READ ME FILE FOR SDNET2021: Annotated NDE dataset for Structural Defects.

The folders contain three types of non-destructive evaluation (NDE) data which are annotated using ground truth information collected from five in-service reinforced concrete bridge decks. The NDE data collected in this study are Impact Echo (IE), Ground Penetrating Radar (GPR), and Infrared Thermography (IRT). The dataset was annotated using three classes in accordance with bridge deck repair: **Class 1** No Delamination; **Class 2** Delamination (delamination above top bar mat), and **Class 3** Delamination (delamination below top bar mat).

Name of parent folder (Dataset) – Structural Defect Dataset 2021 (SDNET2021)

Name of Sub-folders- There are five (5) sub-folders with its contents described below:

- **1. Ground Truth**

This folder contains eleven (11) files: five (5) DWG cad files, and one (1) combined pdf file format. These files show the location of Class 2 and Class 3 delamination on the investigated bridge decks.

- **2. IE and GPR TEST POINTS**

This folder contains five (5) dwg CAD files showing the test points, regions, and locations for the GPR and IE test. The IE and GPR are plotted separately on the same layouts for each bridge decks. 209 GPR and 1,657 IE signals were collected for the study and shown in their respective folders. For the GPR data, the raw signals are directly annotated while the IE signals are annotated on a separate Ms excel workbook.

- **3. Impact Echo**

This folder contains two (2) sub-folders: Impact Echo Field Data and Impact Echo Annotated Data.

a) **01-Impact Echo Field Data:** This contains five (5) sub-folders.
   The five (5) sub-folders contain the raw data of the IE points collected on site for each of the bridges. Each of the 5 sub-folders contains sub-folders which contains the regions of test points A, B, C, D as appropriate. These regions (10'x10') are plotted on the deck layout and shown in the report and in the 'IE and GPR TEST POINTS' folder mentioned above. The raw data was provided for referencing its annotation which has been provided in the next sub-folder.

b) **02-Impact Echo Annotated Data:** This folder contains a Ms. Excel workbook format with name *"ND Bridge_IE_ANNOTATION"*. The workbook contains Five (5) sheets, each sheet for each of the bridges. The columns of these sheets are Bridge, Date, File Number, FileName_LVM, Origin_X_Offset_ft, Origin_Y_Offset_ft, Origin, Local_Y_ft, Data Quality (Inspector) and sub-surface delamination (Delamination Class). This file must be read along with the raw files discussed in the field data above to identify the correct annotation of each of the IE signals. An excerpt of the IE annotated data is shown in the Figure 1.

Park River Median Impact Echo Test

Bridge	Date	FileNumber	FileName_LVM	Origin_X_Offset_ft	Origin_Y_Offset_ft	Origin	Local_X_ft	Local_Y_ft	DataQuality	Sub-surface Delamination/ Removal Class
UND-PR_Median	7/6/2020	1	Metal_1.lvm	38	14	1A	0	0	GOOD	1
UND-PR_Median	7/6/2020	2	Metal_2.lvm	38	14	1A	1	0	GOOD	1
UND-PR_Median	7/6/2020	5	Metal_5.lvm	38	14	1A	2	0	GOOD	1
UND-PR_Median	7/6/2020	6	Metal_6.lvm	38	14	1A	3	0	GOOD	1
UND-PR_Median	7/6/2020	8	Metal_8.lvm	38	14	1A	4	0	GOOD	1
UND-PR_Median	7/6/2020	10	Metal_10.lvm	38	14	1A	5	0	GOOD	1
UND-PR_Median	7/6/2020	11	Metal_11.lvm	38	14	1A	6	0	GOOD	1
UND-PR_Median	7/6/2020	12	Metal_12.lvm	38	14	1A	7	0	GOOD	1
UND-PR_Median	7/6/2020	13	Metal_13.lvm	38	14	1A	8	0	GOOD	1
UND-PR_Median	7/6/2020	14	Metal_14.lvm	38	14	1A	9	0	GOOD	1
UND-PR_Median	7/6/2020	15	Metal_15.lvm	38	14	1A	10	0	GOOD	1
UND-PR_Median	7/6/2020	16	Metal_16.lvm	38	14	1A	0	1	GOOD	1
UND-PR_Median	7/6/2020	17	Metal_17.lvm	38	14	1A	1	1	GOOD	1
UND-PR_Median	7/6/2020	18	Metal_18.lvm	38	14	1A	2	1	GOOD	1
UND-PR_Median	7/6/2020	19	Metal_19.lvm	38	14	1A	3	1	GOOD	1
UND-PR_Median	7/6/2020	20	Metal_20.lvm	38	14	1A	4	1	GOOD	1
UND-PR_Median	7/6/2020	21	Metal_21.lvm	38	14	1A	5	1	GOOD	1
UND-PR_Median	7/6/2020	22	Metal_22.lvm	38	14	1A	6	1	GOOD	1
UND-PR_Median	7/6/2020	23	Metal_23.lvm	38	14	1A	7	1	GOOD	1
UND-PR_Median	7/6/2020	24	Metal_24.lvm	38	14	1A	8	1	GOOD	1
UND-PR_Median	7/6/2020	25	Metal_25.lvm	38	14	1A	9	1	GOOD	1
UND-PR_Median	7/6/2020	26	Metal_26.lvm	38	14	1A	10	1	GOOD	1
UND-PR_Median	7/6/2020	27	Metal_27.lvm	38	14	1A	0	2	GOOD	1
UND-PR_Median	7/6/2020	28	Metal_28.lvm	38	14	1A	1	2	GOOD	1
UND-PR_Median	7/6/2020	30	Metal_30.lvm	38	14	1A	2	2	GOOD	1
UND-PR_Median	7/6/2020	31	Metal_31.lvm	38	14	1A	3	2	GOOD	1
UND-PR_Median	7/6/2020	32	Metal_32.lvm	38	14	1A	4	2	GOOD	1
UND-PR_Median	7/6/2020	33	Metal_33.lvm	38	14	1A	5	2	GOOD	1
UND-PR_Median	7/6/2020	34	Metal_34.lvm	38	14	1A	6	2	GOOD	1
UND-PR_Median	7/6/2020	35	Metal_35.lvm	38	14	1A	7	2	GOOD	1
UND-PR_Median	7/6/2020	36	Metal_36.lvm	38	14	1A	8	2	GOOD	1

Sheet tabs: Park River Median_IE_Annotation · Forest River_NB_IE_Annotation · Park River_SB_IE_Annotation · Park River_NB_IE_Annotation · Forest River_SB_IE_Annotation

Figure 1. IE Annotation workbook and annotation format

- **4. GPR data**

This folder contains five (5) sub-folders of annotated GPR Data for each investigated bridge deck. Each folder contains signal data collected for each bridge deck while each file contains several hundreds and thousands of rows and columns. For instance, Figure 2 is an excerpt of file 001 (GPR signal 01) for Park River median bridge containing 16,383 amplitudes and 512 rows of time increment. The (x,y) coordinates of the signal amplitudes are shown and can be referenced with the test points in 'IE and GPR TEST POINTS' folder 2. In addition, each amplitude signal is annotated according to the class of delamination.

Figure 2.GPR Annotation for signal 01

- **5. Infrared Thermography data.**

This contains five (5) sub-folders including IRT stitched maps for each bridge. Each folder contains two (2) files each for: 'Original images' and 'Annotated images. The 'original images' is a stitched map prior to annotation while the other folders named 'Annotated images' contains pixel annotated based on the class of delamination, 1, 2 or 3 depicted by distinct color codes; Class **1**-No Delamination – (deck's greyish color), Class **2** Delamination (the green component of RGB color space is 255) and Class **3** Delamination (the red component of the RGB color space is 255). In total, there are 5 each of original and annotated IRT images in the folder.