CHAPTER 18 – INSPECTION CHECKLISTS

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Job Guide General Instructions

Introduction: These guides are intended to cover the very basic duties of inspection by reference to key activities which must be supplemented by reference to contract documents, specifications, Special Provisions, instructional manuals, and guidance by the Project Engineer.

Before Beginning Inspection Duties:

- Review plans, Special Provisions, Construction and Materials Manuals, and specifications that apply to your assigned duties.
- Discuss your responsibility and authority with the Project Engineer who has day-to-day project responsibility.
- Review format and required content of your inspection diary.
- Review required testing procedures and forms.
- Discuss notification, changes, corrections, delays, rejections, tolerances and checks with the Project Engineer.
- If you are not 100% sure of your duties, go over them again with the Project Engineer. Ask questions!
- Safety: Review operating procedures to assure that all activities are performed in the safest manner. Safety is everyone's responsibility! When performing duties under traffic, review necessary traffic control requirements.

Construction Signing and Traffic Control

Is construction signing as per plans or Special Provisions, and are temporary detours marked adequately? Document the inspection of construction signing in the diary.

- Quantity and condition of signs – clean, need repair?
- Shape, color and size of signs are appropriate for situation?
- Location of signs – sight distance, height and placement of signs are appropriate.
- Locations of signs – work in progress. Are intermediate signs being moved or removed if not applicable as work progresses?
- Removal or covering of signs at night when not applicable.
- Daily verification of night protection and warnings needed through the project.
- Verify the signing on the project is highly visible and complete so there is no confusion to the traveling public.
- If changes are needed to adequately sign the project, has approval been requested from the Region Traffic Engineer and noted in the diary?
- Periodic night inspections of the signing.
- Are temporary pavement markings provided and adequate?
- Are temporary pavement markings that are not applicable removed or obliterated?

Use of Certified Flaggers

- Do the flaggers have proper equipment; stop sign, fluorescent vests and/or caps or hard hats and flagger's booklet?
- Verify the flaggers' certification card. See Section 634.3 of the Standard Specifications.
- Flaggers should stay visible to the traveling public at all times.
- Flaggers will be alert to traffic situations. No reading or sitting in a vehicle.
- Is a daily record of each flagger's hours being kept?
- If a flagger is used at night is the flagger station properly illuminated?
- Are the flaggers within a reasonable distance of the construction operation?

Use of Pilot Car

- Does the Contractor have the "Pilot Car, Follow Me" sign properly displayed?

- Is there a flashing or rotating amber light displayed on the pilot car?
- Is a daily record of the Pilot Car hours being recorded?

Is the traffic being handled safely and with a minimum delay and inconvenience?

Unless otherwise provided is the road, while undergoing improvements, kept open to all traffic?

Is traffic adequately accommodated to private entrances, parking lots, businesses, crossings, etc? If the Contractor has made arrangements with businesses to temporarily close entrances has this been noted in the diary?

Job Guide for Concrete Curb, Gutter, Walk, Driveway & Barrier

- Review the Contractor's equipment and forms for contract compliance and to assure plan dimensions are met.
- Check vertical and horizontal alignment.
- Inspect base for grade, compaction and moisture.
- Review requirements for reinforcing steel, tie bars, expansion and contraction joints.
- Check location from offset stakes.
- Be aware that proper drainage conditions are met.
- Verify proper concrete mix.
- Be aware of specified slump and air content and perform tests for compliance.
- Make test cylinders as required.
- Collect concrete delivery tickets, verify entries and initial.
- Monitor number and speed of mixing revolutions.
- Record the amount of additional water and mixing revolutions.
- Be aware of time concrete was batched and of allowable time for placement.
- Record time load is completely discharged.
- Check placement and consolidation of concrete.
- Check allowable tolerance and review finishing procedures.
- Inspect curing operations and if required, cold weather protection.
- Review backfilling procedures.
- Complete necessary daily records including item, location, mix, yield, air, slump, etc.

Job Guide for Paving Concrete

Paving Checklist

- Check paving equipment for proper adjustment and compliance with specifications.
- Become familiar with paving sequence and review field controls for line and grade.
- Base to be smooth, compacted, wetted and at proper grade and cross-slope.
- Visually check delivered concrete for load to load consistency. Make air and slump tests and cylinders as directed by the Project Engineer. Be aware of specification limits for air and slump.
- Collect, check and initial delivery tickets where required. Be aware of time of batching and time allowed for depositing concrete. Record time truck is completely discharged.
- For truck mixers, monitor number and speed of mixing revolutions.
- Verify that utility work and conduits are complete. Pre-locate utility fixtures to be poured in the pavement.
- Placement and consolidation should be a continuous uninterrupted operation. Paver should proceed as continuously as possible.
- Monitor reinforcement size, grade, lap, ties, depth and spacing.
- Monitor pavement width, thickness, crown, super-elevation, edge slump, joint match and yield.
- Check surface smoothness with “lapping” 10-foot straightedge.
- Timing of texturing and curing is important.
- Check application of curing compound for uniformity and yield.
- Be aware of cold weather protection requirements.
- Check joint sawing operation. Be aware of joint location adjustments at side streets, castings, etc. Be aware of proper timing of sawing and of appearance, depth, width and cure of sawed joints.
- Joints to be sealed as required in the contract.
- Check smoothness of surface for contract compliance with a straightedge.
- Daily records include workers, hours, equipment, air and slump reading, cylinder data, stations paved, depth, width, yield, weather, temperatures and problems encountered.

Plant Checklist

- Become familiar with concrete batching and mixing equipment and check for contract compliance.
- Obtain proper mix and appropriate batch weights.
- Check for scale certification and perform zero balance and sensitivity tests.
- Observe that all materials including admixtures are properly measured and incorporated in the mix.
- Be aware of maximum allowable water.
- Be aware of minimum and maximum mixing time. Time does not begin until all solids are in the mixer.
- If delivery tickets are required, verify entries and initial. Record batch weights on first ticket daily and when changed. Record the time that cement and water are combined on each ticket or in the plant log.
- Ensure that trucks are clean and excess cleaning water is discharged before reloading.
- Daily records include batch weights and concrete yardage.

Joint Sealing Portland Cement Concrete Pavements

- Correct sealant to meet specification requirements.
- Sealant is from an approved source or listed on the approved products list.
- Product samples are obtained.
- Backer rod is the proper size and type for hot or cold applied sealants.
- For hot-applied sealants, an indirectly heated double boiler type melter with effective agitation is being used and that the melter is in good working order.
- Melter heating system is thermostatically controlled.
- Temperature gauges have been calibrated and checked for accuracy.
- Proper size wand tips for desired application are available.
- After sawing, joints are flushed with high pressure water to remove all saw slurry and debris.
- When cleaning the joints assure the sand blaster is working properly.

- Air compressors have sufficient pressure (90 PSI).

- Air compressors are equipped with oil and moisture filters/traps that are properly functioning. Check the air stream for moisture or oil prior to use by passing the stream over a board and examining for contaminants.

- Concrete saws/blades are of sufficient size to adequately cut the required joint width and depth, and the saw is in good working order.

- Backer rod insertion tool is adjusted for correct installation depth and does not have sharp or jagged edges that could cut or abrade backer material.

- Backer rod is installed after final joint cleaning and inspection for cleanliness just prior to sealant installation.

- Backer rod is inserted uniformly without stretching into the joint to the required depth to provide the specified sealant dimensions.

- Tooling devices for finishing the sealant to the required dimensions are available.

- Sealant is filled from the bottom up to the specified level to produce a uniform surface with no voids in the sealant.

- Verify adequate adhesion, cohesion, shape and depth by pulling up several random sections of the cured sealant.

Repair of Portland Cement Concrete Pavements

- Check estimated number of repair areas with the number in the plans.

- Inspect equipment; saws and jackhammers.

- Verify that patch material is the correct type and meets specifications.

- Verify concrete design mix for full depth repair areas.

- Use vibrators to consolidate concrete.

- Verify that all floats and screeds are straight and capable of producing the desired finish.

- Verify that all reinforcement (dowels or deformed bars) meet specifications.

- Verify epoxy used meets specifications and is used as per specifications.

- Verify joint sealing operation and that it meets specifications.

- Review traffic control and assure proper signing.

- Verify that the surface of the fresh concrete patch is finished and textured to match adjacent surfaces.

Dowel-Bar Retrofit for Portland Cement Concrete Pavement

- Verify that dowel slot cementing grout meets specification requirements.
- Verify that dowel slot cementing grout is being obtained from an approved source or listed on the approved products list.
- Sample materials used as required.
- Verify that dowels, dowel bar chairs, and end caps meet specification requirements.
- Verify that dowel bars are properly coated with epoxy and free of any minor surface damage.
- Verify that curing compound meets specification requirements.
- Verify that slot sawing machine is of sufficient weight, horsepower, and configuration to cut the specified number of slots per wheelpath to the depth shown in the plans.
- Verify that removal jackhammers are limited to the maximum rated weight, usually 30 pounds.
- Verify that sand blaster unit is adjusted and working properly.
- Verify that air compressors have sufficient pressure and volume to adequately remove all dust and debris from slots.
- Verify that vibrators are working properly.
- Make required tests.
- Verify that quantities of concrete patch material being mixed are small enough to prevent premature set.
- Verify that adequate curing compound is applied immediately following finishing.

Diamond Grinding of Portland Cement Concrete Pavements

- Verify that the diamond-grinding machine meets requirements.
- Verify that the blade spacing on the diamond-grinding cutting head meets requirements.
- Verify that the vacuum assembly is in good working order.

- Verify that diamond grinding proceeds in a direction parallel with the pavement centerline.

- Verify that each application of the diamond-grinding overlaps the previous application by no more than the amount designated.

- Verify that each application of the diamond-grinding texture does not exceed the depth of the previous application.

- Verify that the transverse slope of the ground surface is uniform to the extent that no misalignments or depressions that are capable of ponding water.

- Verify on a daily basis that diamond-ground texture meets smoothness specifications.

- Verify that the grinding residue is not discharged into a waterway.

Job Guide for Plant Mix Bituminous Paving

- Check equipment for specification compliance and discuss paving and rolling sequence with the Contractor.
- Gravel base to be smooth, firmly compacted and at correct cross section, grade and alignment. Existing bituminous and concrete bases to be clean and free of loose patches. Excessive joint and crack material to be removed.
- Truck boxes to be clean and coated to prevent build-up, verify if loads are to be covered.
- Be aware of acceptable temperature range of mix. Frequently check temperature.
- Paving inspector to collect, check and initial each delivery ticket.
- Observe loads for proper size and shape, should have consistent color, complete aggregate coating and minimum of segregation.
- Paver to maintain a speed which will minimize stop and start operations.
- Paver to maintain correct line, grade and cross slope and automatic controls adjusted so as to minimize screed “bounce” or “drift”.
- Check mat width, thickness and yield.
- Construction joints to be tight and flush with adjacent surface.
- Mat should have a uniform appearance and be free of longitudinal seams.
- Rolling to be as continuous as possible and at proper speed with drive wheel nearest paver. Discuss rolling pattern with the Project Engineer and paving foreman.
- Break down rolling to be completed with mat temperature above 180º F.
- Cold roll to remove all marks and bumps.
- Monitor density tests to assure adequate compaction.
- Check surface with rolling straightedge for ride quality.
- Daily records include man hours, equipment, stations paved, course, depth, width, tonnage, yield, weather and temperature.

Chip Seal Application

- Oil is sampled and submitted for testing.
- All chips will pass gradation and are clean.
- The broom can be adjusted vertically to avoid excess pressure.
- Distributor nozzles are uniformly angled and unclogged.
- Chip spreader is calibrated.
- Gate controls work properly.
- Scalping screen is in good condition.
- Roller tire pressure comply wit manufacture recommendations and pressure is uniform from one tire to the next.
- All equipment is free of oil leaks.
- Weather conditions are right for the work.
- Maintain oil shot records and chip spread rates.
- Application starts and stops on building paper.
- Enough trucks are on hand to keep a steady supply of chips for the spreader.
- Chip spreader travels slowly enough to avoid chips rolling when they hit the surface.
- No oil is on top of the chips.
- Rollers follow closely behind the chip spreader and shall not operate at a speed in excess of 5 miles per hour.
- Truck operators avoid driving over exposed oil.
- Meet lines are made at center of road, center of lane, or edge of lane.
- Brooming shall be accomplished during the cool period of early morning per specifications.
- Traffic shall be controlled by flaggers and pilot car.

Job Guide for Base Course

- Prior to placing base, verify that grade is true to correct cross-section and alignment. Base to be free of ruts, large stones and excess dust.
- Observe loads for proper size and makeup.
- Placement should generally begin nearest source of supply. Lifts should not exceed 4" of thickness unless otherwise approved by the Engineer.
- Check depth and yield (tons per station) to assure uniform coverage.
- Material generally needs mixing by grader to eliminate segregation and hauling ruts, water to control dust and aid in obtaining compaction, and rolling to obtain density.
- Obtain compaction of each lift before placing the next lift.
- Collect, check and initial weigh ticket for each load as it arrives at site.
- Daily records include workers, hours, equipment, location, lift thickness, quantity and yield.

Truck and Scale Check

- Check for scale certification by an authorized testing agency.
- Observe and record zero balance, sensitivity, end and center test, dial scale test and comparison test at a frequency per the Project Engineer.
- Synchronize digital recorder with scale.
- Observe and record at least once daily, truck ID, number and tare.
- Daily records include to-date and daily totals, tares and scale check information.

Job Guide for Culvert Pipe Installation

- Verify size, type and length of pipe.
- Check pipe for approval stamp and inspect for any subsequent damage or defects.
- Review control stakes and adjacent terrain for proper drainage.
- Check trench for proper width and sheeting needs.
- Check bed for proper grade and compaction. Check shape of bed with template.
- Place tongue end of concrete pipe in direction of flow and lap in metal pipe so that flow is properly over the lap.
- Concrete pipe joints must be snug and liftholes plugged.
- Determine pay length while installing pipe by multiplying the number of sections by their nominal length.
- Backfill material to be free of large rocks and debris.
- Thoroughly compact each lift before placing the next lift.
- When complete, verify that pipe is in proper alignment and undamaged.
- Daily records to include trenching, placement and backfilling information, item, pay length, location, heat numbers, crew and equipment.

Job Guide for Storm Sewer Installation

- Verify size, type and length of pipe.
- Check pipe for approval stamp and inspect for any subsequent damage or defects.
- Review control stakes and adjacent terrain for proper drainage.
- Check trench for proper width and sheeting needs.
- Check bed for proper grade and compaction. Check shape of bed with template.
- Place tongue end of concrete pipe in direction of flow and lap in metal pipe so that flow is properly over the lap.
- Backfill material to be free of large rocks and debris.
- Thoroughly compact each lift before placing the next lift.
- Check for potential conflicts with existing and proposed underground utilities.
- Excavation and sewer installation should begin at the outlet of the proposed sewer and proceed upstream. If existing underground utilities are in the area, the trench excavation should normally be complete between drainage structures before beginning installation of sewer pipe.
- Joints and liftholes are to be sealed in accordance with the contract.
- Check invert elevation and alignment of each section of pipe as installed from string line or laser beam.
- Backfill material to be according to the contract.
- Generally determine pay length by measurement of storm sewer in place prior to or during backfilling. Adjust for end cut-offs after structures are in place.
- Bricks and concrete blocks to be wetted before use.
- Mortar to be 3 parts sand for mortar and 1 part cementing material.
- Check contract requirements for mortar, backplastering and curing.
- Castings to sit on full bed of mortar or to be poured integral.
- Daily records to include trenching placement and backfilling information, item pay length, location, structure numbers, crew, equipment and problems encountered.

Job Guide for Grading

- Review grading and erosion control plans.
- Inspect clearing and grubbing limits and measure quantities. Check contract for disposal of fire wood and debris.
- Monitor salvaging of topsoil to ensure proper drainage and erosion control.
- Unstable material below subgrade must be undercut and measured for final pay. Check with the Project Engineer to establish need for undercut.
- Rock at subgrade elevation to be undercut 6”.
- Masonry walls, floors and foundations, and pavement near subgrade elevation to be broken down and removed 2’ below subgrade.
- Excavation of muck to proceed from one end.
- Muck excavation measurements generally made by cross sectioning prior to backfilling.
- Large stones, rock and broken concrete to be intermixed with soil to prevent voids.
- Embankment to be placed and compacted full width in layers normally not exceeding 8”.
- Check for compaction and stability by visual observation of subgrade and embankment under earth moving equipment.
- Hauling and leveling equipment to be routed over full width of embankment.
- Water and special compacting equipment may be required.
- Throughout operations, consideration must be given to continued drainage and erosion control.
- Culverts to be “bridged” with sufficient embankment to prevent damage from hauling equipment.
- Prior to permitting hauling over structures, check with the Engineer.
- Daily records include location, type of work, workers and hours, equipment, quantities, soil types, layer thickness, relative moisture, degree of compaction, information on rutting or displacement and weather conditions.

Job Guide for Seeding, Finishing, etc.

- Topsoil to be placed on cut and fill slopes to the depth and locations designated in the plans.
- Topsoil to be relatively free of clumps, rocks, roots, etc and shall be prepared suitable for seeding.
- Check composition of delivered fertilizer and seed and verify that requirements of the contract are met.
- Fertilizer and seed to be applied at rate dependent upon composition of supplied materials.
- Fertilizer to be incorporated into topsoil just prior to or in conjunction with final disking, harrowing or raking.
- Seed to be incorporated into the upper ¼ inch of soil.
- Count, record, and dispose of empty fertilizer and seed bags daily.
- Mulching, where specified, shall follow seeding within three days. Verify that mulch material and application methods meet contract requirements.
- Areas to be sodded shall be properly prepared. Sod to consist of healthy, desirable grasses.
- All sod shall be “keyed” in, rolled or lightly tamped. If placed in ditches or on steep slopes it shall be pegged. Water as necessary.
- Check erosion control blankets for conformance with specifications. Place as required, staple in full contact, bury all edges, and restore disturbed areas.
- Final finishing includes removal of all litter and debris, repair of damaged areas, and cleaning of all drainage structures.
- Daily records include location, type of work, estimated or final quantities, and material components.

Job Guide for Structures

General

- Review field controls for horizontal and vertical alignment.
- Review utility installations and railroad company requirements.
- Check earth foundation for correct elevation and suitable bearing value.

Piling

- Check and document type, length, size, heat numbers, condition and certification.
- Check layout for correct location.
- Review driving operation for proper hammer, pile cap, cushion block, hammer operation, pile splices and bearing formula.
- Review subsurface exploration log with the Project Engineer and anticipate driving characteristics.
- Obtain minimum penetration and bearing – do not over-drive. Contact the Project Engineer if penetration varies significantly from plan.
- After driving, check placement and alignment and inspect for damage from driving.
- Record unit, pile number, penetration data, driven length, cut-off length and bearing formula.

Forms

- Check and document condition, location, alignment, elevations, dimensions and stability.

Reinforcement

- Require proper job-site storage.
- Check condition, size, steel grade, length, number, spacing, form clearance, support, bar ties, mat tie down, lap and embedment.
- Check anchor bolt and conduit placement.
- Record number, length, size and grade of bars.

Concrete Placement

- Check mix, air, slump, placement and consolidation.
- Check form alignment during pour.

- Collect concrete delivery tickets, verify entries and initial. Record any addition of water, mixing revolutions, and time truck completed discharge.
- Be aware of the time the concrete was batched and of allowable time for placement.
- Check concrete pour and consolidation.
- Check for proper curing and cold weather protection.
- Check backfill restrictions and requirements.
- Record workers, hours, equipment, pour location, volume, air, slump and test cylinder data.

Beams and Girders

- Make visual checks for in-transit and erection damage, alignment tolerances, defects and dimensional requirements.
- If not set in place on arrival, require proper jobsite storage.
- Inspect bearing devices and girder seats.
- Check in-place alignment, camber, anchor bolts and tie downs.
- Review field welding and bolting requirements.

Bridge Deck Pour

- Before beginning pour, inspect all paving, fogging and curing equipment for condition and adjustment. Perform “dry run” with finishing machinery. Check and record bar steel embedment and deck thickness. Attend pre-pour inspection conference.
- Perform items listed under “Concrete Placement” plus the following:
    - During the pour continually check and record bar steel embedment and deck thickness, also observe deflection of finishing rails and forms. Alert the Contractor if problems develop.
    - Be aware of proper vibration procedure.
    - Inspect straight edging and surface texturing.
    - Fog deck and cover with wetted burlap.
- Check curing and cold weather protection.
- Record pour location, volume, air, slump, problems encountered and make necessary cylinders.

Erosion Control

- Topsoil is to be placed on cut and fill sections to the depth and locations designated in the plans.

- Topsoil is to be relatively free of clumps, rocks roots, etc and shall be prepared suitable for seeding.

- Verify seed mixture and calibrate drill for proper application. Check fertilizer analysis and rate if called for in the plans.

- Mulching, when specified, shall follow seeding in 3 days. Verify that mulch material, rates and application methods meet contract requirements.

- Review plan details for proper installation of erosion control measures (wattles etc.).

- Daily records include pounds of seed used, tons of fertilizer and mulch used, measurement of silt fence and wattles, etc.