

# STATE OF NEW YORK

## SPECIFICATIONS

For the Improvement of the Highway leading from New Lebanon,  
N. Y., to Pittsfield, Mass., from the State Line, 6,500 feet westerly,  
in the Town of New Lebanon, Columbia County, N. Y.

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CHAPTER 115, LAWS OF 1898.

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### WORK TO BE DONE.

The work to be done under these specifications will consist of grading the road to the established grade lines, constructing the necessary drains and culverts, and all other work necessary for the proper fulfillment of the contract according to the meaning and intent of the plans and specifications, which plans are a part hereof. The lump sum named in the contract will cover the cost of all the work to be done.

The Contractor will be required to do all the clearing and grubbing, all excavations and embankments, all levelling, ditching, grading and surfacing, all masonry and stone work and to furnish all materials for the same. He will be required to build all water-ways, drains and culverts, to clear away all rubbish which may obstruct the roadway or the water-ways. He will be required to protect all fences and to repair or replace the same if they become damaged or destroyed by him. In short, he will be required to furnish all the materials, implements and labor required to build and put in complete order for use the said 6,500 feet of road. He will be required to remove from the road and from adjoining property all rubbish and surplus materials pertaining to the work, which may have accumulated during its prosecution.

He shall remove all trees and timber from the right of way and place the same away from said right of way, but all wood and timber shall be the property of the United Society of Shakers of New Lebanon.

The grading of said road shall be completed before the first day of January, 1899, including the building of all culverts and cross drains; also the building of the bridge and abutments.

The gravel covering shall not be placed upon the subgrade until the spring of 1899 and not until all depressions and settlement in the subgrade have been brought up to true grade, and all slides on banks or in drainage ditches, caused by the action of the frost, have been thoroughly cleaned up to the entire satisfaction of the Engineer. The entire contract to be completed by July, 1899.

The Contractor shall be held responsible for any or all damage arising from injury to water pipes and drains leading to and from the reservoirs and also to all pipes leading from springs to the village and crossing the right of way, and should it become necessary to change the course of any of them, they shall be placed at least four (4) feet below the present surface to protect them from frost. Any such change in the location of pipes or the repairing of injury to the same shall be done by the Contractor at his expense.

### EARTHWORK.

All trees, stumps, brush and roots within the roadbed and on the slopes shall be grubbed up and removed as the Engineer may direct.

The roadway shall be graded throughout its entire length to a width of twenty-one (21) feet between ditches, and shall conform to the lines and grades, as shown on the plans, and as given by the Engineer.

The side ditches and slopes shall be neatly and truly cut with side slopes of two (2) horizontal to one (1) vertical.

The ditches shall have a bottom width of one foot. The bottom shall be cut true to grade and shall range from two to three feet below the crown of the road according to the grades furnished by the Engineer in charge.

All rock, boulders or stumps shall be excavated to a depth of at least twelve inches below grade. Wherever such rock or boulders have been excavated, a sufficient amount of clear, fresh earth, sand or gravel, approved by the Engineer, shall be furnished and so placed on the rock surface as to make the surface conform to the required grade.

Where clay bottom is encountered it shall be excavated to a uniform depth of nine inches below grade for the entire width between ditches, and the Contractor shall supply and place a sufficient amount of clear loam, sand or gravel, approved by the Engineer, to make the surface conform to the required grade.

If quicksand, spongy material or vegetable matter is encountered it shall be removed to such depth as may be required by the Engineer and replaced by sufficient gravel, sand or loam, approved by the Engineer, to make the surface conform to the required grades.

Where there is sod upon the original surface of the ground it shall be thoroughly broken up with a plow before any embankment is formed thereon.

Embankments shall be formed of clear earth or other material, suitable to the Engineer, and shall be free from vegetable matter or refuse of any kind.

Surplus excavation shall be used to widen embankments or in such other places as the Engineer may direct.

All surfaces and slopes shall be left with neat, even surfaces and in conformity with lines and directions given by the Engineer.

#### ROLLING SUB-GRADE.

After the surface of the sub-grade has been properly shaped, and before any gravel is applied, the sub-grade shall be thoroughly rolled and compacted. This rolling may, at the option of the Contractor, be begun with a light roller; but the final rolling shall be completed with a steam roller weighing not less than ten (10) tons. All hollows and depressions developing during the rolling shall be filled with material suitable to the Engineer. The rolling shall be continued to the ultimate resistance of the sub-grade or until no depressions can be formed with a roller. No gravel surface shall be begun on this sub-grade until it has been accepted by the Engineer.

#### GRAVEL.

Gravel of suitable quality can be found near the work and will be pointed out by the Engineer. No objection will be made to any material of like quality that may be uncovered during the progress of the work, provided the same is acceptable to the Engineer.

The gravel shall be in two courses. The bottom course shall be three inches thick after rolling and shall consist of the coarser gravel in size varying from one and one-half to two inches.

The top course will be three inches thick after rolling and will consist of the finer kind of gravel found in the beds and raked free from all stones exceeding in size one-half inch.

#### SPREADING AND ROLLING.

After the earth foundation has been completed agreeably to these specifications and has passed the inspection of the said Engineer, a layer of the gravel of the quality and size herein specified for the bottom course, and of such a depth as will when rolled, make a course three inches thick, shall be spread evenly over the prepared sub-grade; this layer is then to be rolled until the stone is as closely fitted together as practicable with or without sprinkling as may be directed. Such an amount of fine gravel or loam as can be introduced without separating the stone, is to be rolled into each course or layer so as to fill the interstices; and gravel is to be added or removed so as to make the surface practically of the proper height.

The next overlying course will be of gravel as hereinbefore described for said course, and is to be spread at such a depth that the surface, when rolled, will be at the proper grade; this layer is then to be rolled, and during the process of rolling, if necessary, similar gravel is to be added or removed from time to time, so that when the rolling ceases the roadway is truly surfaced to the required grade and crown. The rolling is to continue until, by a sufficient use of water, a wave is produced before the wheel of the roller. The surface of any course shall be scratched if required so as to obtain the proper bond with the next overlying.

The rolling of the gravel shall be done with a steam roller weighing not less than ten tons.

Each layer of the gravel shall be well and thoroughly rolled, and the rolling on each layer shall be prosecuted until, in the opinion of the Engineer, such course shall have been completed as hereinbefore specified; and until each layer and the finished surface shall be rolled and finished to his entire satisfaction and approval.

The amount of rolling shall not be less than 100 times over each square yard of surface.

During the rolling of the lower course of gravel only so much water shall be sprinkled thereon as is necessary to prevent wearing by attrition; but in rolling the upper course of stone and screenings, water is to be applied in such quantities and in such manner as may be directed by the Engineer and so as to secure a "set" and to produce the wave hereinbefore referred to.

#### RUBBLE MASONRY LAID IN CEMENT.

NOTE.—All masonry called for under this particular contract will be laid in American Portland cement mortar.

This class of masonry shall be used for head walls of all pipe drains.

Stones shall be sound, durable, well shaped quarry stone, free from all structural defects; either limestone, sandstone or granite of quantity approved by the Resident Engineer.

Stone shall be at least six inches thick. They shall have a bed area of at least two square feet and a depth of bed of at least one and one-half times their dimensions. Walls shall be coped with stone the full width of the wall.

The stones shall be laid on their natural bed in full cement mortar. No spalling up under the bed will be allowed. The entire bed joints and the vertical joints for a distance of four inches back from the face of the wall shall not exceed one inch in width. The whole wall shall be thoroughly bonded together. All joints and interstices shall be completely filled with mortar, and all exposed joints shall be raked out to a depth of at least one inch and neatly pointed.

The dimensions of the walls shall be as shown on the plans.

#### PORTLAND CEMENT, MORTAR AND GROUT.

The mortar and grout will be made of the best quality of Portland cement, and clean, sharp sand, in the proportion of two parts of sand to one of cement by volume.

No cement will be used in any part of the masonry until the State Engineer shall have examined, tried and approved the same. It must be delivered in tight casks or bags, as the Division or Resident Engineer may direct, and thereafter be properly protected from the weather.

The Engineer to direct in what manner the sand shall be screened and worked, and washed, if necessary.

Special directions will be given by the Engineer as to the delivery of cement and as to the time and facilities required for testing it previous to its use in the work. No cement will be used except in compliance with these directions. All facilities required by the Engineer for securing tests must be afforded by the Contractor. All cement must be stored in substantial waterproof structures from the time of delivery till used.

All cement offered for use in any work will be sampled by an agent of the State Engineer's Department. Samples will be collected immediately on delivery of cement at site of work, and Contractors will promptly notify the Engineer of the receipt of cement in order that no delay may be had in the sampling thereof. All samples will be forwarded to the cement-testing office in Albany, and will be subjected to the following tests, and any cement failing on either of them will be rejected, though the further right is reserved to reject any and all cements, the qualities of which have not become well known through prior use in State work or elsewhere.

PORTLAND CEMENT must be of the best quality and of such fineness that ninety-five per cent of the cement will pass through a sieve of 2,500 meshes to the square inch, and ninety per cent through a sieve of 10,000 meshes per square inch. Portland cement when mixed neat and exposed one day in air and six days in water, shall withstand a tensile strain of not less than 400 pounds to the square inch, and when mixed in the ratio of three pounds clean, sharp sand to one pound of cement and exposed one day in air and six days in water, it shall withstand a tensile strain of not less than 125 pounds per square inch.

#### PAVING.

This will include paving at inlet and outlet of all cross drains and culverts as shown on the plans. The paving shall be constructed of sound, durable, well shaped quarry stone. Stone shall be twelve inches deep and at least four inches wide. They shall be laid in line and grade, as directed by the Engineer, on a foundation of six inches of clean, coarse sand or fine gravel, and shall be rammed with a heavy rammer. After ramming, the joints of the paving shall be swept full of coarse sand or fine gravel, and the entire surface of the paving shall be covered to a depth of one inch with sand or gravel.

#### VITRIFIED PIPE.

Vitrified pipe shall be furnished and laid for drains as shown on the plans. All pipes shall be first quality, salt glazed, free from blisters and cracks, straight and round. No chipping will be allowed to insert spigot into bell. All 18 inch pipe shall be extra thick with extra large bells. All pipe shall be laid true to the lines and grades furnished by the Engineer. Nothing but selected fine material, free from cobbles or large stone, shall be placed under or around the pipe, and all material placed under and around the pipe shall be thoroughly tamped with a thin iron tamping bar. All joints shall be made of mortar composed of one part cement to one part clean, coarse sand.

#### IRON PIPE.

Where called for on plans or bidding sheets, or if directed by the Engineer, iron pipe of the size specified will be placed according to plans.

The weight per foot or per length of such pipe will be in accordance with the Engineer's directions in each particular case, as to whether light or heavy pipe is required.

These will be cast in dry sand moulds placed vertically. They shall be sound and smooth, without lumps, blisters, sand holes or other imperfections. All castings will be thoroughly coated with coal pitch varnish mixed with linseed oil in such proportions as will form a firm, tough coating. The temperature of the pipes when coated to be about 300 degrees F.

The price per pound for iron pipe will cover the pipe, handling, laying, caulking and leading. Other items of labor or material required in connection with the pipe will be paid for under their several classifications.

#### NEW IRON OR STEEL STRUCTURES.

**DIMENSIONS.**—All steel structures shall be built to conform exactly in general dimensions, size, shape and position of members, and spacing of bolts, rivets, etc., to the plans furnished by the State Engineer and Surveyor, and no change shall be made in these plans by the Contractor except on the written permission of said State Engineer and Surveyor. The material shall be either iron or steel as noted on the plans.

**STEEL.**—All steel shall be "open hearth," made by a process acceptable to the State Engineer and Surveyor, and shall be uniform in character. Finished material shall be true to shape, of workmanlike finish, free from all flaws and defects, and shall not vary more than two and one-half per cent from the section specified.

Steel made by the "Acid Process" shall not contain to exceed .08 of one per cent of phosphorus nor .05 of one per cent of sulphur.

Steel made by the "Basic Process" shall not contain to exceed .04 of one per cent of phosphorus nor .05 of one per cent of sulphur.

The right is reserved by the State to permit the use of "Bessemer" steel in minor or unimportant structures, where the State Engineer directs, and such steel shall conform to such chemical and physical tests as the State Engineer may prescribe.

Test pieces cut from finished material shall show an ultimate strength of not less than fifty-four thousand (54,000) pounds per square inch, and not more than sixty-four thousand (64,000) pounds per square inch, an elastic limit of not less than fifty-five per cent of the ultimate strength, and elongation of not less than twenty-five per cent in eight inches, and a reduction of area at fracture of not less than fifty per cent. They shall bend cold one hundred and eighty degrees and close flat without rupture, both before and after quenching from a red heat in water at eighty degrees Fahrenheit.

**WORKMANSHIP.**—All workmanship shall be first-class in every particular. Ends of all pieces shall be cut smooth and true and no open joints will be allowed at splices. The Engineer may at his option require any sheared edge to be planed or ground if the shearing be not satisfactory. All stiffening angles shall be ground to a tight fit at ends. All material shall be carefully straightened before being laid out, and, when finished, all members shall be free from bends, twists and kinks.

Rivet holes may be punched. The diameter of the punch shall not exceed the diameter of the rivet by more than one-sixteenth of an inch, and the diameter of the die shall not exceed the diameter of the punch by more than one-sixteenth of an inch. Rivet holes shall be truly spaced and centered exactly on pitch lines. If holes do not match exactly they may be drifted to match, provided a cold rivet of the size to be used in the hole will enter it, but not a hot one. Any greater degree of mismatching shall be corrected by reaming, or if deemed necessary by the Engineer, new material shall be provided and punched to fit. All work to be riveted shall be firmly bolted or clamped together so as to prevent the rivets from upsetting between the pieces. All riveting possible must be done by power, and the machines must be capable of continuing the pressure long enough to prevent any liability of the parts to spring apart after driving.

The depth of the rivet head shall be three-quarters of the diameter of the rivet, and the diameter of the head shall be one and five-eighths times the diameter of the rivet. Rivets shall be thoroughly and uniformly heated to a light cherry red, and upset so as to completely fill the holes, and finished with a hemispherical snap. All loose rivets, burnt rivets, rivets with insufficient stock in heads or with heads cocked or cracked or off center, or with shoulders not brought down to a firm or even bearing all around, shall be at once cut out when required by the inspector, and sound rivets driven in their place.

In handling stock or finished material, care shall be exercised to prevent injury or bending of the pieces. In unloading material from cars no piece shall be thrown off nor allowed to slide down skids unless its motion is so restrained that it will not strike sufficiently hard to injure itself or any other member.

All sliding surfaces and surfaces of rollers, and of plates in contact therewith, shall be machine finished.

**PAINTING.**—All iron work shall receive one coat of mineral paint and boiled linseed oil, of such color as the Engineer may direct, in the shop, and two more after erection. All surfaces coming in contact shall be painted before riveting. Dressed wood shall generally receive three coats of paint as may be directed.

All machine finished surfaces shall be coated as soon as finished with a mixture of white lead and tallow, with sufficient beeswax added to make the proper consistency.

**INSPECTION.**—All raw and finished material and workmanship shall, at all times, be subject to the inspection and acceptance or rejection of the State Engineer and Surveyor, or his authorized representative, at any stage of the work or manufacture, and the State Engineer and Surveyor or his representative, shall at all times, while the work is in progress, have free access to all parts of the furnaces, mills and shops, where the material is being manufactured, or the work is in progress. The Contractor shall furnish, without extra charge, all facilities that may be needed for inspecting

and testing raw material, ingots and finished material at the furnaces and rolling mills, and the workmanship in the shop and during erection. No part of the cost of making such tests and inspection, however, beyond the furnishing of such facilities, shall be borne by the Contractor.

As soon as any order for rolled or cast-iron or steel is placed by the Contractor, a complete and legible copy of the same, together with copies of all diagrams or drawings accompanying the same, shall be furnished to the State Engineer and Surveyor or his authorized inspector by the Contractor. Such orders shall in all cases show the names of the furnaces or mills where the material is to be made, and the kind of material wanted.

The Contractor shall level up the beds for bed plates, and shall set bed plates in a bedding of iron fillings or borings and salamonic or of Portland cement. The Contractor shall drill holes for anchor bolts where shown on plans, afterwards filling the holes with Portland cement well packed in.

GENERAL.—All false work shall be built by and at the expense of the Contractor, who shall also remove the same as fast as the progress of the work permits. The Contractor shall assume all risks and damages that may be occasioned by accident during the progress of the work, and until its final acceptance.

The structure is to be delivered up complete and ready for use by the Contractor, and any defective material or work shall be removed and made good at any time or place where it may be discovered during the progress of the work, at the expense of the Contractor. The acceptance of any material or work at any time will not be a bar to its future rejection if subsequently found defective.

#### TIMBER AND PLANKING.

Timber and planking shall be used as shown on plans and as directed by the Engineer. All timber and planking shall be of first quality hemlock, sound and free from sap, shakes, bad knots or decay.

#### CLAUSES OF GENERAL APPLICATION.

1. The plans and specifications are a part of the contract and will be held to cover any and all work that could reasonably be inferred as needed, taking the two together, for a complete and workmanlike job. Work shown on the plans and not mentioned in the specifications or vice versa will be done the same as if shown by both, when and where required.

2. All work will be neatly cleaned up on completion, according to the Engineer's direction, and be left in a neat and orderly condition ready for use.

3. The Contractor hereby assumes all risks and liabilities for accidents or damages that may accrue to persons or property during the prosecution of the work, by reason of the negligence or carelessness of himself, his agents or employees.

4. The Contractor will provide suitable and proper men, tools and machinery for each of the different kinds of work.

5. Should any work be required, that in the judgement of the Engineer is not included under these specifications, or not covered by the prices named in the contract, such work will be done pursuant to the State Engineer's written directions, after a price therefor shall have been agreed upon.

6. The right is reserved to make such changes in the plans or specifications as may, from time to time, appear necessary or desirable, and such changes shall in no wise invalidate this contract. Should such changes be productive of increased cost to the Contractor, a fair and equitable sum therefor, to be agreed upon before such changed work shall have been begun, shall be added to the contract price, and in like manner deductions shall be made.

7. The Contractor will, without extra compensation, grade a safe, proper and workmanlike connection with all intersecting public or private roads or driveways, according to the Engineer's directions.

8. The work shall progress in such manner and at such times as the Engineer may direct.

The Engineer's estimate of the extent of the principal work involved in this contract is as follows :

Earth Work, . . . . .	16,000 Cu. Yds.
Gravel, . . . . .	2,300 " "
Steel Bridge, . . . . .	1
Abutments, . . . . .	2
Culverts, . . . . .	1
Lines of 4-inch Tile Pipe, . . . . .	20
Cross Drains 18-inch Vitrified Pipe, . . . . .	19

It is, however, distinctly understood that the Contractor must satisfy himself regarding the conditions governing all the work to be done, and as to the nature and extent of all materials required to make the work conform, in all respects, to the plans and specifications, it being further distinctly understood that the State or party or parties of the

second part, do not guarantee the correctness of the quantities above stated, and that whether these quantities are increased or diminished, no sum will be paid therefor in excess of the lump sum named in the contract, unless the plans and specifications shall have been changed as provided for in article 6 of the general clauses of this specification.

SPECIAL.

The Contractor will conform to all the provisions of chapters 415, 416 and 444 of the laws of 1897 regarding rates of wages and times of payment of employees, and the sub-letting of contracts.

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The Contractor shall level up the beds for bed plates, and shall set bed plates in a bedding of iron fillings or borings and salomonic or of Portland cement. The Contractor shall drill holes for anchor bolts where shown on plans, afterwards filling the holes with Portland cement well packed in.

GENERAL.—All false work shall be built by and at the expense of the Contractor, who shall also remove the same as fast as the progress of the work permits. The Contractor shall assume all risks and damages that may be occasioned by accident during the progress of the work, and until its final acceptance.

The structure is to be delivered up complete and ready for use by the Contractor, and any defective material or work shall be removed and made good at any time or place where it may be discovered during the progress of the work, at the expense of the Contractor. The acceptance of any material or work at any time will not be a bar to its future rejection if subsequently found defective.

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2. All work will be neatly cleaned up on completion, according to the Engineer's direction, and be left in a neat and orderly condition ready for use.

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