

Streets/Sidewalks

A. Description

This work shall consist of furnishing and placing subgrade, base course, binder and wearing courses as shown on the plans or as ordered. These specifications include general requirements that are applicable to all types of roads and sidewalks within the City of Concord.

B. Materials

Certificates of Compliance shall be submitted by the Contractor for each material to the City of Concord's Representative for review and approval.

The materials shall be subject to rejection at any time due to failure to meet any of the specification requirements.

Base Materials

Crushed Gravel: Crushed Gravel shall meet the following gradation requirements (NHDOT Item #304.3):

<u>Sieve Size</u>	<u>% Passing</u>
3 Inch	100
2½ Inch	95 – 100
1 Inch	55 – 85
No. 4	27 - 52
No. 200*	0 - 12

*Fraction passing the #4 sieve

At least 50% of the material retained on the 1-inch sieve shall have a fractured face.

Gravel: Gravel shall meet the following gradation requirements (NHDOT Item #304.2):

<u>Sieve Size</u>	<u>% Passing</u>
6 Inch	100
No. 4	25 - 70
No. 200*	0 - 12

*Fraction passing the #4 sieve

The Maximum stone size shall be 6-inches in any dimension for a 12-inch compacted lift. Large stones removed from the gravel box may be used for slope fill when properly placed.

Sand: Sand shall meet the following gradation requirements (NHDOT Item #304.1):

<u>Sieve Size</u>	<u>% Passing</u>
6 Inch	100
No. 4	70-100
No. 200*	0 - 12

*Fraction passing the #4 sieve

The maximum size of any stone or fragment shall not exceed three-fourths of the compacted depth of the layer being placed but in no case larger than 6 inches.

Pavements

Bituminous Concrete Base Course: Base course materials shall conform to the specifications in Section 401 of the NHDOT Standard Specifications for ¾ inch aggregate pavement.

Bituminous Concrete Wearing Course: Wearing course material shall conform to the specifications in Section 401 of the NHDOT Standard Specifications for ½ inch aggregate pavement.

Pavement Overlay: The pavement overlay material shall conform to the specifications in Section 401 of the NHDOT Standard Specifications for ½ inch pavements.

Portland Cement Concrete: Concrete shall be NHDOT Class AA, 4000 psi, reinforced as shown in the City of Concord's Construction Details.

Curb

Vertical Granite Curb: Shall be 5-inches wide and 16 to 18 inches deep. Granite shall be hard, durable, reasonably uniform in appearance and color and free from weakening seams.

Slope Granite Curb: Shall be 6 to 8-inches wide and 12-inches deep. Granite shall be hard, durable, reasonably uniform in appearance and color and free from weakening seams.

Cement: Cement shall be straight Portland Cement, Type I, II, or a Type I/II.

Mortar Sand: Mortar sand shall meet the following gradation requirements:

<u>Sieve Size</u>	<u>% Passing</u>
No. 8	100
No. 16	60-100
No. 50	15-35
No. 100	2-15
No. 200	0-5

Sidewalks

Bituminous Concrete: All bituminous sidewalks (base and wearing course) will be constructed with State of NH Sidewalk mix – Section 608, Table 1 – Composition of Mixtures.

Portland Cement Concrete: Portland cement reinforced concrete sidewalks shall be a minimum of 4-inch thickness (except at drives and curb ramps). Concrete shall be NHDOT Class A (3000 psi), with a maximum slump of 3-inches. Maximum aggregate size shall be 1-inch. Reinforcing shall be 6"x6" W2.9xW2.9 woven wire fabric.

Portland cement reinforced concrete sidewalks at drives and curb ramps shall be a minimum 6-inch thickness. Concrete shall be NHDOT Class AA (4000 psi), with a maximum slump of 3-inches. Maximum aggregate size shall be 1-inch. Reinforcing shall be 6"x6" W2.9xW2.9 woven wire fabric.

Detectable Warning Panels: Detectable Warning Panels shall be untreated cast iron. Dimensions and placement shall be as shown in the City of Concord's Construction Details.

Street Lights

Light poles shall be treated timber poles or tapered steel or aluminum. All poles shall demonstrate similar appearance and durability. All light poles, lights and their installation shall meet the requirements of **Unitil Energy Systems** located at #1 McGuire Street, Concord, NH.

Guardrail

Where guardrail and terminal end units are required or shown on the approved plans, the items shall conform to Section 606 of the NHDOT Standard Specifications for Steel Beam Guard Rail and Terminal Units. If the owner/developer/contractor wishes to deviate from the requirement, a written request shall be sent to the City Engineer for review and approval/disapproval.

Certificates of Compliance shall be submitted by the Contractor for each material to the City of Concord's Representative for review and approval.

Posts with hollow knots, plugged holes, or season checks exceeding ¼ inch in width will be rejected.

Signs

Street Signs: Street signs shall be fabricated in accordance with the Manual on Uniform Traffic Control Devices. Street sign letters will be 6-inches tall on a 9-inch aluminum backing

Pedestrian and School Crossing Signs: Pedestrian and school crossing signs shall have a florescent yellow-green background with black legend and border.

Sign Posts: Sign Posts shall be green enamel 3#/ft flanged channel steel.

Right-of-Way Bounds

Right-of-way bounds shall be reinforced concrete or granite and measure 4"x4"x36" minimum.

C. Construction Requirements

The Community Development Department in conjunction with the General Services Department will oversee all work related to these utilities. Unauthorized use of hydrants is

strictly prohibited. Should a contractor desire to use City water for dust control, sewer testing and flushing operations, etc. the City will furnish a temporary meter. A deposit is required and the contractor will be charged for the water used. **Only qualified City of Concord personnel are authorized to manipulate hydrants.** Unauthorized usage of City water is subject to a minimum \$1,000.00 fine.

Clearing and Grubbing

The entire width of disturbance between slope lines shall be cleared of all stumps, brush, roots, boulders, unstable material and trees not intended for preservation.

Blasting Operations

Slopes: When blasting is required, the required slopes or configuration shown on the plans shall be produced in a safe and stable condition.

Authority to prohibit blasting: The City Engineer or their agent shall at all times have the authority to prohibit or halt the contractor's blasting operations if it is apparent that: through the methods being employed the required slopes are not being attained; or the safety or convenience of the public is being jeopardized.

A pre-blast survey, subject to Engineering Services review, will be required for all buildings within a 500-foot radius of the blast site. No blasting is to take place without an approved pre-blast survey.

Seismic monitoring for frequency and acceleration will be required should adjacent structures be threatened.

The contractor shall also comply with the **2004 Policy on Construction Practices in the City of Concord to Minimize Disturbance and Damages.** In summary, this policy describes that the City Engineer has the authorization to instruct the contractor to monitor vibrations not only during blasting operations but also during intensive construction projects (i.e., deep roadway cuts in close proximity to homes, etc.) to minimize disturbances to the surrounding neighborhood. The City Engineer will enforce the guidelines from NHDOT Standard Specifications for Road and Bridge Construction - Section #203 and #211.

Unsuitable Material

Removal of unsuitable material: Where excavation to the designed elevation results in a subgrade or slope of clay, peat, muck or other unstable material, the contractor shall remove the unstable material to the depth necessary to attain a solid foundation.

Backfilling

Backfilling shall be done with approved materials and shall meet the requirements for: sand, gravel, broken rock or any combination thereof.

Rock fragments in fill shall be placed in layers not in excess of 2 feet. The lifts shall be placed in such a manner as to close all voids. Earth shall be placed in layers to the full width of the roadway, generally parallel to the finish grade. The layers shall not exceed 12-inches of loose depth. Each layer shall be spread to a uniform thickness and compacted to the required density. Continuous grading or shaping shall be carried out concurrently with the compactive effort to assure uniform density throughout each layer of material.

Subbase Application

Prior to the placement of any road base material, all underground utility crossings shall be accomplished, with trenches properly compacted. Gravel and Crushed Gravel shall not be placed until an independent testing laboratory has performed density testing on the underlying material and the material has met the density specification. Gravel and Crushed Gravel shall be placed in lifts not to exceed 12-inches in depth. “Drive through dumping” of material shall not be allowed. It shall be shaped true to the grade and cross-section as shown on the typical section.

Compaction: Compacting of subgrade, gravel and or crushed gravel shall be accomplished with an approved vibratory roller. The materials shall be compacted and rolled until the density requirements are met. When vibratory equipment is being operated, the amplitude of vibrations may be adjusted as necessary to avoid causing damage to adjacent buildings and property.

Bituminous Concrete Pavement Application

Placement of base course: Placement of the base course shall be in close conformity with the lines and grades, thickness and typical cross-sections as shown on the approved plans. Where curbing is to be installed, the base course of pavement may be paved a maximum of one foot (1') narrower on each side to allow for the installation of the curb.

Placement of the final wearing course: Placement of the wearing course shall be in close conformity with the lines and finish grades as shown on the approved plans. It shall be applied on a previous placed base course. All manhole covers, catch basin grates and curbing shall be in place and set to the proper grade before the wearing course is applied.

Environmental conditions: The asphalt binder/base pavement shall be placed only when the underlying crushed gravel surface is dry, frost free and the surface temperature is 40° Fahrenheit and rising. For the placement of the final asphalt wearing course, the surface temperature of the binder material must be 50° Fahrenheit and rising.

Waiver of environmental conditions: In special instances when the City Engineer determines that it is in the best interest of the City of Concord, the above requirements may be waived for base course pavement only. Any material delivered to the spreader having a temperature lower than 250° Fahrenheit shall not be used.

Thickness of pavement: Unless otherwise noted, thickness of pavement as shown on the approved plans and/or the Typical Roadway Section, shall be the compacted thickness after rolling.

Removal of existing pavement: At the beginning and end of the project or project section, the existing pavement shall be removed to a sufficient depth to allow for the placing of the new pavement and construction of a transverse joint. The underlying course shall be clean and free of any foreign materials and loose bituminous patches and must present a dry and unyielding surface. Sawcutting or the use of a jackhammer is required before excavating pavement in the City right-of-way. The use of heavy equipment to “rip” pavement is not allowed.

Requirements for tack coat: A tack coat of emulsified asphalt shall be applied to all lifts of pavement immediately prior to placement unless waived by the City Engineer. The rate of application shall be between 0.02 and 0.05 gal/SY, as determined by the City Engineer. Prior to the application of the tack coat, the asphalt binder surface shall be cleaned to the satisfaction of the City of Concord's Representative. The use of a street sweeper may be required depending on the cleanliness of the surface.

Removal of unsatisfactory material: If any imperfect places are found in any course, the contractor shall remove the unsatisfactory material and replace it after coating the exposed edges with a suitable bituminous emulsion.

Requirements for cold planing at bituminous joints: Surfaces that are to be overlaid with new bituminous pavement will require cold planing at the overlay joint. The existing bituminous surface shall be removed by a planing or milling machine capable of removing the bituminous pavement to the depth specified at the limits of the overlay, and to provide a smooth transition between the new and existing pavements.

Compaction: Immediately after the bituminous mixture has been spread, struck off, and surface irregularities adjusted, it shall be thoroughly and uniformly compacted by rolling. The initial rolling shall be done with a static or vibratory steel-drum roller. Intermediate rolling shall be done by a pneumatic-tired roller. Final rolling shall be done with a static steel-drum roller or a roller of the steel-drum three-axle type, locked. Rollers must be in good mechanical condition, free from excessive backlash, faulty steering mechanism, or worn parts.

Pneumatic-tire rollers shall be self-propelled and shall be equipped with smooth tires of equal size and diameter. The wheels shall be so spaced that one pass of a two-axle roller accomplishes one complete coverage. The wheels shall not wobble and shall be equipped with pads that keep the tires wet. The rollers shall provide an operating weight of not less than 2,000 lb per wheel. All tires shall be maintained at a uniform pressure between 55 and 90 psi with a 5 psi tolerance between tires. A suitable tire pressure gauge shall be readily available.

Unless otherwise directed, rolling shall begin at the sides and proceed longitudinally parallel to the roadway center line, gradually progressing to the crown of the roadway. The overlap shall be one-half the roller width for wheeled rollers and 6 in for vibrating rollers. No overlap is required for pneumatic-tired rollers. When paving in echelon or abutting a previously placed lane, the longitudinal joint shall be rolled first followed by the regular rolling procedure. On superelevated curves, the rolling shall begin at the low side and progress to the high side by overlapping of longitudinal passes parallel to the centerline.

Along forms, curbs, headers, and similar structures and other places not accessible to a normal full-sized roller, sidewalk rollers weighing at least 2,000 lb (900 kg) shall be used. Where rollers are impracticable, the mixture shall be thoroughly compacted with heated or lightly oiled hand tamps or vibrating plate compactors.

Bituminous Concrete Pavement Full Width Overlay

General Requirements: It shall be the responsibility of the contractor to provide a full width permanent pavement overlay following extensive trench excavations within a public way. The contractor shall furnish all labor and materials to install the bituminous pavement overlay over the full width of the roadway curb-to-curb or shoulder-to-shoulder

throughout the entire project limits at the depth specified by the City Engineer. A leveling or shim course of pavement may be required by the City Engineer, to produce a uniform roadway section.

Placement of the pavement overlay: All existing pavement areas and base course trench patched areas are to be brought to a smooth level grade with a hot bituminous leveling shim course. All manhole covers, catch basin frames, water and utility valve boxes and curbing shall be reset to grade prior to overlay placement. The entire area shall be swept and cleaned of all debris.

Portland Cement Concrete Pavement Repair

Portland Cement Concrete Pavement shall be replaced in-kind. Repairs shall be performed as shown in the City of Concord's Construction Details. Traffic will not be allowed to travel on the repair for a minimum 28 days or until the concrete has reached 4000 psi compressive strength.

Vertical Granite Curb

Vertical granite curbing shall be set with a 7-inch reveal above finish pavement. Tip downs at driveway locations shall be at least 7 feet in length. "Curved Curb" shall be used at all curbed roundings when the radius of the rounding is 30-feet or less.

Placement: Vertical granite curb is to be placed after the asphalt base course of pavement has been applied. Installation of curbing shall be so that the front line conforms to the line and grade required. Joints shall be pointed with Portland Cement mortar and the exposed portions finished with a jointer.

Backfilling: Backfilling shall be done immediately after the curb is set and jointed. Backfill shall be crushed gravel placed and thoroughly compacted on both sides of the curbing until the density requirements are met with the use of a vibratory plate compactor or a "Jumping" jack compactor. **The use of hand compaction (i.e., tamping) is not permitted.** Concrete or flowable fill shall not be placed along the face of curb.

Damaged or unsuitable curbing: Any curbing that is damaged or found unsuitable prior to finish pavement being applied shall be replaced with new curbing.

Slope Granite Curb

Slope granite curb shall be placed at locations as noted on the plans with a 5-inch reveal above the finish pavement. A transition piece of granite curb, 6-feet in length, shall be used between the sloped granite curb and the vertical granite curb. Radial joints shall be used at all curbed roundings when the radius is less than 16'. Curved curb shall be used at all curbed roundings with the radius is 2- feet of less.

Placement: Slope granite curb is to be placed after the asphalt base course of pavement has been applied. Installation of curbing shall be so that the front line conforms to the line and grade required. Joints shall be pointed with Portland Cement mortar and the exposed portions finished with a jointer.

Backfilling: Backfilling shall be done immediately after the curb is set and jointed. Backfill shall be crushed gravel placed and thoroughly compacted on both sides of the curbing until the density requirements are met with the use of a vibratory plate compactor

or a “Jumping” jack compactor. **The use of hand compaction (i.e., tamping) is not permitted.**

NHDOT Item 520.421 – Class “F”, Excavatable Flowable Fill may be used as backfill BEHIND the curb. Concrete or flowable fill shall not be placed along the face of curb.

Damaged or unsuitable curbing: Any curbing that is damaged or found unsuitable prior to finish pavement being applied shall be replaced with new curbing.

Mortar

Mortar shall consist of two parts mortar sand to one part Portland Cement. To obtain the proper ratio, one bag of Type I or Type II Portland Cement should be mixed with two-five gallon buckets of mortar sand. The mix shall be thoroughly blended only in such quantity as may be required for immediate use, and shall be used before the initial set has taken place. The mix shall be constantly worked over with hoe or shovel to keep it workable. Adding water after mixing to bring a hardened mix "back to life" will not be allowed.

Sidewalks

Sidewalk: Sidewalks shall comply in all respects to the most recently adopted State of New Hampshire Code for Barrier Free Design and the most recent guidance provided by the U.S. Access Board. Sidewalks shall be a minimum of 5-feet in width, exclusive of any curb, and shall have a transverse slope of 2%, sloping towards the street, driveway or parking area. All measurements shall be taken from the top of the granite curbing.

Curb Ramps: 6” reinforced concrete sidewalk with detectable warning panels shall be constructed at all intersections and at commercial driveways which (per the Revised Draft Guidelines for Accessible Public Right-of-Way, November 23, 2005, Advisory R221) are provided with traffic control devices or otherwise are permitted to operate like public streets.

Preparation of the base: Preparation of the base shall be accomplished by removing material to a depth of 7-inches below finish grade, except at drive locations where it shall be excavated 9-inches below finished grade. Any unsuitable material found will be removed and replaced with crushed gravel as directed.

Crushed Gravel: The excavated area shall be filled with 4-inches of crushed gravel except at driveways where 6-inches of crushed gravel shall be used.

Compaction: Prior to the placement of pavement or concrete, the crushed gravel subbase shall be thoroughly compacted with the use of a roller until the density requirements are met.

Bituminous Concrete Pavement Sidewalk

Placement: Pavement shall be a minimum 3” total thickness placed using a sidewalk or street paver in two lifts (1½” base course, 1½” wearing course).

Portland Cement Concrete Sidewalk

Placement: Before placing the concrete, all foreign materials shall be removed from the base. All forms shall be thoroughly cleaned, secured in position and coated with a form-

release agent. Concrete shall be placed, struck off, consolidated, and finished to plan grade with a mechanical machine, vibrating screed or by hand finishing methods when approved.

Finishing: After concrete has been struck off and consolidated, a bull-float may be used to remove any high or low spots. The final finish shall be made with a clean fine bristled broom, lightly applied in an alternating grid pattern.

Curing: During curing, concrete shall be protected from loss of moisture, rapid temperature change and mechanical injury for a minimum of three days following the placement. Following the curing period, an approved concrete sealer shall be applied at the rate recommended by the manufacturer.

Joints: Joint pattern shall be detailed on the construction plans and shall not be altered without prior approval of the City Engineer. Control or contraction joints shall be formed by sawing or by use of a pre-molded filler and shall be a minimum depth of one-fourth the slab thickness. Sawing shall begin when the concrete has hardened sufficiently to permit sawing without excessive raveling. Joints shall be continuous across the slab, be 5/16" inch to 1/4 inch in width and be completed before uncontrolled shrinkage cracks have occurred.

Guardrail

Placement: Wood posts shall be set plumb. All wood posts shall be retreated after drilling or sawing. The wood block-outs shall be "toe nailed" to the rectangular wood posts.

Street Signs

For new streets the contractor shall be required to provide City street name and traffic control signs. All street, warning, regulatory, etc. signs shall be in accordance with the Manual on Uniform Traffic Control Devices (MUTCD).

Right-of-Way Bounds

Right-of-Way bounds shall be set 5/8" to 1" above the ground in residential areas, 4" to 6" above ground in wooded areas and slightly below grade when set in pavement. The bounds shall be set vertical. The surrounding soil shall be thoroughly compacted so that the bound will not move when struck.

D. Inspection Requirements

The City of Concord will provide full time inspection during all preparation and paving operations at the Contractor's expense.

E. Testing Requirements

The City of Concord's Representative reserves the right to request testing of any material from an independent testing company at any time to ensure that the desired specifications have been met. All testing required by the City Engineer shall be completed by an approved testing agency at the contractor's expense.

Density testing

Testing Standards: Regardless of the application, the density of the subgrade material, Gravel, and or Crushed Gravel shall be determined by AASHTO T191 (Sand Cone Method), or AASHTO T238 and T239 (Nuclear Methods). The density shall be not less than 95-

percent (95%) of the minimum density determined in accordance with AASHTO T180 (Modified Proctor Density), and performed at a minimum of 100 ft between tests. Nuclear density methods will be governed by ASTM D2922.

Testing Frequency: As a minimum, density testing shall be performed prior to placement of any pavement. All test results shall be submitted to the City of Concord's Representative AT LEAST 24-HOURS IN ADVANCE OF THE PAVING OPERATIONS.

Contaminated material

Previously tested and accepted materials contaminated by earthen, organic or other foreign material or degraded by hauling equipment to such an extent that the material ceases to meet the requirements, shall be removed and replaced.

Street Lights

All street lighting and traffic signal installations shall be in place and operational before final acceptance and reduction of financial guarantees.