

## CHAPTER 1

### INTRODUCTION

#### BACKGROUND

When concrete deterioration begins to occur in highway pavement, repairs become necessary to assure the rider safety, extend its useful life and restore its riding qualities. One rehabilitation technique used to restore the pavement to acceptable highway standards is to apply a thin portland cement concrete (PCC) overlay to the existing pavement. First, any necessary repairs are made to the existing pavement, the surface is then prepared, and the PCC overlay is applied.

Brice Petrides-Donohue, Inc. (Donohue) was retained by the Iowa Department of Transportation (IDOT) to evaluate the present condition with respect to debonding of the PCC overlay at fifteen sites on Interstate 80 and State Highway 141 throughout the State of Iowa. This was accomplished by conducting an infrared thermographic and ground penetrating radar survey of these sites which were selected by the Iowa Department of Transportation. The fifteen selected sites were all two lanes wide and one-tenth of a mile long, for a total of three lane miles or 190,080 square feet. The selected sites are as follows: On Interstate 80 Eastbound, from milepost 35.25 to 35.35, milepost 36.00 to 36.10, milepost 37.00 to 37.10, milepost 38.00 to 38.10 and milepost 39.00 to 39.10, on State Highway 141 from milepost 134.00 to 134.10, milepost 134.90 to milepost 135.00, milepost 135.90 to 136.00, milepost 137.00 to 137.10 and milepost 138.00 to 138.10, and on Interstate 80 Westbound from milepost 184.00 to 184.10, milepost 185.00 to 185.10, milepost 186.00 to 186.10, milepost 187.00 to 187.10, and from milepost 188.00 to 188.10.

## PURPOSE

The purpose of this project was to evaluate the location and quantities of debonding in the selected portland cement concrete (PCC) overlays.

## SCOPE

The project entailed an infrared thermographic survey and a ground penetrating radar survey of the PCC overlays to locate areas of debonding between the overlays and the original pavement. An infrared scanner is capable of locating these areas because of the temperature differential which is established between bonded and debonded areas under certain environmental conditions. A conventional video inspection of the top surface of the pavement was also completed in conjunction with the infrared thermographic survey to record the visual condition of the pavement surface. The ground penetrating radar system is capable of locating areas of debonding by detecting return wave forms generated by changes in the dielectric properties at the PCC overlay original pavement interface.

This report consists of two parts; a text and a set of plan sheets. The text summarizes the procedures, analyses and conclusions of the investigation. The plan sheets locate specific areas of debonding, as identified through field observations.

## DEFINITIONS AND ABBREVIATIONS

The following definitions and abbreviations appear throughout the report.

- debonding - A separation of the portland cement concrete overlay from the original pavement.
- Donohue - Brice Petrides-Donohue, Inc.
- GPR - Ground Penetrating Radar
- PCC - Portland cement concrete
- Strip Chart - A graphic representation of the radar signal wave form.