

Appendix 25: Conventional Concrete

Definition

A layer of concrete layed on the subgrade or with a subbase depending on traffic. The concrete is both the wearing surface and main structural element in the pavement. The concrete pavement can be either jointed, unreinforced or continuously reinforced depending on circumstances.

Application

Concrete is suitable when labour-intensive construction methods have to be used and has application for all traffic and road classes from low-volume township streets to inlays and/or overlays on freeways. Concrete is ideally suited to areas of steep grades and stop/start heavy traffic and in areas where maintenance is unlikely or desirable.

Advantages

Concrete paving has a number of advantages including:

- Lower whole life cost for comparable design
- Does not rut, shove or pothole
- Reduced maintenance
- Very low maintenance costs
- Labour friendly and therefore suitable for labour-intensive construction
- Skills acquired are not limited to road construction but are transferable to the wider building and construction industry
- Better performance in difficult areas where heavy loads and stop-start traffic are common
- Existing subgrade and alignment can be used
- Ideal for upgrading existing deteriorated roads by overlaying
- Can reduce stormwater reticulation needed
- Only simple inexpensive equipment needed
- Uses local materials
- Requires less lighting energy where streetlights are provided

Material requirements

The following materials should be used:

- Concrete aggregate should comply with the requirements of SANS 1083 and the stone size should not exceed a quarter of the slab thickness.
- Cement should be Common Cement complying with SANS 50197 and if sawcutting of joints is involved should be of Grade 42,5 or higher.
- Water should be potable water or water which has been adequately tested.
- Reinforcement, where required, maybe in the form of weldmesh or conventional reinforcing bars
- Load transfer devices such as dowels and tiebars where required.

- Curing compound or plastic sheeting for curing.
- Side forms/shutters which can be either timber or steel depending on the size of the
- project and the number of re-uses required.

Equipment

The following equipment will be necessary.

- Concrete mixer. The size will be determined by proposed production
- Wheel barrows, shovels, rakes, etc. to suit size of job.
- Transport for moving concrete from mixer to placing area. This can be by wheelbarrow, dumper, mixer trucks or tippers.
- Equipment for compaction of the concrete. This will generally consist of a poker vibrator for the edges and a vibrating screed beam or truss.
- Scraping straightedge and or bullfloat.
- Hessian or burlap to provide microtexture.
- Broom or tining rake to provide macrotexture.
- Equipment for spraying the curing compound where used.
- Saw for cutting contraction joints where used or a T-beam and plastic sheeting for wet forming of contraction joints.
- Protective tenting where necessary.

Construction

Wetting of subbase/subgrade

Regardless of the type – unbound or cemented – subbases should be wetted down sufficiently in advance of placing the concrete to ensure that the subbase is in a moist condition when concrete is placed.

Immediately before placing the concrete any excess water should be broomed off the subbase so as to ensure that the subbase is still damp but free of puddles of water.

Forms

While either steel or wood forms could be used, only steel forms should generally be permitted. The exceptions are where the project is small and relatively unimportant, or steel forms are unsuitable. All forms must be cleaned and oiled before use.



The forms shall be set up to the correct tolerances.

Reinforcement

Accurately place reinforcement and or dowels and tiebars



Batching, mixing and transporting

The materials for the concrete must be accurately batched and the concrete must be thoroughly mixed. Concrete should be transported to its final position in such a manner that it does not segregate, dry out or become contaminated. The consistence of the concrete can be checked using the slump test.



Placing concrete

The concrete should be deposited evenly and in a manner that requires a minimum amount of rehandling or redistribution. It should be placed to a sufficient loose

thickness to provide a proper surcharge for subsequent finishing operations. As a guide, concrete with a slump of about 50 mm requires a surcharge of about 15%.



Compacting concrete

All concrete should be fully compacted during and/or immediately after placing, special measures being taken to compact concrete adjacent to sideforms. The use of a vibrating beam/truss is adequate up to 150 mm in thickness but a poker must be used along joints. Both poker and beam are required over whole area where the thickness exceeds 150 mm.



Finishing, texturing and curing

Once concrete has been compacted, use a straightedge and/or bullfloat to achieve required surface regularity.



Once concrete has stiffened slightly, drag hessian/burlap longitudinally to provide

microtexture. Broom or tine surface transversely to provide macrotexture.



Apply curing compound or plastic sheeting to cure concrete.



Joints

Saw contraction joints timeously where required.

Seal joints where required.

Production

Estimate that a team of 20 labourers can place 500m²/day at 180 mm thickness.

References

1. Low-volume Concrete Roads, *Cement and Concrete Institute*
2. Concrete Intersections, *Cement and Concrete Institute*
3. Concrete Road Construction, *Cement and Concrete Institute*