# Town of New Boston, NH Road Construction Inspection Procedures

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# ROAD CONSTRUCTION INSPECTION PROCEDURES

# TOWN OF NEW BOSTON

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# Town of New Boston Road Construction Inspection Procedures

The Town of New Boston has an established protocol to ensure that roadway improvements and associated infrastructure are constructed per the approved plans, NHDOT specifications, and accepted industry standards.

In order to facilitate this process, the Developer, Contractor and Town's Consulting Engineer shall perform the responsibilities outlined below:

#### Responsibilities of Contractor:

- Construct improvements per the approved plans using industry standards;
- Maintain open communication with the Town's Consulting Engineer regarding construction schedule;
- Notify the Town's Consulting Engineer 24-hours in advance of all desired inspections;
- Maintain horizontal and vertical control sufficient to construct improvements per the approved plan and to support required inspection and testing. \*\*See below for details.
- Notify the Town's Consulting Engineer of any necessary field changes, material substitutions, and/or the discovery of any design errors;
- Perform the reoccurring inspections required by the EPA NPDES Construction General Permit. The Contractor shall also make revisions to the Storm Water Pollution Prevention Plan (SWPPP) as site conditions require.
- Place and have ready for inspection a minimum of 300 linear feet of subgrade, embankment and/or lift of select materials prior to request for inspection by the Town's Consulting Engineer, unless otherwise determined by the Town's Consulting Engineer.

#### Responsibilities of Developer:

- Ensure the improvements are constructed according to the approved plans.
- Maintain open communication with the Town's Consulting Engineer, Contractor, Planning Department and Planning Board as necessary regarding construction schedule, and questions or concerns regarding inspections.

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• The Developer has the option at any time to hire their own materials testing firm to perform the materials testing required by the Town. See below for details.\*

### Responsibilities of Town's Consulting Engineer:

- Verify improvements are constructed per the approved plan and that industry standards are adhered to;
- Maintain open communication with the Contractor and Town staff regarding progress throughout construction;
- Prepare inspection reports documenting site visits;
- Provide timely inspections of progress when given 24-hours' notice by the Contractor;
- Notify the Contractor of deficiencies in materials and/or methods;
- Advise the Contractor of Town of New Boston regulations and/or policies that affect construction;
- Review and recommend approval of Contractor's repair and corrective action plans as needed;
- Retain a qualified geotechnical engineering consultant to perform testing and consulting on an as needed basis. See below for details.\*;
- Provide a qualified inspector familiar with roadway infrastructure construction, NHDOT specifications, and industry standards. Inspector shall be a New Hampshire licensed professional engineer or have a minimum of three years of experience inspecting roadway construction projects.
- Invoice Town on timely basis (monthly) for construction monitoring services performed. All invoices are to be accompanied with corresponding inspection reports that shall also include a time log documenting arrival on site, start of inspections, completion of inspections and time of departure from site. All reports and invoices shall also be copied to the Developer/Contractor.
- Be equipped with a string line, tape measure, 100-ft tape, pop level, smart level, temperature gauge, and have access to a piece of survey equipment (level, rotary level, or other instrument) capable of spot checking the contractor's grades if desired. This equipment shall be available as needed to perform site inspections. However, it is not intended to relieve the Contractor from their obligation to provide and maintain horizontal and vertical control sufficient to construct improvements per the approved plan.

#### Responsibilities of Town of New Boston Road Committee

• Requests to use an alternate qualified materials testing firm and/or a

geotechnical engineering firm in place of the one retained by the Town's Consulting Engineer should be presented to the Town of New Boston Road Committee prior to the pre-construction meeting. In the event that the Developer disagrees with the Town of New Boston Road Committee on the qualifications of the proposed firm, the Planning Board must be consulted.

\* To assure that construction materials and methods meet New Boston specifications the following professionals shall be retained to perform as needed laboratory & field testing and/or provide geotechnical engineering advice during construction.

#### Criteria for Materials Testing Firm:

• The Developer has the option to hire their own materials testing firm to perform the materials testing required by the Town. The firm shall have a soils laboratory and qualified technicians in soil, concrete and asphalt testing with at least one staff member certified by NETTCP (or equivalent experience as determined by the Town of New Boston Road Committee). If the Developer elects to hire their own independent third party testing firm they will be responsible to coordinate testing to meet the criteria within the Road Construction Inspection Procedures. The testing schedule shall be communicated to the Town's Consulting Engineer with a minimum of 24-hours' notice. All test results and reports shall be copied to the Town's Consulting Engineer by the material testing firm.

#### Criteria for Geotechnical Engineering Consultant:

A qualified geotechnical engineering firm with a soils laboratory and qualified technicians in soil, concrete and asphalt testing shall be retained by the Town's Consulting Engineer to provide geotechnical testing and engineering advice as necessary. The firm should have at least one staff member certified by NETTCP (or equivalent experience as determined by the Town of New Boston Road Committee) and a New Hampshire licensed Geotechnical Engineer. The Town's Consulting Engineer shall seek geotechnical engineering advice from a geotechnical engineer when he/she feels that site conditions warrant this type of expertise.

In the event that the Developer elects to use their own (Road Committee approved) materials testing firm, the Geotechnical Engineering Consultant will perform Quality Assurance testing at the discretion of the Town's Consulting Engineer. In cases where the Developer does not wish to provide their own materials testing firm the Town's Consulting Engineer will have their Geotechnical Engineering Consultant perform all required materials testing.

<sup>\*\*</sup> Required Layout to be Provided and Maintained by Contractor throughout Construction

All benchmarks and layout stakes shall be clearly marked with a label and elevation as appropriate. The Contractor shall establish and be responsible for the preservation of all required layout control. Any benchmarks or construction stakes that are carelessly or wilfully destroyed or disturbed by the Contractor shall be replaced or transferred by the Contractor in a timely fashion. If any reference points are made inaccessible by the progress of construction they shall be transferred to a location where they are useable.

**Prior to clearing site**, the Contractor shall provide flagging which marks the proposed limits of clearing and designates any sensitive areas that may need special attention (i.e. wetlands, buffers, property lines, etc.).

**Prior to grubbing site**, the Contractor shall provide the following layout outside the limits of work, which shall be maintained for the project duration:

- Permanent benchmarks every 500-feet along the roadway and in locations where cross-country improvements are proposed shall be installed and clearly labeled with an elevation.
- Along all tangent sections of roadway side stakes shall be provided every 200-feet at even stations.
- At each horizontal curve along a roadway the Point of Curvature (PC) and Point of Tangency (PT) shall be staked. In addition curves shall be side staked at every 100-foot station.
- The center points of all cul-de-sacs shall be staked.

**Prior to commencing fill placement**, the Contractor shall install the following stakes:

- Roadway centerline every 100-foot station.
- The toe of slope of the 1.5:1 down from the finish grade every 100-foot station (indicates structural fill limits for roadway).

Prior to installing structures (i.e. catch basins, drain manholes, outlet structures, headwalls, etc.), drainage, or underdrain, the Contractor shall provide the following:

- Layout for horizontal location of the proposed infrastructure.
- Local vertical control with which to set infrastructure elevations.

Prior to construction of detention ponds, access roads, treatment swales, level spreaders, and drainage swales, the Contractor shall provide the following:

- Layout for horizontal location of the proposed improvements.
- Stakes at critical components to define design elevations.

**Prior to requesting subgrade or roadway select inspections**, the Contractor shall install the following stakes:

- Roadway centerline every 50-feet with grades marked for subgrade, gravel grade, crushed gravel grade and finish grade.
- Outside edge of shoulder every 50-feet with grades marked for subgrade, gravel grade, crushed gravel grade, and finish grade.
- Center point of cul-de-sac.

#### Construction Administration

- **Prior to Pre-construction Meeting** Once the Planning Department has indicated that a project has satisfactorily addressed its conditions of approval and prior to the Town's Consulting Engineer scheduling a pre-construction meeting, a Developer may request a specific qualified materials testing firm and/or a geotechnical engineering firm to use in place of the one retained by the Town's Consulting Engineer.
- *Pre-construction Meetings* Once the Planning Department has indicated that a project has satisfactorily addressed its conditions of approval, the Town's Consulting Engineer shall schedule the pre-construction meeting. The meeting shall be attended by the Planning Department, Developer, Contractor, Subdivider/Applicant, Road Agent, design engineer, Fire Department if a cistern is involved, and Selectmen (if available and interested). The Town's Consulting Engineer shall prepare an agenda, run the meeting, prepare minutes and distribute to attendees. Each attendee shall provide their contact information and indicate which is their preferred method to be contacted/receive information.

All projects disturbing more than an acre of land shall be covered by the EPA NPDES Construction General Permit. The Developer/Contractor shall file a Notice of Intent (NOI) with the EPA and have a Storm Water Pollution Prevention Plan (SWPPP) prepared for the site. Construction shall not commence until the permit is active on the EPA website.

• *Inspection Reports* – The Town's Consulting Engineer shall prepare inspection reports documenting site inspections and shall disseminate by email (or regular mail if requested) all construction inspection reports on a rolling weekly cycle, i.e. reports will be distributed by Friday for the week ending the Friday prior. Reports shall be submitted to the Town and the Developer/Contractor for their records. Reports shall also be submitted in hard copy with the Town's Consulting Engineers monthly invoices.

- *Communication* Both the Town's Consulting Engineer and the Contractor shall maintain regular communication with each other and town staff as needed. When construction is in full swing the Town's Consulting Engineer and the Contractor should be in contact with each other daily to ensure all necessary inspections are completed. As needed the Town's Consulting Engineer shall provide written correspondence to the Planning Board. All correspondence shall be copied to the Developer and the Contractor as applicable.
- Design Changes In the event that the Developer or Contractor needs to make changes to the approved plan during construction, the Developer/Contractor shall submit the proposed change in writing with justification and/or plans and calculations as needed. The Town's Consulting Engineer, along with the Town's Road Agent, may approve changes in the field as they see appropriate as long as it does not change the original intent of the approved plan. Design change decisions shall be documented on that day's construction inspection report. Additionally, the Town's Consulting Engineer shall send the Planning Board a detailed letter documenting the design change request, the information (plans, reports, calculations, etc.) submitted as part of the request, the decision making process, and the decision reached.

In cases where proposed elevation changes of more than 12" (twelve inches) or realignment of roadway are requested by the Developer/Contractor, the Planning Board must be consulted.

If the Town's Consulting Engineer and the Town's Road Agent disagree on the proposed changes; or, if the Developer/Contractor disagrees with the decision of the Town's Consulting Engineer and Town's Road Agent; or, if the Town's Consulting Engineer and/or the Town's Road Agent want Planning Board input, the Planning Board must be consulted. The Developer/Contractor should be aware that the Planning Board meets at most twice monthly and that advanced notice is required to get put on a specific meeting agenda.

• **Bond Administration** – In order to start construction the Developer must post the bond amount stipulated by the Planning Board as a condition of the project approval. During construction the Developer may request bond reductions based on work completed. The Town's Consulting Engineer shall prepare and submit a bond reduction recommendation to the Planning Board in response to each reduction request. Each bond reduction request will be discussed at a regularly scheduled meeting of the Planning Board. The Developer is allowed to request multiple reductions during construction, but is encouraged to have made significant progress since the last reduction.

• Punch Lists – The Town's Consulting Engineer shall prepare a written list of outstanding items once a project is near completion and/or at the Developer or Contractor's request. The punch list is intended to identify remaining work to prepare the project for acceptance. Omission of items from a punch list does not excuse the Developer/Contractor from constructing the improvements as approved and in conformance with Town specifications. Given the fact that erosion and other infrastructure damage can occur over time the Town reserves the right to add items to a punch list. Ultimately, the expectation is that the Contractor satisfactorily addresses all punch list items before the roadway will be considered for acceptance. Once the Town's Consulting Engineer is satisfied that the improvements are complete, the Consulting Engineer shall write a letter of recommendation to the Planning Board. Upon receipt of such letter the Planning Board will schedule a compliance site walk and subsequent compliance hearing at a regular scheduled Planning Board meeting.

#### Site Inspections

• *Erosion Control* – Prior to commencing stump removal and/or earth excavation the Contractor shall install the best management practices specified by the design engineer to prevent erosion. The Town's Consulting Engineer should inspect the site to make sure these measures have been properly installed (i.e. silt fence, stabilized construction exit, etc.) before construction continues.

It is the Contractor's responsibility to monitor the site on an ongoing basis. Maintenance of erosion control measures and/or installation of supplemental measures is part of this responsibility. During site visits the Town's Consulting Engineer should make it a point to identify any deficiencies observed with the erosion control measures. The Contractor should be sure to inspect erosion control measures/site stabilization as required by the Construction General Permit and after all rainfall events of more than 0.5-inches.

• *Clearing & Grubbing* – Before any fill material or roadway gravel is placed the Town's Consulting Engineer shall inspect the limits of work to confirm removal of all stumps, loam, organic, and deleterious material. This inspection will also provide an opportunity to verify that the subbase material is suitable before fill is placed.

#### • Earthwork (Cuts & Fills)

<u>Ledge Removal</u> – Infrastructure construction may require ledge removal. The Developer/ Contractor shall hire a licensed blasting company to perform drilling and blasting in a safe manner. All NH state laws shall be adhered to. The Town's Consulting Engineer shall perform part-time inspections of blasting progress to verify blasting limits, adherence to the design maximum ledge cut face slope,

- monitor for groundwater seepage, and handling of surface water over the top of ledge cuts.
- <u>Earth Cuts</u> On-site "cut" material may be used as fill as long as it is not clay or excessively silty material, nor too wet. The Contractor should consult with the Town's Consulting Engineer about any onsite material they wish to use as fill to determine if it is acceptable and/or where it may be used. The Town's Consulting Engineer shall monitor earth cuts with part-time inspections of progress.
- Earth Fills The Contractor shall provide the Town's Consulting Engineer 24-hours notice of any fill operation proposed. The Town's Consulting Engineer shall obtain a proctor value for each material proposed for fill. All fill shall be placed in lifts, per specifications. Compaction of fill slopes shall be performed within the fill area extending from the finish grade downward at a 1.5:1 ratio for the entire height of the fill. The Town's Consulting Engineer shall arrange for on-site density testing of lifts on the first day of fill placement. This testing is intended to confirm adequate compaction is being achieved and establish the Contractor's means and methods. The Town's Consulting Engineer shall use their discretion as to the need for ongoing testing of fill operations. Consistency of fill material, Contractor's means and methods, and compaction results shall all be considered when determining the need for ongoing testing.

When ledge fills are proposed the Town's Consulting Engineer shall monitor the fill operation to verify material maximum size, use of a well graded material, maximum lift size, placement of choke layers, and appropriate compaction and consolidation efforts. The composition of blasted rock and/or crushed ledge can vary from one site to the next. With that said the Town's Consulting Engineer shall seek guidance from a geotechnical engineer regarding rock placement specifications as needed.

Ompaction Testing – Compaction testing shall be performed on all fill operations and roadway gravels (NHDOT 304.2 - Gravel & NHDOT 304.3 - Crushed Gravel). Testing shall be performed by a reputable geotechnical engineering firm with certified technicians. The Town's Consulting Engineer is responsible to coordinate all soil testing. Compaction testing frequencies shall be consistent with the following, unless otherwise determined by the Town's Consulting Engineer:

Roadway Fills At each lift per specifications
 Gravel (304.2) 500-foot intervals on alternating lanes
 Crushed Gravel (304.3) 500-foot intervals on alternating lanes

In the event that compaction results are not meeting the required density and/or there is any reason to believe that the material has changed, the Town's Consulting Engineer shall take a sample of the placed material and have a sieve

analysis & modified proctor performed. This laboratory testing will confirm if the placed material is significantly different than the original sample.

• *Underground Utilities (UGU)* - The Developer/Contractor is responsible to install UGU per the service provider's specifications. Prior to starting installation the Developer/Contractor shall provide the Town's Consulting Engineer with the UGU layout plan. The Town's Consulting Engineer shall perform part-time inspections of the UGU installation to ensure conduit is being installed in the proper location. The Contractor is responsible to keep UGU field notes to assist the surveyor in preparation of as-built plans.

#### • Drainage Improvements

- Orainage Pipe & Structures The Contractor shall provide the Town's Consulting Engineer with 24-hours' notice of their intent to install drainage pipe, outlet structures, catch basins, manholes, and/or end sections. All drainage improvements shall be inspected by the Town's Consulting Engineer on a full-time basis. Inspections shall verify size, layout, bedding, backfill, and installation procedures of all drainage infrastructure. Throughout construction the Contractor is responsible to maintain vertical and horizontal control sufficient to construct the improvements per plan. The Town's Consulting Engineer is not responsible to check the control provided by the Contractor, but shall monitor layout of the improvements. In the event that the Town's Consulting Engineer observes a discrepancy with the layout, he/she shall point out the discrepancy to the Contractor and see that the Contractor resolves the situation. At the discretion of the Town's Consulting Engineer drainage inspections may be reduced to a part-time basis.
- Underdrain Once a rough roadway subgrade has been established the Town's Consulting Engineer shall walk the road with the Town of New Boston Road Agent to assess if additional underdrain will be required. Underdrain shall be installed in all locations where it is anticipated that the roadway may intercept groundwater. All underdrain shall outlet to a headwall, catch basin, or drain manhole. Similar to drainage pipe, underdrain shall be inspected on a full-time basis unless the Town's Consulting Engineer deems otherwise.
- Stormwater Management Basins (SWMB) The Contractor shall notify the Town's Consulting Engineer when proceeding with SWMB construction. Basin berm construction shall be performed in lifts. Care shall be taken to construct slopes, inlets, outlets, and access drives per the plan. The Town's Consulting Engineer shall monitor SWMB on a full-time basis when the Contractor is installing stormwater management basin outlet structures and related pipe. The remainder of basin construction shall be monitored on a part-time basis.

<u>Earth Conveyance Channels, Treatment Swales, & Level Spreaders</u> – The
 Contractor shall construct these stormwater conveyance facilities in accordance
 with the approved plans. The Town's Consulting Engineer shall perform part-time
 inspections during the Contractor's progress.

#### • Roadway Gravel Box

The Contractor shall install grade stakes at 50-foot intervals along roadway centerline and right & left offsets of gravel box. Each stake shall be marked with the subgrade, gravel grade, crushed gravel grade, and finish grade. At each level of the roadway box construction the Town's Consulting Engineer shall inspect and "string" the road to verify that the elevations are within allowable tolerances. Prior to placing gravel or crushed gravel the Contractor shall provide the Town's Consulting Engineer with a sample of each product. The Town's Consulting Engineer shall have laboratory testing performed on each sample to verify that the Contractor's materials meet NHDOT specifications for gravel (304.2) and crushed gravel (304.3) respectively. Any sample that meets the sieve analysis for NHDOT specifications shall have a modified proctor value established to be used during compaction testing. The Town's Consulting Engineer shall perform part-time inspection of roadway select material placement. The Contractor shall grade and compact each level to meet specifications. Compaction shall be performed by a vibratory roller. If needed the Contractor shall provide a water truck to dampen the roadway selects to achieve the required compaction.

- Subgrade The Contractor shall grade the subgrade to match the design elevations. Subgrade shall be at or below the design elevation and be graded with a crown. The Town's Consulting Engineer shall approve the subgrade before gravel placement commences.
- Gravel Shall meet NHDOT 304.2 and shall be compacted to 95% of the
  modified proctor. The Contractor shall grade the gravel to match the design
  elevations. Gravel shall be placed at or below the design elevation and be graded
  with a crown. The Town's Consulting Engineer shall approve the gravel before
  crushed gravel placement commences.
- O Crushed Gravel Shall meet NHDOT 304.3 and shall be compacted to 95% of the modified proctor. Sample testing shall include wear test and verification of fractured faces specification per NHDOT 304.3. The Contractor shall grade the crushed gravel to match the design elevations. Crushed gravel shall be placed at the design elevation and be graded with a crown. The Town's Consulting Engineer shall approve the crushed gravel before paving commences. Crushed gravel fine grading shall be performed by a roadway grader with automated grade control. The crushed gravel surface shall be compacted and uniformly graded before paving commences.

#### • Special Inspections (as applicable)

- <u>Fire Cisterns</u> Due to the complex nature of cistern construction the Town's Consulting Engineer shall organize a cistern pre-construction meeting when the Contractor is ready to begin its construction. Cistern inspections shall be performed in accordance with the Application for Inspection forms in the Subdivision Regulations. The Town's Consulting Engineer shall inspect construction on a part-time basis. However, when the tanks are being placed and backfilled full-time inspection is expected.
- O Box Culverts, Bridges, & Retaining Walls The Contractor shall provide the Town's Consulting Engineer with a design plan prepared by a professional engineer licensed in the State of New Hampshire prior to construction. Before construction commences the design plans shall be reviewed and approved by the Town's Consulting Engineer. The Town's Consulting Engineer shall determine the frequency of inspections necessary based on the length, height, and type of structure proposed. It is the Contractor's responsibility to provide material samples and shop drawings to the Town's Consulting Engineer for approval before commencing construction. Compaction testing of bedding and backfill shall be performed by the Town's Consulting Engineer.
- Oconcrete Placement Any improvements with cast-in-place concrete work shall be inspected by the Town's Consulting Engineer. Inspection frequency will be at their discretion. Shop drawings shall be provided by the Contractor before construction begins. The Town's Consulting Engineer shall inspect rebar, pouring of concrete, and finish. Concrete testing shall include field sampling, PSI testing, testing the concrete slump, air entrainment percentage, and temperature. Concrete placement shall occur within 1.5-hours of being loaded at batch plant.

#### Roadway Paving

Paving shall be performed in accordance with NHDOT specifications. The Town's Consulting Engineer shall inspect pavement placement on a full-time basis. Inspections shall confirm suitable weather conditions exist during paving operation. Ambient temperature, ground surface temperature, pavement temperature, paving equipment, mix type and yield shall be monitored. Compaction testing shall be performed during each day of pavement placement. Tests shall be performed at distances no greater than 1,500 feet. The Town's Consulting Engineer shall arrange to have the Marshall Value of the material being placed tested at the batch plant for use during compaction testing. At least one pavement core shall be taken from the roadway, during each day of pavement placement. Additional cores shall be taken at the discretion of the Town's Consulting Engineer. Cores shall be evaluated to determine compacted thickness and bulk density.

 Binder Course – Prior to binder course placement the roadway shall be fine graded with a roadway grader with automated grade control. The crushed gravel

- surface shall be compacted and uniformly graded before paving commences. All locations where the binder course is matching into existing pavement shall be swept and tacked with emulsion. In locations where the existing pavement does not have a uniform edge the Town's Consulting Engineer may request that the edge be sawcut. The Contractor shall provide adequate control to allow the paving contractor to lay out the roadway and any associated flares.
- Wearing Course Prior to wearing course placement the roadway shall be dry and swept of all sand/debris. The binder shall be tacked with emulsion shortly before the wearing course is installed. When tying into existing pavement the contractor shall consult with the Town's Consulting Engineer as to how the match should be made. Cold planing the joint will ordinarily be recommended.
- As-Builts Prior to the road being accepted by the Town the Developer is required to provide an as-built of the constructed infrastructure in accordance with the Subdivision Regulations. The Developer shall submit this plan to the Town's Consulting Engineer for review. The Town's Consulting Engineer will review the as-built plan to verify the constructed improvements match the intent of the design plan. In the event that the review of the as-built plan raises concerns the Town's Consulting Engineer will notify the Developer/Contractor of the issue(s). The Developer/Contractor will take necessary measures to address the identified concerns to the satisfaction of the Town's Consulting Engineer.