

**BUILDING BACKFILL**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. Section includes:
1. Building perimeter and site structure backfilling to subgrade elevations.
  2. Fill under slabs on grade.
  3. Consolidation and compaction.
  4. Fill for over-excavation.

**1.02 REFERENCES**

- A. ANSI/ASTM C136 - Method for Sieve Analysis of Fine and Coarse Aggregates  
 B. ANSI/ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures

**1.03 SUBMITTALS**

- A. Testing laboratory reports indicating that material for backfill under structure meets requirements of this Section.  
 B. Field density test reports of backfill in place.

**PART 2 - PRODUCTS**

**2.01 FILL MATERIALS**

- A. Structural Fill (Crushed Gravel, AOT Spec. 704.05A, Fine): Free of shale, clay, friable material, sand, debris; graded in accordance with ANSI/ASTM C136 within the following limits:
- | Sieve Size | Percent Passing |
|------------|-----------------|
| 2"         | 100             |
| 1 1/2"     | 90 - 100        |
| No. 4      | 30 - 60         |
| No. 100    | 0 - 12          |
| No. 200    | 0 - 6           |
- B. Compacted Fill/Granular Backfill: Free of shale, clay, friable material, debris, and organic matter, graded in accordance with ANSI/ASTM C136 within the following limits:
- | Sieve Size | Percent Passing |
|------------|-----------------|
| 3"         | 100             |
| 3/4"       | 75 - 100        |
| No. 4      | 20 - 100        |
| No. 100    | 0 - 20          |
| No. 200    | 0 - 6           |

**PART 3 - EXECUTION**

**3.01 EXAMINATION**

- A. Verify fill materials to be reused are acceptable.  
 B. Verify underground tanks are anchored to their own foundation to avoid flotation after backfilling.

**3.02 PREPARATION**

- A. Generally, compact subgrade to density requirements for subsequent backfill materials.  
 B. Cut out soft areas of subgrade not capable of insitu compaction. Backfill with crushed gravel fill and compact to density equal to or greater than requirements for subsequent backfill material.  
 C. Prior to placement of aggregate base course material, compact subsoil to 95 percent of its maximum dry density in accordance with ANSI/ASTM D1557.

**3.03 BACKFILLING**

- A. Backfill areas to contours and elevations with unfrozen materials.  
 B. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen or spongy subgrade surfaces.  
 C. Place geotextile fabric as shown in the plans.  
 D. Granular Backfill: Place and compact materials in continuous layers not exceeding 8 inches compacted depth.  
 E. Employ a placement method that does not disturb or damage foundation perimeter drainage and utilities in trenches.  
 F. Maintain optimum moisture content of backfill materials to obtain required compaction density.  
 G. Backfill against supported foundation walls. Do not backfill against unsupported foundation walls. No backfill material shall be placed against a newly completed structure until the concrete has been cured for 7 days.  
 H. Backfill simultaneously on each side of unsupported foundation walls until supports are in place.  
 I. Slope grade away from building a minimum of 1/4 inch per foot, or as shown in plans, unless noted otherwise.  
 J. Make grade changes gradual. Blend slope into level areas.

**3.04 TOLERANCES**

- A. Surface of fill under building slabs shall be graded smooth and even, free of voids, compacted as specified, and to the required elevation. Fill shall be final graded to within a tolerance of 3/8" when tested with a 10' straight edge.

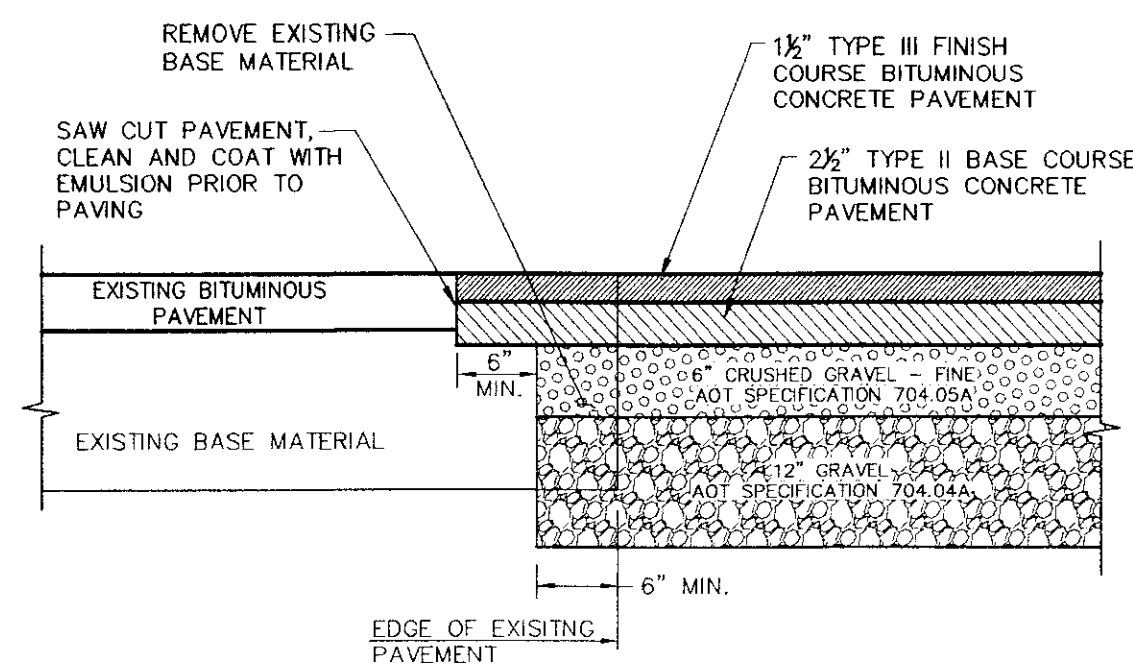
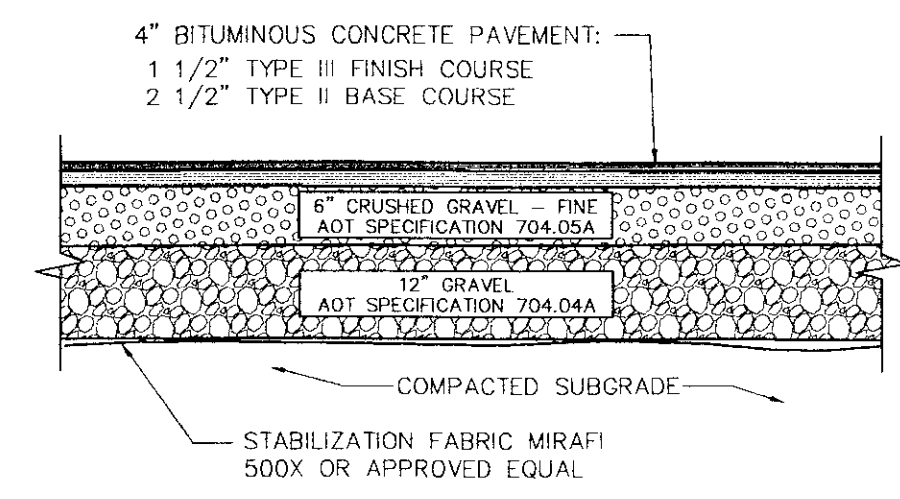
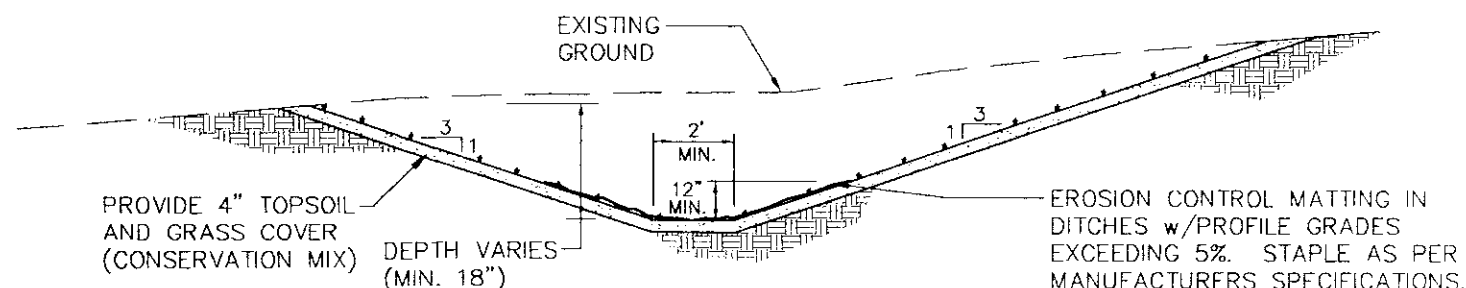
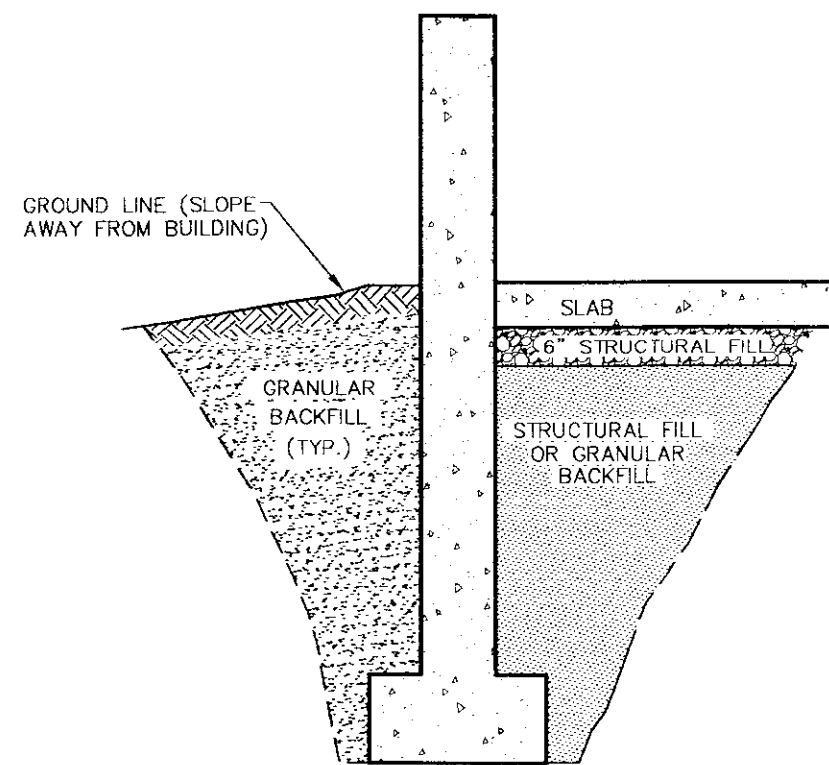
**3.05 FIELD QUALITY CONTROL**

- A. Compaction Requirements: Modified Proctor/ASTM D1557.  
 B. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to Owner.

**3.06 SCHEDULE**

All backfills to be placed in 8" (Maximum) lifts, compacted as specified below:

LOCATION	MATERIAL	% COMPACTION MODIFIED PROCTOR ASTM D-1557
Under Footings	Undisturbed Native Material; or Structural Fill	98%
Interior Slab-on-Grade	Structural Fill	95%
Interior, Adjacent to Foundation Walls	Structural Fill; or Granular Backfill	95%
Exterior, Adjacent to Foundation Walls	Structural Fill; or Granular Backfill	90%



**PROJECT COORDINATION**

**PART 1 - GENERAL**

**1.01 MEETINGS & PROJECT ACCESS**

- A. The Owner shall be notified five (5) days prior to commencement of Work by the Contractor.  
 B. The Contractor will coordinate with the Owner to arrange an on-site pre-construction meeting prior to commencement of any work. Job superintendents and subcontractors shall be included in this meeting.  
 C. The Contractor will coordinate all phases of the Work, so as not to interfere with the normal work procedures in the area.  
 D. The Contractor shall conduct his work in such a manner as to not interfere with or endanger work or traffic in areas adjacent to the construction area, except as permitted by the Owner. The Contractor shall so arrange his construction operations as to provide access for emergency vehicles and equipment to the work site at all times.

**1.02 LABOR**

- A. The Contractor and subcontractors will employ mechanics skilled in their respective trades.  
 B. All labor will be performed in a neat and workmanlike manner.

**1.03 PROTECTION OF PERSONS AND PROPERTY**

- A. The Contractor shall be responsible for initiating, maintaining, and supervising all O.S.H.A. safety precautions in connection with the Work.  
 B. Fire Protection: The Contractor shall take all necessary precautions to prevent fires adjacent to the Work and shall provide adequate facilities for extinguishing fires. The Contractor shall also prevent fires in project related buildings and shall prevent the spread of fires to areas outside the limits of the Work.  
 C. Safety Precautions: Prior to commencement of Work, the Contractor shall be familiar with all safety regulations and practices applicable with construction operations. No additional payments will be made for equipment and procedures necessitated by these safety precautions.

**1.04 CORRECTION OF WORK**

- A. The Contractor shall promptly correct all Work rejected by the Owner as defective or as failing to conform to the Contract Documents. The Contractor shall bear all cost of correcting such rejected Work.

**1.05 WEATHER CONDITIONS**

- A. No Work shall be done when, in the opinion of the Owner, the weather is unsuitable. No concrete, earth backfill, embankment, or paving shall be placed upon frozen material. If there is delay or interruption in the Work due to weather conditions, the necessary precautions must be taken to bond new Work to old.  
 B. Protection Against Water and Storm: The Contractor shall take all precautions to prevent damage to the Work by storms or by water entering the site of the Work directly or through the ground. In case of damage by storm or water, the Contractor, at his own expense, shall make repairs or replacements or rebuild such parts of the Work as the Engineer may require in order that the finished work may be completed as required by the Drawings and Specifications.

**1.06 DISPOSAL OF DEBRIS**

- A. All debris and excess materials, other than that which is authorized to be reused, become the property of the Contractor and shall be promptly removed from the property. The Contractor shall receive title to all debris and/or excess material. The Owner will not be responsible for any loss or damage to debris or excess material owned by the Contractor.

**1.07 PROJECT LAYOUT**

- A. The Contractor shall be responsible for providing all necessary survey staking.  
 1. Locate and protect control points before starting work on the site.  
 2. Preserve permanent reference points during progress of the Work.  
 3. Establish a minimum of two permanent benchmarks on the site, referenced to data established by survey control points.  
 a. Record locations, with horizontal and vertical data, on Project Record Documents.

**SITE EARTHWORK**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. Section includes:  
 1. All excavation (unless covered in other sections of these specifications), removal and stockpiling of topsoil, stabilization fabric, and other miscellaneous and appurtenant works.  
 2. Site filling.  
 3. Roadway structural sections.

**1.02 PROTECTION**

- A. Protect bench marks and existing structures.  
 B. Protect above or below grade utilities which are to remain.

**1.03 SUBMITTALS**

- A. Testing laboratory reports indicating that material for backfill meets requirements of this Section.  
 B. Field density test reports of site fill in place.  
 C. Field density test reports for roadway structural sections in place.  
 D. Stabilization Fabric: Submit copies of manufacturer's specifications and installation instructions.

**PART 2 - PRODUCTS**

**2.01 CRUSHED GRAVEL (AOT SPEC. 704.05A, FINE)**

- A. All materials shall be secured from approved sources. This gravel shall consist of angular and round fragments of hard quarable rock of uniform quality throughout, reasonably free from thin elongated pieces, soft or disintegrated stone, dirt, organic or other objectionable matter. This material shall meet the following grading requirements:
- | Sieve Designation | Percent by Weight Passing Square Mesh Sieve |
|-------------------|---|
| 2"                | 100   |
| 1 1/2"            | 90 - 100                                    |
| No. 4             | 30 - 60                                     |
| No. 100           | 0 - 12                                      |
| No. 200           | 0 - 6                                       |

**2.02 GRAVEL FOR SUBBASE (AOT SPEC. 704.04A)**

- A. This material shall meet the following grading requirements:
- | Sieve Designation | Percent by Weight Passing Square Mesh Sieve |
|-------------------|---|
| No. 4             | 20 - 60                                     |
| No. 100           | 0 - 12                                      |
| No. 200           | 0 - 6                                       |
- The gravel shall be uniformly graded from coarse to fine and the maximum size stone particle shall not exceed 2/3 of the thickness of the layer being placed.

**2.03 COMPACTED FILL/GRANULAR BORROW**

- A. This material shall be free of shale, clay, friable material, debris, and organic matter, graded in accordance with ANSI/ASTM C136 within the following limits:
- | Sieve Designation | Percent by Weight Passing Square Mesh Sieve |
|-------------------|---|
| 6"                | 100   |
| 3/4"              | 75 - 100                                    |
| No. 4             | 20 - 100                                    |
| No. 100           | 0 - 20                                      |
| No. 200           | 0 - 12                                      |

**2.04 GEOTECHNICAL - STABILIZATION FABRIC**

- A. This work shall consist of furnishing and placing on approved stabilization fabric on a prepared surface within the limits shown on the plans. The fabric shall meet, or exceed the following properties:  
 1. Grab tensile strength (ASTM D-1682) - 300 lbs.  
 2. Grab tensile elongation (ASTM D-1682) - 35 %  
 3. Burst strength (ASTM D-751) - 600 psi

**PART 3 - EXECUTION**

**3.01 PREPARATION**

- A. Identify required lines, levels, contours, and datum locations.  
 B. Identify known below grade utilities. Stake and flag locations.  
 C. Maintain and protect existing utilities remaining which pass through work area.  
 D. Upon discovery of unknown utility or concealed conditions, discontinue affected work; notify Engineer.

**3.02 EROSION CONTROL**

- A. Erosion control must be installed prior to beginning any earthwork operations.

**3.03 SITE CLEARING**

- A. Clear areas required for access to site and execution of Work.  
 B. Maintain access to the site at all times.  
 C. Remove trees and shrubs within marked areas. Remove stumps, roots and top roots and other projections 1 1/2" or greater in diameter to 2'-0" below the excavated surfaces in cut areas and 2'-0" below the exposed subgrade in fill areas.  
 D. Remove debris, rock, and extracted plant life from site.

**3.04 TOPSOIL EXCAVATION**

- A. Excavate topsoil from areas to be excavated, re-landscaped or graded and stockpile in areas designated on site or as directed by the Engineer.  
 B. Maintain the stockpile in a manner which will not obstruct the natural flow of drainage.  
 1. Maintain stockpile free from debris and trash.  
 2. Keep the topsoil damp to prevent dust and drying out.

**3.05 SUBSOIL EXCAVATION**

- A. Excavate subsoil from areas to be graded in accordance with plans.  
 B. Excavate subsoil required to accommodate site structures, construction operations, roads, and parking areas.  
 C. Grade top perimeter of excavation to prevent surface water from draining into excavation.  
 D. Notify engineer of unexpected subsurface conditions and discontinue affected work in area until notified to resume work.  
 E. Correct areas over-excavated by error as directed by the Engineer.

**3.06 DITCHES**

- A. Cut accurately to the cross-sections, grades, and elevations shown.  
 B. Maintain excavations free from detrimental quantities of leaves, sticks, trash, and other debris until completion of the work.  
 C. Dispose of excavated materials as shown on the drawings or directed by the Engineer, except do not, in any case, deposit materials less than three feet from the edge of a ditch.

**3.07 COMPACTION REQUIREMENTS**

- A. All backfills and fills shall be compacted in even lifts (12" maximum) to obtain the required densities as follows:
- | Location  | Standard Proctor ASTM D-1557 |
|---|------------------------------|
| Subgrade (6") and Gravel for Roads and Parking Lots | 95%                          |
| General Embankments                                 | 90%                          |

**BITUMINOUS CONCRETE PAVING**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. Section includes:  
 1. Base Courses  
 2. Leveing Courses  
 3. Finish Course  
 B. General: This work shall consist of one or more courses of bituminous mixture, constructed on a prepared foundation in accordance with these Specifications and the type of surface being placed, and in conformity with the lines, grades, thicknesses and typical cross sections shown on the plans or established by the Engineer.

**1.02 QUALITY ASSURANCE**

- A. Use adequate numbers of skilled workers 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.  
 B. All materials and installation shall be in accordance with the Asphalt Institute Manual (MS-4) and the VAOT Standard Specifications, 2001.  
 C. Mixing Plant: Conform to State of Vermont Standards.  
 D. Obtain materials from same source throughout.

**1.03 PROJECT CONDITIONS**

- A. Bituminous concrete shall not be placed between November 1 and May 1. Material shall not be placed when the granular subbase is wet or when the air temperature of the paving site in the shade and away from artificial heat is as follows:
- | Air Temperature Degrees Fahrenheit | Pavement Compacted Depth |
|------------------------------------|--------------------------|
| 40 Degrees or below                | 1 1/4" or Greater        |
| 50 Degrees or below                | Less than 1 1/4"         |

**PART 2 - PRODUCTS**

**2.01 MATERIALS**

- A. Materials shall be combined and graded to meet the criteria as defined in the VAOT Standard Specifications, Division 700 for bituminous concrete.  
 B. Gradation: Materials shall be combined and graded to meet composition limits specified in VAOT Standard Specification, Section 406.03, for the base course and finish course.  
 C. Thickness of paving for drives and parking lots shall be as shown on the plans, consisting of base course and finish course.  
 D. For pavement reconstruction areas due to trenching, the depth of each course shall be increased by 1/2". Pavement reconstruction caused by trench reopening due to improper placement or non-approved placement shall be performed at no additional cost to the Owner.

**2.02 TRAFFIC MARKINGS**

- A. Traffic marking paint to be factory-mixed, meeting the requirements of the VAOT Standard Specifications, Section 708.08.

**PART 3 - EXECUTION**

**3.01 INSTALLATION**

- A. Install in accordance with VAOT Standard Specifications, Section 406.

**3.02 EXAMINATION**

- A. Verify that compacted granular base is dry and ready to support paving and install base.  
 B. Verify gradients and elevations of base are correct.

**3.03 PREPARATION**

- A. Matching Surfaces: When a new pavement is to match an existing bituminous pavement for a roadway or trench, the Contractor shall vertically smooth out the existing pavement, over the existing gravel base. The smooth out shall be thoroughly cleaned and coated with Emulsified Asphalt, RS-1, just prior to paving.

**3.04 PREPARATION - TACK COAT**

- A. When the bottom course of bituminous concrete pavement is left over the winter, or paving is to be made over an existing bituminous concrete pavement, the existing surface shall be cleaned and Emulsified Asphalt applied before the next course is applied.  
 B. Also apply to contact surfaces of curbs.  
 C. Cool surfaces of manhole and catch basin frames with oil to prevent bond with asphalt pavement. Do not tack coat these surfaces.

**3.05 PLACING ASPHALT PAVEMENT**

- A. Place to compacted thickness identified on the plans.  
 B. Compact pavement by rolling. Do not displace or extrude pavement from position. Hand compact in areas inaccessible to rolling equipment.  
 C. Develop rolling with consecutive passes to achieve even and smooth finish, without roller marks.

**3.06 JOINTS**

- A. Joints between old and new pavements or between successive days work shall be made so as to insure a thorough and continuous bond between the old and new mixtures. Whenever the spreading process is interrupted long enough for the mixture to obtain its initial stability, the power shall be removed from the mat and a joint constructed.  
 B. Butt joints shall be formed by cutting the pavement in a vertical plane at right angles to the centerline where the pavement has a true surface as determined by the use of a straight-edge. The butt joint shall be thoroughly coated with Emulsified Asphalt, Type RS-1, just prior to depositing the paving mixture.  
 C. Longitudinal joints that have become cold shall be coated with Emulsified Asphalt, Type RS-1, before the adjacent mat is placed. If they have been exposed to traffic, they shall be cut back to a clean vertical edge prior to painting with the emulsion.  
 D. Unless otherwise directed, longitudinal joints shall be offset at least 6" from any joint in the lower courses of pavement. Transverse joints shall not be constructed nearer than one foot from the transverse joints constructed in lower courses.

**3.07 TOLERANCES**

- A. The surface will be tested by the Engineer using a 16 foot straight-edge at selected locations parallel with the centerline. Any variations exceeding 3/16 of an inch between any two contacts shall be satisfactorily eliminated. A 10 foot straight-edge may be used on a vertical curve. The straight-edges shall be provided by the Contractor.  
 B. Scheduled Compacted Thickness: Within 1/4 inch.  
 C. Variation from True Elevation: Within 1/2 inch.

**3.08 FIELD QUALITY CONTROL**

- A. Permit no vehicular traffic on surfaces until thoroughly cool and hard.

**3.09 REPAIR OF SUBSIDENCE**

- A. Settlement - Should any pavement settle within one year of completion of the Contract, such pavement shall be repaired at the Contractor's expense. If the Contractor fails to make such repairs promptly upon receipt of notice to do so from the Owner, then the Owner may make such repairs as necessary and the Contractor shall pay the Contractor for all costs incurred in making such repairs.

**3.10 MARKING PAVEMENT FOR PAVING**

- A. Striping - Thoroughly clean the areas to receive striping and locate all striping as indicated on the Contract Plans. All striping shall be 4" wide unless otherwise noted.  
 B. Miscellaneous - Provide handpainted symbols and all other miscellaneous signs and symbols as indicated on the Contract Plans.

**SITE ENGINEER:**



**CIVIL ENGINEERING ASSOCIATES, INC.**  
 P.O. BOX 485 SHELBURNE, VT 05482  
 802-985-2323 FAX: 802-985-2271 web: www.cca-vt.com

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PJM

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BCE

**APPROVED**

BCE

**OWNER:**



**STATE OF VERMONT**

VERMONT AGENCY OF TRANSPORTATION  
 MONTPELIER, VERMONT

**PROJECT:**

**DISTRICT 1 WILMINGTON GARAGE**

HAYSTACK ROAD WILMINGTON, VERMONT

DATE	CHECKED	REVISION
3/15/06	BCE	BID DOCUMENTS

**SITE DETAILS and SPECIFICATIONS**

DATE FEB., 2005

SCALE AS SHOWN

PROJ. NO. 04128.11

DRAWING NUMBER

**C2.0**