

## Concrete Paving Checklist

1. Upon receipt of plans and proposal.
  - A. Examine the Plans and make notes of any questions that you have. If there is a conflict Plans will govern over Standard Specifications or Supplemental Specifications.
    - i. Notes.
    - ii. Read the General Notes to determine details that are project specific and not included in the specifications that apply to concrete paving. Plan notes supersede specifications if there is a conflict.
  - b. Estimate of Quantities
    - i. Find out what quantities are for the concrete paving (doweled, non-reinforced, high early strength, fully reinforced, etc.).
  - c. Detail Sheets
    - i. Go through detail sheets and find detail sheets that pertain to concrete paving such as paving transitions, valley gutters, manhole box outs, manhole reinforcement, intersection details, driveway details, etc.
  - d. Typical Sections
    - i. Note Sta's of each proposed cross section.
    - ii. Note where each transition is.
    - iii. Insure the typical sections and transitions match up with the paving layouts.
  - e. Removal section
    - i. See what concrete pavements need to be removed.
  - f. Plan and Profile.
    - i. Check pavement widths, locations of transitions, end points of concrete paving, or any alignment changes.
  - g. Paving Layout
    - i. Note joint spacing and types of joints required on layout sheets.
    - ii. Insure doweled joints are not interlocked together. (Doweled on two different sides)
  - h. Standard Details
    - i. Review all standard detail drawings required with Concrete Paving.
      1. Longitudinal joint details, transverse contraction joint details, transverse construction joint, concrete driveway, floating manhole casting for reinforcement details, or transverse expansion joint detail.
- B. Standard Specifications.
  - a. Review Section 500 and 800 of the Standard Specifications to refresh knowledge of requirements for the work.
    - i. Section 550 covers the Description, Materials, Construction Requirements, Method of Measurement, and Basis of Payment for Portland Cement Concrete Pavement.
    - ii. Section 560 covers Description, Materials, Construction Requirements, Method of Measurement, and Basis of Payment for Recycled Portland Cement Concrete Pavement.

- iii. Section 570 covers Description, Materials, Construction Requirements, Method of Measurement, and Basis of Payment for Portland Cement Concrete Pavement Repair.
- iv. Sections 802-816 on Portland Cement Concrete and the other materials used for Concrete Paving.
- v. Review all specifications referenced within Section 500. Often another specification will be referenced within a specification to save duplication. The reference specification becomes part of the specification referencing it. Materials specifications pertaining to the work will be referenced.

C. Proposal.

- a. Look at Supplemental Specifications to be aware if any specification updates from the Standard Specifications have been made. Supplemental Specifications will govern over the Standard Specifications.
- b. Examine the proposal to find Special Provisions regarding Concrete Paving. Special Provisions are specific to the project and cover items and conditions that are not included in the Standard Specifications. Special Provisions govern over Plans, Supplemental Specifications and Standard Specifications.

D. Check the quantities of the bid items involved in the work. Plans are generally accurate but errors do happen and it is much better to find them early to avoid problems.

- a. Organize calculations to identify where materials are placed.
- b. Inlets

E. Prepare any necessary field books to document the work.

- a. Include:
  - i. Location
  - ii. Date installed
  - iii. Pay item
  - iv. Quantity (LF or SY)
  - v. Date paid
  - vi. Calculations (if needed)
- b. Each main pay item should have a field book
  - i. Can set up each sheet for mainline paving Sta to Sta. Include the date and any measurements taken to get quantity.
- c. Ask for prior year's field books and ask for past inspectors input on what to improve to make field book more complete.

F. Organize the documentation required for materials acceptance.

- a. Determine what materials are accepted by certification and which need sampling or testing.
- b. Prepare a list of materials that are accepted by certification and a testing and sampling frequency for materials that require them.
  - i. Rock
  - ii. Sand
  - iii. Concrete (High early, or normal strength concrete)

- iv. The frequency varies for testing of each of these materials. Look up each one and figure for what type of work the contractor is doing.
2. Prior to the start of Concrete Paving.
    - A. Job site
      - a. Get survey done for exact locations of offsets with elevations.
        - i. Find Sta, offset, and elevations to insure they match the plans.
        - ii. If they are different than the plans make necessary changes to the plans to insure elevations are correct for end sections and inlets.
        - iii. Check elevations of cross sections with the slope staking reports to see if changes are needed.
        - iv. Insure the contractor and the surveyors are on the same page with elevations and offsets so no confusion arises.
        - v. Double check a few points on the string line to insure elevations are correct.
      - b. Check stockpiles.
        - i. Identify type of material and location of materials needed for improvements.
        - ii. Dowel bars, baskets, and tie bars. Insure correct sizes are installed.
    - B. Supplier
      - a. Do you need materials samples from the supplier?
      - b. Do you have the required spec sheets from the supplier for materials used in the PCC?
      - c. Has the rock and sand materials passed the prior gradation tests?
      - d. Have the materials tester performed all gradations and/or concrete tests needed prior to actually placing the concrete.
      - e. Insure all needed trial batches are complete before actual paving begins.
    - C. Have surveyor install all hubs needed for Concrete Paving.
      - a. Get together with contractor and surveyor to find out what way to have surveyor stake the required improvements so the contractor can construct improvements correctly and accurately.(offsets and markings)
      - b. Check elevations and locations of hubs to make sure they match the plans.
      - c. Make sure contractor and yourself can double checks hubs to insure correct elevations are used.
      - d. Have surveyor check the grade of gravel to insure the gravel trimming elevations are correct.
    - D. Reinforcement (If used)
      - a. Insure correct diameters and lengths of reinforcement are installed.
      - b. Check to insure all reinforcement is placed correctly and accurately.
        - i. Insure all doweled baskets are installed in the correct location and secured correctly. (If automatic dowel bar inserter is used, insure the bars are getting installed correctly while paving)
        - ii. Insure tie bars are installed in the correct locations and held in place correctly.
      - c. Insure the reinforcement is within +/- 1 inch in vertical placement and +/- 3 inches in horizontal placement.
      - d. Insure all reinforcement doesn't move during the paving operation.
    - E. Depth checks
      - a. Install depth checks to get quick checks on the pavement depth while contractor is paving. (If contractor doesn't install themselves)

- i. Record these locations and check depths during the paving operation.
    - b. If contractor installs the depth checks note location and record the depths as the contractor makes the depth check during the paving operation.
  - F. Forms
    - a. Insure all forms are placed correctly and securely if used.
    - b. Make sure all necessary tie bars or dowels are placed inside the forms. (if needed along curb & gutter or another slab)
    - c. Insure all keyways are built into the forms if required.
  - G. Grade
    - a. Ensure grade is thoroughly compacted. (no soft spots)
    - b. Make sure adequate moisture is in grade. (If too dry add moisture if too wet have contractor dry grade or remove wet material and replace with dryer material)
- 3. Concrete Paving Construction
  - A. Learn standard details, notes, and plan detail sheets!
  - B. Batching concrete
    - a. Insure the batch plant has the correct mix design.
      - i. Size and batch determined.
      - ii. Mix design proportions adjusted for desired air content.
    - b. Insure all scales checked and calibrated.
      - i. Water meter checked for accuracy.
    - c. Whether by weight or volume insure that the batch plant adds all materials correctly.
    - d. Have contractor check the batching operation as directed by the engineer.
    - e. Should be constant testing and checking of moisture contents of aggregates.
  - C. Delivery
    - a. Read up on section 802.04 D of the spec book.
    - b. Insure batch trucks adequate for size of batch.
    - c. Insure there is not spillage or contamination while loading.
    - d. Insure concrete is mixed to the specifications of the job.
    - e. Don't allow water to be added to mixer truck after 60 minutes.
    - f. Insure the concrete is discharged from the truck in the allotted timeframe. (60 to 90 minutes depending on ambient air temp and type of delivery method)
  - D. Placement of Concrete
    - a. Dumped directly by trucks.
      - i. Insure trucks don't destroy grade.
      - ii. Insure the trucks have adequate ground to dump from before concrete is delivered.
      - iii. Make sure reinforcement is in place and won't be disturbed by trucks.
      - iv. Insure trucks are not blocking traffic for significant periods during dumping. (aren't backing up traffic)
    - b. Pump truck
      - i. Insure truck can reach the required locations.
      - ii. Watch out for overhead utilities (telephone or electrical wires, traffic lights, etc.)
      - iii. Insure the base plates to level the truck are on solid ground.
    - c. Concrete spreader
      - i. Used to get concrete in front of paver when reinforcement is set in place.

- ii. Insure there is enough room for spreader and concrete trucks (especially if there is any vehicle traffic in area).

#### E. Vibration

- a. Paving machine
  - i. Are all vibrators working properly?
  - ii. Is machine moving at a steady rate to avoid over vibration?
  - iii. When operator stops machine make sure he stops the vibrators.
  - iv. Insure that the machine is releasing entrapped air by looking into the machine where the vibrators are located.
  - v. To insure over vibration doesn't occur make sure the paver moves at a decent speed that correlates to the vibrator frequency.
- b. Hand pours
  - i. Ensure proper vibration is occurring by watching the internal vibrator spud release air bubbles from the concrete. (Hand held vibrator operated by laborer)
  - ii. Watch to see the area of influence from the vibration and insure the entire area receives proper vibration.
  - iii. Make sure vibrator operator doesn't drag the vibrator through the concrete (should insert and remove in each location).
  - iv. Assure the vibrator operator can keep up to the paving operation.
  - v. Ensure vibration is releasing air bubbles as concrete can have as much as 20% entrapped air.
  - vi. Make sure proper vibration occurs around any boxed our manholes or other fixtures in the roadway.

#### F. Screeding Concrete

- a. Concrete screeding is leveling and smoothing the top layer of concrete so the concrete is the same height as the forms, or guides.
- b. Insure contractor uses an adequate straight edge to screed concrete.
- c. If paving machine is used ensure machine is full of concrete and is leveling off concrete to a smooth surface.
- d. If burlap is dragged behind paving machine make sure it is damp but not soaked with water. (should not leave water bubbles after it passes)
- e. Hand screeds include: power screed, truss screed, roller screed, laser screed (all mechanical), or simple straight edge (2x4 lumber or steel/aluminum straightedge; non-mechanical).
- f. Mechanical screeds do add external surface vibration to the concrete as well (although internal spud vibrators should be used as well).
- g. If hand screeds are used insure screed is running on the forms or pavement on both sides of the screed to achieve a level surface.

#### G. Finishing Concrete

- a. Ensure contractor uses proper floating equipment to smooth out concrete.
- b. Ensure contractor does not add water to aid in finishing surface.
- c. Contractor should use a long handled float to remove any noticeable bumps and fills holes and low spots.
- d. Ensure the contractor uses proper edging tools to edge the concrete to give a nice edge so the concrete doesn't spall or tear along the edges.
- e. After surface is smoothed over texture needs to be added to the surface of the concrete.

- f. To add texture contractor should pull; burlap, turf drag, or a coarse broom over the surface of the concrete to give the required texture to aid stopping in wet weather.
  - g. The amount of texture required depends mostly on the speed in the area and if stopping is required.
- H. Curing Concrete
- a. Contractor must cure concrete shortly after texturing the concrete.
  - b. If liquid membrane is used ensure contractor covers the entire exposed area with an adequate application rate.
  - c. If forms are removed shortly after initial set a layer of curing compound should be sprayed on the newly exposed surfaces.
  - d. If wet cure is used insure contractor lays burlap down as soon as it will not damage the new concrete.
  - e. The burlap should then be misted with water immediately to ensure burlap doesn't remove moisture from the concrete.
  - f. Burlap should be kept moist for as many days as the plans specify.
  - g. Contractor needs to water burlap as many times a day as necessary to insure burlap is kept moist (all 24 hours of the day as well).
  - h. If insulation blankets are needed it is preferred to use a liquid membrane cure first then lay the insulation blankets to protect concrete from freezing.
- I. Sawing and Sealing Joints
- a. The contractor should have all joints marked so to insure adequate joint spacing and line up joints directly over dowel (if used).
  - b. All joints should be sawed to the required depth once the concrete has adequate strength to hold equipment without any damage to the concrete. (No raveling should occur)
  - c. All joints should be sawed within 24 hours to prevent uncontrolled cracking.
  - d. After sawing joints should be inspected to insure no spalling has occurred. (If spalls are greater than 1/4" in depth the spall should be corrected with an epoxy mortar patch)
  - e. Joints should then all be sealed with a silicone sealant or preformed elastomeric compression joint seal after saw cutting.
- J. Surface Tolerance
- a. After concrete has reached a sufficient strength test the pavement surface with a 10 foot straightedge.
  - b. If needed on job use a profilograph to test the profile index of the roadway.
  - c. If needed contractor needs to grind all areas that do not meet the required profile index. This is at the contractor's expense.
  - d. If used in the set of plans a unit price adjustment will be used to adjust the \$/SY of concrete installed on the project.
4. Post construction
- A. Fill out daily diary
- a. Equipment used for the work
  - b. Labor force to complete the work
  - c. What contractor completed during the day
    - i. Include all locations of where work was completed.
    - ii. Include pay items installed, with their respective quantities.
    - iii. Note any problems or delays that happened during day.
    - iv. Note any changes to plans that were required during construction.

- B. Fill out field books
  - a. Fill out each field book with dates to show what pay items were completed for the day.
  - b. Note any specs required per pay item. (date stamped, grade, tickets, type of concrete, etc.)
  - c. Note any changes in location, grade, or elevations.
- C. Fill out pay quantity report
  - a. Include location, pay item, quantity, and calculations if needed.
  - b. Note what field book is needed to find the information on the pay item.
- D. Open to traffic once the cylinder breaks have reached the required psi strength.