Specification for Concrete Abutment.

(1) The abutments shall be built in accordance with the dimensions indicated upon the plans and drawings hereunto attached and forming part of these specifications.

(2) Concrete referred to in this specification shall be known as "fine concrete," and "rubble concrete." Unless rubble concrete is definitely specified, fine concrete shall be used.

(3) The abutments are to be erected within a substantial and well constructed framework of well fitted lumber, closely boarded up against the work as it proceeds. Care shall be taken to make a smooth regular surface, such that moisture will not find lodgment. The concrete shall be perfectly rammed into place so that all surfaces shall be smooth, without cavities, when the casing is removed. The casing shall not be removed in less than fourteen days from the completion of the work.

(4) Fine concrete shall be composed of one part by measure of Portland cement, two parts by measure of sand, and four parts by measure of broken stone. The soncrete shall be mixed in a water-tight box or platform, placed close to the work, by first spreading evenly a layer of sand; upon this shall be evenly spread the proportionate quantity of cement, and the two thoroughly mixed in a dry state. To this water shall be added, and the whole thoroughly mixed and brought to the consistency of a stiff mortar. The propor-tionate amount of stone shall then be spread evenly over the mortar, and thoroughly intermixed therewith. The concrete, when mixed as described, shall be immediately put in place, and thor-oughly pounded and rammed until it is perfectly and uniformly solid, moisture appearing on the surface.

(5) Within the body of the abutments of culverts, of not less than four foot span, but not nearer than six inches to the surface in any direction, large stones may be placed by hand in layers, to form rubble concrete. The stones shall be in "rack and pinion" order, and not less than two inches apart. Fine concrete shall be carefully inserted between the stones thus placed, and thoroughly parked and rammed so as to fill all voids. Fine concrete shall cover each layer of stones to a thick. ness of half the depth of the stones, when another layer of stones may be placed. A facing of fine concrete is at all times to be kept at least six inches higher than the rubble concrete; and shall be united with the rubble concrete so as to form a continuous and solid mass. This outer rim of fine concrete shall precede the placing of the rubble work within, and shall be placed around the interior of the casing to a height of nine inches, and a thickness of six inches. It is to be thoroughly pounded so that no cavities shall remain when the outside casing is removed. In no instance is the rubble concrete to extend higher

than one foot below the top of the abutment, which top of the abutment shall be finished with concrete.

(6) All cement employed in the work must be of a favorably known brand of Portland cement, and approved by the superintendent in charge of the work. It shall be delivered in barrels or equally tight receptacles, and after delivery must be protected from the weather by storing in a tight building, or by suitable covering. The packages shall not be laid directly on the ground, but shall be placed on boards raised a few inches from it.

(7) The stone used shall be granite, quartzite, fine-grained limestone or other equally strong and durable stone, care being taken to exclude soft limestone, friable sandstone, and stone affected by the atmosphere. It shall be br ken for fine concrete into varying sizes, the largest to pass, anyway, through a two-inch ring. The sand shall be clean, sharp, silicious, and of varying sized grain. The water used shall be clean, and care shall be taken not to use an excessive amount, the concrete when mixed and ready for the work, to have the consistency of freshly dug earth.

(8) When gravel is used in making "fine" concrete, it shall be clean, free from clay, loam or vegetable matter, nor shall it contain stones, any diameter of which exceeds two inches. It shall first be thoroughly mixed in a dry state, with Portland cement, in the proportion of six parts, by measure, of gravel, and one of cement. To this water shall be added, and the whole again thoroughly intermixed, the consistency and manner of placing in the work to be in accordance with all portions of this specification applicable thereto.

Where the gravel contains an excessive amount of sand, loam or other objection able material, it shall be screened to remove all sand and earthy matter; if necessary it shall be well flushed, the dirty water being allowed to run off. The gravel so treated may then be mixed with sand and cement, as prescribed in section four (4) of this specification.

(9) While the work is in progress, it shall be so arranged that a steady supply of mixed concrete shall pass from the mixing-box to the point where it is to be placed. At any time when the work is interrupted before its completion, or at the end of the day, a wet covering shall be placed over the last layer of concrete ; before the work of depositing the concrete is resumed, this surface shall be thoroughly flushed with water, to remove any foreign material which may have gathered thereon. No concrete shall be laid in wet or freezing weather.

"We should not have a dissatisfied agricultural population, worried by debt and harassed by care, so that any demagogue with a promising nostrum is listened to with enthusiasm and respect; we should not have the countryside suffer because of a lack of labor, and the poor in the crowded cities suffer from a lack of work." Curbing.

Curbing is not a thing of beauty, but an unfortunate necessity. It is not placed on park drives, where it would serve little purpose, but only on streets, where it is needed to define the roadway, and to protect the gutter and boulevards. Curbing has its chief uses on business streets where there is much traffic. Vehicles stand at the edge of the roadway, and without a curb the treading of horses and the cutting of wheels would do much injury. The usefulness of a curb is less on residential streets, where the use of the side of the roadway is much less than on business streets. On little used suburban streets. with a macadam or gravel roadway, where the houses are a considerable distance apart, and where there is little likelihood of the boulevard being injured by vehicles or horses, the curb may be omitted to advantage.

The materials commonly used for curbing are stone flags, about five inches thick, three feet long, and eighteen inches deep ; plank, usually cedar, attached to short posts; and concrete. Stone curbing, set, costs about forty cents per lineal foot; plank curbing about seven cents, and concrete about eighteen cents. The type of concrete curb laid at this cost is sixteen inches deep, four inches wide on top, widening to a base of eight inches. Curbs should be carefully set, the earth thoroughly tamped below and around them. If carelessly placed, they will quickly get out of line and have a far from pleasing appearance. Stone curbs are very desirable in respect of appearance, but concrete makes an exceedingly good substitute, and while the initial cost exceeds that of plank, the greater durability will make it, in a term of years, much more economical than timber.

When poor roads prevail in any section, everything else is very apt to be poor-the farmer, the horse, the merchant, the schools. Every day that the public roads are allowed to remain in a poor condition, and the streams to remain improperly. bridged, the community deals a direct and severe blow to its own interests, and the country will remain undeveloped, its hidden treasures locked up. These roads, if improved and properly engineered, with permanent bridges constructed, would give some permanence of settlement, and of contentment; they would induce new settlers to remain, the burden of tax would rest upon so many that the roads would be almost self-sustaining; the saving in horses and running gear would be enormous, and the increased loads that could be sent to market, with a decreased power for draught, would form a substantial increase to the farmer's income. In short, there are few blessings that any community can know equal to that of having first-class roads.