisture-condition to optimum moisture content, and compact to required depth and percentage of maximum density.

C. Placement:

1. Place backfill and fill materials in layers not more than 12" in loose depth for material compacted by heavy compaction equipment and not more than 6" in loose depth for material compacted by hand-operated tampers. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.

2. Place backfill and fill materials evenly adjacent to structures to required elevations. Take care to prevent wedging action of backfill against structures by carrying material uniformly around structure to approximately same elevation in each lift.

3. Do not allow heavy machinery within 5 feet of structure during backfilling and compacting.

D. Backfill:

1. Backfill excavations as promptly as work permits, but not until completion of the following:

a. Acceptance of construction below finish grade including, dampproofing, waterproofing, and perimeter insulation.

b. Inspection and recording locations of underground utilities.

c. Removal of concrete formwork.

d. Removal of shoring and bracing, and backfilling of voids with satisfactory materials. Cut off temporary sheet piling driven below

bottom of structures and remove in manner to prevent settlement of the structure or utilities, or leave in place if required.

e. Removal of trash and debris.

f. Permanent or temporary horizontal bracing is in place on horizontally supported walls.

g. Backfill cast-in-place concrete structures when the concrete has developed adequate strength as determined by the Site Engineer.

h. Use care in backfilling to avoid damage or displacement of underground structures and pipe.

i. Backfill under all existing utility pipes crossed during construction operations with 3/4" crushed stone. The crushed stone backfill will extend continuously from the bedding of new utility pipes to the utility pipe crossed, including a 6" thick envelope of crushed stone all around the existing utility pipes.

j. The 3/4" crushed stone backfill shall stand at its own angle of repose. No "haunching" or "forming" with common fill will be allowed.

E. Backfilling Trenches: See Trench Detail on the drawings.

1. Bed pipe in crushed stone. Limits of bedding and requirements for remaining trench backfill are shown on the Drawings.

2. Trenches in cross-country runs: Restore surface to that existing prior to construction. Mound the trench 6 inches above existing grade if required by the Site Engineer

F. Replacement of unsuitable materials:

1. Below normal grade: See paragraph 3.01K.

2. Above normal grade: Replace unsuitable material with suitable on-site material. If additional material is required, use Select Backfill.

3.05 COMPACTION:

A. Methods: Use methods which produce the required degree of compaction throughout the entire depth of material placed without damage to new or existing facilities and which are approved by the Site Engineer. Adjust moisture content of soil as required to achieve specified compaction. Remove and replace material

which is too wet to compact to required density. Compact each layer of till and slopes as work progresses.

B. Degree of Compaction: Compact to the following minimum densities:

FILL AND BACKFILL LOCATION	DENSITY
Under structure foundations	95% of max.
Top 2 feet under pavement	95%
Below top 2 feet under pavement	92%
Trenches through unpaved areas	92%
Embankments	92%
Pipe Bedding	92%
Beside structure foundation walls, tank walls, and retaining walls	95%
Under pipes through structural fills	92%

Maximum density: ASTM D1557, modified.

Field density tests: ASTM D1556 (sand cone), ASTM D2167 (rubber balloon), or ASTM D2922 (nuclear methods).

C. Testing:

1. Determine actual in place densities using field tests as directed by the Site Engineer. Testing shall be done by an independent laboratory and paid for by the Owner.

D. Minimum Number of Tests:

1. Paved Areas and Building Subgrade: Make at least one field density test of subgrade for every 2000 sq. ft. of paved area or building slab, but in no case less than 3 tests.

3.06 GRADING:

A. Grading: Uniformly grade areas within limits of grading under this section, including adjacent transition areas. Smooth finished surface within specified tolerances, compact with uniform levels or slopes between points where elevations are shown, or between such points and existing grades.

B. Grading Outside Structure Lines: Grade areas adjacent to structure lines to drain away from structures and to prevent ponding.

C. Finish surfaces free from irregular surface changes, and as follows:

1. Lawn or Unpaved Areas: Finish areas to receive topsoil to within not more than 0.10' above or below the required subgrade elevations.

2. Pavements: Shape surface of areas under pavement to line, grade and cross-section, with finish surface not more than one-half (1/2) inch above or below the required subgrade elevation.

3. Fill Under Slabs: Grade smooth and even, free of voids, compacted as specified and to required elevation. Provide final grades within a tolerance of ½ inch when tested with a 10' straight edge.

D. Compaction: After grading, compact subgrade surfaces to the percentage of maximum density for each area classification.

3.07 MAINTENANCE:

A. Protection of Graded Areas: Protect newly graded areas from traffic and erosion. Keep free of trash and debris.

B. Reconditioning Compacted Areas: Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, re-shape, and compact to required density prior to further construction.

3.08 DISPOSAL OF EXCESS MATERIALS:

A. Removal from Owner's Property:

Remove excess excavated material, including surplus loam, and dispose of it off Owner's property.

Grade material to the satisfaction of the Owner of the property on which the material is deposited. Keep roads free of debris. Use suitable watertight vehicles for hauling wet materials over roads and streets. Clean up materials dropped from or spread by vehicles promptly or when directed by the Engineer.

END OF SECTION

SECTION 02444 - CHAIN LINK FENCING AND GATES

PART 1 - GENERAL

11.01 DESCRIPTION OF WORK:

A. Provide chain link fences and gates with 6' fabric height as shown on drawings, and provide signs as specified.

B. Concrete: Section 03300.

1.02 QUALITY ASSURANCE:

A. Provide chain link fences and gates as complete units provided by a single source including necessary erection accessories, fittings, and fastenings.

1.03 SUBMITTALS:

A. Product Data: Manufacturer's technical data, and installation instructions for metal fencing and gates.

PART 2 - PRODUCTS

2.01 GENERAL:

A. Dimensions shown for pipe, roll-formed, and H-sections are outside dimensions.

2.02 STEEL FENCING:

A. Fabric: No. 9 ga. (0.148") finished size steel wires, 2" mesh, with top selvages knuckled for fabric 96" high and under, and both top and bottom selvages twisted and barbed for fabrics over 96" high.

Furnish one-piece fabric widths for fencing up to 12' high.

Fabric finish, galvanized, ASTM A 392, Class II, with not less than 2.0 oz. zinc per sq. ft. of surface.

B. Framework: Galvanized steel, ASTM A 120 or A 123, with not less than 1.8 oz. zinc per sq. ft. of surface.

C. Hardware and Accessories: Galvanized, ASTM A 152, with zinc weights per Table 1.

2.03 FRAMING AND ACCESSORIES:

A. End, Corner and Pull Posts: Minimum sizes and weights as follows:

Over 6' fabric height, 2.875" OD steel pipe, 5.79 lbs. per lin. ft., or 3.5" x 3.5" roll-formed sections, 4.85 lbs. per lin. ft.

B. Line Posts: Space 10' o.c. maximum, unless otherwise indicated, 2.375" OD steel pipe, 3.65 lbs. per lin. ft. or 2.25" x 1.875" H-sections, 2.64 lbs. per lin. ft.

C. Gate Posts: Furnish posts for supporting single gate leaf, or one leaf of a double gate installation, for nominal gate widths as follows:

Leaf Width	Gate Post	lbs./lin. ft
Up to 6'	3.5" x 3.5" roll-formed	4.85
	section or 2.875" od pipe	5.79
Over 6' to 13'	4.000" OD pipe	9.11
Over 13' to 18'	6.625" OD pipe	18.97
Over 18'	8.625" OD pipe	28.55

D. Top Rail: Manufacturer's longest lengths, with expansion type couplings, approximately 6" long, for each joint. Provide means for attaching top rail securely to each gate corner, pull and end post.

1.66" OD pipe, 2.27 lbs. per ft. or 1.625" x 1.25" roll-formed sections, 1.35 lbs. per ft.

E. Post Brace Assembly: Manufacturer's standard adjustable brace at end and gate posts and at both sides of corner and pull posts, with horizontal brace located at mid-height of fabric. Use same material as top rail for brace, and truss to line posts with 0.375" diameter rod and adjustable tightener.

F. Post Tops: Weathertight closure cap (for tubular posts), one cap for each post.

Furnish caps with openings to permit passage of top rail.

G. Stretcher Bars: One piece lengths equal to full height of fabric, with minimum cross-section of 3/16" x 3/4". Provide one stretcher bar for each gate and end post, and 2 for each corner and pull post, except where fabric is integrally woven into post.

H. Stretcher Bar Bands: Space not over 15" o.c., to secure stretcher bars to end, corner, pull, and gate posts.

I. Gates: Fabricate swing gate perimeter frames of 1.90" O.D. pipe. Metal and finish to match framework. Provide horizontal and vertical members to ensure proper gate operation and for attachment of fabric, hardware and accessories. Space so that frame members are not more than 8' apart.

Assemble gate frames by welding or with special fittings and rivets, for rigid connections. Use same fabric as for fence, unless otherwise indicated. Install fabric with stretcher bars at vertical edges. Bars may also be used at top and bottom edges. Attach stretchers to gate frame at not more than 15" o.c. Attach hardware to provide security against removal or breakage. Install diagonal cross-bracing consisting of 3/8" diameter adjustable length truss rods on gates to ensure frame rigidity without sag or twist, if required.

J. Gate Hardware: Furnish the following hardware and accessories for each gate.

Hinges: Size and material to suit gate size, non-lift-off type, offset to permit 180° gate opening. Provide 1-1/2 pair of hinges for each leaf over 6' nominal height.

Latch: Forked type or plunger-bar type to permit operation from either side of gate, with padlock eye as integral part of latch.

Keeper: Provide keeper for vehicle gates, which automatically engages gate leaf and holds it in open position until manually released.

Double Gates: Provide gate stops for double gates, consisting of mushroom type of flush plate with anchors. Set in concrete, to engage center drop rod or plunger bar. Include locking device and padlock eyes as integral part of latch, using one padlock for locking both gate leaves.

K. Wire Ties: For tying fabric to line posts, use wire ties spaced 12" o.c. For tying fabric to rails and braces, use wire ties spaced 24" o.c. For tying fabric to tension wire, use hog rings spaced 24" o.c.

Manufacturer's standard procedure will be accepted if of equal strength and durability.

L Vinyl Slat: All perimeter fencing shall be installed with solid image slats of dark green color set in a diagonal weave per recommendation of fence installer or fabrication company.

M. Locks: Provide one lock equal to Master No. 1 for each gate. All locks keyed alike.

PART 3 - EXECUTION

3.01 INSTALLATION:

A. General: Do not begin installation and erection before final grading is completed, unless otherwise permitted.

B. Excavation: Drill holes for posts of diameters and spacings shown, in firm, undisturbed or compacted soil.

If not shown on drawings, excavate holes to minimum diameters as recommended by fence manufacturer.

Unless otherwise indicated, excavate hole depths approximately 3" lower than post bottom, with bottom of posts set not less than 36" below finish grade surface.

C. Setting Posts: Center and align posts in holes 3" above bottom of excavation.

Place concrete around posts and vibrate or tamp for consolidation. Check each post for vertical and top alignment, and hold in position during placement and finishing operations.

D. Top Rails: Run rail continuously through post caps, bending to radius for curved runs. Provide expansion couplings as recommended by fencing manufacturer.

E. Brace Assemblies: Install braces so posts are plumb when diagonal rod is under proper tension.

F. Tension Wire: Install tension wires before stretching fabric and tie to each post with not less than 6 ga. galvanized wire. Fasten fabric to tension wire using 11 ga. galvanized steel hog rings spaced 24" o.c.

G. Fabric: Leave approximately 2" between finish grade and bottom selvage, unless otherwise indicated. Pull fabric taut and tie to posts, rails, and tension wires. Install fabric on security side of fence, and anchor to framework so that fabric remains in tension after pulling force is released.

H. Stretcher Bars: Thread through or clamp to fabric 4" o.c., and secure posts with metal bands spaced 15" o.c.

I. Gates: Install gates plumb, level, and secure for full opening without interference. Install ground-set items in concrete for anchorage, as recommended by fence manufacturer. Adjust hardware for smooth operation and lubricate where necessary.

J. Tie Wires: Use U-shaped wire, conforming to diameter of pipe to which attached, clasping pipe and fabric firmly with ends twisted at least 2 full turns. Bend wire to minimize hazard to persons or clothing.

K. Fasteners: Install nuts for tension bands and hardware bolts on side of fence side. Peen ends of bolts or score threads to prevent removal of nuts.

END OF SECTION

SECTION 02510 - BITUMINOUS CONCRETE PAVING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS: The general provisions of the Contract, including General and Supplementary Conditions and General Requirements (if any) apply to the work specified in this Section.

1.02 RELATED WORK SPECIFIED IN OTHER SECTIONS:

A. Earthwork: Section 02200
B. Curbing: Section 02525
C. State of Maine, Department of Transportation, Standard Specifications - Highways and Bridges, Revision of April 1995, hereafter designated as MDOT Specifications.
D. Contract Drawings.

1.03 SUMMARY OF WORK:

A. Furnish all labor, materials, and equipment to construct plant mix bituminous concrete pavement, bituminous curbing, and pavement marking in conformity with the Contract Drawings and as specified herein.

1.04 QUALITY ASSURANCE:

A. Performance in accordance with State of Maine, Department of Transportation, Standard Specifications - Highways and Bridges, Revision of April 1995, hereafter designated as MDOT Specifications.

B. Qualifications of Bituminous Concrete Producer: Use only materials which are furnished by a bulk bituminous concrete producer regularly engaged in production of hot-mix, hot-laid bituminous concrete.

C. Qualifications of Testing Agency: Use only recognized commercial testing laboratories with not less than 5 years experience in conducting tests and evaluations of bituminous concrete materials and design.

1.05 SUBMITTALS:

A. Mix Design: Provide the Site Engineer with a job mix formula for each course used in the work.

B. Test Reports: Provide two copies of each test described below at the frequency determined in paragraph C.

1. Aggregate Material: Submit laboratory test reports that aggregates used in the bituminous mix conform to Section 703 of the MDOT Specifications.

2. Asphalt Cement: Submit laboratory test reports that bituminous material used in the bituminous mix conforms to Section 702 of the MDOT Specifications.

3. In-Place, Compacted Bituminous Concrete Mix: Submit laboratory test reports of samples cut from the in-place, compacted pavement indicating the percentage of theoretical maximum density (TMD), based on laboratory specimens of the mix combined in the proportions of the job mix formula.

C. Frequency of Testing:

1. Aggregate Material: Submit laboratory test reports of the stockpiled aggregates initially used in the mix and additional test reports for each change of course.

2. Asphalt Cement: Submit laboratory test reports for asphalt cement used in the initial mix and additional test reports for each change of source.

3. In-Place, Compacted Bituminous Concrete Mix: Submit laboratory test reports at frequencies not less than one of the following:

a. Every 300 tons placed.
b. Each day's placement.
c. Each course, each day's placement.

PART 2 - PRODUCTS

2.01 MATERIALS:

A. Aggregates: Conform to Section 703 of MDOT Specifications.

B. Asphalt Cement: Conform to Section 702 of MDOT Specifications. Grade shall be AC-20.

C. Bituminous Concrete Curbing: Bituminous concrete curbing shall be as shown on the Drawings and conform to MDOT Section 712.36.

PART 3 - EXECUTION

3.01 INSTALLATION:

A. Plant Mix Hot Bituminous Pavement: Produce and place in conformance with Section 401 of MDOT Specifications.

B. Pavement Overlay:

1. Raise all utility structures to grade.

2. Sweep entire area clean of all sand, dirt and debris.

3. Apply tack coat to entire service prior applying finish coat.

C. Temporary Trench Pavement Repair:

1. After trenching operations are complete, the Site Engineer may order temporary pavement repair.

2. Material: SHMA hot bituminous concrete.

3. Clean surfaces of existing pavement which will be bonded to the temporary pavement.

4. Place material to a compacted depth of 2 inches.

5. Maintain temporary pavement smooth, free from potholes and to required grade.

6. Periodically inspect temporary pavement areas and repair as necessary, especially during the Winter months when the temporary pavement remains in place for an extended period. The Site Engineer shall have the authority to order repair by the Contractor to areas which are, in his opinion, in unsatisfactory condition.

D. Permanent Trench Pavement Repair:

1. Saw edges of existing pavement to provide a vertical bonding face.

2. Remove temporary paving and sawn out existing paving.

3. Reset manhole frames and covers.

4. Apply a tack coat to the sawn edges.

5. Apply bituminous concrete paving, as specified on Contract Drawings.

6. Roller compact both courses, compacting the final wear course to meet existing pavement surfaces exactly.

7. Paving with City R.O.W. shall be per City specifications and requirements.

END OF SECTION

SECTION 02515 - UNIT PAVERS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS: The general provisions of the Contract, including General and Supplementary Conditions and General Requirements (if any) apply to the work specified in this Section.

1.02 RELATED WORK SPECIFIED IN OTHER SECTIONS:

A. Earthwork: Section 02200
B. Concrete Sidewalks: Section 02520
C. Bituminous Concrete Paving: Section 02510
D. Curbing: Section 02525
E. Brick Sidewalk Repair: Section 02516 (Supplemental)

1.03 SUMMARY 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. Preparation of site.
2. Supply and place laying course.
3. Supply and install paver stones in quality, shape, thickness and color as specified.
4. Supply and install paver sealant coating.

1.03 SUBMITTALS:

A. General: Provide submittals in compliance with Section 01340 - Submittals, Shop Drawings, Product Data and Samples.

B. Manufacturer's Data: Submit 2 copies of manufacturer's specifications and other data for each type of paver and sealant required, including certification that each type complies with the specified requirements. Include instructions for handling, storage, installation and protection of each.

C. Samples: Submit samples of following:

1. Each paver indicating full range of color and texture to be expected in completed work.

1.04 PERFORMANCE SPECIFICATION:

"Standard Specification for Highways and Bridges" revision of April 1995, Maine Department of Transportation (abbreviated as MDOT "Standard Specification").

1.05 WEATHER LIMITATIONS:

A. Protect unit paver work against freezing when temperature is 40° F (4° C) and falling. Protect unit paver work in hot weather to prevent excessive evaporation of setting beds and grout.

PART 2 - PRODUCTS

2.01 UNIT PAVERS:

A. Granite cobbles per plan detail sheet.

2.02 EDGE RESTRAINT:

A. All edges of the paver stone installation shall be restrained. The type of edge restraint shall be approved and locations noted on the plans.

B. This edge restraint can be:

1. Proposed elements as follows:

a. Concrete sidewalks
b. Granite curbing
c. New edge restraint

2. New edge restraint shall be "Pave Edge" as manufactured by Pave Tech. Inc., Bloomington, MN, or approved equal.

C. Edge restraint shall be in place and secure before paver stones are compacted.

2.03 GRADED AGGREGATE SUBBASE AND BASE COURSE:

A. Aggregate subbase and base course as shown on Drawings. See Section 02200 - EARTHWORK.

2.04 DRY GROUT FOR LEVELING COURSE AND JOINTS:

A. A mixture of six parts sand to one part Portland Cement. Sand shall consist of clean, coarse, concrete sand or granite screening, not Mason sand, with the following gradation limits:

Sieve Size	% Passing

3/8"	100
4	90 - 100
8	80 - 95
16	55 - 85
50	10 - 35
200	0 - 5

2.05 PAVER SEALANT:

A. Paver Guard sealant by Pave Tech, Inc.

PART 3 - EXECUTION

3.01 CONSTRUCTION OF THE AGGREGATE SUBBASE AND BASE COURSE:

A. The aggregate base course shall be constructed to the proper subgrade in accordance with Section 02200, EARTHWORK.

3.02 DRY GROUT SETTING BED:

A. This method is required for brick paver installations only.

B. The laying course shall be spread evenly over the area to be paved and screeded to a level that will produce the required 1" thickness when the unit pavers have been placed and compacted.

C. Once screeded and leveled, the laying course shall not be disturbed in any way.

D. The laying course shall exceed the perimeter of the paved area by a minimum of 3".

3.03 UNIT PAVER INSTALLATION:

A. This method is required for all pavers.

B. After the dry grout setting bed has been properly prepared, the unit pavers shall be placed in the pattern shown on the plans. Place as closely together as possible; the joints between the pavers shall be no wider than that allowed by the natural texture of the paver itself. When necessary, the pavers shall be saw cut.

C. After the pavers are carefully set, a plank or heavy sheet of plywood covering several courses of pavers shall be placed upon the pavers and carefully rammed with a heavy hammer until the paver reaches a firm, unyielding bed and present a surface of the proper slope and grade. Any divergence from line and grade is to be

corrected by taking up and relaying the pavers. After the ramming of the pavers, a sufficient amount of dry grout shall be spread over the surface and thoroughly swept or raked so as to fill the joints. All surplus grout remaining on the sidewalk after the joints have been properly filled shall be carefully removed by sweeping. Care shall be taken to avoid raking out the joints during removal of excess grout. Swept surface shall then be thoroughly dampened with a low volume fine spray of water.

3.04 EDGE RESTRAINT:

A. All edge restraints shall be in place prior to installation/compaction of unit pavers.

B. Install new edge restraint system in accordance with manufacturer's specifications.

3.05 PAVER SEALANT:

A. Install two coats in accordance with manufacturer’s specifications.

END OF SECTION

SECTION 02516 – BRICK SIDEWALK REPAIR

BRICK/PRECAST CONCRETE PAVERS

1.01 DESCRIPTION

This work shall consist of the construction of brick/precast concrete paver sidewalks and driveways on bituminous concrete base in accordance with these specifications and in reasonably close conformity with the lines and grades as shown on the plans.

1.02 MATERIALS

Materials shall conform to the requirements of the various subsections of the specifications listed below:

A. Used Brick: The Contractor shall salvage existing bricks from the project area as specified in Section 203 of the Supplemental Specifications. The Engineer shall have full authority in the choice of brick to be disposed of.

The discarded brick shall become the property of the City and shall be delivered by the Contractor to the Riverside Reclamation Site.

B. New Brick: Conform to the various subsections of the specifications listed below.

Brick shall conform to requirements of ASTM Standard Specifications for Building Brick (made of clay or shale) Designation C62-66 for Grade SW with the following modifications:

1. The absorption limits shall be from 8 to 12 per cent for the average of 5 bricks.
2. The compressive strength shall not be less than 8000 pounds per square inch (psi).
3. The modulus of rupture shall not be less than 1000 pounds per square inch (psi).
4. The bricks shall be No. 1, wire cut type for paving.

Bricks shall be of standard size (2-1/4" x 3-3/4" x 8") with permissible variations not to exceed 1/16" in depth, 1/8" in width or 1/4" in length.

Bricks shall be as manufactured by the Morin Brick Co. of Danville, Maine or an approved equal. Prior to ordering the brick, samples shall be submitted in whole straps to show color range.

All base courses and joints shall conform to the applicable subsections of Division 700 of the Standard Specifications.

C. Precast Concrete Pavers: Conform to the various subsections of the specification listed below. Precast Concrete Pavers shall conform to requirements of ASTM Standard Specifications for Designation C-936 with the following modifications:

1. The absorption limits shall be a maximum of 5 per cent.

2. The compressive strength shall not be less than 8000 pounds per square inch (psi).

Precast concrete pavers shall be the Duracon "Hollandstone" variety of paving stone. The color of the stone shall be "New England Blend". The standard size of paving stone shall conform to the 60mm profile (2-3/8" x 4" x 8").

Precast concrete pavers shall be as manufactured by Genest Concrete of Sanford, Maine or an approved equal.

1.03 CONSTRUCTION METHODS

A. Subgrade: The subgrade for the sidewalks and driveways shall be shaped parallel to the proposed surface of the walks and drives and shall be thoroughly compacted. All depressions occurring shall be filled with a suitable material and again compacted until the surface is smooth and hard.

B. Foundation: After the subgrade has been prepared, a foundation of crushed gravel shall be placed upon it. After being thoroughly compacted, the foundation shall have a thick-ness as shown on the plans and typical details and shall be parallel to the proposed surface of the work.

C. Bituminous Base: A layer of hot bituminous pavement grading "B" shall be spread upon the properly prepared crushed gravel. After being thoroughly compacted, the bituminous base course shall have a minimum thickness of two (2") inches and shall be parallel to the proposed finish grade.

D. Sand-Cement Base: A layer of sand-cement base course material one (1") inch in thickness shall be spread upon the properly prepared bituminous base course. The course shall be thoroughly compacted and present a hard smooth surface parallel to the proposed finished slope and grade of the walks and drives. The ratio shall be six (6) parts of washed mortar sand to one (1) part Portland Cement.

E. Brick/Precast Concrete Pavers Placement: After the sand base course has been properly prepared, the brick/precast concrete pavers shall be placed in the pattern shown on the plans and typical details. The brick/precast concrete pavers shall be placed as closely together as possible and the sand joints between the brick/precast concrete pavers shall be no wider than that allowed by the natural texture of the brick/precast concrete pavers itself. NO OPEN JOINTS WILL BE ALLOWED. Brick/precast concrete pavers shall be saw cut to fit spaces requiring less than a

whole brick. No cut brick/precast concrete pavers shall be less than two (2") inches in length. A journeyman brick mason shall supervise all brick/precast concrete pavers placement.

After the bricks/precast concrete pavers are carefully set upon the properly prepared sand-cement base, a plank or heavy sheet of plywood covering several course of brick shall be placed upon the bricks/precast concrete pavers and carefully rammed with a heavy hammer until the bricks reach a firm, unyielding bed and present a surface of the proper slope and grade. Any divergence from line and grade shall be corrected by taking up and relaying the bricks/precast concrete pavers. After the ramming of the bricks/precast concrete pavers, a sufficient amount of sand-cement shall be spread over the surface and thoroughly swept or raked so as to fill the joints. All surplus sand-cement remaining on the sidewalk and driveway after the joints have been properly filled, shall be carefully removed by sweeping. Care shall be taken to avoid raking out the joints during removal of excess sand-cement. A final application of sand only shall be spread on the sidewalk. The application of sand shall then be removed by sweeping while the aforementioned precautions are being exercised.

A 12" wide bituminous strip shall be placed at the gutter line and at the back edge of the brick driveway as a transition between the brick and adjoining surfaces.

1.04 METHOD OF MEASUREMENT

Brick/Precast Concrete Paver Sidewalks and Driveways will be measured by the square yard of finished surface complete in place.

END OF SECTION

SECTION 02520 PORTLAND CEMENT CONCRETE SIDEWALKS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS: The general provisions of the Contract, including General and Supplementary Conditions and General Requirements (if any) apply to the work specified in this Section.

1.02 RELATED WORK SPECIFIED ELSEWHERE:

A. Earthwork: Section 02200
B. Curbing: Section 02620

1.03 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. Cast-in-place concrete walkways. Refer to Site Drawings for details of site improvement.
2. Formwork for cast-in-place concrete.
3. Reinforcing steel for cast-in-place concrete.
4. Moisture barriers.
5. Control joints in slabs.
6. Expansion joint filler at perimeter, isolation joints and other locations of slabs.

1.04 QUALITY ASSURANCE:

A. General: Comply with the requirements of Division 1 for QUALITY ASSURANCE; SUBMITTALS.

B. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

C. Quality Control:

1. Do not commence placement of concrete until mix designs have been reviewed and approved by the Engineer and all governmental agencies having jurisdiction, and until copies are at the job site, and the batch plant.

2. Also see other requirements for testing as stated in Part 3 of this Section.

1.05 REFERENCE SPECIFICATIONS:

A. Specifications for Structural Concrete for Buildings" by the American Concrete Institute ACI-301-84 (87).

B. "Building Code Requirements for Reinforced Concrete" ACI-318-83 (86).

1.06 SUBMITTALS:

A. General: Comply with the requirements of Division 1.

1.07 NOTIFICATION OF RELATED TRADES:

A. Notify all other trades responsible for installing chases, inserts, sleeves, anchors, louvers, etc., when ready for such installation, and for final checking immediately before concrete is placed. Cooperate with such trades to obtain proper installation.

PART 2 - PRODUCTS

2.01 FORM MATERIALS:

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

B. Form Coatings: Provide commercial formulation form-coating compounds that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

2.02 REINFORCING MATERIALS:

A. Welded Wire Fabric: ASTM A185, Welded Steel Wire Fabric.

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

1. For slabs-on-grade, use supports with sand plates or horizontal runners where base material will not support chair legs. Supports fabricated from concrete may be used when approved.

2.03 MATERIALS FOR CONCRETE:

A. Portland Cement: ASTM C150, Type I or II. Type III may be used at the Contractor's option, when approved by the Engineer. Use one brand of cement throughout the project for each strength and mix of concrete.

B. Water: Water shall be clean and fresh and free from injurious amount of oils, acids, alkalis or organic matter.

C. Aggregate:

1. Normal Weight: Maximum sizes shown in the Proportioning Table in this Section, conforming to ASTM C 33.

2. Fine and coarse aggregates shall be regarded as separate ingredients.

3. Variation of required aggregate graduation will be permitted only upon the concrete supplier's written guarantee of the specified strengths of the concrete determined in accordance with cylinder tests specified in the Concrete Testing Section in Division 1.

4. The aggregates shall be free from injurious amounts of organic impurities.

5. The aggregates shall be combined so that the grading will fit the following table:

Grading Limits of Combined Aggregates
Percentage Passing

Sieve Sizes	Class A-1	Class A-2	Class B & C
3 inches	--	--	100
2½ inches			95-100
1½ inches	90-100	--	65- 87
1 inch	50- 86	90-100	50- 75
3/4 inch	45- 75	55-100	45- 66
3/8 inch	38- 45	45- 75	38- 55
#4	30- 45	35- 60	30- 45
#16	17- 33	20- 35	17- 27
#50	4- 10	5- 15	4- 9
#100	1- 3	1- 5	1- 3

D. Admixtures:

1. Water reducing agent: "Sonotard WR" by Sonneborn Building Products, "WRDA" by W. R. Grace & Company, "Pozzolith 100" by Master Builders Company, or equal approved by the Engineer and conforming with ASTM

494 Type A. The water reducing agent must be by the same manufacturer as the air-entraining agent.

2. Air-entraining agent: "Aerolith" by Sonneborn Building Products, "Darex" by W. R. Grace & Company, "MB-VR" by Master Builders Company, or equal approved by the Engineer conforming to ASTM C-260. To be used to obtain percent air-entrainment specified unless obtained by cement used.

3. No other admixtures may be used without Engineer approval. Calcium chloride will not be permitted.

2.04 RELATED MATERIALS:

A. Joint filler at slab perimeters - ¼" thick polyethylene closed cell material to be Sonoflex F. by Sonneborn, or Engineer approved equal.

B. Absorptive Cover: Burlap cloth made from Jute or kenaf, weighing approximately 9 oz. per square yard, complying with AASHTO M182, Class 2.

C. Moisture-Retaining Cover: One of the following, complying with ASTM C171.

1. Waterproof paper.

D. Liquid Membrane Curing Compound:

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

E. Non-Shrink Grout - "Embeco Pre-Mixed Grout" by Master Builders, "P.I.W. Irontrox Grout" by Toch Brothers, Inc., "Por-Rok" Expanding Grout by Hallemite Manufacturing Company, or equal as approved by the Engineer.

F. Expansion Joint Filler shall be Sonoflex by Sonneborn or Engineer approved equal.

G. Joint Filler at Expansion Joints in Paved Areas: ½" thick polyethylene closed cell material to be Sonoflex F. by Sonneborn, or Engineer approved equal.

H. Backing Rod for Resilient Caulk at Control Joints: 3/8 in. polyethylene backing rod. Use type NP-1 for vertical surfaces and type SL-1 for horizontal surfaces.

I. Seal coat for all exposed concrete walk surfaces shall consist of two coats of Hydrozo Clear 15 as manufactured by Hydrozo Coatings Company, Lincoln, Nebraska or Engineer approved equal.

2.05 STORAGE OF MATERIALS:

A. All materials shall be stored to prevent damage from the elements and other causes.

B. Cement and aggregates shall be stored in such a manner as to prevent deterioration damage from weather or intrusion of foreign matter. Any materials which have deteriorated, or which have been damaged, shall not be used for concrete.

C. Store reinforcing steel on wood skids to protect it from weather, oil, earth and damage from trucking or other construction operations. Reinforcement shall be free from loose mill scale, rust, oil, concrete spatter and other extraneous coatings at the time it is embedded in the concrete.

D. All forms shall be stored in a neat manner and orderly fashion, protected from the weather and abuse.

E. Materials which are judged by the Engineer to be not acceptable for this project shall be immediately removed from the site.

2.06 PROPORTIONING AND DESIGN OF MIXES:

A. PROPORTIONS:

1. Concrete shall be a homogeneous mixture of Portland cement, water, fine aggregates, and coarse aggregates proportioned within the limits specified in this Section.

2. Classes:

a. Class A: General use for reinforced sections.

3. Proportioning Table: See the end of this section.

4. Proportion admixtures according to the manufacturer's recommendations.

5. Mix Design:

a. Select the proportion of ingredients to produce proper placeability, durability, strength, and other required properties.

b. Proportion the mixture so that it will work readily into corners and angles of the forms and around reinforcement by the methods of placing and consolidating used on the job, but without permitting

the materials to segregate or excessive free water to collect on the surface.

c. Determine the water-cement ratio to attain the required strength in accordance with the following Proportioning Table.

6. An alternate mix design employing the same ingredients proposed for use and used successfully on a previous project under similar conditions to those anticipated on this project may be used, provided the following are submitted and approved:

a. The concrete mix design.

b. Reports for at least 20 consecutive sets of 7 and 28 day concrete strength tests made from the same materials and sources covering a period of at least 6 months.

c. Reports of current compliance tests of fine and coarse aggregates made of materials from the same source.

B. MIXING:

1. General: All concrete shall be Ready Mixed concrete.

2. Admixtures (when approved by the Engineer):

a. Add all admixtures to the mixer as a solution and dispense automatically by a metering device having a measuring accuracy of ±3 percent.

b. Add different admixtures separately.

c. Add retarders directly after cement is introduced.

3. Retempering:

a. Do not retemper concrete that has set.

b. Add water only to the extent that the permissible slump and the maximum water-cement ratio is not exceeded. No water may be added to the mix once the deposition of a load has commenced.

c. Do not add cement or water without the express written approval of the Engineer.

PROPORTIONING TABLE

Class and Use	28 day Compressive Strength (psi)	Max.Size Coarse Aggregate (inches)	Percent Air (±1%)	Max. Slump (inches)	Min. Cement Factor (#/CY)	Max. W/ C #/#
Class A6 Slabs on Grade Exterior	4,000	3/4"	7	3"	*	*

* The determination of the Water-Cement Ratio and Minimum Cement Factor to acquire the required strength shall be in accordance with Method 1 or Method 2 of ACI Standard 301, Paragraph #3.8.2.1 and 3.8.2.2

NOTE: A water reducing additive may be required to make a workable mix and stay below the maximum water/cement ratio.

PART 3 - EXECUTION

3.01 FORMING:

A. Formwork shall conform to ACI 347.

B. Forms shall be constructed to conform to shapes, lines and dimensions shown, plumb and straight and shall be maintained sufficiently rigid to prevent deformation under load. Forms shall be sufficiently tight to prevent the leakage of concrete. Securely brace and shore forms to prevent displacement and to safely support the construction loads.

C. Treat forms and form linings with a commercial grade form release agent applied according to the manufacturer's instructions, by roller, brush or spray to produce a uniform thin film without bubbles or streaks. Apply the release agent in two coats for the first use of the form and in one coat for each additional use.

D. Removal:

1. Formwork for columns, walls, sides of beams and other parts not supporting the weight of the concrete may be removed as soon as concrete has hardened sufficiently to resist damage from removal operations, but must remain a minimum of 3 days after the placement of the concrete.

2. No live loads shall be allowed on slabs until the concrete has reached the specified 28 day strength, unless the slab is reshored.

3.02 MIXING PROCESS:

A. Use ready-mix process, ACI 301-72 Par. 7.1.

3.03 PLACING REINFORCEMENT:

A. Comply with Concrete Reinforcing Steel Institute's recommended practice for "Placing Reinforcing Bars", for details and methods of reinforcement placement and supports, and as herein specified.

1. Clean reinforcement of loose rust and mill scale, earth, ice and other materials which reduce or destroy bond with concrete.

2. Accurately position, support and secure reinforcement against displacement by formwork, construction, or concrete placement operations. Locate and support reinforcing by metal chairs, runners, bolsters, spacers and hangers, as required to comply with Contract Drawings.

3. Place reinforcement to obtain specified coverages for concrete protection. Arrange, space and securely tie bars and bar supports to hold reinforcement in position during concrete placement operations. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.

4. Install welded wire fabric in as long lengths as practicable. Lap adjoining pieces at least one full mesh and lace splices with wire. Offset end laps in adjacent widths to prevent continuous laps in either direction.

3.04 JOINTS:

A. Provide construction joints as shown on the DRAWINGS, but in any case limit the maximum dimensions for placement of concrete in any one pour as follows:

1. Slabs-on-grade: Saw out joints in slabs where indicated on drawings and in accordance with Contract Drawings, within 48 hours of finishing. Cut to be at locations and depth shown on Contract Drawings as narrow as possible; cut to a true straight line.

B. Joints in Paved Areas:

1. General:

a. Construct expansion joints true-to-line with face perpendicular to surface of paved areas, unless otherwise shown.

2. Construction Joints:

   a. Place construction joints at expansion joints.
   b. Construct joints as shown on the Drawings.

3. Weakened-Plane (Contraction) Joints: Provide weakened-plane (contraction) joints, sectioning the walkway into areas at maximum 5 ft.-0 in. o.c.

   a. Form weakened plane points in the fresh concrete by grooving the top portion of the slabs with a recommended cutting tool and finishing edges with a jointer.

4. Expansion and Isolation Joints:

   a. Construct expansion joints true to line with face perpendicular to surface of paved areas. Align with existing joints where appropriate.

   b. Provide pre-molded joint filler for expansion joints and isolation joints abutting concrete paving and curbs, catch basins, manholes, inlet structures, walks, and other fixed objects.

   c. Locate expansion joints as shown on the plans.

   d. Extend joint fillers full width and depth of the joint, and ½" below the finished pavement surface. Furnish joint fillers in one-piece lengths for the full width being placed, wherever possible. Where more than one length is required, carefully butt joint filler sections together.

   e. Protect the top edge of the joint filler during concrete placement with a metal cap or other temporary material. Remove protection after both sides of joint are placed.

   f. Apply resilient caulking material in accordance with manufacturer's direction.

5. Control Joints:

   a. Control joints shall be tooled where shown on DRAWINGS.

   b. Insert backing rods in joints before applying caulking compound. Rods shall be installed in vertical joint first.

3.05 CONCRETE PLACEMENT:

A. 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 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 a straightedge and strikeoff. Use full 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. Cold Weather Placing: Protect concrete work from physical damage or reduced strength which could be caused by frost, freezing actions, or low temperatures, in compliance with ACI 306 and as herein specified.

1. When air temperature has fallen to or is expected to fall below 40 deg. F. (4 deg. C), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg. F (10 deg. C), and not more than 80 deg. F (27 deg. C) at point of placement.

2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.

3. Do not use calcium chloride, salt and other materials containing antifreeze agents or chemical accelerators.

4. All temporary heat, form insulation, insulated blankets, coverings, or other equipment and materials necessary to protect the concrete work from physical damage caused by frost, freezing action, or low temperature shall be provided prior to start of placing operations. Prior to construction, proposed methods must be approved by the Engineer.

a. When the air temperature has fallen to or is expected to fall below 40 deg. F, provide adequate means to maintain the temperature in the area where concrete is being placed between 50 and 70 deg. F.

3.06 SLAB FINISHES:

A. Test Panel: A test panel, 5’ x 5’, containing all joints required shall be inspected and approved by the Architect prior to placement of any final pours. The approved test panel shall set the standard for all flat work.

B. Non-Slip Broom Finish (NSBrm-Fn): Apply non-slip broom finish to exterior concrete platforms, steps and ramps, and elsewhere as indicated.

1. Immediately after trowel finishing, slightly roughen concrete surface by brooming with fiber bristle broom perpendicular to main traffic route. Coordinate required final finish with Engineer before application.

C. Finishing Landing Slabs:

1. After striking off and consolidating concrete, smooth the surface by screeding and floating. Use square nose shovels to consolidate along edges and corners. Use hand methods only where mechanical floating is not possible. Adjust the floating to compact the surface and produce a uniform texture.

2. After floating, test surface for trueness with a 10' straightedge. Distribute concrete as required to remove surface irregularities, and refloat repaired areas to provide a continuous, smooth finish.

3. Work edges of exposed slabs with a 1/8 in. radius edging tool, unless otherwise shown.

4. After completion of floating and when excess moisture or surface sheen has disappeared, complete surface finishing as follows:

a. Provide broom finish by drawing a fine-hair broom across the concrete surface, perpendicular to the line of traffic.

b. Repeat operation if required to provide a fine line texture acceptable to the Engineer.

3.07 CONCRETE CURING AND PROTECTION:

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Protect concrete work from physical damage or reduced strength which could be caused by frost, freezing actions, or low temperatures, in compliance with the requirements of ACI 306 and as herein specified.

1. Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing. Weather permitting, keep continuously moist for not less than 7 days.

2. Begin final curing procedures immediately following initial curing and before concrete has dried. Continue final curing for at least 7 days in accordance with ACI 301 procedures. Avoid rapid drying at end of final curing period.

    a. Curing shall be continued for at least 7 days in the case of all concrete except high-early-strength concrete for which the period shall be at least 3 days. Alternatively, if tests are made of cylinders kept adjacent to the structure and cured by the same methods, moisture retention measures may be terminated when the average compressive strength has reached 70 percent of the specified strength, f'c. If one of the curing procedures below is used initially, it may be replaced by one of the other procedures any time after the concrete is 1 day old provided the concrete is not permitted to become surface dry during the transition.

3. When the mean daily outdoor temperature is less than 40 deg. F, the temperature of the concrete shall be maintained between 50 and 70 deg. F. for the required curing period.

    a. When necessary, arrangements for heating, covering, insulating, or housing the concrete work shall be adequate to maintain the required temperature without injury due to concentration of heat. Combustion heaters shall not be used during the first 24 hours unless precautions are 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 hr. or 50 deg. F. in any 24-hr. 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" 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 in continuous operation by power-spray or roller in accordance with manufacturer's direction. 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.

   c. No chemical curing, sealing, or parting agents of any kind shall be used without the written approval of the finish floor manufacturer.

3.08 QUALITY CONTROL TESTING DURING CONSTRUCTION:

A. The owner will employ a testing laboratory to inspect, sample and test the materials and the production of concrete and to submit test reports.

B. 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 Engineer. 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

SECTION 02525 - CURBING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS: The Plans, General Conditions of the Contract, and Supplementary General Conditions, apply to the work specified in this Section.

1.02 DESCRIPTION OF WORK:

A. Provide all materials, equipment, and labor necessary for the placement of granite curbing, precast concrete curbing, and bituminous concrete curbing as shown on the Plans and as specified herein.

B. Related Work Specified Elsewhere:

1. Earthwork: Section 02200
2. Unit Pavers: Section 02515
3. Portland Cement Concrete Sidewalks: Section 02520

1.03 PERFORMANCE SPECIFICATION:

"Standard Specification for Highways and Bridges" revision of April 1995, Maine Department of Transportation (abbreviated as MDOT "Standard Specification").

PART 2 - MATERIALS

2.01 GRANITE CURBING: Quarried granite stone conforming to MDOT Section 712.04.

2.02 CIRCULAR GRANITE CURB: Circular granite curb shall be in reasonable close conformity with the shape and dimensions as shown on the Plans and to the applicable material requirement.

PART 3 - INSTALLATION

3.01 PLACEMENT OF CURBING:

A. Installation of Granite:

1. Vertical Granite Curb: Set curb on a compacted foundation so that the front top arris line conforms to the lines and grades required. Assure the required spacing between stones by the use of an approved spacing device to provide an open joint between stones of at least 1/8 inch and no greater than 1/2 inch.

2. Sloped Granite Curb: Prepare the concrete foundation in advance of setting the stone by grading the proper elevation and shaping to conform as closely as possible to the shape of the bottom of the stone. Fill voids between stones with mortar mix. Maximum joint spacing is 1/2 inch.

B. Backfilling:

1. Fill all remaining spaces under the curb with approved material and thoroughly hand tamped so the stones will have a firm uniform bearing on the foundation for the entire length and width.

2. Fill any remaining excavated areas surrounding the curb to the required grade with approved materials. Place this material in layers not exceeding 8 inches in depth, loose measure and thoroughly tamped.

3. Vertical Granite Curb: To ensure backfill material does not infiltrate through the joints between the stones, place geotextile fabric in the back portion of the joint to prevent such infiltrating.

C. Protection:

1. Protect the curb and keep in good condition.

2. Clean and restore all exposed surfaces smeared or discolored to a satisfactory condition or remove and replace the curb stone.

END OF SECTION

SECTION 02630 - PAVEMENT MARKINGS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS: The general provisions of the Contract, including General and Supplementary Conditions and General Requirements (if any) apply to the work specified in this Section.

1.02 RELATED WORK SPECIFIED ELSEWHERE:

A. Bituminous Concrete Paving: Section 02612

1.03 DESCRIPTION OF WORK:

A. Provide all materials, equipment, and labor necessary for marking of pavement, including parking lots, walks and roadways, as indicated on the drawings.

PART 2 - MATERIALS

2.01 GENERAL: All materials conforming to M.D.O.T. specifications Section 708.03.

2.02 Paint For Pavement Marking: White, yellow and blue as shown on Drawings meeting the requirements of AASHTO M248, Type N.

PART 3 - INSTALLATION

3.01 GENERAL: Comply with requirements of the manual on Uniform Traffic Control.

3.02 PREPARATION OF SURFACE: Immediately prior to applying pavement marking, clean the surface of dirt, grease, oil, water and other foreign matter. Dry the surface if necessary.

3.03 LAYOUT: Layout required markings with chalk prior to applying paint to ensure proper alignment. Use standard stencils for all directional arrows.

3.04 APPLICATION: Apply paint by hand or with striping machine to a minimum wet thickness of 15 mils.

3.05 PROTECTION: Place temporary barriers to keep traffic off paint throughout required drying time.

END OF SECTION

SECTION 02665 - WATER MAINS AND APPURTENANCES

PART I - GENERAL

1.01 RELATED DOCUMENTS: The general provisions of the Contract, including General and Supplementary conditions and General Requirements (if any), apply to the work specified in this Section.

1.02 RELATED WORK SPECIFIED ELSEWHERE:

A. Earthwork: Section 02200
B. Erosion Control: Section 02100

1.03 DESCRIPTION:

A. Work Included: Furnish and install the pipe materials, fittings, and appurtenances of the type(s) and size(s), and in the location(s) shown on the Drawings and as specified herein. Comply with all applicable local, State and Federal regulations.

1.04 SUBMITTALS

A. Furnish the name of the manufacturer to the Engineer prior to commencing work. For any given pipe material, use pipe of the same manufacturer through the project.

B. The Construction Manager requests that the Contractor submit manufacturer's certification that the product meets requirements of the Specification.

PART 2 - PRODUCTS

2.01 GENERAL:

A. Except where the type of class or use of pipe is explicitly indicated on plan or specified herein, the Contractor may provide any of the kinds of pipe specified. However, in the interest of future maintainability, only one type of pipe will be approved for a given utility for general use in all those areas where the Contractor has choice.

B. Pipe and appurtenant materials from the service connection to the Water District's Main shall conform to the specifications of the Water District.

C. Pipe and fittings within the project shall conform to the Water District's standards and applicable State and Federal Regulations.

2.02 DUCTILE IRON PIPE:

A. Shall be cement lined ductile iron pipe, Class 52 meeting the standards of ANSI/AWWA C150/A21.50, ANSI/AWWA C151/A21.51, and ANSI/AWWA C104/A21.4.

B. Fittings shall be of ductile or gray cast iron conforming to ANSI/AWWA C110/A21.10.

C. Pipe and fittings shall be furnished with factory applied bituminous coating.

D. Pipe and fittings shall be furnished for a minimum rated working pressure of 125 psi.

2.03 PIPE AND FITTINGS FOR SERVICE CONNECTIONS: Size and type to meet local and State codes and standards.

2.04 GATE VALVES:

A. Design:

1. Meet requirements of AWWA C500.

2. Buried valves for fire protection system designed for minimum 175 psi working pressure.

3. Interior Valves for Fire Protection System: Flanged joints with rising stem; furnish with post indicators.

4. Buried Valves: Mechanical joints, non-rising stem, turn right clockwise) to open.

5. Bituminous coated.

6. UF and F.M. approved.

7. Design permits repacking in wide-open position while in service without leakage.

B. Fabrication:

1. Cast iron body, bronze mounted double disc type gate.

2. Cast manufacturer's name and catalog number in valve body.

2.05 VALVE BOXES:

A. Acceptable Manufacturers: M & H as manufactured by Dresser Industries, Inc., A.P. Smith as manufactured by U.S. Pipe and Foundry Co., or approved equal product of the size indicated on the plans.

B. Design:

1. Cast iron and of the adjustable, telescoping, heavy-pattern type.

2. Construct to prevent the direct transmission of traffic loads to the pipe or valve.

C. Fabrication:

1. The Upper or Sliding Section of the Box: 24-in. top with top flange, 36-in. bottom slide type, cast iron, provided with a flange having sufficient bearing area to prevent undue settlement.

2. The Lower Section of the Box: Designed to enclose the operating nut and stuffing box of the valve and rest on the valve bonnet.

3. Adjustable through at least 6 in. vertically without reduction of the lap between section to less than 4 in.

4. Length: As necessary to suit the ground elevation.

5. Inside Diameter of Box: At least 5 1/4 in.

6. Covers: Close fitting and substantially dirt-tight, and top of cover flush with the top of the box rim.

7. The word "WATER" shall be cast in the covers.

2.06 FLEXIBLE COUPLINGS:

A. Ductile iron, as manufactured by Ford Meter Box Co., or Engineer approved equal.

2.07 CORPORATION STOPS:

A. Design: Meet AWWA standard designation C 800.

B. Bronze with a lapped, ground key.

C. Inlet Thread: Steep taper type.

D. Outlet Connections: As required to suit the type of pipe or tubing connected.

E. Threaded inlet and flared copper outlet with I.P. thread under tube nut, or be an approved equal product.

2.08 CURB STOPS:

A. Ground key, round way, inverted key with drain type. Made of bronze conforming to ASTM B61 to B62. Suitable for the working pressure of the system. End Type: As appropriate for connection to the service piping. Cast arrow into body indicating direction of flow.

2.09 TAPPING SLEEVES AND VALVES:

A. Acceptable Manufacturers: Mueller Co. or A.P. Smith, or Engineer approved equal.

B. Design: Meet the latest AWWA Specifications.

C. Fabrication:

1. Tapping Sleeves:

a. Two-part castings, flanged on the vertical centerline.

b. Surface area of each flange: Thoroughly machine.

c. Sleeve flanges: Fit with lead gaskets, covering the entire surface area of each flange and providing a watertight join for full length of the sleeve.

d. Bolts used to assemble the sleeves: Pass directly through each flange and through each gasket.

e. Provide with raised beads at the base of each bell, to aid in centering the sleeve on the pipe and to provide a stop for caulking.

f. Sleeve outlets: Provide counterbored flanges to insure proper centering of the tapping valve.

2. Tapping Valves:

a. Flanged by mechanical joint.
b. Meet specifications for gate valves.

3. Installing: Check the dimensions of the pipe on which the tapping sleeves are to be installed, prior to ordering the sleeve.

2.10 PIPE INSULATION:

A. Styrofoam SM insulation as manufactured by Dow Chemical Co.

PART 3 - EXECUTION

3.01 INSTALLATION:

A General:

1. Install all pipe and fittings in strict accordance with the manufacturer's instructions and recommendations, and in conformance with Water District standards except as required to be modified by the use of PVC pipe.

2. Install all pipes and fittings in accordance with the lines and grades shown on the Drawings and as required for a complete installation. Minimum depth of cover for water main shall be 5' - 6".

3. Install adapters, as required, when connecting pipes constructed from different materials.

B. Pipe Laying:

1. Firmly support the pipe and fittings on bedding material as shown on the Drawings and as specified in the appropriate Sections of these Specifications.

2. Do not permanently support the pipe or fittings on saddles, blocking stones, or any material which does not provide firm and uniform bearing along the outside length of the pipe.

3. Thoroughly compact the material under the pipe to obtain a substantial unyielding bed shaped to fully support the pipe.

4. Excavate suitable holes for the joints so that only the barrel of the pipe received bearing pressure from the supporting material after placement.

5. Lay each pipe length so it forms a close joint with the adjoining length and bring the inverts to the required grade.

6. Do not drive the pipe down to grade by striking it with a shovel handle, timber, rammer, or any other unyielding object.

7. When each pipe length has been properly set, place and compact enough of the bedding material between the pipe and the sides of the trench to hold the pipe in correct alignment.

8. After filling the sides of the trench, place and lightly tamp bedding material to complete the bedding as shown on the Drawings.

9. Take all necessary precautions to prevent flotation of the pipe in the trench.

C. Temporary Plugs:

1. When pipe installation work in trenches is not in progress, close the open ends of the pipe with temporary watertight plugs.

2. If water is in the trench when work is resumed, do not remove plugs until all danger of water entering the pipe is eliminated.

3. Do not use the pipelines as conductors for trench drainage during construction.

D. Jointing Push-On Pipe:

1. Connect pipe in accordance with the latest manufacturer's instructions and recommendations.

2. Clear each pipe length, coupling and fitting of all debris and dirt before installation.

3. Shove home each length of pipe against the pipe previously laid an hold securely in position. Do not pull or cramp joints.

4. 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.

5. Immediately after making a joint, fill the holes for the joints with bedding material, and compact.

E. Jointing Bolted Joints:

1. Before the pieces are assembled, remove rust-preventative coatings from machined surfaces.

2. Pipe Ends, Sockets, Sleeves, Housings, and Gaskets: Thoroughly clean and smooth burrs and other defects.

F. Jointing Mechanical Joints:

1. Thoroughly brush surfaces against which the gasket will come in contact with a wire brush prior to assembly of the joint.

2. Clean and lubricate the gasket, bell, and spigot by washing with soapy water.

3. Slip gland and gasket, in that order, over the spigot, and insert the spigot into the bell until it is correctly seated.

4. Seat gasket evenly in the bell at all points, centering the spigot, and press the gland firmly against the gasket.

5. After all bolts have been inserted and the nuts have been made up fingertight, progressively and uniformly tighten diametrically opposite nuts all around the joint to the proper tension by means of a torque wrench.

6. The correct range of torque as indicated by a torque wrench and the length of wrench (if not a torque wrench) used by an average man to produce such range of torque, is as follows:

TORQUE RANGE VALUES

Range of torque	60-90 ft.-lb.
Length of wrench	10 in.

7. If effective sealing of the joint is not attained at the maximum torque indicated above, disassemble the joint, thoroughly clean, and reassemble.

8. Do not overstress bolts to tighten a leaking joint.

G. Pipe Cutting:

1. Cut in accordance with manufacturer's recommendations.

2. Cut the pipe with a hand saw, metal-inserted abrasive wheel (except asbestos-cement pipe), or pipe cutter with blades (not rollers).

3. Examine all cut ends for possible cracks caused by cutting.

H. Pipe Insulation:

1. Install 2 in. thick x 4 ft. wide styrofoam SM insulation as manufactured by Dow Chemical Co., or Engineer approved equal, between pipe and culvert or over pipe when noted on plans.

2. Between culvert and pipe, extend insulation 6 ft. each side of the culvert along the pipe.

3. Install over the pipe when there is less than 4 ft. of cover between the top of pipe and original ground grade.

4. Install 6 in above the pipe unless otherwise shown on Drawings.

5. For dual pipe trenches the insulation shall be 8 ft. wide.

6. Provide 6 in. sand blanket above and below insulation or as shown on Drawings.

I. Pipe Deflection Allowances: Per manufacturer's recommendations.

J. Valve Installation:

1. Install in accordance with the specifications for the pipe to which they are to be connected.

2. Make up valve joints in accordance with the Contract Drawings.

3. The valves shall bear no stresses due to loads from the adjacent pipe.

4. Inspect, clean, and lubricate before installation.

K. Bracing and Blocking:

1. Block and anchor all bends, 22½° or greater, tees, plugs, etc. with concrete to prevent movement of the pipe in the joints due to internal or external pressures.

2. Place concrete around fittings to the walls of the trench, as shown on the Drawings, so placed that joints may be caulked or tightened, if necessary.

3. Do not backfill until the concrete has set.

4. If the soil does not provide firm support for thrust block placement, provide retainer clamps and tie rods as shown on the Drawings and/or directed by the Owner's Representative.

L. Air Vents and Blowoffs, Corporation Stops, Curb Stops, Valve Boxes, Copper Tubing and Styrofoam Insulation: Install in accordance with the Drawings and as directed by the Owner's Representative.

M. Vertical Separation From Sanitary Sewer:

1. Whenever water mains must cross sewers, lay at such an elevation that the top of the sewer is at least 18 in. below the bottom of the water main.

2. When the elevation of the sewer cannot be buried to meet the above requirements, center one full length of water main over the sewer so that both joints will be as far from the sewer as possible.

N. Water Service Leads and Stops:

1. Provide and install corporation valves, water service leads, and curb stops for all proposed house connections as shown on the Drawings, or where directed by the Construction Manager.

2. Use Type K copper tubing of the size shown on the Drawings.

3.02 PRESSURE TESTING AND DISINFECTION:

A. Pressure testing and disinfection shall be performed in strict accordance with Water District Specifications.

B. Pressure testing and disinfection shall be performed in the presence of the representative of the Water District, and the Construction Manager.

END OF SECTION

SECTION 02710 - SEWERS, DRAINS and SITE PIPING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS: The general provisions of the Contract, including General and Supplementary Conditions and General Requirements (if any) apply to the work specified in this Section.

1.02 RELATED WORK SPECIFIED ELSEWHERE:

A. Shoring & Bracing: Section 02150
B. Earthwork: Section 02200 (includes excavation, bedding, backfill).

1.03 DESCRIPTION OF WORK:

A. Provide storm drain system and drainage system as shown on the drawings. This section includes:

1. Storm drain pipes
2. Miscellaneous site piping

1.04 SUBMITTALS:

A. Manufacturer's product data and installation instructions.

PART 2 - PRODUCTS

2.01 PIPE AND FITTINGS:

A. General: Provide fittings of same type and class of materials as pipe. Provide commercially manufactured wyes or tees for service connections. Fitting must have single piece gasket.

B. Fountain Drain: Corrugated polyethylene drainage tubing, highway grade, AASHTO M252, ASTM F-405-74, Architect approved equal to that produced by American Drainage Systems.

C. Storm Drain Pipe: Corrugated smooth bore polyethylene pipe conforming to AASHTO M294 equal to HI-Q pipe as manufactured by Hancor, Inc. for area installations outside of City right-of-way and streets. All storm drain pipe within City right-of-way shall conform to the same specifications as sewer pipe listed hereafter.

D. Sewer Pipe: Buried Piping: PVC meeting ASTM D3034 or ASTM D3033, strength requirement SDR 35, push-on joints ASTM D3212, gaskets ASTM F-477. Sewer force main pipe – Schedule 40 PVC.

E. Electric/Tel-Data Conduit: Schedule 40 PVC pipe.

2.02 MISCELLANEOUS

A. Flexible Adapters:

1. Non-pressure: Neoprene sleeve with stainless steel bands Engineer approved equal to those manufactured by Fernco.

2. Pressure: Engineer approved equal to Rockwell cast couplings.

B. Insulation: Styrofoam SM as manufactured by Dow Chemical.

PART 3 - EXECUTION

3.01 INSTALLATION OF GRAVITY PIPE AND FITTINGS:

A. Methods: Install in accordance with manufacturer's recommendations. Use a laser beam for line and grade unless otherwise permitted by the Engineer. Secure each length of pipe with bedding before placing next length. Plug open ends when work is suspended. Bed pipe as shown on drawings. A 30-inch minimum cover over the top of PVC pipe should be provided before the trench is wheel-loaded.

B. Grade and Line: Lay pipe to line and grade shown on the drawings. If grade is not shown, determine elevations of start and finish points for each run of pipe. Lay pipe to a uniform grade between these points.

Line and grade may be adjusted by the Engineer as required by field conditions.

C. Conditions: Lay pipe in the dry. Do not use installed pipe to remove water from work area.

D. Flush all pipe and remove debris. Flushing method approved by Engineer. Gravity flushing is not acceptable.

E. Connections to manholes and catch basins: Provide short length of pipe so that joints are located within 3 feet of inside surface of manholes and catch basins for other than PVC pipe.

3.02 UTILITIES TO BE ABANDONED

A. Closing Abandoned Utilities: Close open ends of abandoned underground utilities which are not indicated to be removed. Provide sufficiently strong closures acceptable to Engineers to withstand hydrostatic or earth pressure which may result after ends of abandoned utilities have been closed.

3.03 INSULATION:

A. Install as shown on Drawings.

END OF SECTION

SECTION 02720 - MANHOLES, CATCH BASINS AND PRECAST CONCRETE

PART 1 - GENERAL

1.01 RELATED DOCUMENTS: The general provisions of the Contract, including General and Supplementary Conditions and General Requirements (if any) apply to the work specified in this Section.

1.02 RELATED WORK SPECIFIED ELSEWHERE:

A. Earthwork: Section 02200.
B. Erosion and Sedimentation Control: Section 02100
C. Curbing: Section 02525
D. Sewers, Drains and Site Piping: Section 02710.
E. Contract Drawings

1.03 DESCRIPTION OF WORK

A. Provide drainage manholes and catch basins, and precast concrete items as shown on the drawings. This section includes:

1. Precast drainage manholes
2. Precast catch basins
3. Frames and covers, and grates.
4. Concrete light bases.
5. Transformer vault.

1.04 QUALITY ASSURANCE

A. General: Provide complete manhole, catch basin, and precast concrete structures capable of supporting AASHTO H20 loading.

All precast concrete shall comply with ASTM C913 "Standard Specification for Precast Concrete Water and Wastewater Structures."

B. Precast Manhole and Catch Basin Components: ASTM C478.

1.05 SUBMITTALS

A. Shop Drawings: Submit for approval precast manholes, catch basins and all precast concrete items prior to fabrication. Show components to be used and elevations of top of precast sections, base and pipe inverts, location of pipe penetrations, steps, for each manhole.

B. Product Data: Manufacturers' product data and installation instructions for frames, covers, grates, precast items, manhole sleeves, joint sealants and frost barrier.

PART 2 - PRODUCTS

2.01 SANITARY MANHOLES:

A. Base Sections: Precast monolithic construction with steps.

B. Barrel Sections: Precast with steps.

C. Top Sections: Precast eccentric cone with steps. Use flat cover only if shown on drawings.

D. Steps: Aluminum allow 6061-T6 or polypropylene reinforced with steel rod. Meet OSHA requirements, Min. width 14". Coat aluminum to be cast into concrete with bituminous paint.

E. Pipe to Manhole Connections:

1. Pipe sizes 6" or larger: Flexible manhole sleeves to be CP series manufactured by Interpace Corp. or Engineer approved equal size to fit diameter and type of pipe without use of gaskets.

2. Pipe sizes less than 6: Thermoplastic pipe sleeve to be "Link-Seal Century Line" model CS100 by Thunderline Corp. or Engineer approved equal with sleeve seal to be "Link-Seal" by Thunderline Corp. or Engineer approved equal.

F. Joints Between Precast Sections: Watertight, shiplap type, seal with two rings of 1-inch diameter butyl rubber sealant.

2.02 CATCH BASINS AND DRAIN MANHOLES

A. Base Sections: Precast.

B. Barrel Sections: Precast.

C. Top Sections: Precast concentric cone, eccentric, or flat cover if required by grade.

D. Joints between precast sections: Watertight, shiplap type, seal with two rings of 1-inch diameter butyl rubber sealant.

2.03 PRECAST CONCRETE RISERS

A. General: Reinforced precast concrete annular rings, size as shown on drawings. Provide with four 1-inch diameter vertical cast through holes.

2.04 MASONRY MATERIALS

A. Concrete Masonry Units: ASTM C139.

B. Mortar: Type M, ASTM C270. Use Type II Portland cement, Type S lime. Proportions for Mortar: 1 part Portland cement, 1/4 part hydrated lime. 3 to 3 3/4 parts sand.

2.05 FRAMES, GRATES AND COVERS

A. Cast iron: ASTM A48 Class 30.

B. Manhole frames and covers: Minimum 24" dia. opening, minimum weight 350 pounds.

1. Standard drainage frame and cover: All drainage manholes to be Etheridge Foundry M248S, or Engineer approved equal.

2. Waterproof locking frames and covers: Model R1755-F frame and type C cover by Neenah Foundry or Engineer approved equal.

C. Catch Basin Frames and Grates: To be Etheridge Foundry M248G, or Engineer approved equal.

2.06 CONCRETE LIGHT BASES

A. Precast Light Bases: Superior Concrete Item No. 6851, or equal.

2.07 MISCELLANEOUS

A. Joint Sealants:

1. Butyl Rubber Sealant: One inch diameter strips as manufactured by Kent Seal, or Engineer approved equal.

2. Butyl Rubber Caulking: Conform to AASHTO M-198, Type B.

B. Dampproofing: Bituminous coating to be Dehydrate No. 4 Dampproof by W. R. Grace of Bitumastic Super Service Black by Koppers Co. for field application, or Engineer approved equal.

2.08 STORMWATER TREATMENT SYSTEM

A. Four foot (4') diameter Downstream Defender as manufactured by HYDRO International.

2.09 FIELD DRAIN

A. PVC Surface Drain Inlets as manufactured by Nylaplast, a division of ADS, Inc. Drain basin shall be 12" diameter drain basin insulated with 12" "Pedestrian" cast iron grate H-10 with hinge as manufactured by Nylaplast.

PART 3 - EXECUTION

3.01 INSTALLATION OF MANHOLES

A. Placement: Place bases on compacted bedding material so manhole structure is plumb and pipe inverts are at proper elevations. Place barrel and top sections in the appropriate height combinations. Plug all lifting holes inside and out with non-shrink grout.

B. Joints: Follow manufacturer's instructions for sealing joints between precast sections. Provide two rings of 1-inch diameter butyl rubber sealant. Point joints inside and out with butyl caulk.

C. Frame and Covers: Set to final grade as shown on the Drawings or set flush with pavement grade in paved areas or 2" below finish grade in unpaved roads or 24" above grade in cross-country areas. Provide adequate temporary covers (conforming with applicable local, State and Federal regulations) to prevent accidental entry until final placement of frame and cover is made.

Use two rings of 1-inch diameter butyl rubber sealant between frame and chimney joints. Provide downward force to frame so as to compress the joint and provide a watertight seal and prevent future settlement. Point compressed joint with butyl rubber caulk sealant.

Set manhole frames and covers to final grade only after pavement base course has been applied, or after final grading of gravel roads.

D. Inverts: See detail on drawings.

E. Steps: Replace steps out of plumb and out of proper horizontal placement.

3.02 INSTALLATION OF CATCH BASINS

A. Placement: Place bases on compacted bedding material so catch basins structure is plumb and pipe inverts are at proper elevations. Place barrel and top sections in the appropriate height combinations. Plug all lifting holes inside and out with non-shrink grout.

B. Joints: Follow manufacturers instructions for sealing joints between precast sections. Provide two rings of 1-inch diameter butyl rubber sealant. Point joints inside and out with butyl caulk.

C. Frame and covers: Set to final grade as shown on the drawings. Use two rings of 1-inch diameter butyl rubber sealant between frame and chimney joints. Provide downward force to frame so as to compress the joint and provide a watertight seal and prevent future settlement. Point compressed joint with butyl rubber caulk sealant.

D. Inverts: See detail on drawings.

3.03 PRECAST CONCRETE RISERS

A. General: For chimneys height 3 to 12 inches as required.

B. Joints: Provide two rings of 1 inch diameter butyl rubber sealant. Compress joints to create permanent seal and prevent future settlement. Point joints with butyl rubber caulk sealant.

C. Install as shown on drawings.

D. Hardware: As specified on drawings.

3.04 INSTALLATION OF STORMWATER TREATMENT SYSTEM

A. Follow manufacturer's specifications on assembly and installation of structure.

3.05 LEAKAGE TESTING – SANITARY MANHOLES

A. General: Tests must be observed and certified by the City Sewer District. Manholes must be complete, including backfill for final test acceptance except for shelf and invert brickwork. Plug all pipes and other openings in the manhole walls prior to test.

B. Infiltration Test: For manholes with groundwater table above highest joint. Manhole passes infiltration test if there is no visible leakage into manhole.

C. Exfiltration Test:

1. Plug pipes into and out of MH and secure plugs.

2. Lower groundwater table (GWT) to below MH. Maintain GWT at this level throughout test. Provide means of determining GWT level at any time throughout test.

3. Fill MH with water to top of cone.

4. Allow a period of time for absorption (determined by Contractor).

5. Refill top of cone.

6. Determine volume of leakage in an 8 hour (min) test period and calculate rate.

7. Acceptable leakage rate: Not more than 1 gallon per vertical foot per 24 hours.

D. Manhole Vacuum Test: The manhole being tested must not be backfilled. The test is passing if the manhole holds 10 inches of Mercury Vacuum for 3 minutes, with 1 inch of Mercury loss allowable.

3.06 REPAIRS

A. Determine causes of all leaks and repair them. Perform earthwork required if manhole has been backfilled.

B. Perform repairs using methods and materials approved by the Engineer. Remove and replace or reconstruct manhole if necessary. Remove and replace defective sections if required by Engineer.

END OF SECTION

SECTION 02850 - SITE IMPROVEMENTS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. The Drawings, General Conditions of the Contract, and Supplementary General Conditions apply to the work specified in this section.

1.02 SCOPE

A. The work of this section consists of all site improvements and related items as indicated on the drawings and/or as specified herein and includes, but is not limited to, the following:

1. Site signage

1.03 RELATED WORK UNDER OTHER SECTIONS

A. The following items of related work are specified and included in other sections of the specifications:

1. Earthwork - Section 02200
2. Bituminous Paving - Section 02612
3. Cast-in-Place Concrete - Section 03300

1.04 SUBMITTALS

A. General: Comply with the requirements of Section 01300 - SUBMITTALS.

B. Provide submittals for the following:

1. Site signage

1.05 SHOP DRAWINGS

A. The contractor shall submit six copies of all required shop drawings, including fabrication details and layout and dimensioning for the approval of the Engineer. Shop drawings shall be submitted for the following:

1. Site signage

PART 2 - PRODUCTS

2.01 BASIC MATERIALS

A. Concrete Supports: Comply with requirements of Section 03300 - CONCRETE.

B. Metal Fasteners: Comply with requirements of Section 05500- METAL FABRICATION.

C. Painted Surfaces: Comply with requirements of Section 09900 - PAINTING.

2.02 SITE SIGNAGE

A. Provide handicapped parking signs as shown on drawings in accordance with the provisions of the Maine Human Rights Act, Title 5, M.R.S.A. 4551, utilizing the international symbol of accessibility.

B. Provide other miscellaneous signage as shown on drawings.

PART 3 - EXECUTION

3.01 SITE SIGNAGE

A. Install as shown on drawings, erected plumb and true to the lines and elevations required.

END OF SECTION

SECTION 02900 - LANDSCAPE WORK

PART 1 - GENERAL

1.01 RELATED DOCUMENTS: The general provisions of the Contract, including General and Supplementary Conditions and General Requirements (if any) apply to the work specified in this Section.

1.02 RELATED WORK SPECIFIED ELSEWHERE:

1. Erosion and Sedimentation Control: Section 02540.
2. Earthwork: Section 02200

1.03 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. Planting installation of trees, shrubs and ground covers; planting of lawns and other work as indicated on Site Drawings.

1.04 QUALITY ASSURANCE:

A. General: Comply with requirements of Division 1.

B. Source Quality Control:

1. General: Ship landscape materials with certificates of inspection as required by governmental authorities. Comply with governing regulations applicable to landscape materials.

2. Analysis and Standards: Package standard products with manufacturer's certified analysis. For other materials, provide analysis by recognized laboratory made in accordance with methods established by the Association of Official Agricultural Chemists, wherever applicable or as further specified.

3. Topsoil: Before delivery of topsoil, furnish written statement giving location of properties from which topsoil is to be obtained.

4. Plant Material:

a. Plant materials shall mean trees, shrubs, ground covers, and plants of all descriptions, required to be furnished for the project and shall conform to all provisions of the publication, "American Standard for Nursery Stock."

b. Substitutions: In the event that trees, shrubs, or other plant material specified in the plant list are in the opinion of the Contractor, impossible or unreasonably difficult to obtain, the Contractor shall immediately notify the Owner's Representative to discuss appropriate substitutions. No substitutions of plant material may be made without the prior approval of the Owner's Representative. When authorized, adjustment of contract amount will be made.

5. Inspection: The Owner's Representative reserves the right to inspect any plant materials either at the place of growth or at the site before planting, for compliance with requirements for name, variety, size, quality and health.

6. All work of planting shall be done by a proficient landscape contractor with five years minimum experience.

7. The plant supplier/nursery shall be ALCA certified.

1.04 SUBMITTALS:

A. Certification:

1. For information only, submit 2 copies of certificates of inspection as required by governmental authorities, and manufacturer's or vendor's analysis for soil amendments and fertilizer materials. Submit other data substantiating that materials comply with specified requirements.

2. Submit seed vendor's certified statement for each grass seed mixture required, stating botanical and common name, percentage by weight, and percentages of purity, germination, and weed seed for each grass seed species.

1.05 PRODUCT DELIVERY, STORAGE, AND HANDLING:

A. Packaged Materials: Deliver packaged materials in containers showing weight, analysis and name of manufacturer. Protect materials from deterioration during delivery, and while stored at the site.

B. Plant Materials:

1. In preparing plants for moving, all precautions customary in good trade practice shall be taken. All plants shall be dug immediately before moving unless otherwise specified. Broken, loose, or manufactured balls will be rejected.

2. All plants shall be packed, transported, and handled with utmost care to insure adequate protection against injury and drying. Do not bend or bind-tie trees or shrubs in such manner as to damage bark, break branches or destroy natural shape. Provide protective covering during delivery.

3. Deliver plant materials after preparations for planting have been completed and plant immediately. If planting is delayed more than 6 hours after delivery, set all plants in shade, protect from weather and mechanical damage, and keep roots moist.

4. Label all plant materials of each variety with a securely attached waterproof tag bearing legible designation of botanical and common name.

1.06 JOB CONDITIONS:

A. Contractor must examine the subgrade, verify the elevations, observe the conditions under which work is to be performed, and notify the Owner's Representative of unsatisfactory conditions. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner aceptable to Engineer or Landscape Architect.

B. Utilities: Determine location of underground utilities and perform work in a manner which will avoid possible damage. Hand excavate, as required, to minimize possibility of damage to underground utilities. Maintain grade stakes set by others until removal is mutually agreed upon by all parties concerned.

C. Excavation: When conditions detrimental to plant growth are encountered, such as rubble fill, adverse drainage conditions, or obstructions, the Contractor shall notify the Owner's Representative before planting. The Contractor shall be responsible for correcting such conditions.

D. Planting and Seeding Seasons: Unless variance is requested in writing and approved by the Owner's Representative, planting and seeding shall be done within the following dates:

Lawns: April 1 - September 15

Plant Materials:	
Potted and Container Grown Plants	Spring: April 1 - July 15 Fall: Aug. 15 - Nov. 15
Balled and Burlapped Plants	Spring: April 1 - June 15 Fall: Aug. 15 - Oct. 15

E. Coordination with Lawns: Plant trees and shrubs after final grades are established and prior to planting of lawns, unless otherwise acceptable to the Owner's Representative. If planting of trees and shrubs occurs after lawn work, protect lawn areas and promptly repair damage to lawns resulting from planting operations.

PART 2 - PRODUCTS

2.01 TOPSOIL:

A. Loam or approved topsoil removed within the confines of the project area shall be reused in accordance with Section 02200, Earthwork. If quantity of stockpiled topsoil is insufficient, provide new topsoil which is fertile, friable, natural loam, surface soil, reasonably free of subsoil, clay lumps, brush, weeds and other litter, and free of roots, stumps, stones larger than 2 in. in any dimension, and other extraneous or toxic matter harmful to plant growth. Sand, silt, and clay contents comprising existing or new topsoil shall fall within the following ranges:

Sand	50% - 70%
Silt	2% - 40%
Clay	10% - 28%

B. Submit representative soil samples of new topsoil from off-site sources as well as existing topsoil removed from within confines of site to qualified soil testing laboratory to ascertain what amendments may be necessary to obtain proper tilth, nutrient characteristics, and pH balance in accordance with the following. Provide amendments as necessary at rates indicated on the soil test.

- organic matter: greater than 5% organic matter (by weight)
- pH range: 5.8 to 6.2
- phosphorus/potassium: medium to medium high range
- soluble salt: not greater than 500 ppm

C. Soil Amendments:

1. Lime: Natural limestone containing not less than 90 percent of total carbonates, ground so that not less than 100 percent passes a 10-mesh sieve, not less than 90 percent passes a 20-mesh sieve, and not less than 50 percent passes a 100-mesh sieve.

2. Peat Humus: Peat humus shall be a natural peat approved by the Owner's Representative consisting or sedge, sphagnum or reed peat of such physical condition as will pass through a 1 in. screen and will be readily incorporated with the topsoil. The peat humus shall be free from sticks, stones, roots and other objectionable matter.

3. Fertilizer: Fertilizer shall contain available elements in conformity with the standards of the Association of Official Agricultural Chemists. The fertilizer shall indicate the weight, contents and guarantee analysis shown thereon or on a securely attached tag, as applicable.

   a. Granular fertilizer shall be a commercial grade fertilizer containing the following percentages of available nutrients by weight:

Nitrogen	10 percent
Phosphoric Acid	10 percent
Potash	10 percent

   b. Water soluble fertilizer shall be completely soluble in water and contain the following percentages of available nutrients by weight. It shall contain a coloring agent.

Nitrogen	16 percent
Phosphoric Acid	32 percent
Potash	16 percent

   c. Slow release fertilizer packets shall be slow release fertilizer contained in a polyethylene perforated bag with micropore holes. Each bag shall contain 4 ounces of minimum water soluble fertilizer to be effective for 8 years. Packages shall contain the following percentage of available elements by weight.

Nitrogen	20 percent
Phosphoric Acid	10 percent
Potash	5 percent

   The Owner's Representative may approve the use of other fertilizers providing they contain an equivalent amount of nutrients in an acceptable form.

4. Manure: Manure shall be dehydrated processed, well-rotted manure subject to approval by the Owner's Representative. Manure shall be free of weeds, grass, or harmful chemicals.

2.02 PLANT MATERIALS:

A. Quality:

1. Provide trees, shrubs, and other plants complying with the recommendations and requirements of ANSI Z260.1 "Standard for Nursery Stock" as published by the American Association of Nurserymen. All plants shall be nursery grown unless otherwise stated, and shall have been growing under the same climatic conditions as the location of this project for at least two (2) years prior to award date of this contract.

B. Deciduous Shrubs: Provide balled and burlapped (B&B) deciduous shrubs otherwise noted in plant list. Container grown deciduous shrubs will be acceptable in lieu of balled and burlapped deciduous shrubs as approved by the Owner's Representative.

C. Coniferous and Broadleafed Evergreens: Provide balled and burlapped (B&B) evergreens. Container grown evergreens will be acceptable as approved by the Owner's Representative.

D. Deciduous Trees:

1. Provide balled and burlapped (B&B) deciduous trees unless otherwise noted in plant list. Container grown deciduous trees will be accepted in lieu of balled and burlapped deciduous trees as approved by the Owner's Representative.

2.03 GRASS MATERIAL:

A. Grass Seed:

1. Provide fresh, clean, new-crop seed complying with the tolerance for purity and germination established by the Official Seed Analysts of North America. Provide seed of the grass species, proportions and minimum percentages of purity, germination, and maximum percentage of weed seed, as specified.
2. The seed mixture for lawn areas shall consist of seeds proportioned by weight as follows:

Creeping Red Fescue	20%
Kentucky Bluegrass	70%
Italian or Perennial Ryegrass	10%

3. The seed mixture for detention basin areas shall consist of seeds proportioned by weight as follows:

Kentucky Bluegrass	24%
Redtop	6%
Creeping Red Fescue	35%
Perennial Ryegrass	10%
Annual Ryegrass	20%
White Dutch Clover	5%

2.04 SOD MATERIALS:

A. Sod shall be composed of the grass mixture as recommended by the New England Sod Producer's Associations and shall be one of the following, as based on site conditions:

For Sunny Turf Areas:

Kentucky Bluegrass	50 - 100%
Red Fescue	0 - 50%

(Use one or more of the following Kentucky Bluegrass varieties: Marion, Fylking, Pennstar, Windsor, Baron)
For Shady Turf Areas:

Kentucky Bluegrass	10 - 25%
Red Fescue	75 - 90%
Poa Trivials	0 - 10%

(Use the following Red Fescue varieties: Highlight Jamestown, Penn Lawn)

B. Lawn sods shall have been nursery grown on cultivated agricultural land specifically for sod purposes. The sods shall be free of objectionable grassy and broad leaf weeds. Sod shall be considered free of such weeds if less than 5 such plants are found per 100 sq. ft. of area. The sod shall be machine cut at a uniform minimum thickness of 3/4 in. at the time of cutting. Measurement for thickness shall exclude top growth and thatch. Individual pieces of sod shall be cut to the supplier's standard width and length. Maximum allowable deviation from standard widths will not be acceptable.

C. Pegs for holding sod shall be of approved sound wood and at least 3/4 in. in thickness and at least 8 in. long.

2.05 GROUND COVER: Provide plants established and well-rooted in removable containers or integral peat pots and with no less than the minimum number and length of runners required by ANSI Z60.1 for the pot size shown or listed.

2.06 MISCELLANEOUS LANDSCAPE MATERIALS:

A. Planting Bed Mulch: Provide shredded bark mulch for planting beds. Do not use material that is decayed or mixed with soil, weeds or other foreign matter. Use material that is large enough in size to prevent it from drifting and blowing in normal wind storms. Submit samples to Owner's Representative for approval prior to delivery of bark mulch to site.

B. Anti-Erosion Mulch: Use "Erosionet" or similar mulch where slopes are too severe to be maintained by planting bed mulch alone.

C. Anti-Desiccant: Emulsion type, film-forming agent or Wilt-Pruf by Nursery Specialty Products, Inc., designed to permit transpiration but retard excessive loss of moisture from plants. Deliver in manufacturer's fully identified containers and mix in accordance with manufacturer's instructions.

D. Wrapping: Wrapping material for tree trunks shall be furnished in strips approximately 4 to 6 inches wide consisting of first quality, 8 oz. per sq. yd. burlap, approved waterproof paper tape or polyethylene film, ASTM D 2103.

E. Stakes and Guys: Provide stakes of sound new hardwood, free of known holes and other defects. Provide wire ties and guys of 2-strand, twisted, pliable galvanized iron wire not lighter than 12 ga. with zinc-coated turnbuckles or an approved equal. Provide new 2-ply garden hose not less than 1/2 in. hose size, cut to required lengths to protect tree trunks from damage by wires or an approved equal.

F. Mulch for Seeded Areas:

1. Straw mulch shall consist of long fibered straw, reasonably free from noxious weeds and other undesirable material. No material shall be used which is too wet, decayed, or compacted as to inhibit even and uniform spreading. No chapped hay, grass clippings or other short fibered material shall be used unless directed by the Owner's Representative.

2. Cellulose fiber mulch shall consist of natural wood, recycled paper or humus cellulose fiber containing no materials which will inhibit seed germination or plant growth. Sufficient non-toxic water soluble green dye shall be added to provide a definite color contrast to the ground surface to aid in even distribution. Cellulose fiber mulch shall be supplied in moisture resistant, sealed bags marked with the manufacturer's name, the air dry weight, and composition of the contents.

G. Mulch Binder: Material for mulch binder may be emulsified asphalt of a type acceptable to the Owner's Representative and may be diluted with water to assure even distribution. Other types of approved mulch binders may be used when authorized by the Owner's Representative.

H. Water: Water used for landscape work shall be free from oil, acids, alkalis, salts, or other substances harmful to plants.

2.07 PREPARATION OF PLANTING SOIL:

A. Before mixing, clean topsoil of roots, plants, sods, stones, clay lumps, and other extraneous materials harmful or toxic to plant growth. Mix specified soil amendments with topsoil at the rates specified. Unless otherwise specified or indicated on the Drawings, the following planting soil mixture (thoroughly mixed by volume) shall be used for backfill around trees and shrubs: dehydrated processed manure 1 part; topsoil 8 parts; peat moss 3 parts.

PART 3 - EXECUTION

3.01 PROTECTION OF PAVEMENT, CURB AND NEW FACILITIES:

A. In performance of landscape work, protect new paved surfaces, curbing, concrete and other work from damage due to trucks, equipment and materials. Run only equipment with street or turf tires on wearing course of pavement, Knobby tires and track equipment are not allowed.

3.02 PREPARATION:

A. Layout: Locations for trees and outlines of planting bed areas shall be staked on the ground by the Contractor and the stakes marked by plant type at least 48 hours before any plant pits or beds are dug. Owner's Representative shall approve all locations of stakes and planting bed outlines prior to installation of plant material.

B. Preparation for Planting Lawns and Disturbed Areas:

1. Spread topsoil on prepared areas to a minimum depth of 6 in. and as required to meet lines, grades and elevations shown, after light rolling and natural settlement. Before placing the topsoil, loosen and scarify subgrade of lawn areas to a minimum depth of 6 in. Remove stones over 1 1/2 in. in any dimension and sticks, roots, rubbish and other extraneous matter.

2. Grade lawn area to smooth, even surface with loose, uniformly fine texture. Roll and rake out all pieces of sod, roots, and grass. Remove ridges and fill depressions, as required to meet finish grades. Limit fine grading to areas which can be planted immediately after grading.

3. Moisten prepared lawn areas before planting if soil is dry. Water thoroughly and allow surface moisture to dry before planting lawns. Do not create a muddy soil condition.

4. Restore lawn areas to specified condition if eroded or otherwise disturbed after fine grading and prior to planting.

C. Preparation of Unchanged Grades: Where lawns are to be planted in areas that have not been altered or disturbed by excavating, grading, or stripping operations, prepare soil for lawn planting as follows: till to a depth of not less than 6 in.; apply soil amendments and initial fertilizers as specified; remove high areas and fill in depressions. Till soil to a homogenous mixture of fine texture, free of lumps, clods, stones, roots and other extraneous matter. Incorporate soil amendments, as specified, at appropriate stages.

D. Preparation of Planting Beds:

1. Loosen subgrade of planting bed areas to a minimum depth of 6 in. using a cultimulcher or similar equipment. Remove stones over 1 1/2 in. in any dimension, and sticks, stones, rubbish and other extraneous matter. Spread planting soil mixture to the minimum depth required to meet lines, grades and elevations shown, after light rolling and natural settlement.

E. Excavation for Trees and Shrubs:

1. Excavate pits in accordance with Typical Planting Details with vertical sides and with bottom of excavation slightly raised at center to provide proper drainage. Loosen hard subsoil in bottom of excavation. For balled and burlapped (B&B) trees and shrubs, make excavations at least twice as wide as the ball diameter and a minimum of 1 ft. 6 in. wider than root spread.

3.03 PLANTING:

A. Planting Trees and Shrubs:

1. Planting shall be done in accordance with Typical Planting Details. Set balled and burlapped (B&B) stock on layer of compacted planting soil mixture, plumb and in center of pit or trench with top of ball at same elevation as adjacent finished landscape grades. When set, carefully remove burlap from sides of balls; retain on bottom only if removal is impossible without damage to root balls. Place additional backfill around base and sides of ball, and work each layer to settle backfill and eliminate voids and air pockets. When excavation is approximately 2/3-full, water thoroughly before placing remainder of backfill. Repeat watering until no more is absorbed. Water again after placing final layer of backfill.

2. Set container grown stock as specified for balled and burlapped stock, removing containers in such a way as to not damage roots.

3. Dish completed planting pits to form shallow (4") saucer to collect water. Mulch pits, trenches and planted areas with at least 4 in. thickness of shredded bark or equivalent substitute approved by Owner's Representative.

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

5. Prune, thin out and shape trees and shrubs in accordance with standard horticultural practice. Remove dead, broken, or diseased branches. Prune trees to retain required height and spread. Unless otherwise directed by the Owner's Representative, do not cut tree leaders, and remove only injured or dead branches from flowering trees, if any. Prune shrubs to retain natural character and accomplish their use in the landscape design. Required shrub sizes are the size after pruning. Remove and replace excessively pruned or misformed stock resulting from improper pruning.

6. Wrap tree trunks of 2 in. caliper and larger. Start at ground and cover trunk to height of first branches and securely attach. Inspect tree trunks for injury, improper pruning and insect infestation and take corrective measures required before wrapping.

7. Immediately after planting, guy and stake trees of 1 1/2 in. caliper or larger or over 6 ft. in height on planting schedule.

B. Seeding New Lawns:

1. Do not use wet seed or seed which is moldy or otherwise damaged in transit or storage.

2. Rates of Application:

a. Limestone shall be applied at the rate of 25 lbs. per 1,000 sq. ft., each method.

b. Fertilizer shall be applied at the rate of 30 lbs. of 10-10-10 granular fertilizer per 1,000 sq. ft., each method.

c. Seed for lawn areas shall be sown at the rate of 5 lbs. per 1000 sq. ft. of coverage. Erosion control seed mixture for ditch areas shall be sown at a rate of 3 lbs/1000 sq. ft. For temporary seeding, rates greater than 3 lbs. per 1,000 sq. ft. shall be applied as directed.

3. The hydraulic spray method shall be used for seeding all areas unless alternative methods are approved by the Owner's Representative.

4. Application Procedure:

   a. Hydraulic Spray Method: The hydraulic spray method of sowing seed shall be done with an Engineer approved machine operated by a competent crew. Seed and fertilizing materials shall be mixed with water in the tank of the machine and kept thoroughly agitated so the materials are uniformly mixed and suspended in the water at all times during operation. Contractor shall furnish seed and fertilizer labels to Owner's Representative prior to mixing. The spraying equipment must be designed and operated to distribute seed and fertilizing materials evenly and uniformly on the designated areas at the required rates. If the Owner's Representative finds the application uneven or otherwise unsatisfactory, he may require the hydraulic spray method to be abandoned and the balance of the work done as specified under another method.

   b. Mechanical Method:

      (1) The mechanical method shall be used only when approved by the Owner's Representative. Fertilizing and liming shall be done when the soil is in a moist condition and at least 24 hrs. before sowing the seed. The fertilizer and lime shall be applied to the soil by means of a mechanical spreader or be applied to the soil by means of a mechanical spreader or other Engineer approved method capable of maintaining a uniform rate of application and shall be thoroughly harrowed, raked or otherwise mixed with the soil to a depth of not less than 1 in. The fertilizer and lime shall not be applied together unless applied hydraulically.

      (2) Grass seed of the required mixture and quality shall be sown by a mechanical seeder or other method which will sow the seed uniformly over the entire area to be seeded.

5. Mulching:

   a. Cellulose fiber mulch shall be applied as a waterborne slurry. The cellulose fiber and water shall be thoroughly mixed and sprayed on the area to be covered so as to form a uniform mat of mulch at the

rate of not less than 60 lbs. at mulch material per 1,000 sq. ft. unit of area.

Cellulose fiber mulch may be mixed with the proper quantities of seed, fertilizer, and agricultural limestone as required, or may be applied separately the next day after seeding.

b. Straw mulch shall be spread evenly and uniformly over any designated areas or as directed by the Owner's Representative in the field so to avoid damage to seeded areas. Unless otherwise directed, mulch shall be applied at the rate of 3 tons per acre. Too heavy application of mulch material shall be thinned.

Unless otherwise authorized, the mulch shall be anchored in place by uniformly applying an acceptable mulch binder at a rate of 10 to 13 gallons per 1,000 sq. ft. Application of a concentrated stream of mulch binder will not be allowed. Asphalt mulch binder may be omitted when authorized and when there is a danger of the asphalt defacing the surface of nearby structures, houses, vehicles or other objects. Other methods of anchoring mulch may be used subject to the approval of the Owner's Representative.

C. Sodding New Lawns:

1. General:

a. The sod shall be freshly cut by an approved sod cutter in strips of uniform thickness having a minimum width of 12 in. and not less than 18 in. long and transported in an unbroken condition to the area to be sodded. Sod shall be placed in its final position promptly after cutting. Cut sod shall be protected from drying from sun and wind during the time between cutting and placing.

b. The areas to be sodded shall be brought to the grades shown on the Drawings, allowing for the thickness of the sod. Area to be sodded shall be cleared of large stones, roots, clods and other debris that might interfere with laying sod or subsequent maintenance of the sodded areas. A foundation for the sod shall be constructed and it shall consist of topsoil spread in quantities sufficient to produce after natural settlement has taken place and after tamping, a depth of at least 6 in. Fertilizer and agricultural limestone shall be applied, either before or after laying sod, at the rate of not less than 25 lbs. per 1,000 sq. ft. for agricultural limestone. On hard packed soil the areas under preparation shall be scarified, harrowed, or otherwise loosened to a depth of at least 3 in. before laying sod, unless otherwise directed.

c. Sod shall be moist when laid and shall be placed on a moist soil bed. The sod shall be placed at right angles to the flow of water, commencing at the lower end and tightly fitted, edge to edge, to provide a uniform surface. Transverse joints shall be staggered. Gaps shall be filled with sod plugs or loam to produce a tight surface. The sod shall be compacted and bonded to the soil with an approved tamper or light roller. After tamping or rolling the sod shall have a smooth, even surface free from humps or depressions.

d. On slopes steeper than 3:1, sod shall be held securely in place by fastening alternate lines of sod with wooden pegs. The pegs shall be not less than 8 in. in length, and they shall be spaced 3 ft. apart and driven flush with the surface of the sod. Other approved methods of fastening sod to slopes may be used where pegging is not practicable.

e. Water immediately to moisten sod and upper 4 inches of topsoil.

D. Planting Ground Cover: Space plants as shown or scheduled. Excavate subgrade to a depth of 6 inches for contiguous groundcover area and backfill with planting soil. Work soil around roots to eliminate air pockets and leave a slight saucer indentation around plants to hold water. Water thoroughly after planting, taking care not to cover crowns of plants with wet soils. Protect from hot sun and wind for several days. Remove protection when plants show evidence of recovery from transplanting shock. Mulch areas between ground cover plants; place not less than 4 in. thick.

3.04 FERTILIZING TREES AND SHRUBS:

A. Water Soluble Fertilizer:

1. The first liquid feeding will be permitted as the first watering only during backfilling of the plant, unless otherwise directed by the Owner's Representative. All seedlings will be liquid fed during planting. The second liquid feeding will be made the following Spring season, no later than June 30th.
2. Liquid fertilizer shall be completely dissolved and mixed in water at the rate of 6 lbs. of the fertilizer concentrate to 100 gallons of water.

3. The resulting solution shall be poured in the plant pit as directed by the Owner's Representative. A second application at the same rate shall be applied as directed by the Owner's Representative. The solution shall be applied at the following rates for each application:

Plants up to 2 ft. in height shall receive 4 quarts.
Plants above 2 ft. and up to 6 ft. shall receive 6 quarts.
Plants above 6 ft. and up to 12 ft. shall receive 12 quarts.
Plants above 12 ft. shall receive 16 quarts.

B. Slow Release Fertilizer Packets:

1. All woody plants except evergreen seedlings shall be fertilized with slow release fertilizer packets at the time of planting, unless otherwise directed by the Owner's Representative. Fertilizer packets shall be placed equidistantly within the planting pit adjacent to the ball or root mass, but not in direct contact with roots. Placement depth shall be 6 to 8 inches. Packets shall not be cut, ripped or damaged.

2. If it becomes necessary to remove and replace dead or unhealthy plants, damaged or broken packets shall be replaced with new packets.

The application rates shall be as follows:

Type of Plants	No. of Packets
Evergreen Trees	
Under 18 inches height	1
18 inches to 3 ft. height	2
3 ft. to 6 ft. height	3
Over 6 ft. height	4
Deciduous Trees	
Under 6 ft. height	2
6 ft. to 12 ft. height or under 4 in. caliper	3
Over 4 inches caliper	4
Shrubs	1
Under 2 ft. height or spread	
2 ft. to 3 ft. height or spread	2
Over 3 ft. height or spread	3
Vines and Ground Covers	1

3.05 WATERING: Thoroughly water all plants after delivery to the site and immediately after planting. This shall mean full and thorough saturation of all backfill in the pits and beds during the same day of planting. Apply water only by open end hose at a very low pressure to avoid air pockets and injury to the roots. Continue to water all plants and lawns as required to promote healthy growth during the establishment period.

3.06 GUYING: See Typical Planting Details on Drawings for installation requirements. Keep supports in place during entire guarantee period.

3.07 WRAPPING: Wrap trees by overlapping tree wrap tape to 50 percent. Wind from the lowest main branches to the base of the tree. Tie the wrapping at the top and bottom. Wrap within four days after planting and maintain in place for the entire guarantee period.

3.08 PRUNING: After planting, neatly prune all plants to preserve their natural form and character and in a manner appropriate to their requirements. Limit pruning to the minimum necessary to remove injured twigs and branches and to compensate for the loss of roots during transplanting, but never to exceed 1/3 of the branching structure.

3.09 MULCHING: Within two (2) days after planting, mulch all tree pits and planting beds with 4 in. layers of mulching material.

3.10 MAINTENANCE AND ACCEPTANCE:

A. Lawns:

1. Maintain lawns by watering (on a daily basis during the germination period), fertilizing, weeding, mowing, trimming, and other operations such as rolling, re-grading and re-planting as required to establish a smooth, acceptable lawn, free of eroded or bare areas. Landscape Architect to approval final acceptance of lawn areas.

    a. Areas will be accepted only upon attainment of a reasonably thick uniform stand of grass of not less than 80 percent coverage of permanent grasses, free from thin or bare spots.

2. The acceptance of any seeded areas will be in writing. After acceptance, the contractor will be relieved of further expense for maintaining the areas, except for damage resulting from his own or his subcontractor's operations.

B. Trees and Shrubs:

1. The acceptability of the plant material furnished and planted under this Contract shall be at the end of a period of establishment, during which the Contractor, as necessary, shall employ all possible means to preserve the plants in a healthy and vigorously growing condition and to insure their successful establishment. The establishment period shall extend for a period of one (1) calendar year from the date of final acceptance of the project. During this period, the Contractor shall water, cultivate and prune the plants, repair guy wires and stakes, mouse bait as may be required and do any other work necessary to maintain the plants in a healthy growing

condition. This shall include seasonal spraying with approved insecticides or fungicides as may be required. The Contractor shall also be responsible for protecting the plants from mice and other rodents. All dead or rejected plants shall be promptly removed from the project and replaced by live healthy plants meeting the same specifications, if such plants are declared unacceptable during this planting season. Otherwise, they shall be replaced during the next subsequent planting season. No payment shall be made for unsatisfactory work during the establishment period.

2. The period of establishment shall commence at the date of final acceptance. Necessary replacements shall be made so that at the time of final acceptance all plants shall be in a healthy, vigorous growing condition and free from sizable die-back.

3. It shall be the sole responsibility of the Contractor to replace any unsatisfactory plants on the project regardless of whether they are specifically designated by the Owner's Representative. In the case of individual doubtful plants, the Contractor may call upon the Owner's Representative to make a determination as to their acceptability, but it shall not be incumbent on the Owner's Representative to furnish the Contractor with exact lists of replacements.

4. All replacements of plants shall be completed by the end of the planting season prior to the final acceptance date. Any small quantity of plants which fail between the end of the planting season and the final acceptance date shall be canceled from the list of accepted plants and the Contractor will receive no payment for them. If a sizable number fails, the Owner's Representative may extend the date of final acceptance to the subsequent planting season, in which case, the Contractor will be subject to liquidated damages. All replacement planting shall conform in every way to the requirements of the original planting. The Owner's Representative may require that any replacement plants that are not dormant, or that are planted late in the season, be sprayed, as directed, with an approved anti-desiccant.

3.11 CLEANUP AND PROTECTION: During landscape work, store materials and equipment where directed. Keep pavements clean and work area in an orderly condition. Protect landscape work and materials from damage due to landscape operations, operations by other contractors and trades and trespassers. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged landscape work as directed.

3.12 RESTORATION: All pavements, seeded and planted areas, structures and substructures not specifically provided for in the contract disturbed by the Contractor during the execution of the work shall be restored by the Contractor, in a manner satisfactory to the Owner's Representative, to their original conditions at no additional cost to the Owner.

END OF SECTION