

### BUILDING BACKFILL

- PART 1 - GENERAL**
- 1.01 SUMMARY**
- A. Section includes:
- Building perimeter and site structure backfilling to subgrade elevations.
  - Fill under slabs on grade.
  - Consolidation and compaction.
  - Fill for over-excavation.
- 1.02 REFERENCES**
- ANSI/ASTM C136 - Method for Sieve Analysis of Fine and Coarse Aggregates
  - ANSI/ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures
- 1.03 SUBMITTALS**
- Testing laboratory reports indicating that material for backfill under structure meets requirements of this Section.
  - 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:

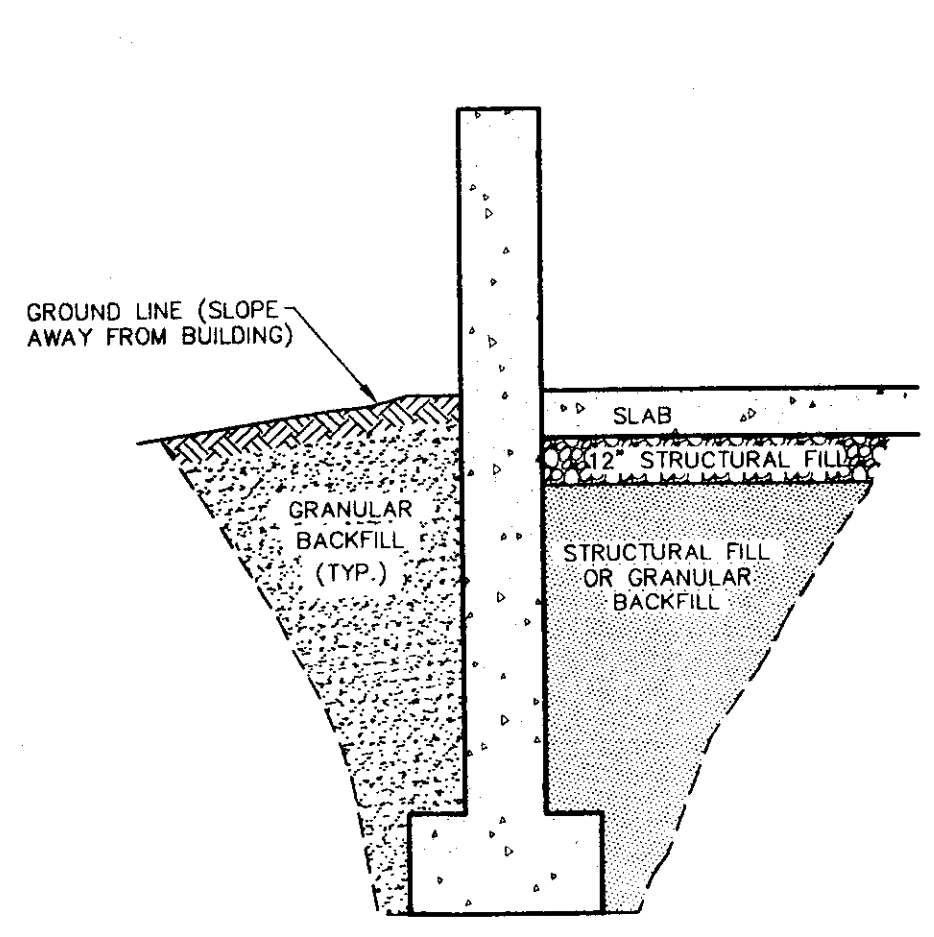
| Sieve Size | Percent Passing |
|------------|-----------------|
| 2"         | 100             |
| 1 1/2"     | 90 - 100        |
| No. 4      | 30 - 60         |
| No. 100    | 0 - 12          |
| No. 200    | 0 - 6           |

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:

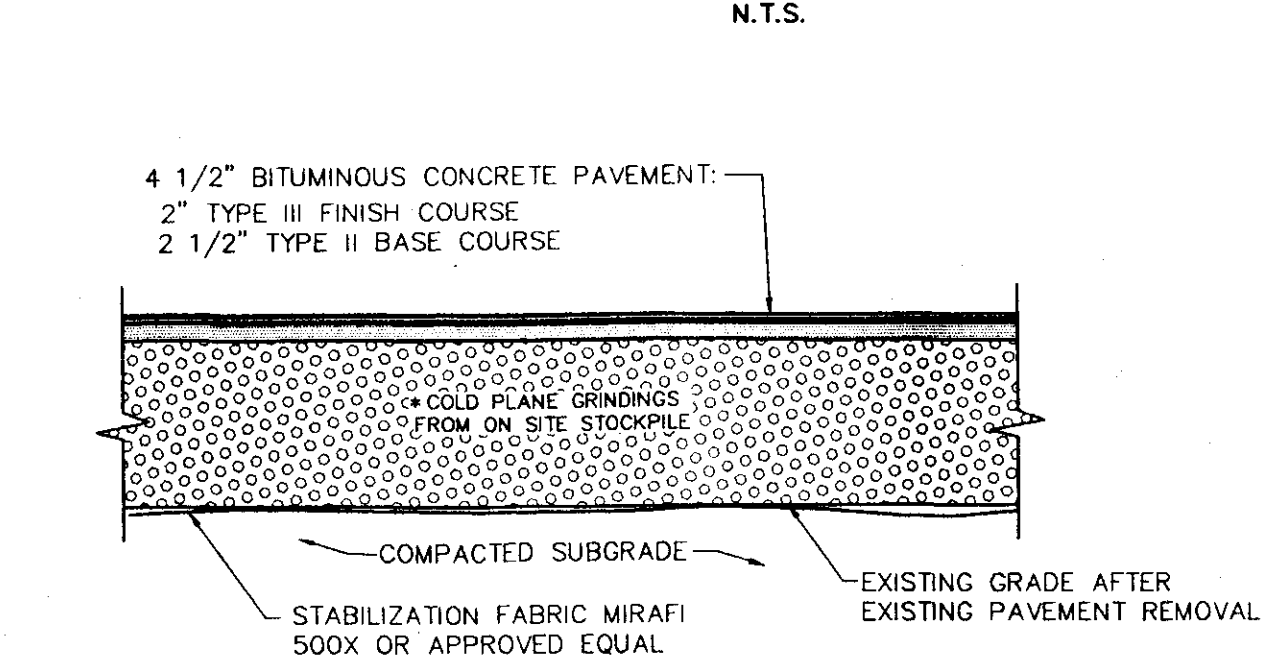
| Sieve Size | Percent Passing |
|------------|-----------------|
| 3"         | 100             |
| 3/4"       | 75 - 100        |
| No. 4      | 20 - 100        |
| No. 100    | 0 - 20          |
| No. 200    | 0 - 6           |

- PART 3 - EXECUTION**
- 3.01 EXAMINATION**
- Verify fill materials to be reused are acceptable.
  - Verify underground tanks are anchored to their own foundation to avoid floatation after backfilling.
- 3.02 PREPARATION**
- Generally, compact subgrade to density requirements for subsequent backfill materials.
  - Cut out soft areas of subgrade not capable of in situ compaction. Backfill with crushed gravel fill and compact to density equal to or greater than requirements for subsequent backfill material.
  - 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**
- Backfill areas to contours and elevations with unfrozen materials.
  - Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen or spongy subgrade surfaces.
  - Place geotextile fabric as shown in the plans.
  - Granular Backfill: Place and compact materials in continuous layers not exceeding 8 inches compacted depth.
  - Employ a placement method that does not disturb or damage foundation perimeter drainage and utilities in trenches.
  - Maintain optimum moisture content of backfill materials to attain required compaction density.
  - 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.
  - Backfill simultaneously on each side of unsupported foundation walls until supports are in place.
  - Slope grade away from building a minimum of 1/4 inch per foot, or as shown in plans, unless noted otherwise.
  - Make grade changes gradual. Blend slope into level areas.
- 3.04 TOLERANCES**
- 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 1/8" when tested with a 10' straight edge.
- 3.05 FIELD QUALITY CONTROL**
- Compaction Requirements: Modified Proctor/ASTM D1557.
  - 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:

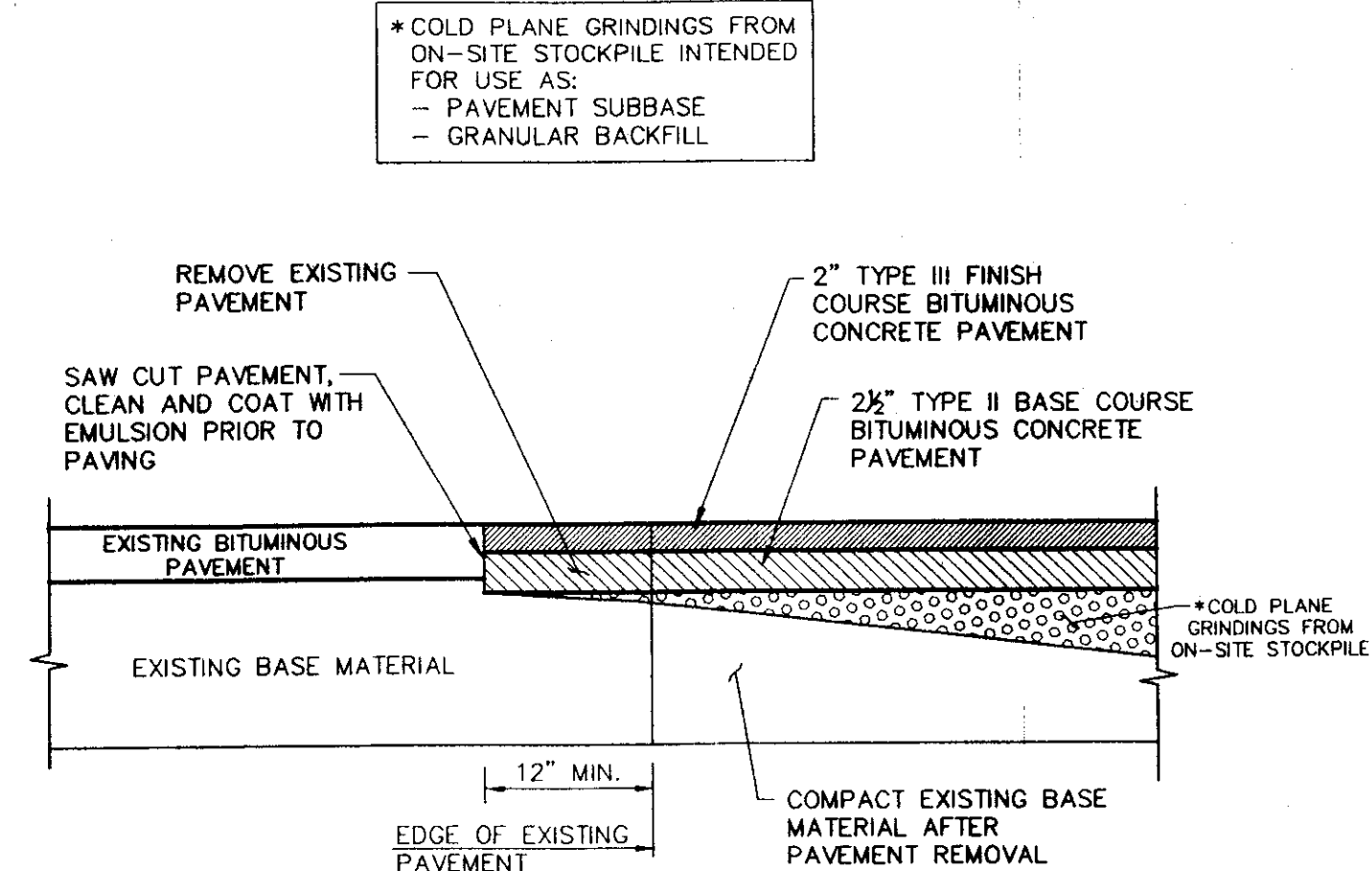
| LOCATION                               | MATERIAL   | % COMPACTION<br>MODIFIED PROCTOR<br>ASTM D-1557 |
|--|--|---|
| Under Footings                         | Undisturbed Native Material; or<br>Structural Fill | 98%   |
| Interior Slab-on-Grade                 | Structural Fill                    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



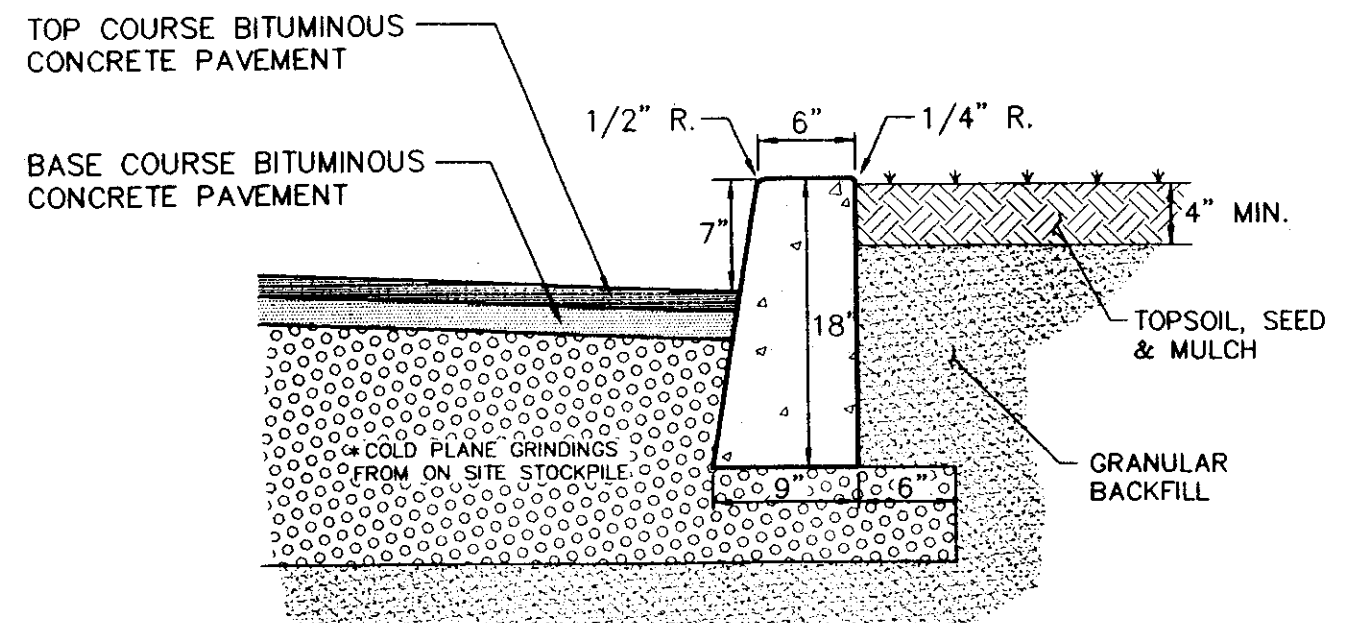
**TYPICAL FOUNDATION BACKFILL SECTION**  
N.T.S.



**TYPICAL PAVEMENT SECTION**  
N.T.S.



**TRANSITION FROM NEW PAVEMENT TO EXISTING PAVEMENT**  
N.T.S.



- CURBING SHALL BE CONSTRUCTED IN 10' SECTIONS WITH 1/8" JOINT BETWEEN SECTIONS.
- CURBING EXPANSION JOINTS SHALL BE CONSTRUCTED EVERY 20' AND SHALL BE CONSTRUCTED OF MATERIAL CONFORMING TO AASHTO DESIGNATION M-153 (1/2" SPONGE RUBBER OR CORK).

**TYPICAL CONCRETE CURB DETAIL**  
N.T.S.

- PROJECT COORDINATION**
- PART 1 - GENERAL**
- 1.01 MEETINGS & PROJECT ACCESS**
- The Owner shall be notified five (5) days prior to commencement of Work by the Contractor.
  - 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.
  - The Contractor will coordinate all phases of the Work, so as not to interfere with the normal work procedures in the area.
  - 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 also arrange his construction operations as to provide access for emergency vehicles and equipment to the work site at all times.
- 1.02 LABOR**
- The Contractor and subcontractors will employ mechanics skilled in their respective trades.
  - All labor will be performed in a neat and workmanlike manner.
- 1.03 PROTECTION OF PERSONS AND PROPERTY**
- The Contractor shall be responsible for initiating, maintaining, and supervising all O.S.H.A. safety precautions in connection with the Work.
  - 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.
  - 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**
- 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**
- 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 a delay or interruption in the Work due to weather conditions, the necessary precautions must be taken to bond new Work to old.
  - 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**
- 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**
- The Contractor shall be responsible for providing all necessary survey staking.
  - Locate and protect control points before starting work on the site.
  - Preserve permanent reference points during progress of the Work.
  - Establish a minimum of two permanent benchmarks on the site, referenced to data established by survey control points.
    - Record locations, with horizontal and vertical data, on Project Record Documents.
- 1.08 FIELD QUALITY CONTROL**
- Testing Agency: Contractor will engage a qualified independent geotechnical engineering testing agency to perform field quality control.
  - Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earthwork only after test results for previously completed work comply with requirements and frequencies.
  - Testing agency will test compaction of soils in place according to ASTM D2922. Tests will be performed at the following locations and frequencies:
    - Paved Areas: At subgrade and at each compacted fill and backfill layer, at least 1 test for every 2000 sq. ft. or less of paved area, but in no case fewer than 3 tests.
    - Buildings: At subgrade and at each compacted fill and backfill layer, at least 1 test for every 2000 sq. ft. or less of backfilled area, but in no case fewer than 3 tests.
- SIEVE ANALYSIS**
- | 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                                       |
- 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.
- COMPACTED FILL/GRAVULAR BORROW**
- 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"                | 75  |
| 3/4"              | 100   |
| No. 4             | 20 - 100                                    |
| No. 100           | 0 - 20                                      |
| No. 200           | 0 - 12                                      |
- GRADING REQUIREMENTS**
- Subgrade (8") and Gravel for Roads and Parking Lots: 95%  
General Embankments: 90%

- PART 2 - PRODUCTS**
- 2.01 MATERIALS**
- Materials shall be combined and graded to meet the criteria as defined in the VAOT Standard Specifications, Division 700 for bituminous concrete.
  - 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.
- 2.02 TRAFFIC MARKINGS**
- Traffic marking paint to be factory-mixed, meeting the requirements of the VAOT Standard Specifications, Section 708.08.
- PART 3 - EXECUTION**
- 3.01 PREPARATION**
- Identify required lines, levels, contours, and datum.
  - Identify known below grade utilities. Stake and flag locations.
  - Maintain and protect existing utilities remaining which pass through work area.
  - Upon discovery of unknown utility or concealed conditions, discontinue affected work; notify Engineer.
- 3.02 EROSION CONTROL**
- Erosion control must be installed prior to beginning any earthwork operations.
- 3.03 SITE CLEARING**
- Clear areas required for access to site and execution of Work.
  - Maintain access to the site at all times.
  - Remove trees and shrubs within marked areas. Remove stumps, roots and top roots and other projections 1/2" or greater in diameter to 2'-0" below the exposed surface in fill areas and 2'-0" below the exposed subgrade in fill areas.
  - Remove debris, rock, and extracted plant life from site.
  - Use means necessary to prevent dust becoming a nuisance to the public, to neighbors, and to other work being performed on or near the site.
- 3.04 TOPSOIL EXCAVATION**
- Excavate topsoil from areas to be excavated, re-landscaped or regraded and stockpile in areas designated on site or as directed by the Engineer.
  - Maintain the stockpile in a manner which will not obstruct the natural flow of drainage.
    - Maintain stockpile free from debris and trash.
    - Keep the topsoil damp to prevent dust and drying out.
- 3.05 SUBSOIL EXCAVATION**
- Excavate subsoil from areas to be regraded in accordance with plans.
  - Excavate subsoil required to accommodate site structures, construction operations, roads, and parking areas.
  - Grade top perimeter of excavation to prevent surface water from draining into excavation.
  - Notify engineer of unexpected subsurface conditions and discontinue affected work in area until notified to resume work.
  - Correct areas over-excavated by error as directed by the Engineer.
- 3.06 DITCHES**
- Cut accurately to the cross-sections, grades, and elevations shown.
  - Maintain excavations free from detrimental quantities of leaves, sticks, trash, and other debris until completion of the work.
  - 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**
- All backfills and fills shall be compacted in even lifts (12" maximum) to attain the required densities as follows:
- | Location  | Standard Proctor<br>ASTM D-1557 |
|---|---------------------------------|
| Subgrade (8") and Gravel for Roads and Parking Lots | 95%                             |
| General Embankments                                 | 90%                             |

**SITE EARTHWORK**

- PART 1 - GENERAL**
- 1.01 SUMMARY**
- A. Section includes:
- All excavation (unless covered in other sections of these specifications), removal and stockpile of topsoil, stabilization fabric, and other miscellaneous and appurtenant works.
  - Site filling.
  - Roadway structural sections.
- 1.02 PROTECTION**
- Protect bench marks and existing structures.
  - Protect above or below grade utilities which are to remain.
- 1.03 SUBMITTALS**
- Testing laboratory reports indicating that material for backfill meets requirements of this Section.
  - Field density test reports of site fill in place.
  - Field density test reports for roadway structural sections in place.
  - Stabilization Fabric: Submit copies of manufacturer's specifications and installation instructions.
- PART 2 - PRODUCTS**
- 2.01 CRUSHED GRAVEL (AOT SPEC. 704.05A, FINE)**
- All materials shall be secured from approved sources. This gravel shall consist of angular and round fragments of hard durable 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:

- 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.
- COMPACTED FILL/GRAVULAR BORROW**
- 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"                | 75  |
| 3/4"              | 100   |
| No. 4             | 20 - 100                                    |
| No. 100           | 0 - 20                                      |
| No. 200           | 0 - 12                                      |
- BITUMINOUS CONCRETE PAVING**
- PART 1 - GENERAL**
- 1.01 SUMMARY**
- A. Section includes:
- Base Courses
  - Leaving Courses
  - 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.

SITE ENGINEER:

**CIVIL ENGINEERING ASSOCIATES, INC.**  
P.O. BOX 485 SHELBURNE, VT 05482  
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DRAWN: JCW/PJM  
CHECKED: BCE  
APPROVED: BCE

OWNER:

**STATE OF VERMONT**  
DEPARTMENT OF BUILDINGS AND GENERAL SERVICES  
MONTPELIER, VERMONT

PROJECT:

**BERLIN STORAGE BUILDING**

MAINTENANCE GARAGE BERLIN, VERMONT

| DATE    | CHECKED | REVISION      |
|---------|---------|---------------|
| 5/06/05 | BCE     | BID DOCUMENTS |
|         |         |               |
|         |         |               |

**SITE DETAILS and SPECIFICATIONS**

**3.07 TOLERANCES**

- 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.
- Scheduled Compacted Thickness: Within 1/4 inch.
- Variation from True Elevation: Within 1/2 inch.

DATE: MAY, 2005  
SCALE: AS SHOWN  
DRAWING NUMBER: C3.0

PROJ. NO. 03146.02