

# **CITY OF LINCOLN – SAMPLING AND TESTING PROCEDURES**

## **A. GENERAL**

1. Consulting Engineer shall be defined as the Engineering Consulting Firm or its representative.
2. NDOR shall be defined as the Nebraska Department Of Roads.
3. Coordinator shall be defined as the City of Lincoln, Engineering Services staff member responsible for oversight of the project.
4. The Engineer shall provide the name and phone number of the project manager, on-site inspector, and a fax number for reports to the City Coordinator.
5. The Engineer shall provide the name and phone number of the Testing Lab, which will provide on-site testing services to the City Coordinator.
6. All personnel providing the testing shall be ACI-Certified.
7. All observations shall be provided by personnel who hold a valid site supervisors certification.
8. The Engineer shall submit copies of reports of on-site testing to the City Coordinator on a weekly basis.
9. All construction within the City ROW must conform to City of Lincoln Standard Specifications. All materials used must be on the latest edition of the NDOR Approved Products or Gravel and Rock Producers Lists unless approved by the City.
10. The Engineer shall notify the City Coordinator in advance of a request to use materials not on the latest version of the NDOR Approved Products or Gravel and Rock Producers Lists.
11. The Engineer shall notify the City Coordinator of construction not conforming to the City of Lincoln Standard Specifications.
12. The Engineer shall submit final sign-off notice to the City Coordinator at the completion of the project.

## **B. SOILS**

1. Sample, test, and report to the City Testing Lab, results of soil proctor curve information including maximum density and optimum moisture and location of each soil curve sample on subdivision site. The City's Soil Data Base may be utilized where curves are available by contacting the City Testing Lab. Soil curves shall be run in conformance to AASHTO T-99, Method A.
2. Deliver to the City Testing Lab by the end of construction of each subdivision, a minimum 5lb. representative sample of the material passing the #4 sieve of each soil curve ran, for soil classification testing.
3. Obtain compaction and moisture tests of fill, pavement sub-grade, and utility backfill at varying depths below finished grade at the rate of one test for each 300 linear feet of two-lane pavement grade or utility trench with a minimum of one test per day to represent work. Additional testing of smaller areas of construction may be required at the direction of the Engineer.
4. Utility trench backfill tests at finished grade should be obtained by having the Contractor turn the backhoe around and dig a sample hole 1' to 2' deep behind where current compaction is being done. For depths between 2' and 4' below

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finished grade, tests are obtained by having the Contractor peel a spot from the area currently being compacted. Sampling at depths greater than 4' below finished grade should only be done in trenches with the proper width, stepping, and/or shoring based on accepted practices for excavation and trench safety in the various soil types.

5. Inform the Engineer and Contractor of test results as soon as possible.
6. Record and report compaction/moisture test information including general test location (i.e. street name), Centerline Station and Offset, depth below finished grade, and check test indications for failed tests.
7. To perform density cores after the Work is complete, if required by the City.

### C. CONCRETE

1. Concrete must meet all the requirements of Chapter 11 of the 2006 City of Lincoln Standard Specifications.
2. Make a minimum of one set of 3, 6" by 12", test cylinders for each concrete mix to represent each day's construction. On large pours make a set of 3 cylinders to represent each ½ days work. Additional sets may be required at the direction of the Engineer.
3. Notify the City Testing Lab prior to the start of each concrete placement of 100 cubic yards or more to allow for plant inspection.
4. Each concrete placement of 100 cubic yards or more shall require air, slump, and concrete temperature tests in addition to one set of 3, 6" by 12" cylinders for each one half day's construction. Tests should be run after any adjustments to the mix at the project site and cylinders should be made after the tests to be representative of concrete incorporated into the structure.
5. If concrete is pumped, tests must be run and cylinders fabricated from concrete sampled after the pump with the hose at approximately the same angle as required for the structure and not from the hose lying horizontal along the ground.
6. Notify concrete plant personnel of test results as soon as possible after testing to allow for adjustments to the mix.
7. If field tests indicate a need for a plant adjustment, additional tests should be run and cylinders fabricated after adjustment.
8. On large pours, an initial one or two loads of concrete which is slightly out of the specification range for air and/or slump (+/- 0.5% air, or +/- 0.5 inch slump) may be incorporated into the structure as long as immediate action is taken to adjust the mix within the specification range on all subsequent loads and is verified with test results.
9. If the air content of the concrete at the job site is less than the minimum specified, only one addition of air-entraining admixtures to a load is allowed. If the air content is then outside the limits specified, the load of concrete shall be rejected.
10. Admixtures which are not incorporated into the mix at the plant shall not be added to individual loads of concrete at the job site to enhance work-ability or pump-ability without permission from the Engineer.

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11. Admixtures shall not be added to individual loads of concrete at the job site to reduce either air content or slump without permission from the Engineer.
12. No Class “C” Fly Ash Modified Concrete is allowed in City of Lincoln concrete pours. Refer to Chapter 11 of the 2006 City of Lincoln Standard Specifications.
13. Deliver each set of test cylinders to the City Testing Lab for compression testing on the day following fabrication or on Monday if the pour occurred on Friday or the weekend.
14. Test cylinders delivered to the City Testing Lab shall be accompanied by a cylinder identification envelope (may be obtained from the City Testing Lab) containing the following information: date, time of fabrication, project number and location, test location within project, structure, method of cure of both structure and test cylinders, method of placement, weather conditions at the time of testing, mix, concrete plant, truck number, air, slump, and temperature tests if ran, amount of water, if any, added to the sample load represented by tests, in gal./cubic yard.
15. Truck delivery tickets indicating mix, plant, batch size, aggregate moisture, material weights, and admixtures must accompany every load delivered to the project site on City of Lincoln concrete pours and a copy of this ticket representing the load tested must accompany the test cylinders delivered to the City Testing Lab.
16. Each set of cylinders will be tested for compressive strength at 7 days and 28 days. The third cylinder will be an early break, tested prior to 7 days, depending on concrete mix and when made. If a specific age is desired, it should be indicated on the cylinder identification envelope. If more than one early break is desired, then additional cylinders should be fabricated and ages indicated on cylinder identification envelope.
17. Cylinder break reports will be faxed from the City Testing Lab to the Engineer on a weekly basis.

### **D. ASPHALT**

1. Asphalt must conform to Chapters 5 and 12 of the 2006 City of Lincoln Standard Specifications.
2. Plants supplying asphalt for subdivision work must submit mix designs and material samples to the City Testing Lab, for all mix types to be used, at the beginning of each construction season and at least 14 days prior to production as defined in Chapter 12.
3. Notify the City Testing Lab at the beginning of each day Asphaltic Concrete is to be placed to receive the sampling schedule and to allow for plant material sampling.
4. Field sampling of Asphaltic Concrete shall be done by the Engineer on a lot basis, at the rate of one sample for each 500 tons placed or fraction thereof per day.

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5. Sample Asphalt from the mat immediately behind the paver prior to rolling. Follow the sampling schedule as close as possible for the sample ton, but do not sample in a radius or other hand work area.
6. Sample is obtained by extracting two full scoops from the mat with a square-nosed shovel and placing in a double layered, large, paper grocery bag. Penetrate the mat as completely as possible, but do not get into the tack oil or sub-grade below the mat.
7. Obtain a second sample adjacent to the first sample and give to the Contractor's personnel for correlation testing.
8. Measure the mat temperature at the sample location at time of sampling.
9. Record the following information on the bags of both samples:
  - a. Date
  - b. Sample number
  - c. Sample ton
  - d. Mat temperature
  - e. Lift (e.g. Top, Middle, Bottom)
  - f. Lane (e.g. WB-O, West Bound Outside or NB-RT, North Bound Right Turn)
  - g. General Location (e.g. Pioneers Blvd., 150' east of 56th)
  - h. Stationing and Offset left or right from centerline is also helpful but not required.
10. Transport the City's sample to the City Testing Lab as soon as possible to maintain heat. Notify the City Testing Lab by phone (441-8407) when in route.
11. After the rolling process is complete and the mat has cooled mark the location for a density core, in the mat, five to ten feet from the sample location, by painting a box with the sample number inside of it. Make sure that this location does not fall in a radius or hand-work area.

### **E. ASPHALT (Contd.)**

13. Density cores shall be obtained by the Contractor and delivered to the City Testing Lab as per Chapter 5. If the density core does not meet the required density for 100% pay, the City Testing Lab will notify the Engineer to mark two additional check core locations within five to ten feet either side of the original core. The City Testing Lab will notify the Contractor to obtain and deliver check cores as per Chapter 5.
14. If density core testing results in pay deductions for any lot, the tonnage of that lot shall be obtained from the Engineer's placement records and the deduct amount calculated from the bid price per ton as per Chapter 5.

### **F. PAVEMENT CORING**

1. Before acceptance of new pavement construction, drilled cores shall be obtained by the Engineer to verify compliance with pavement design thickness and concrete compressive strength specifications.

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2. Cores for depth shall be taken, with a minimum 2" diameter core bit, at the rate of one core for each 300 linear feet of two lane pavement. Additional cores shall be taken to represent turn lanes, intersections, and other areas as directed by the Engineer.
  3. If test cylinders indicate questionable compressive strength, cores shall be taken using a 4" diameter core bit to represent the concrete in question and shall be delivered to the City Testing Lab for compressive strength testing.
  4. All core holes shall be filled immediately after cores are removed with a commercially produced concrete mix product approved by the Engineer.
  5. Reports of all coring shall be submitted to the City Coordinator.
- G. GRANULAR MATERIALS (Surfacing, Bedding, Foundation, Base, Fill, Backfill, etc.)
1. The Engineer shall run all quality, physical, and chemical tests required by the project specifications to represent the material source and all proctor curves required including AASHTO T-99 for standard density and ASTM D 4253 and ASTM D 4254 for relative density. Results of these tests and locations of samples shall be reported to the City Testing Lab.
  2. These materials shall be sampled and tested for project specification compliance for gradation at the rate of one sample for every 250 tons or fraction thereof of material delivered to the project site. Samples shall conform to ASTM C 136 for size.
  3. When required, moisture-density testing shall be done at the rate of one test for each 300 linear feet of pipe or two lane pavement or fraction thereof per day. In cases of short sections or structure backfills, the number of tests is to be increased at the direction of the Engineer, to adequately represent the material in the fill.