EXPERIMENTAL PROJECTS

PROVIDING SMOOTH RAILROAD GRADE CROSSINGS USING ASPHALT CONCRETE PAVEMENT

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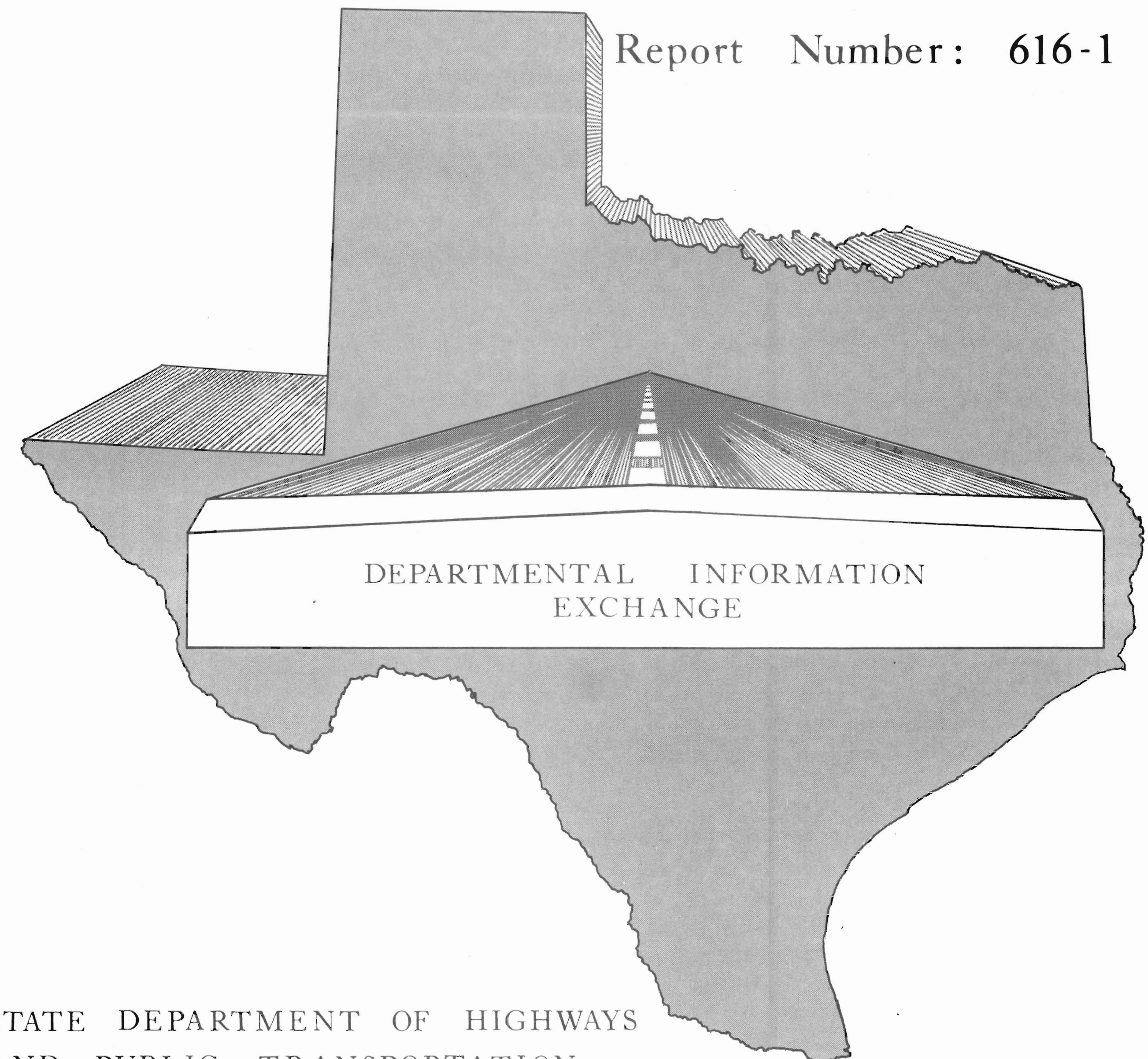

STATE DEPARTMENT OF HIGHWAYS
AND PUBLIC TRANSPORTATION

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Report 616-1

District 21
Hidalgo County, Texas

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ASPHALT CONCRETE PAVEMENT FOR RAILROAD GRADE CROSSINGS
IN DISTRICT 21

Smooth railroad grade crossings to blend with the balance of our highway system are expected by the traveling public. A rough grade crossing will cause more adverse public relations than almost any other roadway feature. District 21, with its large number of crossings, has experienced a considerable increase in timber crossing pavement failures. Some of these failures occurred within a few months after construction. Timbers would become loose, causing a rough crossing and a hazard in this area. Many times we have found loose timbers and sometimes they would be completely gone from their place in the roadway. We also noticed that, like everything else, the cost of timber crossings was increasing. The use of rubber, steel or concrete was ruled out, due to the tremendous cost.

It is well known fact that asphalt material has been used many years and many places and serves as a satisfactory crossing. In studying these asphalt crossings, it was found that in some cases, the pavement seemed to shove or move and cause a rough bump or hump in the roadway. This, we considered, was due to improper rolling and this condition could be improved with proper procedures. In talking to various empoloyees of the railroad companies that operate in this district, they offered no objections to the use of asphaltic pavement and even encouraged its use. They felt that this material would seal the crossing from moisture which, of course, causes serious problems to installations. They also preferred to have asphalt tight against the inside rail and only a small groove for the wheel of the locomotive. Many railroad employees remarked that at no time could they remember when a train derailed at an asphalt crossing; the material being of such a nature that the asphalt would shove or give even if rocks were placed in the flange or guide area. On one occasion, when a large timber came loose, we could not find a railroad maintenance crew. One of our State Maintenance crews filled this area with coldmix asphalt. This was observed for several months and was found to be in excellent condition even in high speed heavy traffic area. With our success with this instance and a request from the railroad company to repair another crossing where the timbers had failed, we were prompted to give consideration to asphaltic concrete pavement crossing.

At this time, our first crossing has been in over three years, the traffic (24 hour annual traffic is 20,000 vehicles and rail traffic is four trains, heavy freight, per day).

In March 1974, two (2) 48' timber crossings were installed. The cost of these timbers, plus installation, was $37.40 per foot. This did not include the cost for removal of the old crossing or the replacement of ballast, ties and rail. This is for labor and material for the timbers only. As a direct comparison, the cost of installing asphalt concrete pavement crossings is now running approximately $8.50 per foot. On four occasions, timber crossings in this area have shown considerable wear and/or planking came loose and jumped out in a period of three to four years. For this reason, several A.C.P. crossings have been installed and have been found to be equally as good and considerably less costly. It has been determined that some timber crossing failures were caused by rail joint being within the limits of the crossing. Therefore, all crossings replaced must have continuous rail within the limits of the crossing. In order to accomplish this, provisions for detouring traffic must be arranged so that the entire crossing may be closed. This means all highway traffic must be detoured. Sometimes it is necessary to construct a temporary detour, if a convenient one is not available. If this is not possible, then half of the crossing is worked one day and the other half the following day. Then a thermo-weld is applied to the rail joint, located in the center of the highway.

The method or procedure used for replacing a bad timber crossing is as follows: Train movement is the first consideration. A period of time during which there are no scheduled trains must be used for removing and replacing track. Provisions are then made for detouring all highway traffic. Barricades are set up and flagmen used when necessary. The railroad section crew removes the old timbers, rails and ties and the Highway Department representative then stakes the area to be excavated. If, for example, an 80' timber crossing is to be installed, the excavated area should be 82' long and 11' wide with a depth necessary to accommodate 14" of compacted cement stabilized caliche base, (in areas where a stabilized base is required) 8" of ballast, plus the tie, tie plate and rail. Normally this is approximately 36". The Highway Department backhoe and trucks are used for this excavation procedure. The proper depth is determined by grade shots with a wye level. The cement stabilized caliche is mixed at the maintenance yard and hauled to the jobsite in bobtail dump trucks. The personnel at the yard are notified when to begin mixing stabilized caliche. This is done by windrowing the required amount of caliche with the maintainer, then the three sacks per cubic yard of cement is spread by hand on the caliche. This mixture is blade mixed until uniform blending of cement with caliche is achieved and then water is added and more blade mixing is done until the entire amount has a moisture content to make a loose ball when hand pressed. This mixture is then loaded into dump trucks and hauled to the location and dumped into the excavated area. Approximately 1/2 the total amount is spread, rolled and tamped by the backhoe. Then the other 1/2 is added, rolled and tamped. Approximately 1/2 of the required amount of the ballast is placed on top of the stabilized caliche and spread with the State backhoe. The ballast may be handled two or three different ways. Sometimes it is unloaded from railroad cars and stockpiled until needed; then it is loaded by the State backhoe into State trucks, hauled and dumped as needed. In other cases, the railroad bottom-unload car is spotted at a siding near the location. When needed, the ballast is released on the ground, picked up by the State backhoe, loaded into State trucks and hauled to the location. In other cases, the ballast is unloaded along the track near the crossing from bottom-unload cars. Then when needed, the State backhoe picks it up and loads it into State trucks. It is then hauled to the construction area and dumped into the crossing. After one half of the ballast is applied, the railroad crew places all the new ties and tie plates in place. With the help of the State backhoe, two continuous rails are located in position and bolted in place with angle bars at each end. The rails are then spiked to ties by the railroad crew with hand mauls. When this phase is complete, the additional ballast is added on top of the rail and ties. Hand jacks are then placed under each rail at approximately eight tie intervals, through the entire crossing. The entire panel is then jacked to the required elevation as per instruction of the State level man. Usually, this is two to three inches above the elevation of the old crossing, but generally not exceeding two inches above the elevation of the existing roadway centerline. The ballast is then hand tamped with shovels, under and around each tie, by the railroad crews. In some cases, there is a machine tamper available for use and it performs a faster, more secure tamp job. When the tamping is completed, all jacks are removed and the ballast is leveled off flush with the top of the ties. The crews then align the new panel and rail with the existing track alignment. The maintenance yard is alerted in advance to start preparing the cement stabilized Type "D" coldmix so that it will be ready when needed. This preparation is accomplished by windrowing the required amount of coldmix with the maintainer. The three sacks of cement per cubic yard is spread by hand on the coldmix. The windrow is blade mixed until proper distribution of cement is achieved. In some cases, this material may require a small amount of water. This mixture is then loaded into dump trucks and hauled to the location. This mixture is applied directly to the ties and ballast in approximately a two inch layer and rolled parallel to the rails with a vibrating roller. Successive layers of stabilized coldmix are then applied in thicknesses not to exceed three inches and rolled in the same manner until roadway height is reached.

The final lift to bring the asphalt up to top of rail is applied and the tapered section from top of rail to existing pavement (to provide for a smooth approach) is placed at this time. A tack coat must be applied to insure a good bond. The entire area is then rolled to complete the crossing. After the railroad crews have completed the crossing, it is necessary for them to adjust or raise the adjoining tracks in each direction for a smooth rail crossing.