

CONSTRUCTION OF WATER BOUND BASE WITH CLASS I BINDER AND SURFACE

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The flexible type of base construction is pretty well standardized but is still a good subject for lively discussion when and wherever road construction men meet.

The Kentucky Highway Department has a standard specification covering construction of flexible pavements which is, in the main, a result of many years of experience and know-how. This specification has continued to keep abreast of modern day practice and standards. If it is followed in a reasonable and intelligent manner, you can be assured of a durable pavement that will give the years of satisfactory service and fine riding qualities for which it was designed. It is, therefore, not my purpose to suggest that our standard specification be revised, amended or otherwise changed.

Now that we acknowledge a good specification, who is going to accept the responsibility of its application out on the job? The answer is, of course, the contractor with his organization and the field engineering party assigned to direct and handle the engineering supervision. It is, in general, to be taken for granted that the contractor's work will be manned by men who know the work and are willing to cooperate.

This one-sided discussion is presented in an humble effort to give air to the problems of the project engineer and his inspectors on water bound base and blacktop construction in the hope that it will start or accelerate an exchange of ideas, the reaction of which will make for better and smoother pavements for the motoring public.

It is nice and interesting work but be assured it is not smooth sailing all the way. It is loaded with headaches unless you fall in love with your work right at the very beginning — this will help a lot but is not a cure-all. A good inspector is a busy man — you don't get up in the morning to go to work. You wake up in the morning surrounded by it. Really, to get the desired results, you must belly right up against the job and stay there until completed.

Be sure to get acquainted with your contractor and his organization. Have a good understanding and come to agreement as to schedule of work, who is to be in charge, general procedure and requirements to govern. Naturally, your first construction operation would be the placing of shoulder material from a designated source.

Some thought and planning will be necessary in order that yardage be held down to actual needs — otherwise, you may end up with surplus material, especially if the source and supply are favorable to the operation. Be sure that *adequate shoulder drains are cut and maintained until it is time to fill them with crushed stone* as you progress with the base.

It is assumed that the water bound base is to be built on a previously constructed grade with traffic bound surface that has been in service for a sufficient time for the sub-grade to settle and the surface become crusty. The traffic bound road makes a very good sub-base for the water bound base construction with bituminous top if it is thick enough; say 2" to 3". There is but one way to determine this and that is to dig test holes.

Grade stakes should be driven to top of proposed base stone and will, in general, be set at 50' intervals — but under some conditions, even closer together. A good workable distance is 3' to 3.5' from pavement edge. From your grade hubs it is advisable to check the sub-grade, using string and rule as there may be some sections where the grade could be revised to better fit the existing surface.

Ahead of the insulation course a grader, equipped with scarifier attachment, must remove and level out all holes, waves and irregularities in the existing surface — otherwise, these will show up in time in the finished surface. If extra tonnage is necessary to obtain true grade and typical section, it should go into the base instead of extra material in binder and surface. Place the insulation course several hundred feet ahead of first base. Water and roll until fairly tight. Keep it maintained in good condition. Assign a beginner inspector to this work. He can stay busy if the tonnage is sizeable.

Some water bound base has been built in recent years without the use of side forms. It is my humble but decided opinion that they should be used, especially on first base course. They shall be set true to line and grade to top of loose stone, always 200 to 300 feet ahead of base operation.

Currently, contractors are using several types of mechanical spreaders, any one of which has a decided advantage over the old "tail gate" method of placing the base stone. However, I have observed good results where a grader followed closely on the "tail gate" spreading. In some instances a patrol grader has been used to good advantage along with the mechanical spreader box. Particularly where a grader is used there is a growing tendency by the contractor to remove side forms ahead of the grader. This should not be permitted ahead of the leveling and picking operation.

When the stone has been placed on a section of workable length, roll with a three-wheel ten-ton roller just enough to smooth out the surface for hand picking and leveling. The hand leveling work should be thorough for upon it much depends as to the riding qualities of the completed surface. *By all means a 10' straightedge and crown board shall be used to the complete satisfaction of the inspector.* It may help if you start out with the knowledge that it is going to be uphill business to get either of them used very much. It will help some if each is equipped with carrying handles. It is highly recommended that you also do a good eye job of seeing that waves are not permitted between 50' grade stakes or at any other point, either on one side of the road or all the way across. It is thought that the use of a string would be a great help in keeping the pavement free of long waves.

After the hand-leveling operation, roll until the stone is firmly keyed in place and until the layer of stone does not creep or wave ahead of the roller. Great care must be used in this operation for upon its thoroughness depends, to a large degree, the number of years of satisfactory service before the destructive force of "internal wear" sets in which is the beginning of the end. Too much rolling could damage the stone, but a small amount of crushing is not so objectionable if in so doing you obtain a base well keyed. The base should be re-checked if roughness or depressions show up before applying screenings.

The buckeye type of spreader box is much to be desired over the "tail gate" method currently in use on some projects for the application of screenings. You have seen a uniform section of base stone become bumpy and rough during the screening operation. This can be avoided under proper supervision and inspection in seeing that screenings are applied uniformly over the full width of surface. Spread the fines in thin layers that do not overlap each other for the full width of a section before permitting them to be rolled in. Repeat in this manner until voids are full of dust. Before adding water it will be necessary to do patching here and there. Incidentally, there is a strong inclination to cushion the screenings on top of the base stone before watering in order to avoid patching of voids that are sure to show up while sprinkling and rolling — do not tolerate this unsound practice. More screenings are added as desired when sprinkling and rolling. When the proper amount of water and screenings have been added, a wave of grout will be pushed along ahead of the broom on the roller. Back rolling and watering should continue through the second and sometimes the third day. This should result in a tight and well-bonded base that would take considerable traffic without noticeable ravel.

If the completed base is open to traffic, some maintenance will be necessary to keep the screenings evenly distributed. For this purpose a long base drag broom is highly recommended. If used properly, it will also tend to eliminate caking of screenings on outside edges, thereby reducing cost of cleaning base for prime. Before priming the water-bound base it should be swept with a power broom so that the large stones are exposed.

As we have said in substance hereinbefore, *the place to begin making plans and working for a good riding surface is at the very bottom of the base stone* — the existing traffic bound surface. If in so doing a base is constructed with good riding qualities, one should have no fear as to the smoothness and riding ease of the bituminous surface. Always providing, of course, that good equipment is manned by a competent force of workmen under proper supervision and inspection. While the quantities should be controlled on the bituminous binder and surface, you should be more concerned with the surface finish than with tonnage. Do not permit adjusting of paver screed up and down as this will cause irregular surface. It is most important that the material be delivered to the paver while still hot and workable. *Cool loads should be rejected.* Keep truck movements regular; and if the interval between loads causes a delay at the paver, it will help to cut the speed of the paver in order to reduce the waiting time with unspread material in the machine. We have a preference for sand over limestone dust in the bituminous concrete surface.

In general, I doubt if the bituminous concrete binder and surfaces are getting enough rolling. The head roller man wants to work right up against the paver and seems to think as long as the material is smoothed out in a manner pleasing to the eye that a little loafing of the roller is in order. Also, the roller operators in the rear at times seem to think the surface looks pretty good and doubt the advisability of additional rolling. I am sure we are in agreement that density is most important; and since we do run density tests of samples cut from the pavement, I am wondering if a minimum density requirement could be established with a slight penalty for low density.

It is not my purpose to discuss here the construction of Kentucky rock asphalt surface which has the finest of riding and skid resistant qualities, but I would offer for consideration the following:

(1) *That is not be laid too late in the fall to get some good hot-weather traffic.*

(2) That the roller be held back a sufficient time to permit

escape of moisture added by the steam heating method — permit no more than 1% moisture when rolled.

(3) Steaming of rock asphalt on the ground not be permitted but must be on boards or in railroad cars so as to permit draining from the bottom.

(4) The Adnun paver is not approved because of necessity it does some rolling of material as it is laid, thereby retarding evaporation.

One more passing thought about rock asphalt — it excels as a surface seal.

It is my considered opinion that we need a little better work by the contractors and our construction field parties, as well as a little closer inspection and better supervision by all of us in our construction work.

In conclusion, few things compare with the thrill of a good job well done.